Unified Port of San Diego

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September 11, 2012

Ms. Laurie Walsh
Mr. Wayne Chiu
San Diego Regional Water Quality Control Board
9174 Sky Park Ct., Suite 100
San Diego, CA 92123-4340

Submitted via email: lwalsh@waterboards.ca.gov and wchiu@waterboards.ca.gov

Subject: Comments on Tentative Order No. R9-2012-0011, Administrative Draft of Permit Requirements for Discharges from the Municipal Separate Storm Sewer System in the San Diego Region

Dear Ms. Walsh and Mr. Chiu,

The Port of San Diego (Port) respectfully submits this comment letter to supplement the San Diego County Municipal Copermitees (Copermitees) comments on the Administrative Draft of Permit Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) in the San Diego Region.

The Port greatly appreciates the efforts of the San Diego Regional Water Quality Control Board (Regional Board) to consider this new approach to permit reissuance by seeking early stakeholder input on an administrative draft of a new MS4 permit prior to issuing the technical draft for formal review. Moreover, we found the workshops to be extremely productive and your team to be open to receiving input and considering permit changes. We feel this process has provided an effective, efficient mechanism to engage stakeholders and receive varying perspectives in an open transparent manner. We fully believe that this process will result in an MS4 permit that Copermittees can support and implement, and which will ultimately achieve improvements in water quality.

The Port is committed to developing an effective and efficient permit. We recognized at the start of the review process that we wanted to fully utilize the opportunity to review the Administrative Draft and have open discussion with the Regional Board and other stakeholders through focus meetings. To that point, the Port devoted at least 500 staff hours over the past five months towards reviewing and developing feedback to the Administrative Draft both internally and with the other Copermittees. The Port also participated on the panel for two of the focus meetings. Through the process, the Port has gained an understanding of the Regional Board's intent of the Administrative Draft and the Board's limitations. We trust that you have heard our concerns and input, and that the ideas and comments the Copermittees have provided will be reflected in the permit. Furthermore, we were encouraged by the feedback received at the September 5, 2012 focus meeting whereby the Regional Board listed concepts of the

Administrative Draft that they planned to change. It is our understanding the list was not exhaustive.

The Port understands that the Copermittees will collectively, through the County of San Diego, submit a red-line strikeout document recommending substantial changes to the permit language. The changes help to clarify permit compliance points, provide a more efficient monitoring program to support the end goal of improving water quality, and are aligned with the Copermittee vision of incorporating adaptive management into the Permit. The Port fully supports the Copermittee recommendations as, in our opinion, the modifications clearly meet the overall objective of the Clean Water Act to restore and maintain the physical, chemical, and biological integrity of receiving waters and provide a well-designed approach that will improve water quality. We strongly encourage you to consider the proposal.

The Port also has general and specific comments on the Administrative Draft as outlined below:

- Modifications to the Receiving Water Limitations in Provision A are required to ensure the implementation of the iterative process. The Port supports revisions to the receiving water limitations language that aligns with the State Board's policy that compliance with water quality standards is "to be achieved over time, through an iterative approach requiring improved BMPs". It is our understanding that a workshop will be held at the state level to discuss the receiving water limitations language in MS4 permits. The Port strongly recommends that language developed as part of the statewide process be incorporated into the permit.

- Although the Regional Board has confirmed verbally that implementation of a Regional Board-approved Water Quality Improvement Plan (WQIP) constitutes compliance with the permit, the Administrative Draft does not reflect that idea. The Port requests that this compliance point be clearly stated.

- As proposed in the Administrative Draft, the monitoring program is very prescriptive and will not allow for efficient or best use of Copermittee resources or for adaptive management. The Copermittees are proposing an alternate monitoring program, and we understand from the discussions at the workshops that the Regional Board is open to considering the Copermittees' proposed program. While we strongly encourage you to incorporate the Copermittee proposed program in its entirety, we recognize that there may be some changes. As such, we want to emphasize the following points in regards to developing the permit's monitoring requirements:

    - Monitoring is only one part in implementing an effective program; it must be coordinated with the other programmatic implementation efforts to provide the most useful information. To be most effective, a monitoring and assessment program should be tailored to the needs of each

Watershed Management Area (WMA). As such, it will need to be part of the WQIPs and developed in alignment with the other programmatic elements.

- The Copermittees' proposed monitoring program shifts the focus of the monitoring efforts from receiving waters to MS4 outfalls. This places a greater reliance on outfall data, prioritizing sources and conducting special studies to determine how to best implement solutions that lead to water quality improvements. This paradigm shift is based on the fact that the Copermittees have a solid understanding of the large-scale receiving water problems and need to now focus on understanding sources so that pollutant load reductions can occur. The Port supports this approach, as we feel this provides the most reasonable means to identify programmatic adjustments that will improve water quality.

- The Port encourages the use of a question-driven monitoring approach. This approach is widely supported by local, state and federal regulatory agencies. It is based on a logical hierarchy in which overall management objectives help define clear management questions. Additional specific questions and assessment frameworks can help to develop appropriate monitoring designs so that meaningful data are collected. This ensures that data and resources are aligned to focus on high priority issues and solutions that can be effective.

- Jurisdictional accountability is best achieved by requiring Copermittees to participate in the WQIPs and conducting monitoring within their portion of the WMA to evaluate whether their programmatic activities are reducing pollutant loads; boundary monitoring does not accomplish this purpose. Jurisdictional boundary monitoring, similar to what is being proposed in the Administrative Draft, has been found to be relatively ineffective in estimating water quality impacts and loading from MS4 discharges. Several factors lead to this finding, 1) typically there is high variability of the constituent concentrations in receiving waters and discharges, 2) there are relatively small percentages of MS4 discharged pollutant loads in the receiving waters, 3) MS4 flows are highly variable and 4) discharges to the MS4 are highly variable. As such, the inability to detect significant differences would be unlikely to support any programmatic changes or guide improvements to water quality.

- A two-part monitoring approach to address transient and persistent non-stormwater discharges is recommended. Rather than implement an extensive MS4 outfall chemical field screening and analysis for all outfall discharges, the Copermittees propose a screening program to appropriately identify and prioritize persistent flows that impact receiving water quality. Coupled with this, a broad, visual-based monitoring program is being proposed to find and eliminate transient discharges. The Port believes that an approach of this type is cost effective and may actually lead to the elimination of a greater number of transient discharges, while at the same time providing a better understanding of those persistent outfalls that are contributing to receiving water problems.

- While Copermittees may be able to identify sources outside of their MS4, the requirement to reduce/eliminate such discharges is outside the Copermittees control. Requirements to monitor non-stormwater discharges from sources outside of a Copermittee's jurisdictional authority should be removed.

- One element of the WQIP is the numeric targets. It was understood from the discussions at the focus meetings that those numeric targets are to be goals, but are not enforceable. The Port requests that this point is clearly specified in the permit language.

- As written, numeric action levels (NALs) and stormwater action levels (SALs) are triggers for immediate follow-up action. However, during the focus meetings, the Regional Board staff clarified that the NALs/SALs were intended to be used as a mechanism to measure progress and set priorities, and were not intended to be used for determining compliance. The Port requests that this point is clearly specified in the permit language.

- As proposed in the Administrative Draft, Priority Development Projects are to implement BMPs to retain the volume of runoff equivalent to the design capture volume. Due to the Port's location at the headwaters of San Diego Bay, a high groundwater table and existing soils with low infiltration rates, retention is not technically feasible on Port tidelands. The Port is at the bottom of the watershed so consequently retained runoff must be stored for a longer period of time after the peak of a storm. Large underground storage tanks to store the runoff would be infeasible because most tanks would have significant design constraints due to the high groundwater table, flat topography, and high receiving water elevation, making gravity flow drainage systems nearly impossible. Above ground storage tanks would be infeasible because most of Port tidelands are built-out and there is limited room for these facilities. Also, above ground storage tanks pose a vector hazard and a visual nuisance.

  Similarly, the proposed offsite mitigation option discussed in the Administrative Draft also is not feasible within the Port's jurisdiction. Furthermore, mitigation outside of the Port's jurisdiction is also not feasible because the Port would not have the authority to enforce the implementation and maintenance of BMPs outside of its jurisdiction. The Port requests that the retention requirement is removed from the permit.

On behalf of the Port, I wanted to thank you for providing us the opportunity to engage with you and the other stakeholders through the public workshops, and the ability to submit comments on the administrative draft. Please contact Allison Vosskuhler at (619) 686-6434 or avosskuhler@portofsandiego.org if you have any questions or would like additional clarification on the information provided.

Sincerely,

Randa Coniglio

Randa Coniglio,
Executive Vice President, Operations
San Diego Unified Port District

cc: Paul Fanfera
Bill McMinn
Karen Holman
Allison Vosskuhler

DM#541697

Walsh, Laurie@Waterboards

From:	Julie Day <JDay@brownandwinters.com>
Sent:	Friday, September 14, 2012 3:17 PM
To:	Walsh, Laurie@Waterboards; Chiu, Wayne@Waterboards
Cc:	bmcminn@portofsandiego.org; Bill Brown
Subject:	Comments on Administrative Draft of Permit Requirements for Discharges from Municipal Separate Storm Sewer System, San Diego Region (TO No. R9--2012-2011)
Attachments:	2012-9-14_comments to water board_MS4.pdf

<<2012-9-14_comments to water board_MS4.pdf>> Dear Ms. Walsh and Mr.
Chiu:

Attached are the San Diego Unified Port District's comments regarding the subject referenced above. Thank you.

Julie Day
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The message is ready to be sent with the following file or link
attachments:

2012-9-14_comments to water board_MS4

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September 14, 2012

VIA EMAIL
lwalsh@waterboards.ca.gov
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Laurie Walsh
Wayne Chiu
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Re: Comments on the Administrative Draft of Permit Requirements for Discharges from the Municipal Separate Storm Sewer System in the San Diego Region (Tentative Order No. R9-2012-0011)

Dear Ms. Walsh and Mr. Chiu:

The San Diego Unified Port District (Port) submits the following comments supplementing other comments by the Port to the Administrative Draft of Permit Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) in the San Diego Region (the Permit). We note at the outset that the Port supports the objectives of the Permit. We wish simply to address one point regarding the current draft Permit. The Permit should clarify that each Copermittee is responsible only for discharges from that portion of the MS4 which it owns and operates, not for discharges from all MS4 facilities within that Copermittee's jurisdictional boundaries.

The Clean Water Act upon which the MS4 permit is grounded defines "copermittee" as "a permittee to an NPDES permit that is only responsible for permit conditions relating to the discharge *for which it is operator*." (40 Code of Federal Regulations §122.6(b)(1) [emphasis added].) The Regional Board's recent September 7, 2012, letter addressing its authority states that "[t]he federal regulations make it clear that Copermittees need only comply with permit conditions relating to discharges from the MS4s ***for which they are operators***." (Emphasis added, citing 40 CFR Part 122.26(a)(3)(vi).) The Port is unaware of any legal authority that equates operation with jurisdictional location. Nor is such an interpretation consistent with the common and plain meaning of the word "operate." "Operate" strongly connotes the performance of a function or exertion of physical control or power over the object being operated.

This is a potentially significant distinction for the Port. The Port's jurisdiction overlaps with the jurisdiction of a number of Copermittees. Due to this fact, a significant amount of the MS4 facilities within the Port's geographic jurisdiction are not operated by the Port, but are instead owned and/or operated by others under easements or other forms of ownership and operation. Accordingly, the Permit should include language affirming the intent of the CWA on this point.

This distinction is also not a hypothetical concern, as the Regional Board has previously construed the Port's responsibility for MS4 facilities more broadly than the plain language of the CWA allows. The Port would propose the following clarifying language, which could be placed in the cover for the Permit, just ahead of Table 2 and just following the sentence added by the Copermittees in their proposed redline version of the Permit referencing 40 CFR §122.21(a)(vi):

"The location of an MS4 facility within any Copermittee's jurisdiction boundaries does not, of itself, make the Copermittee an owner or operator of that MS4 facility."

We emphasize that the Port strongly supports the objectives of the Permit. We welcome the opportunity to respond to any questions the Regional Board may have with respect to our comments. Please contact the undersigned or Bill Brown at (760) 633-4485 if you have any questions or would like any clarification of the Port's position.

Very truly yours,

Scott E. Patterson

SEP/jd
cc: William D. McMinn, Esq.

CITY OF CHULA VISTA
Public Works Department

September 12, 2012
File # 0780-85-KY181
Via: Email and Regular Mail

California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340
Attention: Laurie Walsh

SUBJECT: COMMENTS ON THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) ORDER NO. R9-2012-0011 ADMINISTRATIVE DRAFT PERMIT FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHEDS OF THE SAN DIEGO REGION

The City of Chula Vista appreciates the opportunity to provide comments on the Draft Order No. R9-2012-0011 (NPDES General Permit No. CAS0109266). City staff has carefully reviewed the Administrative Draft Order, and has specific comments that are presented in Attachment A to this letter. In addition, the City supports the comments and proposed revisions to the draft Administrative Order submitted by the County of San Diego on behalf of the San Diego Copermittees.

We trust that the San Diego Regional Board will give full consideration to our comments and recommendations in order to facilitate continued compliance, and increase effectiveness of the MS4 Permit for the San Diego Region.

Should you have any questions or if you need further information, please call me at (619) 397-6111. Thank you.

K. Aminpour

KHOSRO AMINPOUR
SENIOR CIVIL ENGINEER

Attachment

C: Richard Hopkins, Director of Public Works
William Valle, Assistant Director of Public Works Engineering
Silvester Evetovich, Principal Civil Engineer

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ATTACHMENT A – City of Chula Vista Comments on Administrative Draft Order No. R9-2012-0011

Comment No.	Page No.	Comment
PROVISION II.B – WATER QUALITY IMPROVEMENT PLANS		
1	19-20	II.B.4 – As Monitoring and Assessment (Provision II.D) is an integral component of WQIP development, Permit language should be revised to show that these two aspects are linked. As Copermittees establish and/or update priority water quality problems within their respective WMA(s), the Monitoring and Assessment plans should be modified to be consistent with these priorities.
PROVISION II.C – ACTION LEVELS		
2	22-25	II.C.1 and II.C.2 – The Permit requires Copermittees to incorporate NALs and SALs into their WQIPs, and Tables C-1 through C-5 include specific limits for which the Copermittees are to use to direct efforts for addressing MS4 discharges to receiving waters. However, Provision II.B requires that Copermittees develop WQIPs that focus on the highest water quality priorities in a watershed. The constituents as listed in Tables C-1 through C-5 may not be the highest watershed priorities for a particular WMA, which may lead to resources being used to address pollutants that are not the highest priority. More flexibility is needed in this provision for the Copermittees to develop NALs and SALs that address the highest priority pollutants in their respective WMA(s).
PROVISION II.D – MONITORING AND ASSESSMENT REQUIREMENTS		
3	26-52	Overall – The Monitoring and Assessment Program should follow a question-driven approach, allow Copermittees to make efficient use of resources for monitoring, incorporate past monitoring data into assessment, and utilize other region-wide monitoring programs.
4	26-52	Overall – Copermittees should only be responsible for discharges within their own jurisdictions.
5	41	II.D.2.b.(6) – Dry weather HMP monitoring should be conducted along with the Copermittees' existing HMP Monitoring Program and not as duplicate efforts or added requirements.
PROVISION II.E – JURISDICTIONAL RUNOFF MANAGEMENT PROGRAMS		
6	54	II.E.2.a – 40 CFR 122.26.(d).(2).(iv).(B).(1) provides municipalities with discretion to determine if certain non-storm water discharges are sources of pollutants to waters of the United States and should be addressed. Such discharges include water line flushing, landscape irrigation, discharges from potable water sources, lawn watering, individual residential car washing, dechlorinated swimming pool discharges, etc. The Administrative Draft Permit exceeds federal regulations in requiring the Copermittees to categorically address all discharges by eliminating Copermittee discretion.

PROVISION II.E (continued)		
Comment No.	**Page No.**	**Comment**
7	57	II.E.2.b.(1) – The entire MS4 and all the locations required to be identified on the MS4 map cannot be shown on a single map of practical size. It is recommended that the MS4 map should only show the MS4. Detailed locations should be available in GIS or other mapping system and be made available to the Regional Board upon request.
8	61	II.E.3.a – Change "all development projects" to "all non-exempt development projects." An exempt-projects category should be created to include projects such as tenant improvements, traffic signals, utility work, road resurfacing, and projects similar to those exempted under the definition of Redevelopment (Attachment "C").
9	61	II.E.3.a.(1)(c) – By definition, all MS4s are waters of the state. Permanent BMPs require to be connected to drainage systems by conveyance systems that are also considered MS4s. Therefore, permanent BMPs inevitably are located within waters of the state. Please consider deleting "or waters of the state" per Order No. R9-2007-0001.
10	62	II.E.3.a.(3)(c) – After "Conservation of natural areas within the project footprint including existing trees, other vegetation, and soils" add "to the maximum extent practicable."
11	64	II.E.3.b.(1)(b) – In the second line of this Provision, change "or" to "and" so the sentence will read, "…impervious surfaces on an already developed site, **and** the redevelopment project is a…"
12	66	II.E.3.b.(3)(a) – Directing runoff from sidewalks to landscaped areas may result in localized flooding, standing water, degradation/damage to sidewalks, and excessive infiltration into electrical and other utility trenches. It is recommended to provide categorical exemption for sidewalks from SUSMP requirements, similar to Order No. R9-2007-0001.
13	66	II.E.3.b.(3)(c) – After "Impervious trails" add "or maintenance access roads."
14	66	II.E.3.c.(1) – This Provision is redundant since Provision II.E.3.a.(2) is applicable to all projects per Provision II.E.3.a.
15	66	II.E.3.(c)(2) – The requirement to retain and treat pollutants onsite eliminates the option of regional shared treatment and hydromodification control BMPs which are allowed under Provision II.E.3.a.(1)(b) on Page 61. It is recommended to delete "onsite."
16	67	II.E.3.(c)(2)(a) – This provision is redundant since Provision II.E.3.a.(3) is applicable to all projects per Provision II.E.3.a.

PROVISION II.E (continued)		
Comment No.	**Page No.**	**Comment**
17	67	II.E.3.c.(2)(b) – Examples of LID BMPs that retain runoff should be provided. Retention facilities typically include retention basins, rain barrels, or underground vaults. Can these facilities be considered LID BMPs? What should be done with the retained water in situations where soils are impermeable and there is a lack of demand for irrigation water during the rainy season?
18	67	II.E.3.c.(2)(c) – In the last paragraph, mitigation is required for the portion of the pollutant load that is not retained onsite. Guidelines should be provided to calculate pollutant loads to be mitigated and sizing of mitigation if retrofitting projects or stream and/or habitat restoration are to be used, as provided in Provision II.E.3.c.(4)(c)(ii) on Page 71.
19	67	II.E.3.(c)(2)(d) – Sizing and pollutant removal efficiency criteria have been established for <u>onsite</u> treatment control BMPs. Do these criteria also apply to <u>offsite</u> treatment control BMPs?
20	68	II.E.3.c.(3) – Compliance with hydromodification control requirements on small projects is often infeasible and inefficient. It is recommended to adopt a lower threshold of one acre of impervious area (addition or replacement) for hydromodification control compliance, in line with the San Francisco Bay Area NPDES Municipal Permit.
21	68	II.E.3.c.(3) – Considering that the San Diego HMP has many layers of conservative assumptions, comparing developed condition runoff rates with naturally occurring conditions will add another conservative layer, which may make hydromodification control BMPs infeasible for many projects or may adversely affect the integrity of downstream channels and habitat. This is particularly true for many redevelopment and infill projects.
22	68	II.E.3.c.(3)(a)(ii) – The intent of this Provision is not clear. If it is because of possible future rehabilitation of the channel to its natural condition, then the exemption in Provision II.E.3.c.(3)(d)(ii) on Page 69 should not be allowed by the same reasoning.
23	68	II.E.3.c.(3)(a)(iii) – Monitoring data from Provision II.D.2.b.(6) will not provide necessary information to re-define the range of flows causing erosion.
24	68	II.E.3.c.(3)(b) – The Permit should provide guidelines to calculate sediment loss and the methods by which sediment loss can be compensated.

PROVISION II.E (continued)		
Comment No.	**Page No.**	**Comment**
25	69	II.E.3.c.(3)(d) – The Copermittees have spent over $1M and about four years to develop the Final HMP. The current HMP includes a monitoring plan that extends for five years. Data from the monitoring plan will determine if assumptions and criteria used in the Final HMP are appropriate or not. It is not reasonable to make any changes (including exemptions) to the HMP until monitoring data are available.
26	69	II.E.3.c.(4)(a)(iii) – The Permit requires project applicants to perform mitigation with a net result of at least the same level of water quality protection. The Permit should explain how the same level of water quality protection can be assessed if retrofitting projects or stream or habitat restoration is used as mitigation.
27	71	II.E.3.c.(4).(c)(iii) – It is hardly ever possible to synchronize mitigation projects with development projects. The requirement to complete mitigation prior to occupancy eliminates this option as a practical option.
28	71	II.E.3.c.(4)(c)(iv) – Pollutant credit system has not been explained in the Permit. This mechanism should be described in the context of this permit.
29	71	II.E.3.d – The update to the Design Manual should not include an update of the Final HMP for reasons discussed in Comment No. 25.
30	73	II.E.3.c.(2)(a) – Implementation of local SUSMPs in San Diego County started on 12/12/2002. Inventories of Priority Development Projects prior to that date are not available.
31	75	II.E.4.a.(1) and (3) – This Provision will create duplication of effort and overlap of responsibilities. The State Water Resources Control Board administers the Construction General Permit and has the authority to approve SWPPPs. While the Copermittees review SWPPPs during their construction site inspections, they enforce their own local storm water and grading ordinances. Further, SWPPPs are dynamic documents that reflect daily changes to construction activities on each site. Construction methods, site layout, and daily activities are planned by contractors. Prior to approval of construction or grading permits, such information is not generally available.
32	75	II.E.4.a.(4) – This requirement is already included in other environmental regulations and its inclusion in the Permit is redundant.

PROVISION II.E (continued)		
Comment No.	**Page No.**	**Comment**
33	79	II.E.5.a – The permit should provide the option for the Copermittees to use more than one data management system (inventory) to track the required information. For example, a GIS system can be used to identify and track the names and locations of existing facilities, while another system such as a business license database or a specially developed industrial/commercial database can provide the SIC codes, WDID No. etc.
34	79	II.E.5.a – The term "all its existing development" is too general and should not be used for identifying, tracking, inspections, implementation of BMPs, etc. A more selective term should be used for the purpose of this section.
35	79	II.E.5.a.(1), E.5.a.(2), E.5.a.(8), E.5.a.(9), E.5.a.(10), E.5.a.(11), E.5.a.(12) – Activities are not developments and should not be included in this section. Many of the requirements in Provision E.5 do not apply to activities. Such requirements include developing an inventory which includes names, locations, hydrologic sub-areas, SIC Codes, NOIs, WDID Nos., etc. It may be more appropriate to describe requirements for activities under a separate provision.
36	79	II.E.5.a.(8) – Pollutants generated and potentially generated by existing facilities, areas, and/or activities can only be identified for typical land uses and not individual facilities or areas.
37	83	II.E.5.d – Inspections of all parcels, streets, open spaces, drainage systems, sewage collections systems, etc. are neither feasible nor practicable. The permit should be more specific about the existing developments requiring inspections.
38	83	II.E.5.d.(1)(a) – Changes in property ownership or pollutant generating activities are not reported to the Copermittees in real time. They are generally identified during annual inspections.
39	86	II.E.6.a.(4) – This provision requires the Copermittees to determine if each identified non-storm water discharge is in exceedance of NALs developed pursuant to Provision C.1. For this purpose, the Copermittees would have to sample and test each and every non-storm water discharge, obtain laboratory results, and report to the San Diego Water Board within three business days. Clarification is needed regarding the intent of this requirement, since having qualified persons available for taking samples at multiple locations throughout the day and obtaining laboratory results within three business days are impossible tasks.

CITY OF DANA POINT

DEPARTMENT OF PUBLIC WORKS

September 13, 2012

San Diego Regional Water Quality Control Board
9174 Sky Park Court,
Suite 100,
San Diego, CA 92123-4340
Attn: Laurie Walsh, submitted via e-mail at lwalsh@waterboards.ca.gov

Subject: Comment letter – Regional Municipal Separate Storm Sewer System (MS4) Storm Water NPDES Permit, Tentative Order No. R9-2012-0011

Dear Ms. Walsh and Regional Permit Team:

The City of Dana Point very much appreciated the opportunity to participate in the stakeholder focus meetings to help draft an effective, implementable, and practical MS4 Permit for our region (Regional Permit). The City enjoyed its participation in these meetings, meeting the San Diego Regional Water Quality Control Board (SDRWQCB) team and hearing your ideas and intent for the next iteration of the MS4 Permit while discussing some of the broad concepts and issues.

The City agrees that the Water Quality Improvement Plan (WQIP) and adaptive management approach are an improvement over the current permit and will help Copermittees to progress in their continuing efforts to manage runoff and improve water quality. The focus meeting process and transparency also infused some vigor and enthusiasm into the regulatory atmosphere. We look forward to the continued dialogue and closer working relationship with your staff so that we can work cooperatively to achieve our common goals in an efficient and effective manner.

The City worked with our Principal Permittee, the County of Orange, to develop the redline/strike out version and general comments that will be submitted on behalf of the Orange County Copermittees by the County of Orange, and support the suggestions contained therein.

It is understood that the intent of the comments submitted at this juncture are to address broad topics based on the SDRWQCB's guidance that we received during the focus workshops. Not withstanding the recognition of the benefits and the progress

that has been made of this collaborative approach to draft the Regional Permit, there is concern that the Fact Sheet has not been made available during this process. In addition, the Report of Waste Discharge (ROWD), which represents the opportunity of the Copermittees to consider and apply experiential knowledge, appears largely irrelevant by the regional permit approach to date. Therefore, it is not the intent of this submittal to provide lengthy legal and extremely detailed technical comments and the City reserves its right to comment independently or cooperatively on any specific issue(s) when the revised final complete Draft Tentative Order is released for public comment in the future.

In addition to the suggestions provided by the County of Orange, the City of Dana Point would like to emphasize the following:

1. Please strongly consider the receiving water language (as provided in the County redline / strikeout version) that supports meaningful programs, supports the historical interpretation of State Board Policy and supports an adaptive management strategy. The recent Ninth Circuit NRDC/L.A. decision has put the Copermittees into a difficult situation.

   We believe that if the Copermittees are better able to adaptively manage their programs to focus their resources on those Best Management Practice (BMP) strategies and monitoring efforts that are identified in the approved Water Quality Improvement Plan (WQIP) as being most effective to address the watersheds priorities, overall progress to improving water quality will be improved.

   Local government certainly recognizes the importance of attaining water quality standards. At the same time, however, it was recognized by your staff in Finding 19, that immediately realizing this goal at the moment of permit adoption is not possible at all times. Indeed, this reality is reflected by the many TMDLs across the State that specifically recognize that current water quality standards cannot be immediately attained and can only be addressed by regulation that supports implementation of an adaptive program over a period of time.

   We also hope that the adaptive management approach will allow for flexibility to re-focus resources for special studies and/or technology improvements where it makes sense. We have a phenomenal resource base of scientists in our local regional that we can tap into; however we need the flexibility to re-allocate or refocus resources to get some of this work done. We have been successful at removing some of our beaches from bacteria 303(d) listing and a clear imperative to address our efforts in the San Juan Creek watershed at the beach with the greatest population use, Doheny State Park Beach.

   The City of Dana Point recognizes the need to continue to make significant progress toward attainment of water quality standards. However, we also believe that no regulatory benefit accrues from the Regional Board establishing permit provisions that result in the potential of immediate non-compliance for

Copermittees. For these reasons, the City of Dana Point requests Receiving Water Limitations language, as supported by the California Stormwater Quality Association (CASQA), and as provided in the redline/ strikeout version provided by the County of Orange be incorporated in the permit. We strongly support this language because it will enable regulated entities to focus and prioritize their resources on critical water quality issues and achieve environmental outcomes that are meaningful to the communities we serve. Importantly, it will also help ensure that good faith compliance is not the subject of significant legal liability and lawsuits.

2. Additionally, and as an alternate, the City of Dana Point strongly supports the revisions shown via track changes in **Attachment A** to this letter, for Section A of the Draft Permit regarding adaptive management.

3. Regarding monitoring, please consider a less prescriptive, flexible, question-driven monitoring and assessment program that can be adapted to provide meaningful answers to our programs. We feel that the monitoring should focus on the watershed and constituents of concern. Our previous dry weather monitoring program was effective and functional and provided a diagnostic tool to support the ID/IC program requirements.

   Although perhaps ideal in an ideal world, it is not practical to take samples every quarter mile. Even a one time effort would be prohibitively expensive and lead to a plethora of unanswerable queries. We have an existing and effective process to investigate exceedances and are learning more each year as technology is advanced. The City has installed numerous Best Management Practices (BMPs), such as diversions and treatment systems, to address runoff pollution at nearly every outlet to the ocean in priority areas in order to make improvements in the short term, while we continue to address long term goals and solutions.

4. Please also strongly consider the need for reasonable, feasible and meaningful hydromodification and development requirements, based on science, practice and experience. We ask for the flexibility to be able to allow for biofiltration and regional, offsite mitigation options that will work effectively in the real world. There was consensus at the workshops that a much larger benefit may be achieved with regional programming in certain circumstances. We hope that the Hydromodification Workshop that was held on August 30 in San Diego provided some additional insight as to the challenges and unknowns that exist at this time. We hope to be able to work together to craft effective requirements, based on what is known so as to avoid going in the wrong direction, requiring large investments without correlated benefits.

We respectfully ask that the Board staff understand that we believe the implementation of this permit does in fact include some unfunded mandates. To state in the Findings that "the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this order" is misleading given the provisions of California Proposition 218. The voters have the authority. Please acknowledge this by referring to Proposition 218.

Thank you for your time, effort and investment in this stakeholder process to develop the next iteration of the MS4 Permit in our Region. If you have any questions regarding the above, please do not hesitate to contact Lisa Zawaski at 949-248-3584.

Respectfully,

Brad Fowler

Brad Fowler, P.E.
Director of Public Works & Engineering Services
City of Dana Point

cc: C. Crompton, R. Boon, County of Orange
Lisa Zawaski, City of Dana Point
Orange County Copermittees

Attachment A: Suggested Changes to Section A

ATTACHMENT A

SUGGESTED CHANGES TO SECTION A

II. PROVISIONS

THEREFORE, IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND LIMITATIONS

The purpose of this provision is to describe the conditions under which ~~storm water and~~ non-storm water discharges into ~~and from~~the MS4s are to be effectively prohibited or limited, and to describe how pollutants in discharges from the MS4, whether from storm-water or non-storm water, are to be reduced to the maximum extent practicable (MEP). The goal of this provision is to address the impacts of MS4 discharges so that such discharges do not impair water quality and designated beneficial uses of waters of the state. This goal will be accomplished through implementation of control measures that effectively prohibit non-storm water discharges into the Copermittees' MS4s, and reduce pollutants in ~~storm water~~all discharges from the Copermittees' MS4s to the MEP. The process for ~~determination of~~determining compliance with the Discharge Prohibitions (A.1), Receiving Water Limitations (A.2), and Effluent Limitations (A.~~3~~3, including effluent limitations derived from the TMDL requirements - Attachment E) is defined in Provision A.4.

1. Discharge Prohibitions

a. Except as ~~provided for in Provisions A.1.e or A.4,~~otherwise permitted herein, discharges from MS4s in a manner causing~~, or threatening to cause,~~ a condition of pollution, contamination, or nuisance in waters of the state are prohibited.

b. Non-storm water discharges into MS4s are effectively prohibited, unless such discharges are either authorized by a separate NPDES permit, or the discharge is a category of non-storm water discharges or flows that must be addressed pursuant to Provisions E.2.a.(1)-(5) of this Order.

c. Discharges from MS4s are subject to all ~~waste discharge prohibitions in the Basin Plan, included in Attachment A to this Order.~~applicable waste discharge prohibitions in the Basin Plan.

d. Storm water discharges from the City of San Diego's MS4 to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's MS4 to the Heisler Park ASBS are authorized under this Order subject to the Special Protections contained in Attachment B to State Water Board Resolution No. 2012-0012 applicable to these discharges, included in Attachment A to this Order. All other discharges from MS4s to ASBS are prohibited, unless authorized by a ~~subsequent Order~~separate order.

e. ~~For discharges associated with water body pollutant combinations addressed in a TMDL~~

~~in Attachment E of this Order, the affected Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions).~~

2. Receiving Water Limitations

a. Discharges from MS4s must not ~~have a reasonable potential to~~ cause or contribute to the violation of water quality standards in any receiving waters, including but not limited to all applicable provisions contained in the list below ~~including any modifications, unless the Regional Board determines~~, to the extent they remain in effect and are operative, unless such discharges are being addressed by the Copermittee(s) through the ~~process~~processes set forth in this Order (including Provision A.4 below and Attachment E – the TMDL Provisions):

(1) The San Diego Water Board's Basin Plan, including beneficial uses, water quality objectives, and implementation plans;

(2) State Water Board plans for water quality control including the following:

(a) Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries (Thermal Plan), and

(b) The Ocean Plan, including beneficial uses, water quality objectives, and implementation plans;

(3) State Water Board policies for water and sediment quality control including the following:

(a) Water Quality Control Policy for the Enclosed Bays and Estuaries of California,

(b) Sediment Quality Control Plan which includes the following narrative objectives for bays and estuaries:

(i) Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities, and

(ii) Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health,

(c) The Statement of Policy with Respect to Maintaining High Quality of Waters in California (State Water Board Resolution No. 68-16).

(4) Priority pollutant criteria promulgated by the USEPA through the following:

(a) National Toxics Rule (NTR)[1] (promulgated on December 22, 1992 and amended on May

[1] 40 CFR 131.36

4, 1995), and

(b) California Toxics Rule (CTR)[2,3]

~~b. For Receiving Water Limitations associated with a waterbody pollutant combination addressed in a TMDL in Attachment E of this Order, the Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions).~~

3. Effluent Limitations

a. Technology and Water Quality Based Effluent Limitations (including Effluent Limitations based on TMDLs).
Each Copermittee shall reduce pollutants in ~~stormwater~~ discharges from the MS4 to the maximum extent practicable (MEP[4]).

~~b. Water Quality Based Effluent Limitations (WQBELs)This Order establishes WQBELs consistent with the assumptions and requirements of all available TMDL waste load allocations assigned to discharges from the respective MS4s. Each Copermittee shall comply with applicable WQBELs as established for the TMDLs in Attachment E to this Order, pursuant to the applicable TMDL compliance schedules.~~ It is understood that compliance with this requirement will be achieved through the use of MEP-compliant best management practices (BMPs) or other controls that are consistent with the MEP standard.

4. Compliance with Discharge Prohibitions, Receiving Water Limitations, and Effluent Limitations

a. Each Copermittee must comply with the discharge prohibitions (A.1), receiving water limitations (A.2), and effluent limitations (A.~~3~~3, including effluent limitations developed based on TMDLs) of this Order through timely implementation of strategies, control measures and other actions as specified in Provisions B and E, and Attachment E (TMDLs) of this Order~~, including any modifications~~. The Water Quality Improvement Plans described in Provision B shall be designed to achieve compliance to the MEP standard with the discharge prohibitions, receiving water limitations, and all effluent limitations. If the ~~Regional Board~~Executive Officer approves ~~the~~a Water Quality Improvement ~~Plans~~Plan and subsequent updates as described in Provision B and F.1, and ~~the Regional Board Executive Officer determines they are~~ the plan is being implemented in a timely and good faith manner ~~that provides reasonable assurance of attaining the prohibitions and limitations~~

[2] 65 Federal Register 31682-31719 (May 18, 2000), adding Section 131.38 to 40 CFR

[3] If a water quality objective and a CTR criterion are in effect for the same priority pollutant, the more stringent of the two applies, unless a previous regulatory action (i.e., TMDL) has specified otherwise.

[4] This requirement does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in ~~storm water~~ discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment must occur prior to the discharge of runoff into receiving waters per Finding ~~8.~~**Error! Reference source not found.**.

~~described above through acceptance of the annual reports required by Provision F.3.b, such determination constitutes~~, such implementation of the plan shall constitute compliance with Provisions A.1, A.2, and A.3.

~~1. Except as provided in Parts A.4.3, A,4,4, and A.4.5 below, discharges from the MS4 for which a Permittee is responsible shall not have reasonable potential to cause or contribute to an exceedance of any applicable water quality standard.~~

~~2. Except as provided in Parts A.4.3, A,4,4, and A.4.5, discharges from the MS4 of storm water, or non-storm water, for which a Permittee is responsible, shall not cause a condition of nuisance.~~

.

~~3.~~ b. In instances where discharges from the MS4 for which the permittee is responsible ~~(1)~~, causes or contributes to an exceedance of any applicable water quality standard or effluent limitation, or causes a condition of nuisance in the receiving water; ~~(2) the receiving water is not subject to an approved TMDL that is in effect for the constituent(s) involved; and (3)~~and the ~~constituent~~pollutant(s) associated with the discharge is otherwise not specifically addressed by a provision of this Order (such as specific scheduled actions in a Water Quality Improvement Plan), the Permittee shall comply with the following iterative procedure:

~~a.~~ 1. Submit a report to the ~~State or Regional Water Board (as applicable)~~Executive Officer that:

i. Summarizes and evaluates water quality data associated with the pollutant of concern in the context of the applicable water quality ~~objectives~~objective, discharge prohibition or effluent limitation including the magnitude and frequency of the exceedances.

ii. Includes a work plan to identify the sources of the constituents of concern (including those not associated with the MS4 such that non-MS4s sources can be pursued).

iii. Describes the strategy and schedule for implementing ~~best management practices (BMPs)~~MEP-compliant BMPs and other MEP-compliant controls (including those that are currently being implemented) that will address the Permittee's sources of constituents that are causing or contributing to the exceedances of any applicable water quality standard, discharge prohibition or effluent limitation, or causing a condition of nuisance, and are reflective of the severity of the exceedances. The strategy shall demonstrate that the selection of BMPs will address the Permittee's sources of constituents and include a mechanism for tracking BMP implementation. The strategy shall provide for future refinement pending the results of the source identification work plan noted ~~in A.4.3. ii~~ above.

iv. Outlines, if necessary, additional monitoring to evaluate improvement in water quality and, if appropriate, special studies that will be undertaken to support future management decisions.

v. Includes a methodology(ies) that will assess the effectiveness of the BMPs to address the exceedances.

vi. This report may be submitted in conjunction with the Annual Report unless the ~~State or Regional Water Board~~Executive Officer directs an earlier submittal.

~~b.~~ 2. Submit any modifications to the report that are required by the ~~State of Regional Water Board~~Executive Officer and that are consistent with the MEP standard within 60 days of notification from the Executive Officer. The report is deemed approved within 60 days of its submission if no response is received from the ~~State or Regional Water Board~~Executive Officer.

~~c.~~ 3. Implement the actions specified in the report in accordance with the acceptance or approval of the Executive Officer, including the implementation schedule ~~and any modifications to this Order~~.

.

~~d. As long as the Permittee has complied~~c. Compliance with the procedure set forth above for the subject pollutant or pollutants shall constitute compliance with the applicable discharge prohibition, receiving water limitation or effluent limitation (including the applicable TMDL) in issue, and ~~is implementing the actions,~~ the Permittee does not have to repeat the same procedure for continuing or recurring exceedances ~~of the same receiving water limitations unless directed by the State Water Board or the Regional Water Board to develop additional BMPs.~~

~~4. For Receiving Water Limitations associated with waterbody-pollutant combinations addressed in an adopted TMDL that is in effect and that has been incorporated in this Order, the Permittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions) of this Order. For Receiving Water Limitations associated with waterbody-pollutant combinations on the CWA 303(d) list, which are not otherwise addressed by an applicable pollutant-specific provision of this Order, the Permittees shall achieve compliance as outlined in Part A.4.3 of this Order.~~

~~5. If a Permittee is found to have discharges from its MS4 causing or contributing to an exceedance of any applicable water quality standard or causing a condition of nuisance in the receiving water, the Permittee shall be deemed in compliance with Parts A.4.1 and A.4.2 above, unless it fails to implement the requirements provided in Parts A.4.3 and A.4.4 or as otherwise covered by a provision of this order specifically addressing the constituent in question, as applicable.~~

2.

The information developed pursuant to A.~~4.3~~4.b must be incorporated into the Water Quality Improvement Plans and/or the jurisdictional runoff management programs, as needed.

Walsh, Laurie@Waterboards

From: Cheryl Filar <Cfilar@ci.escondido.ca.us>
Sent: Thursday, September 13, 2012 5:20 PM
To: Walsh, Laurie@Waterboards
Cc: Christopher W. McKinney; Cynthia Mallett (CMallett@ci.oceanside.ca.us); Cheryl Filar; Jeff Warner
Subject: City of Escondido Comments on Tentative Order No. R9-2012-0011
Attachments: SLRExcusionRequest.pdf; slrmap.pdf; SLRemailsupport.pdf

Laurie,

Please find enclosed the City of Escondido's comments (and two attachments) on the proposed 2012 Administrative Draft Municipal Separate Storm Sewer (MS4) Permit.

Thank you for considering our comments.

Cheryl Filar
Environmental Programs Manager
City of Escondido
Utilities Department
201 N Broadway
Escondido, CA 92025

760-839-6315
760-291-7254 (cell)

760-839-4668 (Stormwater Hotline)

ESCONDIDO
City of Choice

Christopher W. McKinney
Director of Utilities
201 N. Broadway, Escondido, CA 92025
Phone: 760-839-4662 Fax: 760-839-4651

September 13, 2012

Ms. Laurie Walsh
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Re: CITY OF ESCONDIDO COPERMITTEE COMMENT SUBMITTAL ON THE ADMINISTRATIVE DRAFT MUNICIPAL SEPARATE STORM SEWER (MS4) PERMIT (TENTATIVE ORDER NO. R9-2012-0011)

Dear Ms. Walsh:

Thank you for the opportunity to comment on the Administrative Draft Municipal Separate Storm Sewer (MS4) Permit that is proposed to cover portions of San Diego County, Orange County, and Riverside County (Tentative Order No. R9-2012-0011). Although the City generally concurs with those comments that are provided as part of the San Diego Copermittees' submission, we do have a particular comment and request to make regarding our inclusion in the San Luis Rey (SLR) Watershed as part of the proposed 2012 draft permit.

During the 2007 draft permit issuance process, the City successfully applied for a waiver from participation/inclusion in the San Luis Rey (SLR) Watershed based on our minimal geographic representation in it. Escondido's 2008 JURMP submittal includes the following language that documents the approved rationale for our non-membership in the SLR Watershed:

1.4.1 San Luis Rey Watershed

Approximately 53 acres of the City are located within the San Luis Rey Watershed, which is associated with Daley Ranch, an open-space preserve that will remain undeveloped in perpetuity. This area occupies only 0.014 percent of the San Luis Rey Watershed and is far removed from any tributary that would convey runoff into San Luis Rey River. Because of this extremely low runoff contribution to the San Luis Rey Watershed, the City of Escondido is not included as a member agency in the management of this watershed. Therefore, for the purposes of assessing and controlling potential pollutants in runoff within watershed areas, the City focuses on the Carlsbad and San Dieguito River watersheds, which make up the majority of the City's jurisdiction.

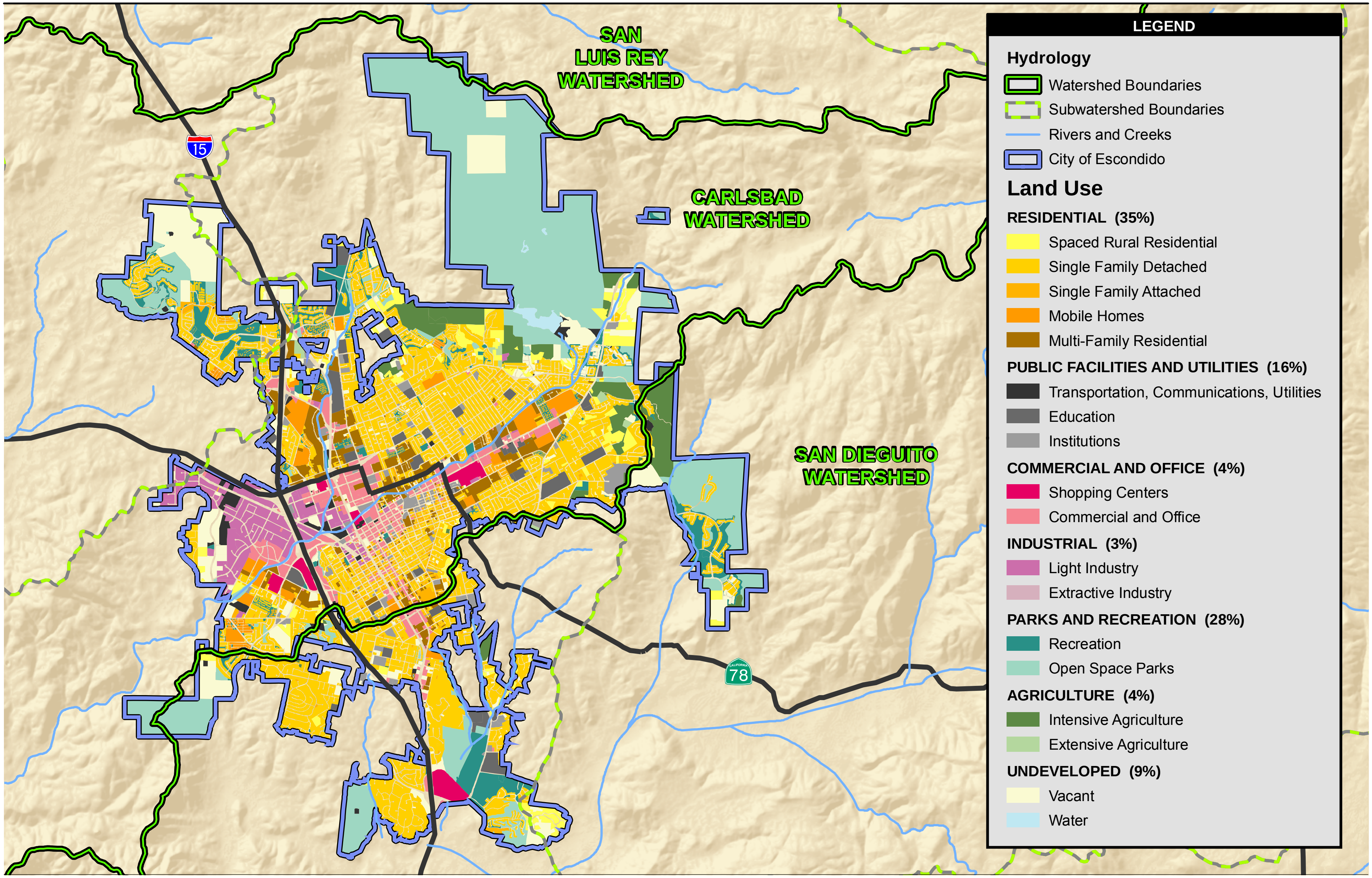
The attached map provides a visual depiction of our continuing minimal and undeveloped footprint in the SLR Watershed. In addition, I have attached an email from the City of Oceanside, the lead for the SLR Watershed, which supports Escondido's continued exclusion.

The City of Escondido appreciates your consideration of this matter and looks forward to working with the Regional Board to further improve water quality in our region.

Sincerely,

Cheryl Filar
Environmental Programs Manager

cc: Christopher W. McKinney, Director of Utilities
Cynthia Mallett, Environmental Specialist, City of Oceanside



Source: USGS 2000; SANDAG 2010; California Interagency Watershed Mapping Committee 2004; City of Escondido 2009

1.8 0.9 0 1.8 Miles

Scale: 1 = 114,000; 1 inch = 1.8 miles

Figure 1-2
Land Use Designations

Cheryl Filar

From: Cynthia Mallett <CMallett@ci.oceanside.ca.us>
Sent: Wednesday, September 12, 2012 3:12 PM
To: Cheryl Filar
Cc: Paul Hartman (phartman@cityofvista.com); Scott Norris (scott.norris@sdcounty.ca.gov); Mo Lahsaiezadeh; Alison Witheridge
Subject: Exclude Escondido from SLR Watershed

Hi Cheryl,

I received your email regarding exclusion from the SLR Watershed in the draft administrative Stormwater Permit. I discussed this internally with Oceanside staff and we are fine with the exclusion. The City of Vista and the County of San Diego are fine with this exclusion as well. Also, in the San Diego County Copermittee comments to the RWQCB on the Draft Administrative Permit, Escondido is not included in table B-1 for the San Luis Rey Watershed Management Area.

Let me know if you have any questions.

Thank you,

Cynthia Mallett
Environmental Specialist
Oceanside Clean Water Program
760-435-5807
Urban Runoff Hotline
760-435-5800

CALIFORNIA
NATIONAL CITY
1887
INCORPORATED

Via email: lwalsh@waterboards.ca.gov

September 13, 2012

Laurie Walsh, P.E.
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Re: Comments on Administrative Draft MS4 NPDES Permit

Dear Ms. Walsh:

The City of National City (City) appreciates the opportunity to comment on the San Diego Regional Water Quality Control Board (Regional Board) Regional Municipal Separate Storm Sewer (MS4) Storm Water NPDES Permit (Tentative Order No. R9-2012-0011, hereafter "Administrative Draft"). In particular, the City would like to thank the Regional Board for the opportunity to participate in open focused meetings along with other stakeholders. These meetings have been helpful in helping the various stakeholders to better understand each others' positions, and, we believe, to reach consensus on some, although not all, issues.

City representatives have been actively involved in San Diego County Copermittee preparations for the focused meetings and in the process of developing a set of written comments on the Administrative Draft. The City is in general agreement with the Copermittee group comments that are being submitted to the Regional Board and therefore, for the sake of simplicity, is not submitting a separate group of comments at this time. We look forward to continuing to work with you and the rest of the staff at the Regional Board as this permit reissuance process goes forward.

Sincerely,

Stephen Manganiello
City Engineer

Walsh, Laurie@Waterboards

From:	Peck Pool Services <bill@peckpool.com>
Sent:	Thursday, September 13, 2012 2:18 AM
To:	Walsh, Laurie@Waterboards
Cc:	joe.sunpools@yahoo.com
Subject:	NPDES Draft Permit (Order #R9-2012-0011) comment on a proposed additional rule

The purpose of this letter is to comment on a possible proposed rule addition to the NPDES Draft Permit (Order #R-9-2012-0011). On page 56 (4) (c) this document addresses "Dechlorinated swimming pool discharges". It has come to my attention that a "non-profit coastal group" is planning to propose an additional rule to require residents to use the services of an onsite reverse osmosis filtering company rather than drain their pool into either the MS4 or sanitary sewer. While water conservation is commendable, the scope and purpose of the NPDES is not water conservation but rather the elimination of pollutants entering the MS4. Therefore this proposed rule does not belong in this Permit. In addition, it should be noted that most swimming pool water in the Region covered by this Permit was on its way to the ocean when it was diverted for use in swimming pools, and when discharged (in compliance with the Permit) it finishes this journey. Therefore the water itself is not creating a burden upon the receiving waters (the Pacific Ocean).

If any clarification of this comment is needed please feel free to e-mail me or call me at 858-735-2565.

Respectfully submitted,

Bill Peck, owner, Wm. Peck Pool Services, San Diego, CA

Walsh, Laurie@Waterboards

From: Uhley, Jason <JUHLEY@rcflood.org>
Sent: Thursday, September 13, 2012 6:30 PM
To: Walsh, Laurie@Waterboards
Cc: robert_collacott@urscorp.com; Padres, Claudio
Subject: Riverside County MS4 Permittee Comments regarding Regional MS4 Permit
Attachments: sep 13 Riv Co Regional Permit Comments.pdf

Laurie,

Please find enclosed a copy of our comments regarding the Regional Permit. An original wet-signed version will follow in the mail.

Please let me know if you have any questions or comments.

Regards,

Jason Uhley
Chief of Watershed Protection
Riverside County Flood Control and Water Conservation District
1995 Market Street
Riverside, CA 92501
951.955.1273

September 14, 2012

Ms. Laurie Walsh
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4340

Dear Ms. Walsh:

Re: Administrative Draft Order R9-2012-0011, NPDES No. CAS 0109266 and Waste Discharge Requirements for MS4s Draining the Watersheds within the San Diego Region

The Riverside County Flood Control and Water Conservation District (District) is submitting this comment letter on the above listed Administrative Draft Order, on behalf of the Riverside County MS4 Permittees within the San Diego Region (Riverside County Permittees) which includes the District, the County of Riverside and the Cities of Murrieta, Temecula and Wildomar. Administrative Draft Order R9-2012-0011 (Administrative Draft) was drafted by Board staff to cover Phase I municipal separate storm sewer system (MS4) permittees in San Diego County, Southern Orange County, and the portion of southwestern Riverside County referred to as the Santa Margarita Region. Although the Administrative Draft will initially only apply to the San Diego County MS4 permittees, Provision F.5.a mandates that it will apply to the Riverside County Permittees on expiration of their existing Santa Margarita Region MS4 permit in 2015, unless early enrollment is granted prior to Provision F.6. Since the Administrative Draft purports to cover the activities of the Riverside County Permittees, this letter, developed in consultation with the Riverside County Permittees, reflects those Permittees' most critical concerns. The Board's careful consideration of these critical concerns will be appreciated.

In the workshop on the Administrative Draft Order on April 22nd Regional Board staff identified the following desired outcomes of the Administrative Draft:

- Improving the quality of water discharged from the MS4
- Restoring or enhancing beneficial uses and receiving water quality

It was further identified by Board staff that to be able to meet those goals, the proposed regional MS4 permit needed to be 1) Strategic, 2) Adaptive, and 3) Synergistic.

While the Riverside Copermittees still have questions regarding the legal authority to issue this regional MS4 permit to Copermittees within the three counties, the Copermittees agree that being able to adapt and direct resources toward specific water quality priorities in a given watershed, rather than all-potential problems simultaneously, is more likely to result in actual / meaningful improvements in water quality. However, to be able to achieve those improvements the MS4 Permit must be written to allow the Copermittees to truly and fully adaptively manage their programs to focus their resources on those BMP strategies and monitoring efforts that are identified as being most effective, consistent with the MEP standard, at addressing the watershed's priorities.

Unfortunately, the prescriptive provisions and the receiving water limitations presented in the Administrative Draft are not supportive of achieving those outcomes, as it currently does not allow the Copermittees to be strategic with the use of their resources, nor to adapt their programs to focus on the highest priority water quality needs of the watershed. This comment letter identifies the fundamental issues which, if resolved, will address these limitations and facilitate the desired improvements. Among other issues, there needs to be a greater emphasis on the ***integration*** of the Monitoring, Water Quality Improvement Plans, and Jurisdictional Runoff Management Plans, which may require key elements of the Administrative Draft and, in particular, the proposed monitoring and jurisdictional requirements, to be simplified to provide the needed flexibility for effective implementation of an integrated adaptive management approach.

1 BACKGROUND

The Riverside County Permittees were issued an extensive and prescriptive MS4 Permit in November 2010 (2010 MS4 Permit) which greatly expanded monitoring obligations, required special studies, jurisdictional runoff management program, and watershed workplan requirements. Development and implementation of the 2010 MS4 Permit compliance requirements has been unduly expensive relative to the size, resources, and known beneficial use impairments in the Santa Margarita Region, and the demonstrated benefits of the mandated compliance requirements. These requirements have left other important societal needs unfulfilled by the Riverside County Permittees during a period of unprecedented and continuing economic distress. The Riverside County Permittees are still in the process of developing and implementing these requirements which is a concern given the different approach proposed in the Administrative Draft.

While the Riverside County Permittees have long sought a more flexible, adaptive, and outcome-oriented MS4 permit, the extraordinarily prescriptive compliance and monitoring mandates in the 2010 MS4 Permit have significantly limited the Riverside County Permittees' ability to participate in the focused meetings and to provide detailed comments on the Administrative Draft.

The Riverside County Permittees appreciate that Board staff were have been seeking MS4 permittee input during the focused meetings on the Administrative Draft. Unfortunately, the Riverside County Permittees were effectively precluded from participation in the first two focused meetings, due to the need to meet compliance deadlines set forth in the 2010 MS4 Permit issued by the San Diego Water Board just 18 months earlier. The Riverside County Permittees notified the Regional Board staff of these requirements both verbally and in written correspondence on multiple instances prior to the first focused meeting and stated that, without relief from the 2010 MS4 Permit requirements, the Riverside County Permittees could not attend the first two focused meetings. Nonetheless, Regional Board staff decided to proceed with those first two meetings without participation of the Riverside County Permittees, due to self-imposed goals for the adoption of this regional MS4 permit. Our ability to fully prepare for and participate in the second two focused meetings, and additionally to provide these written comments, continues to be constrained by the demands of developing and rolling out of additional compliance documents mandated in the 2010 MS4 Permit.

However, as the public noticing documents indicated, these comments on the Administrative Draft are considered to be informal and will not be responded to by staff. However, in an apparent contradiction, Regional Board staff has made other comments at focused meetings suggesting that a significant proportion of changes to the proposed regional MS4 permit will be made in response to comments on the Administrative Draft, and that proportionally fewer changes are expected based on (not yet submitted) comments on the (not yet drafted) Tentative Order. Under the Clean Water Act and California law, all interested persons, including the Riverside County Permittees, must be provided the full opportunity to review and comment upon the

Tentative Order, which will represent the actual proposed regional MS4 permit. To not give full consideration to address and respond to all comments on the Tentative Order, including the projected MS4 Permittees in the Santa Margarita Region, would be an abuse of discretion by the Regional Board. Not only should Regional Board staff provide full consideration of all comments on the Tentative Order, but Regional Board staff should have no pre-established expectation or limitation on the amount or scale of changes that will be considered as appropriate on the Tentative Order.

Further, due to the public policy significance of the shift to a regional permitting approach, a series of workshops in front of the Regional Board Members should, and are requested to be scheduled following release of the Tentative Order. Conducting such workshops for the Regional Board Members is critical to allow them to be fully informed of, and hear first-hand the issues from a variety of perspectives, before being asked by Regional Board staff to adopt a regional MS4 permit.

While the Riverside County Permittees appreciate this opportunity to comment on the Administrative Draft, we anticipate providing additional, and perhaps more significant, comments on the Tentative Order. As noted above, our opportunity to review, evaluate, participate in focused meetings on, and develop comments on the Administrative Draft has been significantly constrained by mandates to comply with the 2010 MS4 Permit. Moreover, the Riverside County Permittees reserve the right to make additional or different comments on the Tentative Order from those made on the Administrative Draft, including potentially on similar sections of the permits, as well as to submit redline comments and other exhibits. The provision of comments on the Administrative Draft does not, in any way, preempt the ability of the Riverside County Permittees to collectively or individually make comments on the Tentative Order, and any such comments should be fully considered at that time as part of the formal proceedings.

2 GENERAL COMMENTS

2.1 Authority to Require Regional Permit

Letters were sent by the Orange County and Riverside County Counsels' Offices to the State Water Board's Office of Chief Counsel in May, requesting the views of that office on the legal authority of the Regional Board to issue a single regional MS4 permit covering these three counties, across a number of separate watersheds, with no interconnected MS4, and for which no Report of Waste Discharge (ROWD) had been issued. The Office of Chief Counsel only provided a response to these letters a few days ago, several months after the original letters were sent. While we have reviewed their response, we believe that the response may not have fully considered the entirety of the Clean Water Act regulations regarding jurisdictions that can be regulated on a single permit. The Riverside County Permittees plan to address the Office of Chief Counsel letter separately.

While the Riverside County Permittees continue to reserve the right to contest inclusion in any regional MS4 permit, and wish to state that the submission of comments or participation in focused meetings regarding the Administrative Draft represents no waiver of such reservation, the Riverside County Permittees concur that they may voluntarily agree to enter into such a regional MS4 permit. While the participation of the Riverside County Permittees in focused meetings and workshops should not be construed as any agreement to voluntarily enter into a regional MS4 permit, they remain open to the concept of such a regional MS4 permit, depending on its terms.

2.2 Increase Flexibility to Account for Local Conditions

The Santa Margarita Region has distinctly different hydrology, soils, topography, climate, and water quality concerns than those found in Orange and San Diego Counties. These differences are significant and warrant MS4 permit provisions that are sufficiently flexible to account for them. In addition, the Riverside County Permittees are making significant resource and staff investments in developing and implementing compliance programs for the 2010 MS4 Permit, and are concerned that the inclusion of highly prescriptive requirements in the Administrative Draft, may unnecessarily conflict with the programs developed. If the Regional Board intends to adopt a tri-county regional MS4 permit, these factors must not be ignored or dismissed by Regional Board staff in the development of the Tentative Order, and need to be addressed by giving full consideration to, and not dismissing, each of the comments provided by the Riverside County Permittees.

2.3 Adaptive Management

The Riverside County Permittees are supportive of the adaptive management approach verbally advocated by the Regional Board staff; however the adaptive management approach proposed in the Administrative Draft will require modification to be feasible.

The Administrative Draft does not currently allow true/full adaptive management, and as such will not enable the MS4 Permittees to focus and prioritize their efforts and resources toward obtaining those improvements. The Administrative Draft also proposes an extraordinarily expansive monitoring data collection exercise that is not justified by water quality needs and potential benefits, and certainly not by the coniditons found in the Santa Margarita Region. This absence of flexibility and mandated commitment of resources to implement the monitoring program would severely restrict the ability of the Riverside County Permittee’s flexibility to redirect resources to address priority water quality concerns.
Recommendation

Effective implementation of an adaptive management approach requires broad compliance and budgetary flexibility to allow the Riverside County Permittees to focus their resources on those BMP strategies and monitoring efforts that are identified in the approved WQIP as being most effective, consistent with the MEP standard, to address the watersheds priorities. A figure entitled “Example Process for Integrated Adaptive Management Process” which illustrates the adaptive management process supported by the Riverside County Permittees is attached to this letter.

The Riverside County Permittees have attached a figure entitled “Example Process for Integrated Adaptive Management Process” wich illustrates the type of adaptive management process supported by the Permittees. Following is a narrative summary of the attached figure. Although Orange and San Diego Counties may be including similar figures in their comments, differences underscore the need to collaborate in the development of an effective adaptive management approach, including development of functional definitions of “adaptive management” and “iterative approach” as related to the implementation of compliance programs:

- WQIP:

The WQIP should be the primary driver for decisions regarding what programs should be implemented, and the relative scale and resources dedicated to those programs. To provide structure, predictability, and enforceability to that decision process, the WQIP should empower the MS4 Permittees to:

- Identify the highest water quality priorities that are affected by discharges from the MS4;
- Develop jurisdictional and regional BMP strategies, and identify monitoring and assessment efforts, which will be most effective at addressing the watershed's highest water quality priorities affected by discharges from the MS4;
- Develop an assessment system, including monitoring, to measure progress, and identify and control pollutant sources, etc;
- The Water Quality Improvement Plan (and the BMP strategies and Monitoring and Assessment Plans (MAP) therein), should be adaptively managed every five years (addressed in the ROWD), and as/if needed in between; and
- Each MS4 Copermittee should then be held accountable to implement its respective responsibilities as laid-out and scheduled within the WQIP, thereby constituting compliance with the proposed regional MS4 permit.

- *JRMP and Monitoring:*
  - There should not be an expectation (or requirement) that the JRMP and/or the Monitoring programs are separately adaptively managed outside the WQIP process. These plans/programs should be iteratively managed on an ongoing, as-needed basis, provided that WQIP commitments are met. For example, if the WQIP specifies a target for inspections of a particular existing development management area of every three months, a Copermittee should be able to change its internal inspection processes, inspection forms, etc. at any time, provided that the inspections still occur every three months. As illustrated in the attached figure, maintenance of baseline programs (e.g., IC/ID, public education, and others) will continue to be included. However, those baseline programs will be evaluated and revised to tailor to the specific needs of each watershed area and will likely result in changes from the programs described in the existing MS4 permits.
  - The JRMP and monitoring program requirements should be described in the regional MS4 permit as a "menu" of options, recognizing that the WQIP – which will be publically vetted and approved by the Regional Board - will specify those jurisdictional and regional activities that will be implemented to address that watershed's priorities, the appropriate frequencies, performance standards and other compliance elements. This Permit language must recognize that not all compliance requirements specified in the Administrative Draft may be required to appropriately manage high water quality priorities; otherwise if everything is still required all the time, the Copermittees' will NOT be able to focus their resources, and the desired outcomes will likely not be achieved.

2.4 Legal Authority

First, the Legal Authority Establishment and Enforcement provisions, E.1, must be modified to reflect the requirements of law. First, the requirement to address illicit discharges as written is much broader than the requirements of the federal regulations, which require MS4 permittees only to "effectively prohibit through ordinance, order or similar means, illicit discharges to the municipal separate sewer." 40 CFR § 122.26(d)(2)(i)()B). The permit should reflect this language, and should not include any goals or requirements to 'eliminate' or 'prevent' illegal discharges.

Second, the requirement to control discharges from industrial and construction activity should not include the responsibility to control sites covered by general stormwater permits, as that responsibility is that of the Regional Board and fees for the inspection of those facilities are already collected by the State.

Third, the regulations do not require interagency agreements between non-MS4 dischargers and third parties such as Native American tribes, Caltrans or the federal government, but only among MS4 permittees. The Regional Board has authority and responsibility under the Porter Cologne Water Quality Act to regulate discharges from other non-MS4 sources, and that responsibility cannot be transferred to the MS4 permittees. The MS4 copermittees can certainly work cooperatively with such third parties on a voluntary basis.

2.5 “Ensuring” Compliance

Provision E.4.d of the Administrative Draft requires MS4 permittees to conduct inspections of construction sites to “ensure” compliance with various requirements. Such terminology can be read as a requirement to ‘guarantee’ compliance. The MS4 permittees are not required under federal law to “ensure” (or guarantee) the compliance of third parties, and cannot in fact do so. These provisions should be modified to require that the MS4 permittees “confirm” that requirements are being met, and to conduct enforcement within their jurisdictional authority, where necessary, to prompt the party to come into compliance.

Additionally, the use of the term “ensure” can be found in other provisions in the Administrative Draft, and the Riverside County Permittees object to those usages as well. In particular, we note that the term is used in Provision E.3.e. (Priority Development Project BMP Impact and Oversight), E.4.a. (Construction Management Project Approval Process), E.5.d. (Existing Development inspections) and in the definition of Jurisdictional Runoff Management Program in the Glossary, which requires that JRMPs “ensure” that pollutants in MS4 discharges are reduced to the MEP. In all these cases, and elsewhere in the Administrative Draft where there is a requirement to “ensure” or otherwise guarantee compliance, the Riverside County Permittees request alternative language, such as “confirm,” which reflects the iterative process of compliance, one which reflects the real world impossibility of ‘ensuring’ compliance.

2.6 Fiscal Analysis

Provision E.8.A. requires that “Each Copermittee must secure the resources necessary to meet all the requirements of this Order.” This requirement is objectionable on several grounds. First, it exceeds the requirements of federal law or regulation. The MS4 regulations require *only* that MS4 permittees submit a “fiscal analysis” of the resources required to accomplish MS4 permit program activities, including a description of the sources of funds. 40 CFR § 122.26(d)(2)(vi). Second, this requirement ignores the real world limitations facing MS4 permittees in attempting to find funding to conduct the programs required under MS4 permits and ignores the economic conditions faced by the Riverside County Permittees. Third, neither the Clean Water Act nor the Porter-Cologne Water Quality Act give the Regional Board budget authority over municipalities or flood control districts. Thus, there is no legal authority for this provision. It should be deleted and replaced with language reflecting the requirements of the MS4 regulations, which are cited above.

2.7 Purpose of Clean Water Act

Throughout the Administrative Draft, it is stated that that the goal of various provisions of the Administrative Draft is to protect, preserve, enhance or restore water quality or designated beneficial uses of waters of the state. It is true that the Clean Water Act has as its basic goal to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” 33 U.S.C. § 1251(a) Congress, however, translated that goal for MS4 operators (which does not call for “enhancement” of those waters) in the provisions of Section 402(p)(3)(B), which require that MS4 operators “effectively prohibit” non-stormwater discharges into the MS4s and to “require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." 33 U.S.C. § 1342()(3)(B) Thus, the two Congressional requirements for MS4 operators in the Clean Water Act for MS4 Permits are (1) effective prohibition of non-stormwater discharges into the MS4 and (2) the control of pollutants discharged from the MS4, of whatever source, to the maximum extent practicable ("MEP").

Accordingly, Congress' intent was not to place the entire burden of achieving the goals of the Clean Water Act in a watershed upon owners/operators of the MS4, nor that the attainment of water quality standards or beneficial uses should be expressed as the 'goal' of an NPDES MS4 permit. The USEPA, the State Board and the Regional Boards regulate many other potentially significant sources of pollutants, including from industrial dischargers, publicly owned treatment works, federal and tribal sources and agricultural runoff, sources that are beyond the control of the MS4 owners/operators. It is through the combined and proper regulation – by the USEPA, State and Regional Boards, of each of those sources that the goals of the overall Clean Water Act can be met.

[Additionally, while the Water Board has the authority, under the Porter-Cologne Water Quality Act, to adopt requirements in a waste discharge requirement, that adoption requires the Regional Board to follow the requirements of state law, including those set forth in Water Code § 13263(a), and, without limitation, the requirements of Water Code § 13241. The Administrative Draft does not set forth that such requirements have been complied with, as was required by both state law and the California Supreme Court in *City of Burbank v. State Water Resources Control Board* (2005) 35 Cal. 4th 613, 625.]

2.8 Attempted Transfer of Regional Board Responsibilities

Under the Porter-Cologne Water Quality Act, the Legislature delegated primary responsibility for managing waters of the state to the Regional Boards. This includes developing and implementing multi-discharger watershed management approaches if/where necessary, including directly regulating all sources of pollutants in a watershed. Although MS4 dischargers are only one of those potential sources of pollutants, in several sections the Administrative Draft inappropriately attempts to transfer the entire responsibility and burden of watershed planning and attainment or restoration of beneficial uses to the MS4 Permittees, in the form of MS4 permit requirements and, to that extent, is thus inconsistent with this legislative mandate. These responsibilities include proposed requirements for the MS4 Permittees to singlehandedly take the lead in developing watershed plans, conducting receiving water monitoring; conducting special studies, controlling and regulating non-MS4 pollutant sources, and implementing retrofit and stream rehabilitation projects, each with the goal of restoring or rehabilitating beneficial uses in receiving waters. However, in adopting the Porter-Cologne Water Quality Act, the Legislature determined that the Regional Boards, not the MS4 Permittees (i.e., general purpose governments and flood control districts), are the most appropriate entities to implement such efforts. The Riverside County Permittees have demonstrated their commitment to *participate in* watershed management planning and to implement compliance programs that are focused obn addressing the watershed's highest water quality priorities specifically related to MS4 discharges to the extent of their authorities. However, the Riverside Copermittees are not willing to usurp what is otherwise the responsibility of the Regional Board, and to unilaterally pay for activities, such as previously mentioned, that which should be accomplished via the combined resources and proper regulation of all sources, including non-MS4 sources.

The Administrative Draft also attempts to assign all responsibility and liability for funding programs for improving receiving water quality and attaining water quality objectives in receiving waters on the MS4 dischargers. Development and implementation of water quality improvement plans, receiving water monitoring, and monitoring of non-MS4 sources of pollutants must be supported by all of the entities responsible for these pollutant sources. These other sources include Phase II facilities, sites permitted under the General Construction and Industrial Stormwater Permits, federal and state facilities (including Caltrans), agricultural sources, POTWs, purveyors of reclaimed water, and NPDES and waste discharge requirement dischargers otherwise authorized by the Regional Board. The requirement in the Administrative Draft for the MS4 permittees to fully fund the development and implementation of watershed improvement plans would constitute an attempted transfer of local public resources to support the activities of these other public and private entities. If the Regional Board's desired objective is to implement a watershed approach rather than a discharger-based approach, the Regional Board must require all dischargers and sources in the watershed to participate in jointly funding the watershed planning efforts.

Recommendation

If the Regional Board endeavors to accomplish the broader goals of the Clean Water Act, the proper means would be to focus existing Regional Board staff and resources on proper proactive regulation and permitting of all source categories, and bringing those sources together to implement the desired watershed and Basin Planning. All requirements or implications that any element of the MS4 permittees' programs should to singlehandedly take on or lead those responsibilities, or meet those broader Clean Water Act goals, must be removed in the Tentative Order.

In assigning responsibility for basin planning to the Regional Boards, the Legislature authorized the Regional Boards to issue permits and other mandates and to require funding of compliance requirements. The Riverside County Permittees request that the Regional Board retain its legislatively-mandated leadership role in basin planning and require that all sources of pollutants participate in funding monitoring, planning, compliance and other water quality management activities and that requirements which focus that effort only on MS4 permittees be removed from the Tentative Order. The approach described in the federal regulations for development and implementation of Total Maximum Daily loads is a possible model of such an inclusive process.

2.9 Update of Basin Plan

For outcome-based permitting to be successful, the desired outcomes must be achievable by the discharging entity and take into account the background conditions in the watershed (see previous comments about setting desired goals or outcomes at the broader Clean Water Act goals). The Basin Plan should be updated prior to adoption of a regional permit to identify realistic water quality standards which take into account data reflecting local conditions, not just a literature search.

Recommendation

The Riverside County Permittees support a comprehensive evaluation of the Basin Plan for the Santa Margarita River watershed to determine if water quality standards need adjustment to properly reflect localconditions. With the move to outcome based permitting, such an update is necessary to ensure that limited local resources are focused on solving real environmental problems. Such an update should be led by and adequately funded by the Regional Board with participation by the MS4 permittees and other dischargers and sources in the watershed.

2.10 Use of "including but not limited to" Language

Throughout the Administrative Draft, the wording "including but not limited to" is used to define various requirements. This language is impermissibly vague and ambiguous, and potentially leaves the MS4 permittees open to liability for permit violations due to their alleged failure to guess at additional requirements. The MS4 permittees must have certainty in the requirements of the MS4 Permit so that they can plan their compliance activities. The MS4 Permittees cannot be forced to guess at what additional, unstated requirements may be in the minds of Regional Board staff or citizen plaintiffs. The terms of the MS4 Permit are read like a contract. *Northwest Environmental Advocates v. City of Portland*, 56 F.3d 979, 982 (9th Cir. 1995). A provision requiring a MS4 permittee to perform "including but not limited to" certain identified tasks leaves the MS4 permittee with no certainty that performance of the identified tasks is enough for compliance. This basic uncertainty renders the MS4 permit vague and unenforceable and subject to abuse.

This or similar language can be found in the Administrative Draft at the following places:

A.2.a; B.2.a.6; B.2.c.4; B.5.a.1; B.5.b.1; E.3.c.4.(b); E.3.d.1; E.3.f.4.(a)(4); E.5.c.4.(a); F.3.b.1.(d); Attachment B, General Provision 2.g.2; Attachment B, General Provision j.1; Glossary, definition of "construction site."

The Riverside County Permittees object wherever this or similar language is found in the Administrative Draft, whether or not identified above.

Recommendation

The proposed MS4 permit can require that minimum steps be followed; if such steps are followed; however, the permittee is in compliance, though the permittee could voluntarily elect to follow additional steps

3 SPECIFIC CONCERNS

The following comments represent specific high level concerns that the Riverside Copermittees have identified at this time. It does not represent a comprehensive set of comments on all issues with the Administrative Draft.

3.1 Findings

The Riverside County Permittees have two separate sets of comments on the Findings set forth in the Administrative Draft. The first addresses the failure of the draft to include findings on important aspects of California law as well as the physical setting of the Santa Margarita Region. The second addresses issues raised by specific Findings that were included in the Administrative Draft.

3.1.1 Needed Additional Findings

The Administrative Draft fails to fully address the context and conditions under which the proposed regional MS4 permit requirements are to be applied. A more complete explanation of this background is necessary to ensure that the provisions ultimately included in the Tentative Order are credible and appropriate, and legally required, and that the provisions (which should stem from the Findings) are written in context of the broader issues that affect MS4. The Riverside County Permittees request that the Regional Board work with the MS4 permittees to expand the Findings, including the addition of findings to address the following:

- California Water Law – This body of law requires that downstream entities must accept runoff from upgradient properties. Owners and operators of MS4s are not exempt from this legal mandate, even if that runoff contains pollutants. A Finding which describes this mandate is fundamental to properly frame the role of the MS4 permittees, the difficulties in managing runoff from the MS4, and in turn provide the context for the requirements proposed within the MS4 permit.
- Porter-Cologne Water Quality Act – This legislation establishes the State Water Resources Control Board and the Regional Water Quality Control Boards, not the MS4 permittees, are the primary governmental entities responsible for adequately regulating sources of pollutants to meet beneficial uses in receiving waters in California. Please see discussion above.
- Flooding – Many areas that would be under the jurisdiction of a proposed regional MS4 Permit are subject to periodic catastrophic flooding resulting from natural conditions. This flooding exists even in the absence of development. Such flooding has and will result in loss of life, widespread property damage, and exposes runoff to significant amounts of pollutants from industrial, commercial, residential and agricultural land uses, thus damaging watercourses, habitat and the beneficial uses therein. Further, flooding can mobilize significant volumes of pollutants that can have significant and permanent detrimental effects. MS4 systems are designed and constructed to mitigate these impacts. A Finding describing these conditions is necessary to provide a context for the role of drainage system improvements in the management of flood waters and receiving water quality.
- Flood Control District Acts – The Legislature adopted separate acts to establish Flood Control Districts in Orange, Riverside, and San Diego Counties. In these Acts, the Legislature has determined that protection of life and property from the effects of flooding through the implementation of flood control improvements is a priority, and has assigned those Districts with the sole responsibility for the identification of necessary flood hazard mitigation efforts, and the construction and maintenance of those improvements that are necessary to manage and contain flood waters to prevent such negative impacts. These improvements are not only critical to the protection of life and property, but they represent fundamental water quality BMPs inasmuch as they reduce the widespread exposure of runoff to pollutants. Additionally, the Flood Control Districts, while being owners and operators of MS4s, have no authorities or powers beyond those granted by the Legislature in their Acts. The Legislature did not provide the districts authority to control the quality of runoff received by their MS4 facilities. Additionally, the Districts lack authority to govern land use activities since they are not municipal entities. Findings describing the legislative priority for flood control and the limitations on the governing power of the Flood Control Districts are necessary to provide context for the role of flood control improvements relative to water quality priorities and to provide context for the appropriate role of the Flood Control Districts as MS4 permittees.
- Limits of Permittee Legal Authority - The MS4 permittees lack the authority to regulate many of the categories of sources of pollutants that may impact surface receiving waters. For example, the Permittees lack authority to regulate pollutants discharged from federal and state lands and facilities, tribal lands, special districts, utilities, agriculture, and railroads. The Federal Insecticide, Fungicide, and Rodentcide Act (FIFRA) precludes local regulation of pesticides. In some instances, the Regional Board has authority to regulate these sources. A Finding(s) describing these limitations is necessary to provide context for properly assigning responsibilities to the MS4 permittees.

3.1.2 Findings 3, 4 and 16

Findings 3 and 4 of the Administrative Draft erroneously state that the Clean Water Act requires controls to reduce the discharge of pollutants "in storm water" to the MEP. Finding 16 states that non-storm water discharges from the MS4 are "not considered storm water discharges and therefore are not subject to the MEP standard, arguing that the MEP standard "is explicitly for 'Municipal . . . Stormwater Discharges" from the MS4s.

In fact, the plain language of the Clean Water Act is silent as to the nature of the waters discharged from MS4s which must be controlled to the MEP standard. See 33 U.S.C. § 1342(p)(3)(B)(iii). While the heading of 33 U.S.C. § 1342(p) refers to "Municipal and industrial stormwater discharges," this is not dispositive, as 33 U.S.C. § 1342(p)(3)(B)(ii) in fact refers specifically to "non-stormwater" discharges. Also, USEPA, in the preamble to the final stormwater regulations, made it clear that "MEP control measures" would be implemented to address not only pollutants in "storm water" but also from "non-storm water discharges."
As the preamble states:

> "Permittees are required to develop management programs for four types of pollutant sources which discharge to large and medium municipal storm sewer systems. Discharges from [such systems] are usually expected to be composed primarily of: (1) Runoff from commercial and residential areas; (2) storm water runoff from industrial areas; (3) runoff from construction sites; and (4) non-storm water discharges. Part 2 of the permit application has been designed to allow [permittees] the opportunity to propose MEP control measures for each of these components of the discharge."
> 55 Fed. Reg. at 48052. (emphasis supplied)

This language sets forth USEPA's understanding of the plain language of the Clean Water Act: "pollutants" must be controlled to the MEP from the MS4 "discharge," not merely pollutants in stormwater.

3.1.3 Finding 27

This finding purports to find that the regional MS4 permit proposed in the Administrative Draft does not constitute an unfunded state mandate. The Riverside County Permittees take issue with the subsections set forth in this finding. More importantly, the finding is without legal effect because exclusive jurisdiction as to whether a state mandate exists lies with the Commission on State Mandates. Government Code §§ 17751 and 17552; *Lucia Mar Unified School District v. Honig* (1988) 44 Cal.3d 830, 837; *Hayes v. Commission on State Mandates* (1992) 11 Cal.App.4th 1546, 1596-97. The finding of an agency that has no jurisdiction to make that finding is entitled to no weight. This finding should be deleted.

3.1.4 Finding 29

The Riverside County Permittees believe that the receiving water limitation language set forth in the Administrative Draft renders compliance with the regional MS4 permit proposed in the Administrative Draft impossible, since exceedances of water quality standards may occur routinely through no fault of the MS4 Permittees. Please see discussion regarding Provision A, below. Moreover, this same language, as recently interpreted by the United States Court of Appeals for the Ninth Circuit in *Natural Resources Defense Council v. County of Los Angeles*, 673 F.3d 880 (9th Cir. 2011), *cert. granted*, ___ U.S. ___ (2012), renders any "iterative process" to comply with water quality standards or other requirements superfluous, since the Ninth Circuit ruled that the prohibitions against discharges that exceed water quality standards or create condition of nuisance must be read, and enforced, separately from the iterative process otherwise set forth in the MS4 permit. 673 F.3d at 892. The Riverside County Permittees view the exposure to third party litigation from the Receiving Waters Limitations language, highlighted by the *NRDC* case, to be one of the most significant detriments to the otherwise collaborative effort to design a regional MS4 permit that utilizes an iterative approach to achieve long term water quality improvement.

3.2 Provision A, Prohibitions and Limitations

As noted above, the requirements set forth in Provision A are of great concern to the Riverside County Permittees, especially in light of the recent *NRDC* decision by the Ninth Circuit. The Riverside County Permittees note that the State Water Board has proposed a workshop scheduled for November 20, 2012, in which the concerns of stakeholders regarding the current Receiving Water Limitations language (which is reflected in the Administrative Draft) and how it has been interpreted by the Ninth Circuit, will be addressed. Additionally, the Riverside County Permittees have reviewed comments submitted by South Orange County permittees on Provision A and believe that this approach may have merit.

The Riverside County Permittees generally support an approach to compliance that utilizes Water Quality Improvement Plans (WQIP). Additionally, the Riverside County Permittees have reviewed comments submitted by South Orange County permittees on Provision A and believe that this approach has merit in addressing the problems raised by the *NRDC* decision. However, the Permittees wish to note a concern that the basic benefit of the WQIP aproach, its prioritization of resources and effort to address the greatest threats to water quality, not be lost if the MS4 Permittees must develop 'additional BMP strategies' and 'schedules for implementation' for every exceedance of a water quality standard or other receiving water limitation that is not identified as a high priority for the watershed.

Recommendation

The Riverside County Permittees request that the Regional Board revise Provision A in a manner that ensures that a true iterative process be employed with respect to the Receiving Water Limitations language and further request that no Tentative Order version of Provision A be released until after the State Water Board has considered this issue.

In the absence of a revised precedential order from the State Water Board, the Riverside County Permittees further request that the Regional Board consider the alternative language being submitted by stakeholders on the Administrative Draft intended to address the loss of the iterative process originally set forth in State Board Order Nos. 99-05 and 2001-0015. *In particular*, to facilitate successful implementation of an Adaptive Management process, Provision A should not require that every exceedance to become a 'de-facto' high priority water quality concern outside of the WQIP prioritization process.

3.2.1 Provision A, Introduction (page 9)

The Riverside County Permittees have the following comments on this paragraph. First, the provision sets forth a goal that includes the enhancement and restoration of water quality and designated beneficial uses. Please see comments above regarding how Congress determined to implement the goals of the Clean Water Act through permits for MS4 dischargers. Second, the provision states that the MS4 permit will implement control measures that effectively prohibit non-storm water discharges "into and from the Copermittees' MS4." The Clean Water Act requires only the effective prohibition of non-stormwater discharges *into* the MS4. 33 U.S.C. § 1342(p)(3)(B)(ii). Third, the provision notes the pollutants "in storm water discharges" from the MS4 must be controlled to the MEP. As discussed above, the Clean Water Act does not differentiate between storm water and non-stormwater discharges from the MS4. Moreover, as noted above, these provisions do not acknowledge the fact that California water law requires that upstream runoff must be accepted, without exception as to the quality of the runoff. To manage the quality of MS4 discharges, the MS4 Permittees will necessarily rely on the proactive efforts to control discharges and sources not under their control.

3.2.2 Provision A.1.a (page 9)

The Riverside County Permittees have two comments. First, the provision prohibits "discharges into MS4s." Such discharges are not the responsibility of the MS4 operators but rather third party dischargers, and thus are beyond the scope of the MS4 permit. Second, the provision prohibiting discharges which are "threatening to cause" a condition of pollution, etc. is unenforceable, because it prohibits an action that, with respect to MS4 operators, is beyond their control. Also, there is no authority for such provisions in waste discharge requirements.

3.2.3 Provision A.1.b (page 9)

This provision in the Administrative Draft attempts to prohibit non-stormwater discharges "from" MS4s." As noted above, such discharges are subject to the MEP standard, not the "effective prohibition" standard. The "effective prohibition" standard in the Clean Water Act refers only to discharges of non-stormwater "into" MS4s. Also, the Clean Water Act requires that discharges of non-stormwater *into* the MS4 must be "effectively prohibited," so the word "effectively" should be added to this subsection.

3.2.4 Provision A.1.c (page 9)

This provision in the Administrative Draft requires the MS4 permittees to comply with the Basin Plan prohibitions listed in Attachment A. This list is over-inclusive, as it contains many requirements that are inapplicable to either any MS4 discharger, or to the Riverside County Permittees in particular. The Riverside County Permittees request that this provision be amended to read as follows: "Discharges from MS4s are subject to all applicable waste discharge prohibitions in the Basin Plan."

3.2.5 Provision A.2.a (pages 9-10)

The Riverside County Permittees have three comments on this provision of the Administrative Draft. First, as noted above, this provision and Provisions A.1. and A.3 should be subject to an iterative process described in A.4. The language employed in Provision A.2.a. as well as elsewhere in Provision A (in subsections A.1 and A.3.) has been interpreted to impose strict liability on MS4 Permittees for any exceedance of a water quality standard. *NRDC*, 673 F.3d at 892. Second, the provision uses the "including but not limited to" language discussed previously. Third, the Riverside County Permittees are concerned that the plans, policies, etc. set forth in Provision A.2.a.(1)-(4) may not all qualify as "water quality standards" or be applicable to the MS4 permittees. These subsections should be deleted, and replaced with a reference to "Water Quality Standards," which is a defined term in the Administrative Draft. Otherwise, the MS4 permit would become over inclusive with respect to what is considered a water quality standard. Such standards must be established in accordance with federal and state law. If this process has not been followed for a particular requirement, it is not a "water quality standard."

3.2.6 Provision A.2.c (page 10)

The Riverside County Permittees believe that this requirement should simply reflect that, for Receiving Water Limitations associated with a water body/pollutant combination addressed in a TMDL in

Attachment E, the MS4 Permittees must achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions).

3.2.7 Provision A.3.a (page 11)

As discussed above, this provision erroneously states that pollutants "in storm water discharges" from MS4s must be reduced to the MEP. This MEP requirement applies to all discharges from MS4s as discussed above.

3.2.8 Provision A.3.b (page 11)

This provision should also provide that compliance with a TMDL constitutes compliance with those pollutants/water bodies subject to a TMDL.

3.2.9 Provision A.4.a (pages 11-12)

The Riverside County Permittees support an approach whereby compliance with Provisions A.1 through A.3 are achieved through a truly iterative approach, one which reflects the intent of the precedential State Water Board Order Nos. 99-05 and 2001-015. The Riverside County Permittees note again that the State Water Board is planning a workshop on November 20 to discuss Receiving Water Limitations language, and request that the Regional Board hold in abeyance *any* Tentative Order language on Provision A until that workshop has been held and any revisions to Receiving Water Limitations language are adopted by the State Water Board.

3.2.10 Provision A.4.b (page 12)

This provision proposed in the Administrative Draft, which requires the repeating of the procedure set forth in Provision A.4.a. unless directed not to do so by the Regional Board, does not reflect the language of State Water Board Order No. 99-05, which does not require such repetitions. This provision should reflect either the provisions reflected in precedential decisions of the State Water Board or potential new Receiving Water Limitations language to be adopted by the State Water Board in response to the *NRDC* decision.

3.2.11 Provision A.4.c (page 12)

This provision should be deleted. It affords the Regional Board untrammeled discretion to enforce the proposed MS4 permit, making any iterative process absolutely without meaning, and potentially further reinforcing the Ninth-Circuit Court of Appeals decision. While the Regional Board plainly retains its jurisdiction to enforce the MS4 permit, but the MS4 Permittees must be given the ability to address the requirements of Provision A through a true iterative process.

3.3 Provision B, Water Quality Improvement Plans

3.3.1 Provision B, introductory paragraph (page 13)

This paragraph states that the "goal" of the Water Quality Improvement Plan ("WQIP") "is to attain the reasonable protection, preservation, enhancement, and restoration of water quality and designated beneficial uses of water of the state." Such a goal is not a requirement for NPDES MS4 permittees, who are required under the Clean Water Act, again, to effectively prohibit non-stormwater discharges into the MS4 and to apply controls to the MEP to address discharges from the MS4. Please see the general comments above.

3.3.2 Provision B.2.d (page 17)

This provision requires that numeric targets and schedules must be used to measure progress towards "an ultimate outcome of protections, preservation, enhancement, and restoration of receiving water beneficial uses." As discussed above, meeting the broader goals of the Clean Water Act cannot be singlehandedly assigned to a single discharger group, in this case the MS4 permittees. The goals of an MS4 Permit are clearly established in the Clean Water Act; see comments above.

3.3.3 Provision B.3 (page 18)

The introductory paragraph again refers to the requirement to prevent or eliminate non-stormwater discharges "from the MS4" and reducing pollutants in "storm water discharges" to the MEP. As noted above, the Clean Water Act requires effective prohibition of discharges "into" the MS4, and does not distinguish between stormwater and non-stormwater in discharges from the MS4 subject to the MEP standard.

3.4 Retrofitting and Channel Rehabilitation

In Section II.E.5.b the Administrative Draft proposes to require the MS4 permittees to develop and implement a program to retrofit areas of existing development to reduce the discharge of pollutants in stormwater from the MS4 to the MEP and to restore impaired beneficial uses of streams within their jurisdictions. During the Focused Meeting on the Administrative Draft in Vista on August 22, Regional Board staff stated that all MS4 permittees would be expected to identify and implement retrofit and restoration projects.

The Riverside County Permittees have the following comments regarding these proposed requirements:

- These requirements not only go beyond the Clean Water Act requirements established in 33 U.S.C. § 1342(p)(3), they also could compromise public safety and flood control efforts, as described below.
- Flood control channels are generally not part of the MS4 but rather navigable waters of the United States. The Clean Water Act does not require "rehabilitation" of such navigable waters.
- As described in our comments on "Findings" above, the State Legislature has mandated that the Flood Control Districts, including the Riverside County Flood Control and Water Conservation District, implement measures necessary to protect lives and property from flooding. Achieving this protection may require the construction and maintenance of engineered channels. A requirement to "restore" or even rehabilitate such streams can conflict with these requirements, and must be removed. While there may be cases where rehabilitation can occur, it is up to the Flood Control Districts to determine when that is feasible consistent with their legislative mandate for protection of lives and property from flooding. It is inappropriate for the Regional Board to set policy within an MS4 permit that presumes and/or requires such restoration or rehabilitation to occur.
- The MS4 Permittees cannot be unilaterally held responsible for restoring receiving waters as has been discussed previously.
- Retrofitting and channel rehabilitation projects can only be considered warranted and responsible use of public funds where the WQIP has identified both that such projects are necessary and that funding is realistically available and, moreover, that the project will not interfere with an MS4 permittee's ability to meet other societal needs including the protection of public safety. Retrofit and channel rehabilitation projects should only be considered a 'tool in the toolbox' – not a mandated compliance requirement.

- "Rehabilitation" of flood control improvements should only be considered where such projects are determined to be consistent with Army Corps of Engineers mandates for navigable waters and flood protection applicable to such improvements. Such flood control channels are most likely navigable waters of the United States, and not MS4.

3.5 Monitoring

Provision D of the Administrative Draft proposes a 22-page detailed, prescriptive and expensive monitoring-centered approach that is extremely broad and excessive relative to the data needed to manage water quality in the Santa Margarita Region. The proposed monitoring provisions should be revised to provide for identification of monitoring programs that are specific to the needs of each hydrologic unit. Specifically, monitoring should have three purposes:

- Inform receiving water priorities in the WQIP (and future updates thereto)
- Help identify pollutant sources to those receiving water priorities
- Help assess the effectiveness of the BMP strategies

These purposes are part of the Monitoring Action Plan ('MAP' - part of the WQIP) – so the WQIP (not the permit itself) should define specifics of the 'where', 'when', 'how often', and 'for what' that needs to be monitored. The monitoring provisions in the proposed regional MS4 permit should be limited to broadly establishing the monitoring elements that need to be considered in developing the MAP, but leave the specifics to the WQIP.

3.6 Non-Stormwater

As previously stated, the Clean Water Act only requires the 'Copermitees' to 'effectively prohibit' Non-Stormwater discharges 'into' the MS4. It is not practical to presume, nor to require, that Non-Stormwater discharges need to be 'eliminated' everywhere. Proactive source IDs and elimination of pure non-stormwater, should ONLY be done if/when/where the WQIP dictates that is an appropriate strategy to address the watershed's highest priorities, or where there is an obvious pollutant (illegal) discharge. For example, if a non-stormwater discharge infiltrates and does not reach perennial surface waters, these discharges have little opportunity to affect the beneficial uses of the perennial surface waters. Redirecting resources to conduct source IDs and enforcement for such a discharge reduces the Copermittees' ability to implement efforts that are important to the watershed's priorities, and further diminishes the overall credibility of the MS4 permit programs. It would be better to allow the Copermittees to focus such efforts on discharges that are known or believed to be affecting those identified watershed priorities. In that case, during enforcement, the Copermittees can better explain to dischargers why a discharge needs to be eliminated.

4 CONCLUSION

The Riverside County Permittees are supportive of an MS4 Permitting approach that reduces compliance costs and provides for a more focused, flexible, and adaptive approach to addressing priority water quality concerns. Based on the markedly different climatic, hydrologic, and water quality conditions between the Santa Margarita Region and Southern Orange and San Diego Counties, a less prescriptive management approach that relies on a more robust and integrated adaptive management program is needed to cost-effectively address the priority water quality concerns in our watershed.

The Riverside County Permittees strongly support working with the Regional Board staff, the San Diego and South Orange County MS4 permittees and other interested parties in developing a more cost-effective integrated adaptive management approach to addressing high priority water quality concerns. The Riverside County Permittees request that the Regional Board staff continue to work with the MS4 Permittees in all three counties, prior to the release of a Tentative Order, to address the concerns of the three counties, including those discussed in this letter.

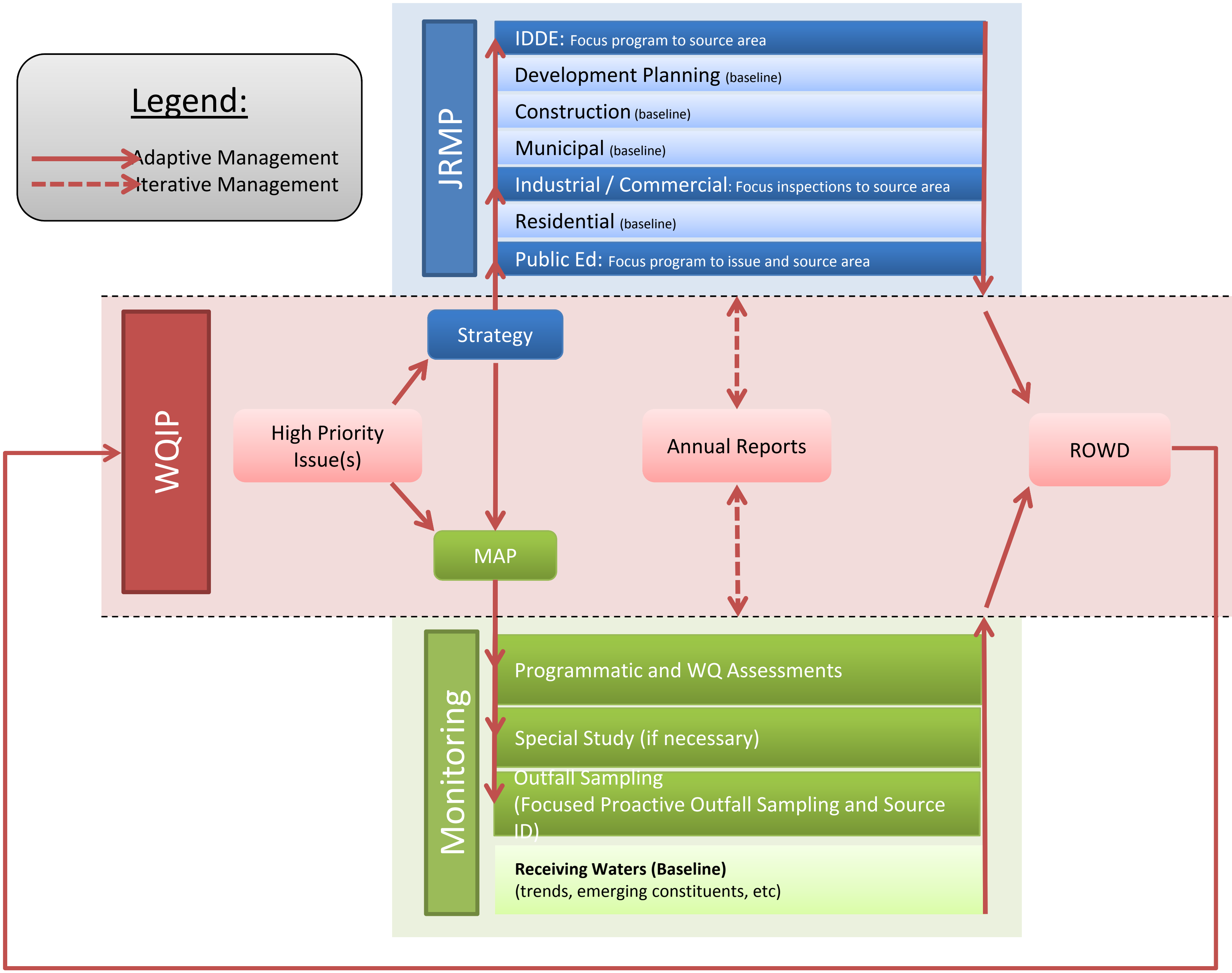
Very truly yours,

JASON E. UHLEY
Chief of Watershed Protection Division

CP:BC:cw
P8/

Example Process for Integrated Adaptive Management Process

* This presents an example scenario. Based on the strategy, various JRMP elements may become prioritized.



Walsh, Laurie@Waterboards

From: Mark Grey <mgrey@biasc.org>
Sent: Friday, September 14, 2012 9:46 AM
To: Walsh, Laurie@Waterboards
Subject: BIA/SC-CICWQ Comment Letter Package
Attachments: Attachment 2. EPA Bioretention Brownfields.pdf; Attachment 1. EPA Bioretention Applications.pdf; Attachment 3. BIASC_CICWQ SD Regional MS4 Permit Redline.pdf; BIASC_CICWQ SD Regional MS4 Permit Comment Letter.pdf

Hi Laurie, attached to this email is our comment letter package.

I would hope that you and Wayne and Eric may have a few minutes to meet with us over the next month or so and discuss your thoughts on all the comments you received and where you/we are heading moving forward prior to the release of the next Permit draft.

I would be happy to discuss the issues at hand at any point. Regards,

Mark Grey, Ph.D.
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VIA E-MAIL

September 14, 2012
Ms. Laurie Walsh, Senior Engineer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, Ca 92123-4340

Re: ADMINISTRATIVE DRAFT REGIONAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (Tentative Order No. R9-2012-0011)

Dear: Ms. Walsh

On behalf of the Building Industry Association of Southern California, Inc. (BIA/SC) and the Construction Industry Coalition on Water Quality (CICWQ) and the members of both, we appreciate the opportunity to provide comments on the Administrative Draft of the San Diego County Regional MS4 Permit (Administrative Draft Permit). We submit these comments in addition to and in support of comments made by our affiliate in San Diego County, the Building Industry Association of San Diego and its coalition partners, and comments submitted by Rancho Mission Viejo.

BIA/SC is a nonprofit trade association representing nearly 1,000 member companies, which together have nearly 100,000 employees. BIA/SC's members have, for decades, built the majority of the homes in Ventura, Los Angeles, Orange, Riverside, and San Bernardino Counties in southern California. CICWQ is a water quality coalition comprised of representatives from five industry trade associations (in addition to BIA/SC) involved in the development of public and private building, infrastructure and roads throughout California (Associated General Contractors, Engineering Contractors Association, Southern California Contractors Association, Engineering and General Contractors Association, and United Contractors). All of the above trade associations and their members and the union labor work force are affected by the post-construction runoff control requirements proposed in the Draft Permit, and this letter and supporting attachments are intended to provide the San Diego Regional Board staff with constructive suggestions for improvement.

We appreciate the Regional Board's release of the Administrative Draft Permit in April 2012, and the extensive stakeholder involvement process that ensued over the summer of 2012. The comments provided here are intended to further meet the permit's underlying objective of protecting and improving water quality within the watersheds administered by the San Diego Regional Board. Our comments, supporting attachments, and suggested redline permit language modifications reflect years of working not only on MS4 permits issued by the San Diego Board, but other MS4 permits administered by the Los Angeles, Santa Ana, and San Francisco Bay Regional Water Quality Control Boards.

We have four primary concerns with the Administrative Draft Permit content and the following discussion summarizes those concerns and provides the technical basis for those concerns including supporting attachments:

1. **Administrative Draft Permit Provision E. 3.c.(2)(c) establishes a zero discharge standard for biofiltration-type LID BMPs that are designed with an outlet/underdrain. This type of LID BMP cannot meet the on-site design capture volume standard as it is written. Such a zero discharge standard is scientifically and technically unsound and unsupported.**

Biofiltration is an established LID BMP for use in attempting to mimic pre-development hydrology. The US EPA, in multiple guidance documents produced since 2006, have recognized the use of biofiltration-type systems such as curb contained biofilters, bioswales, rain gardens, and using landscape areas for impervious area disconnection as essential LID BMP elements to include in land development projects, a few of which are cited below. The inclusion of biofiltration BMPs in US EPA's menu is a reflection of the practical limitations to retention of stormwater – retention practices are not universally feasible or desirable. When appropriately selected and designed, biofiltration BMPs achieve high levels of pollutant removal, which may exceed pollutant removal achieved in retention BMPs, particularly in cases where retention BMPs are inappropriately applied.

The retention requirement is contrary to EPA's definition of LID because it disfavors development strategies designed to appropriately "filter" runoff, such as bioretention cells or other vegetated LID BMPs. There are five principal EPA documents regarding LID; and four of them identify the appropriate roles of biotreatment-type BMP, such as detention (i.e., slow down, treat through vegetation, and then release across property lines), filtration, and surface release of stormwater.

In a compilation of case studies by EPA, most of 17 exemplary projects included biotreatment elements, such as bioretention, swales, and wetlands. *See* U.S. EPA 841-F-07-006. Each of two case studies described in another EPA document (s*ee* Attachment 1 at pp. 1-2, EPA 841-B-00-005) included the use of underdrains, and the example in one of the two specifically fed into the MS4 system at issue. Another EPA document updated in January 2009 refers to the many practices used to adhere to LID principles of promoting a watershed's hydrologic and ecological functions, such as bioretention facilities and rain gardens. *See* Attachment 2 at p. 2, EPA-560-F-07-231 (describing "an under-drain system to release treated stormwater off site," permitting planted areas to "safely allow filtration and evapotranspiration of stormwater");

http://www.epa.gov/owow/nps/lid/ (fact sheet describing under-drains used to release treated stormwater off site and permitting planted areas to safely allow filtration of stormwater). Thus, EPA's literature and guidance clearly recognize the important and even necessary role that biofiltration/biotreatment approaches play in real-world implementation of LID principles.

The National Research Council, in their 2008 Report to Congress titled "Urban Stormwater Management in the United States" cite the use of biofiltration and bioretention systems in improving water quality and in attempting to mimic predevelopment hydrology at many different site contexts and locations across the United States. The 2008 NRC report contains and cites numerous examples of using biofiltration type systems to reduce runoff volume and pollutant loads. The 2008 NRC Report clearly recognizes the role that biofiltration systems play in the LID BMP feasibility and selection process, and in achieving runoff management goals. The report states "In some situations ARCD (Aquatic Resources Conservation Design) practices will not be feasible, at least not entirely, and the SCMs [stormwater control measures] conventionally used now and in the recent past (e.g., retention/detention basins, biofiltration without soil enhancement, and sand filters) should be integrated into the overall system to realize the highest management potential." Note that the NRC report definition of ARCD includes both retention and biofiltration elements.

From a management perspective, a review of 4th Term Phase I MS4 permits within California (San Francisco Bay Area, Sacramento Area, North and South Orange County, Western and Southern Riverside County, and San Bernardino County) shows that the use of biofiltration to meet water quality volume and flow control performance standards is clearly allowed (See matrices submitted by BIA/SC_CICWQ at the August 22, 2012 Stakeholder Meeting and provided to the Regional Board by Mark Grey on August 24, 2012). These Regional Boards in California recognize that biofilter-type LID BMPs are an integral component of applying site design principles which seek to mimic pre-development hydrology. Furthermore, these permits implement a clear LID BMP feasibility and selection process, one that first requires examination of on-site retention systems (infiltration, harvest and use, and evapotranspiration), before moving to the evaluation and potential selection of bioinfiltration (some infiltration achieved) and biofiltration systems. This feasibility evaluation hierarchy, which is clearly explained in the South Orange County and South Riverside County MS4 permits adopted by the San Diego Regional Board in 2009 and 2010, respectively, must be preserved and included in the next version of the Administrative Draft Permit.

In summary, the zero discharge standard established by the Administrative Draft Permit significantly narrows the definition of LID, which is contrary to US EPA guidance, the 2008 NRC Report, and the standards established in recently-adopted Permits by the San Diego Regional Board and other Regional Boards. In essence, the proposed provisions would establish a standard that (i) will be impracticable in a relatively large proportion of sites, and (ii) has not been demonstrated to be necessary to protect receiving water quality. We provide in Attachment 3 suggested permit language to address the continued use of biofiltration.

2. **A mitigation requirement is established when using flow-thru biofiltration-type LID BMPs to manage that portion of the SWQDv that is not retained on-site. This requirement is inconsistent with all other adopted Phase I MS4 permits in California and nationally. Biofiltration and bioretention BMPs are established LID practices; requiring accompanying mitigation of SWQDv that has already been biofiltered penalizes and dis-incentivizes use of these controls.**

Equally problematic, because it does not allow biofiltration type LID BMPs to meet the on-site storm water quality design volume (SWQDv) standard, is the current requirement in Administrative Draft Permit Provision E. 3.c.(2)(c) to “perform mitigation for the portion of the pollutant load that is not retained on-site.” In other words, the draft provisions would require that, if a project proponent cannot retain 100 percent of the SWQDv on-site, and must therefore use biofiltration LID BMPs (with a treated discharge), then the use and installation of these systems will trigger an off-site mitigation or in-lieu fee program participation requirement. This provision in the Administrative Draft Permit is technically unjustified, disfavors the use of all types of recognized biofiltration LID BMPs, and could theoretically require a project proponent to not only pay for the installation and O&M of a biofiltration LID BMP, but also require mitigation or fee payment for that portion of runoff managed by it.

Biofiltration BMPs including natural treatment systems such as those that are part of the Irvine Ranch Water District’s Natural Treatment System in Orange County (a regional example) can remove vast quantities of pollutant load, and provide other benefits such as habitat, flood control, and aesthetic, recreational and educational value. To relegate multi-benefit biofiltration or biotreatment BMPs applied at a site scale to a status inferior to on-site retention BMPs is not justified on a water quality basis, and is poor public policy, essentially depriving the region of an extremely important and effective approach to managing water quality.

While we agree that project proponents should be required to retain stormwater where technically and economically feasible, there are numerous conditions beyond a project’s control that make retention infeasible, undesirable and/or ineffective. For example, in achieving a zero discharge standard, it is necessary to either maintain pre-project ET (which is generally impracticable) or increase the volume of stormwater that is infiltrated (which is the common result). Over-infiltrating rainwater can have adverse consequences such as altering the natural flow regime of the receiving waters such that riparian habitat changes, mobilizing pre-existing contamination in shallow groundwater, increasing inflow and infiltration to sanitary sewers, causing damage from rising groundwater, and other potential effects. By discouraging the use of biofiltration LID BMPs where there are more appropriate than retention, the Administrative

Draft Permit irresponsibly encourages the use of retention where it may have adverse consequences.

Retention BMPs are not necessarily more effective than biofiltration BMPs as the Administrative Draft Permit implies, especially considering the back-to-back-to-back nature of storm systems that arrive in southern California during winter months and deliver the majority of total rainfall volume. The Administrative Draft Permit establishes a SWQDv that must be retained, but does not specify the time over which this volume must be drawn down (i.e., drained) in order to have capacity for the volume from subsequent storms. The rate at which the SWQDv can be drained is a function of the infiltration rates of soils and the demand for harvested water. Where soils are not sufficiently permeable and/or where harvested water demands are moderate to low, the drawdown time of retention BMPs can be in the range of several days to several weeks.

In comparison, biofiltration BMPs are designed with engineered soils that can generally drain the SWQDv much more quickly, on the order of several hours. In cases where retention opportunities are limited, this results in a higher level of capture and treatment by biofiltration BMPs than retention BMPs, which can more than offset the lower “treatment efficiency” afforded by biofiltration compared to full retention. For example, based on rigorous technical analysis contained in the Orange County Technical Guidance Document (Figure III.2, Page III-11), a hypothetical biofiltration BMP draining in 12 hours would achieve approximately 25 percent greater treatment of average annual stormwater runoff volume than an equivalently sized retention BMP that drains in 72 hours and approximately 60 percent greater treatment than a retention BMP that drains in 10 days.

Because drawdown time is an important factor in (i) assessing BMP effectiveness and (ii) evaluating the site-specific determination of whether retention or biofiltration are preferable, we strongly recommend (in addition to allowing the use of biofiltration or biotreatment systems to meet the retention standard) including a secondary performance metric of managing 80 percent of annual runoff volume using continuous simulation modeling. This provides a means of accounting for the performance of strictly on-site retention BMPs versus the addition of biofiltration or biotreatment BMPs which can be designed to manage a greater volume of average annual runoff volume than retention BMPs of the same size. The total amount of water captured and treated and associated pollutant load reduction should be a primary deciding factor in whether retention or biofiltration BMPs are selected for a given project. As written, the Administrative Draft Permit strongly discourages an entire group of effective practices which have the potential to provide better protection of water quality, when compared to retention, in a wide range of cases. Attachment 3 provides suggestions for permit language which corrects these deficiencies.

3. **Hydromodification control measures should allow use of the EP method to meet in stream standards; recognize multiple types of channel hardening when evaluating applications for hydromodification control exemptions**

In Attachment 3, we also make suggestions for improving the consistency of hydromodification control standards with those identified and allowed in the South Orange County MS4 permit. Specifically, we recommend providing for an in-stream hydromodification control performance standard using the erosion potential (EP) approach and recognizing that there are a number of different types of channel hardening that have been used for armoring in stream systems besides concrete.

The Administrative Draft Permit provides an "on-site" option for addressing hydromodification through flow duration control. This is an important element of the hydromodification control standard. However the Administrative Draft Permit is incomplete without an option to assess and demonstrate hydromodification control through in-stream metrics. In many cases, significant development within a watershed has already caused hydromodification impacts. Requiring project-by-project flow duration control for each new project may not address the existing issue as effectively as a regionally-coordinated approach that combines upland control with in-stream remedies. Including the EP standard enables the development of more comprehensive approaches that include both upland controls and stream modifications (i.e., restoration). This option is critical for more effectively and efficiently protecting the region's aquatic resources.

Additionally, the Administrative Draft Permit includes an unnecessarily narrow definition of hardened channels that includes only those channels lined with concrete. Other forms of artificial hardening may be comparably resistant to hydromodification impacts, such as channels that are lined with rip rap, armored with soil cement, or armored with other practices. While the Permittees or the project proponent should be responsible for demonstrating that a specific channel material is sufficiently stable, the narrow definition currently provided by the Administrative Draft Permit does not allow the use of sound engineering judgment and does not allow for use of innovative materials.

Finally, the Administrative Draft Permit should explicitly recognize the findings of hydromodification management plans (HMPs) that have been previously approved by this Board. The South Orange County HMP and the San Diego County HMPs were both the products of rigorous technical analysis based on the state of the practice, which were reviewed in detail by Board Staff. The findings of these efforts must not be jeopardized under the new terms of the Administrative Draft Permit. Specifically, findings regarding exempt water bodies must be appreciated and upheld, and they should be explicitly recognized in the Administrative Draft Permit per our suggested redline.

4. The Permit must preserve important provisions for watershed level design and implementation of LID BMPs.

The proposed development project criteria and requirements in the Administrative Draft Permit do not include the language in the current South Orange County Permit that provides for Alternative Compliance for Watershed-Based Planning (See page 40-41 of the 2009 Permit). We ask that the Regional Board continue to recognize the protections to water quality and enhancements to water bodies which are achieved through watershed-based projects such as the Rancho Mission Viejo Ranch Plan, as it has in the current South County MS4 permit, and define Watershed Planning as an alternative and co-equal approach to the project-specific requirements. Attachment 3 to this submittal contains suggested redline language for addition to the Administrative Draft Permit.

Concluding Remarks:

BIA/SC and CICWQ have been active participants and contributors to the creation of improved MS4 permits across southern California. We continue to believe that rational, *implementable*, and *effective* permit requirements are critical to achieving great progress concerning water quality and our environment. We hope that these comments are received in the manner in which they are intended – to continue the discussion of how we can create a workable permit that improves water quality to the maximum extent practicable. We remain committed to a positive dialog with the Board and its staff – one that will result in an informed, balanced and effective permit.

If you have any questions or want to discuss the content of our comment letter, please feel free to contact me at (951) 781-7310, ext. 213, (909) 525-0623, cell phone, or mgrey@biasc.org.

Sincerely,

Mark Grey

Mark Grey, Ph.D.
Director of Environmental Affairs and Technical Director
Building Industry Association of Southern California and
Construction Industry Coalition on Water Quality

United States
Environmental Protection Agency

Office of Water (4203)
Washington, DC 20460

EPA-841-B-00-005A
October 2000

Bioretention Applications

Inglewood Demonstration Project, Largo, Maryland
Florida Aquarium, Tampa, Florida

Key Concepts:

- Retrofits
- Structural Controls
- Source Controls

LOW-IMPACT DEVELOPMENT CENTER

Introduction

Two case studies demonstrate the potential to use integrated management plans (IMPs) in the design of new parking facilities and as retrofits for existing parking facilities. The Inglewood study in Largo, Maryland, compared the pollutant removal efficiency of a bioretention cell in a laboratory setting to that of a comparable facility constructed in a parking lot. The Florida Aquarium study in Tampa, Florida, included monitoring of several storm events for volume and water quality control.

Inglewood Project Area

The project area is an existing 5-acre outdoor parking area located in a highly urbanized office park adjacent to Interstate 95. Runoff from adjacent areas does not flow across the lot. The slope of the parking area is approximately 3 percent. Parking stalls are aligned at 90-degree angles, and there are approximately 30 cars in each row of an aisle. At the end of each aisle are planting areas surrounded by curbs and gutters. Curb drainage inlets have been placed in some of the islands to intercept and collect runoff as sheet flow, which is piped to a downstream regional stormwater management facility.

Inglewood Project Description

The Inglewood project consisted of a laboratory segment and a field segment. The laboratory segment involved construction of a planter box filled with a typical bioretention facility soil mixture (50 percent construction sand, 20 to 30 percent topsoil, and 20 to 30 percent compost). This facility is approximately half the size in volume of the Inglewood facility. The box was planted with representative plants and mulched. A synthetic stormwater mixture was applied and the pollutant removal efficiency, temperature, and runoff volume rate were measured. The pollutant mix included metals (copper, lead, and zinc), phosphorus, organic nitrogen, and nitrate.

Project Benefits:

- Retrofit Opportunity
- Pollutant Removal
- Volume Reduction
- Cost-Effectiveness

A landscaped island measuring approximately 38 feet by 12 feet was chosen as the retrofit area. The island contains a curb inlet that drains into the municipal storm drain system. Almost the entire drainage area is impervious. A 4-foot slot was cut into the curb immediately before the inlet. The landscaped island was then excavated to a depth of 4 feet. An underdrain was installed and tied into the bottom of the existing inlet to completely drain the planting soil to avoid oversaturation. The underdrain was covered with 8 inches of 1- to 2-inch gravel and backfilled with typical bioretention soil mix. The backfill extended to a depth of about 12 inches below the top of the curb, which allows for a ponding depth of approximately 6 inches of water in the island

Figure 1. Bioretention landscaping at the Inglewood demonstration project site.

Table 1. Summary of bioretention pollutant removal results for the Inglewood demonstration project.

Pollutant	Input mean ± standard deviation	Output mean ± standard deviation	Output range	Output percent removal mean ± standard deviation
Cu dissolved (µg/L)	120 ± 27	63 ± 6.5	55–75	48 ± 12
Cu total (µg/L)	120 ± 27	69 ± 9.4	55–85	43 ± 11
Pb dissolved (µg/L)	54 ± 9.4	11 ± 6	6.7–25	79 ± 26
Pb total (µg/L)	54 ± 9.4	16 ± 7	6.7–26	70 ± 23
Zn dissolved (mg/L)	1.1 ± 0.021	0.24 ± 0.44	0.11–0.56	78 ± 29
Zn total (mg/L)	1.1 ± 0.021	0.39 ± 0.44	0.12–1.4	64 ± 42
Ca (mg/L)	44 ± 6.4	32 ± 6.1	24–41	27 ± 14
Cl^- (mg/L)	5.1 ± 0.48	162 ± 80	74–228	3,000[a]
Na (mg/L)	3.1	359 ± 170	68–497	11,000[a]
P (mg/L)	0.83	0.11 ± 0.017	0.10–0.13	87 ± 2
TKN (mg/L as N)	6.9 ± 0.81	2.3 ± 0.64	1.7–3.0	67 ± 9
NO_3^- (mg/L as N)	1.3 ± 0.05	1.1 ± 0.15	0.94–1.2	15 ± 12

[a]Shows percent production.

before a backwater is created at the curb opening. Subsequently the area was planted and covered with 3 inches of shredded hardwood mulch. Figure 1 shows the bioretention area after vegetation was established.

The stormwater mixture was applied to a 50-square-foot area in the field facility at a rate of 1.6 inches per hour for 6 hours. The removal rates for several pollutants are shown in Table 1. In addition to pollutant removal, the runoff temperature was lowered approximately 12 °C as the runoff was processed and filtered through the soil mixture. Most of the pollutant removal process occurred in the mulch layer.

A similar field investigation was conducted on an 8-year-old facility, and the metals removal rate was much higher (Davis et al., 1998). This effect might be attributed to slower flow rates through the soil, which has higher clay content, as well as greater pollutant uptake by vegetation.

Inglewood Project Summary and Benefits

This study showed the feasibility of retrofitting an existing parking facility and demonstrated the consistency of laboratory and field pollutant removal performance. The retrofit cost approximately $4,500 to construct and treats approximately one-half acre of impervious surface. The bioretention retrofit was a more cost-effective way to filter pollutants than many proprietary devices designed to treat the same volume of runoff. These proprietary devices could cost $15,000 to $20,000, would be more expensive to maintain, and would not significantly decrease runoff volume or temperature. Also, bioretention areas offer the ancillary benefit of aesthetic enhancement. It is interesting to note that a drought occurred after the installation of the plants, and although many of the other plants in the parking lot died or experienced severe drought stress, the plants in the bioretention facility survived because of the retained water supply.

Florida Aquarium Project Area

The Florida Aquarium site is an 11.5-acre, asphalt and concrete parking area that serves approximately 700,000 visitors per year. Runoff was controlled using the following IMPs:

- End-of-island bioretention cells
- Bioretention swales located around the parking perimeter
- Permeable paving
- Bioretention strips between parking stalls
- A small pond to supplement storage and pollutant removal

Figure 2 is an illustration of the site that details the type and location of runoff controls.

Florida Aquarium Project Description

A total of 30 storm events were monitored for one year at the Florida Aquarium site during 1998-1999. The Southwest Florida Water Management

District measured rainfall and flow from eight of the subcatchments in the parking area and collected water quality samples on a flow-weighted basis. Comparisons between pavement areas controlled by IMPs and uncontrolled asphalt areas were made for peak runoff rate, runoff volume, runoff coefficients, and water quality. Sediment cores from swales also were collected and analyzed.

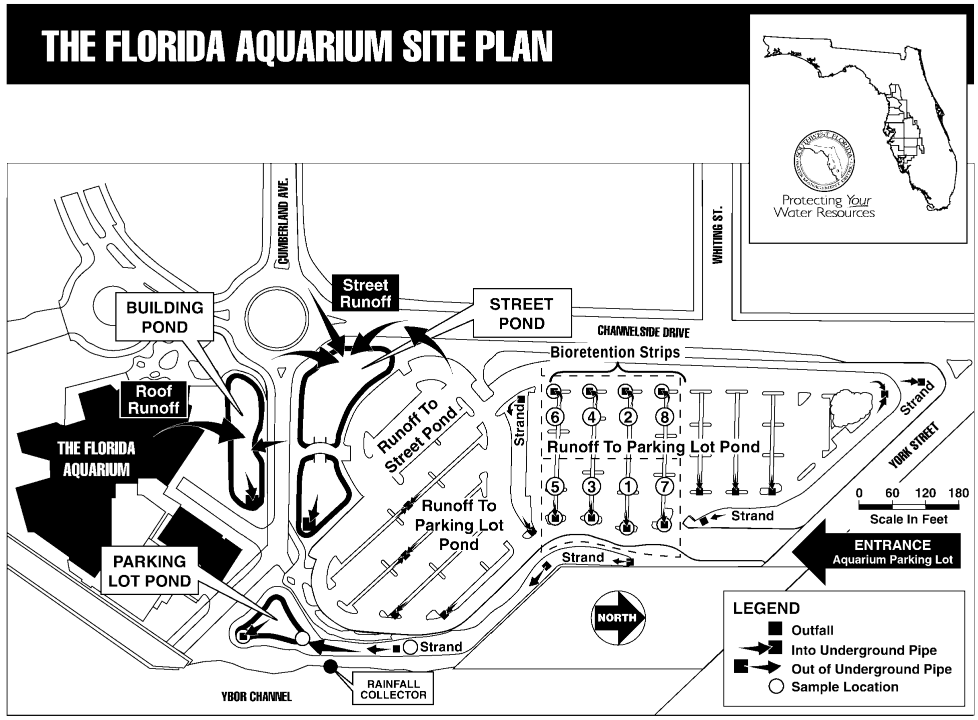

Figure 2. Layout of the Florida Aquarium site with IMPs. The eight basins outlined with dotted lines were evaluated in this part of the study.

Florida Aquarium Project Summary and Benefits

The parking areas controlled by IMPs showed a significant reduction in runoff volume and peak runoff rate. Table 2 shows pollutant load reductions for three pavement types; reduction is compared to pollutant loads in runoff from a basin without a swale. Much of the pollutant reduction is attributed to the reduced runoff in basins with swales. Because the swales are only the first element in the treatment train, even better removal efficiencies should be seen when data are analyzed for the entire system.

Table 2. Load efficiency of pollutants expressed as percent reduction for three types of pavement at the Florida Aquarium site.

Constituents	Percent pollutant reduction[a]		
	Asphalt w/swale	Cement w/swale	Porous w/swale
Ammonia	45	73	85
Nitrate	44	41	66
Total Nitrogen	9	16	42
Orthophosphorus	-180	-180	-74
Total Phosphorus	-94	-62	3
Suspended Solids	46	78	91
Copper	23	72	81
Iron	52	84	92
Lead	59	78	85
Manganese	40	68	92
Zinc	46	62	75

[a]The basins with swales were compared to a basin without a swale to determine the amount of reduction in pollutant loads possible using these small alterations. Notice that the efficiencies for phosphorus are negative, indicating an increase in phosphorus load in the basins with a swale.

References

Davis, A., M. Shokouhian, H. Sharma, and C. Minami, 1998. *Optimization of Bioretention Design for Water Quality and Hydrologic Characteristics*. Report 01-04-31032. Final report to Prince George's County, Maryland.

Rushton, B. 1999. *Low Impact Parking Lot Design Reduces Runoff and Pollutant Loads: Annual Report #1*. Southwest Florida Watershed Management District, Brooksville, Florida.

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Design Principles

for Stormwater Management on Compacted, Contaminated Soils in Dense Urban Areas

EPA's Brownfields Program is designed to empower states, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse brownfields. A brownfield is a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. EPA's Brownfields Program provides financial and technical assistance for brownfield revitalization, including grants for environmental assessment, cleanup, and job training.

What is Green Infrastructure?

Most development and redevelopment practices cover large areas of the ground with impervious surfaces such as roads, driveways, sidewalks, and new buildings themselves, which then prevent rainwater from soaking into the ground. These hard surfaces increase the speed and amount of stormwater that runs into nearby waterways, carrying pollutants and sediment each time it rains.

Green infrastructure seeks to reduce or divert stormwater from the sewer system and direct it to areas where it can be infiltrated, reused or evapotranspirated. Soil and vegetation are used instead of, or in conjunction with, traditional drains, gutters, pipes and centralized treatment areas. In many new and redevelopment projects, green infrastructure is implemented to manage and mitigate the polluted runoff created by precipitation that falls on rooftops, streets, sidewalks, parking lots and other impervious surfaces.

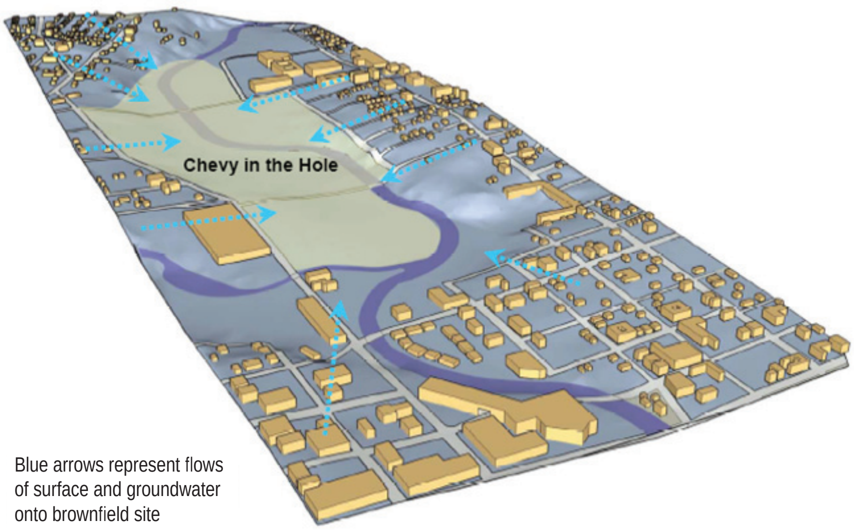
How can Green Infrastructure be Applied to Brownfield Sites?

Preparing brownfields for redevelopment often requires capping of contaminated soils, creating even larger impervious surfaces. The challenge for managing stormwater on brownfield sites is allowing this capping while mitigating the impervious surface conditions that can negatively impact local waterways.

Unlike many conventional developments, impervious footprints on brownfields cannot always be minimized through site designs that incorporate more porous surfaces to allow for infiltration. Direct infiltration on a brownfield site may introduce additional pollutant loads to groundwater and nearby surface waters. However, green infrastructure practices exist that can retain, treat and then release stormwater without it ever coming in contact with contaminated soils.

A bioswale in Wilmington, Delaware, designed to absorb and retain stormwater runoff.

The University of Michigan's School of Natural Resources and Environment developed design guidelines that use low impact development techniques on contaminated sites. Using a former industrial site in Flint, Michigan, called Chevy in the Hole, graduate students considered and refined methods to prevent residual contamination from moving with stormwater.



Blue arrows represent flows of surface and groundwater onto brownfield site

Design Considerations

A key component of using green infrastructure for brownfield sites is treatment and storage of stormwater, rather than complete infiltration. Most brownfields that have residual contamination need caps, so vegetated areas need to be located above caps and fitted with underdrain systems to remove overflow stormwater.

Development and redevelopment projects should start with keeping existing trees onsite, minimizing compaction of earth that inhibits water infiltration, and planting trees and other vegetation in areas where none exists. Retaining existing tree cover and vegetated areas helps infiltrate and evapotranspirate stormwater runoff while intercepting large amounts of rainfall that would otherwise enter waterways as runoff.

Buildings and other impervious surfaces can be strategically located to act as caps over areas with known contamination. Areas with fill caps can include soils and vegetation above the cap in the form of swales or rain gardens. If fitted with an under-drain system to release treated stormwater off site, these planted areas can safely allow filtration and evapotranspiration of stormwater. Additional features like impermeable liners or gravel filter blankets can be coupled with modified low impact development (LID) practices that safely filter stormwater without exposing the water to contaminated soils.

Green roofs are an ideal way to reduce the runoff from building roofs by encouraging evapotranspiration of rainwater. Another option for brownfield sites is the capture and reuse of stormwater for non-potable uses; this can include runoff storage in rain barrels for irrigation of green roofs or landscaped areas, or in cisterns that store rainwater for toilet flushing and other uses.

Site location within the watershed is very important. In particular, projects in groundwater recharge areas should avoid low impact development practices that promote infiltration, and use techniques that directly discharge treated stormwater instead. Furthermore, new and redeveloped sites near brownfields should use green infrastructure practices to prevent additional runoff from flowing onto potentially contaminated areas.

Overall, when developing a stormwater management plan on a brownfield, surrounding sites must be considered. *(Source: Flint Futures: Alternative Futures for Brownfield Redevelopment in Flint, Michigan.)*

The Matthew Henson Conservation Center in Washington, DC, utilizes a green roof.

General Principles for Using Green Infrastructure on Brownfield Sites

Guideline #1: Differentiate between groups of contaminants as a way to better minimize risks.

Guideline #2: Keep non-contaminated stormwater separate from contaminated soils and water to prevent leaching and spreading of contaminants.

Guideline #3: Prevent soil erosion using vegetation, such as existing trees, and structural practices like swales or sediment basins.

Guideline #4: Include measures that minimize runoff on all new development within and adjacent to a brownfield. These measures include green roofs, green walls, large trees, and rainwater cisterns.

Definitions

Bioswales are open channels with a dense cover of vegetation where runoff is directed or retained to evapotranspirate and filter.

Evapotranspiration is the return of water to the atmosphere either through evaporation or by plants.

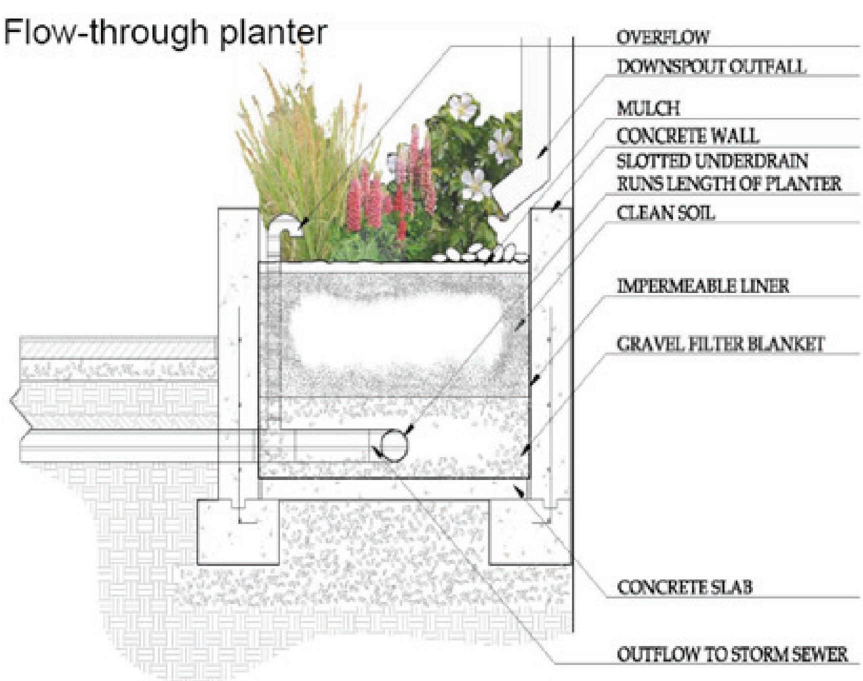
Green Infrastructure and ***Low Impact Development (LID)*** both refer to systems and practices that use or mimic natural processes to infiltrate, evapotranspirate or reuse stormwater or runoff on the site where it is generated.

Green roofs can be used to effectively reduce or eliminate runoff from small and medium sized storms. A soil mixture is placed over a waterproof membrane and drainage system and then planted with water absorbent and drought tolerant plants. Most systems also have root barriers. These roofs soak up stormwater and release it back into the atmosphere through evaporation and plant respiration, while draining excess runoff.

Rain gardens serve the same purpose as stormwater planters and are appropriate where there is more area to plant vegetation. Sizing is dependent on the area of impervious surfaces draining to the rain garden, but they can be designed to only treat a portion of the runoff so they can be placed in most situations.

Stormwater harvest and reuse. Rainwater harvested in cisterns, rain barrels, or other devices may be used to reduce potable water used for landscape irrigation, fire suppression, toilet and urinal flushing, and custodial uses. Storage and reuse techniques range from small-scale systems (e.g., rain barrels) to underground cisterns that may hold large volumes of water.

Stormwater planters. Downspouts can be directed into stormwater planters. These planters are used to temporarily detain, filter and evapotranspirate stormwater using plant uptake.



Additional Resources

The Emeryville, California *Stormwater Guidelines for Green, Dense Redevelopment* provides guidance on using vegetative stormwater treatment measures for this dense, brownfield-laden city: www.ci.emeryville.ca.us/planning/stormwater.html.

EPA's *Green Infrastructure Web site* (www.epa.gov/npdes/greeninfrastructure) provides definitions, case studies and performance data for various practices that might be applicable to brownfield sites.

The Low Impact Development Center is dedicated to research, development, and training for water resource and natural resource protection issues. The Center focuses specifically on furthering the advancement of Low Impact Development technology: www.lowimpactdevelopment.org.

Green Roofs for Healthy Cities collects and publishes technical information on green roof products and services: www.greenroofs.org.

The Center for Watershed Protection's Better Site Design Tools provide links to various better site design resources and publications: www.cwp.org/PublicationStore/bsd.htm.

American Rivers' *Catching the Rain: A Great Lakes Resource Guide for Natural Stormwater Management* describes a variety of low impact development strategies that can be implemented in a wide range of built environments. Available at: www.americanrivers.org/site/DocServer/CatchingTheRain.pdf?docID=163

NRDC's *Rooftops to Rivers: Green Strategies for Controlling Stormwater and Combined Sewer Overflows* is a policy guide for decision makers looking to implement green strategies in their own area, including nine case studies of cities that have successfully used green techniques to create a healthier urban environment. Available at: www.nrdc.org/water/pollution/rooftops/contents.asp

Portland's (Oregon) *Trees for Green Streets: An Illustrated Guide* is a guidebook that helps communities select street trees that reduce stormwater runoff from streets and improve water quality. Available at: www.metro-region.org/article.cfm?articleID=263

Seattle's *pilot Street Edge Alternatives Project (SEA Streets)* is designed to provide drainage that more closely mimics the natural landscape prior to development than traditional piped systems. Good information can be found at: www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Natural_Drainage_Systems/Street_Edge_Alternatives/index.asp

EPA's *Protecting Water Resources with Higher-Density Development* report helps communities better understand the impacts of higher and lower density development on water resources. The findings indicate that low-density development may not always be the preferred strategy for protecting water resources. Available at: www.epa.gov/dced/water_density.htm.

Portland Metro's (Oregon) *Green Streets: Innovative Solutions for Stormwater and Stream Crossings* is a handbook that describes stormwater management strategies and includes detailed illustrations of "green" street designs that allow infiltration and limit stormwater runoff. Available at www.metro-region.org/article.cfm?articleID=262

EPA's *Protecting Water Resources with Smart Growth* is a report intended for audiences already familiar with smart growth concepts who seek specific ideas on how techniques for smarter growth can be used to protect water resources. The report describes 75 policies that communities can use to grow in the way that they want while protecting their water quality. Available at: www.epa.gov/dced/water_resource.htm

EPA's *Using Smart Growth Techniques as Stormwater Best Management Practices* reviews nine common smart growth techniques and examines how they can be used to prevent or manage stormwater runoff. Available at: www.epa.gov/dced/stormwater.htm

EPA's *Brownfields Program Website* (www.epa.gov/brownfields) provides information on and resources for assessing, cleaning up and redeveloping brownfields, including grant funding opportunities.

3. Development Planning

Each Copermittee must use their land use/planning authorities to implement a development planning program that includes, at a minimum, the following requirements.

a. Permanent BMP Requirements for All Development Projects

Each Copermittee must prescribe the following BMP requirements during the planning process (i.e. prior to project approval and issuance of grading or building permits) for all pollutant-generating[14] development projects (regardless of project type or size), where local permits are issued~~, including unpaved roads and flood management projects:~~

(1) General Requirements

(a) All BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters~~, and as close to the source as possible~~;

(b) Multiple development projects may use shared permanent BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any development project from which the BMP will receive runoff; and

(c) Permanent BMPs must not be constructed within a waters of the U.S. or waters of the state except those that have obtained a CWA Section 401 Water Quality Certification or Waste Discharge Requirement as applicable.

(2) Source Control BMP Requirements

The following source control BMPs must be implemented at all development projects where applicable and feasible:

(a) Prevention of illicit discharges into the MS4;

(b) Storm drain system stenciling or signage;

(c) Properly designed outdoor material storage areas;

(d) Properly designed outdoor work areas;

(e) Properly designed trash storage areas; ~~and~~

~~(f) Any additional BMPs necessary to minimize pollutant generation at each project.~~

[14] Pollutant generating development projects are those projects that generate pollutants at levels greater than natural background levels.

(3) Low Impact Development (LID) BMP Requirements

The following LID BMPs must be implemented at all pollutant generating development projects where applicable and feasible:

(a) Maintenance or restoration of natural storage reservoirs and drainage corridors (including topographic depressions, areas of permeable soils, natural swales, and ephemeral and intermittent streams);~~[14]~~[15]

(b) Buffer zones for natural water bodies (where buffer zones are technically infeasible, require project applicant to include other buffers such as trees, access restrictions, etc.);

(c) Conservation of natural areas within the project footprint including existing trees, other vegetation, and soils;

(d) Construction of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided public safety is not compromised;

(e) Minimization of the impervious footprint of the project;

(f) Minimization of soil compaction to landscaped areas;

(g) Disconnection of impervious surfaces through distributed pervious areas;

(h) Landscaped or other pervious areas designed and constructed to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4;

(i) Small collection strategies located at, or as close as possible to, the source (i.e. the point where storm water initially meets the ground) to minimize the transport of runoff and pollutants to receiving waters;

(j) Use of permeable materials for projects with low traffic areas and appropriate soil conditions;

(k) Landscaping with native or drought tolerant species; and

(l) Harvesting and using precipitation.

~~14~~ 15 Development projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. Projects proposing to dredge or fill waters of the State must obtain Waste Discharge Requirements.

(4) Long-Term Permanent BMP Maintenance

Each Copermittee must require the project applicant to submit proof of the mechanism under which ongoing long-term maintenance of all permanent BMPs will be conducted.

(5) Infiltration and Groundwater Protection

(a) Infiltration and treatment control BMPs ~~designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins)~~ must not cause or contribute to an exceedance of an applicable groundwater quality objective. At a minimum, such infiltration and treatment control BMPs must be in conformance with the design criteria listed below, unless the development project applicant demonstrates to the Copermittee that one or more of the specific design criteria listed below are not necessary to protect groundwater quality. The ~~The design criteria listed below do not apply to small infiltration systems dispersed throughout a development project.~~ Permittees may establish different design criteria than those listed below for different BMP types based on the inherent degree of risk to groundwater quality (for example, dry wells versus bioretention).

(i) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(ii) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(iii) Infiltration treatment control BMPs must be adequately maintained to remove pollutants in storm water to the MEP;

(iv) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(v) The soil through which infiltration is to occur must have physical and chemical characteristics (e.g., appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses, unless first treated or filtered to remove pollutants prior to infiltration;

(vi) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities as designated by each Copermittee, unless first treated or filtered to remove pollutants prior to infiltration; and

(vii) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(b) The Copermittees may collectively or individually develop alternative mandatory design criteria to that listed above for infiltration and treatment control BMPs which are designed to primarily function as centralized infiltration devices. Before implementing the alternative design criteria in the development planning process the Copermitee(s) must:

(i) Notify the San Diego Water Board of the intent to implement the alternative design criteria submitted; and

(ii) Comply with any conditions set by the San Diego Water Board.

b. PRIORITY DEVELOPMENT PROJECTS

(1) Definition of Priority Development Project

Priority Development Projects include the following:

(a) All new development projects that fall under the Priority Development Project categories listed under Provision E.3.b.(2). Where a new development project feature, such as a parking lot, falls into a Priority Development Project category, the entire project footprint is subject to Priority Development Project requirements; and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site, or the redevelopment project is a Priority Development Project category listed under Provision E.3.b.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to Priority Development Project requirements, the performance and sizing requirements discussed in Provisions E.3.c.(2) and E.3.c.(3) apply only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the performance and sizing requirements apply to the entire development.

(2) Priority Development Project Categories

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This category includes commercial, industrial, residential, mixed-use, and public development projects on public or private land which fall under the planning and building authority of the Copermittee.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is 5,000 square feet or more.

(d) Hillside development projects. This category includes any development which creates 5,000 square feet or more of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally sensitive areas (ESAs). This category includes any development located within, directly adjacent to, or discharging directly to an ESA, which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent to” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that collects runoff from the subject development or redevelopment site and terminates at or in receiving waters within the ESA.

(f) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce that has 5,000 square feet or more of impervious surface.

(g) Streets, roads, highways, freeways, and residential driveways. This category is defined as any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(i) Large development projects. This category includes any post-construction pollutant-generating new development projects that result in the disturbance of one acre or more of land.

(3) Priority Development Project Exemptions

Each Copermittee has the discretion to exempt the following projects from being defined as Priority Development Projects:

(a) Sidewalks constructed as part of new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(b) Bicycle lanes that are constructed as part of new streets or roads but are not hydraulically connected to the new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(c) Impervious trails constructed and designed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas;

(d) Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.

c. PRIORITY DEVELOPMENT PROJECT PERMANENT BMP PERFORMANCE AND SIZING REQUIREMENTS

In addition to the BMP requirements listed for all pollutant generating development projects under Provision E.3.a, Priority Development Projects must also implement permanent BMPs that conform to performance and sizing requirements.

(1) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs listed under Provision E.3.a.(2).

(2) Retention and Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement BMPs to retain and treat pollutants onsite in the following order:

(a) Each Priority Development Project must be required to implement LID BMPs as described in Provision E.3.a.(3);

(b) Each Priority Development Project must be required to implement LID BMPs that are sized and designed to retain the volume equivalent to runoff produced from a 24-hour 85th percentile storm ~~event[15]~~ event[16] (“design capture volume”).~~;~~

(c) If onsite retention using LID BMPs is technically infeasible per Provision E.3.c.(4), flow-thru LID ~~and/or conventional~~ treatment control BMPs, such as bioretention with an underdrain, must be implemented to treat the portion of the design capture volume that is not retained onsite. Flow-thru LID treatment control BMPs that are sized for the portion of the design capture volume that is not retained onsite may be used if full onsite retention is technically infeasible. Flow-thru LID treatment control BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. ~~Additionally, project applicants must perform mitigation for the portion of the pollutant load in the design capture volume that is not retained onsite, as described in Provision E.3.c.(4)(c).~~

(d) If it is shown to be technically infeasible per Provision E.3.c.(4) to retain and/or treat with flow-thru LID treatment control BMPs sized for the portion of the design capture volume that is not retained onsite, then the project must implement conventional treatment control BMPs in accordance with Provision E.3.c.(2)(d) below and must participate in the alternative compliance program in Provision E.3.c.(4)(c).

(~~d~~e) All onsite treatment control BMPs must:

(i) Be correctly sized and designed so as to remove pollutants from storm water to the MEP;

(ii) Be sized to comply with the following numeric sizing criteria:

[a] Volume-based treatment control BMPs must be designed to treat the remaining portion of the design capture volume that was not retained and/or treated with flow-thru LID treatment control BMPs sized for the portion of the design capture volume that is not retained onsite~~retained or onsite~~; or

[b] Flow-based treatment control BMPs must be designed to ~~mitigate (filter or~~ treat~~)~~ either: 1) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or 2) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two, or 3) an alternative design rate that is demonstrated to result in the treatment of a volume of stormwater equivalent to that achieved under c.(2)(e)(ii)[a].

(iii) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

[15] This volume is not a single volume to be applied to all areas covered by this Order. The size of the 85th percentile storm event is different for various parts of the San Diego Region. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its BMP Design Manuals.

(3) Hydromodification Management BMP Requirements

Each Copermittee must require each Priority Development Project to implement hydromodification management BMPs so that:

(a) ~~(a)~~ Post-project runoff flow rates and durations do not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent (for the range of flows that result in increased potential for erosion or degraded channel conditions downstream of Priority Development Projects).

OR

The erosion potential ratio is maintained to within 10 percent of the target value from the project discharge point to a downstream receiving water that is exempt from the hydromodification management BMP requirements per Provision E.3.c.(3)(d). Erosion potential is the ratio of total long-term sediment transport capacity or channel work in the proposed condition versus the pre-development (naturally occurring) condition.

(i) In evaluating the range of flows that results in increased potential for erosion of natural (non-hardened) channels, the lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks.

~~(ii) For artificially hardened channels, analysis to identify the lower boundary must use characteristics of a natural stream segment similar to that found in the watershed. The lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or erodes the toe of the channel banks.~~

(ii~~i~~) The Copermittees may use monitoring results pursuant to Provision D.2.b.(6) to re-define the range of flows resulting in increased potential for erosion or degraded channel conditions, as warranted by the data.

(b) ~~(b)~~ Post-project conditions ~~runoff flow rates and durations~~ must ~~compensate~~ manage for the loss of bed sediment supply due to the development project, ~~should~~ if significant loss of sediment supply occurs as a result of the development project.

~~(a)~~(c) If hydromodification management BMPs are technically infeasible per Provision E.3.c.(4), project applicants must perform mitigation for the portion of the runoff volume that is not controlled and will cause or contribute to increased potential for erosion of receiving waters downstream of the Priority Development Project, as described in Provision E.3.c.(4)(c).

~~(b)~~(d) Exemptions

Each Copermittee has the discretion to exempt a Priority Development Project from the hydromodification management BMP requirements where the project:

(i) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, ~~or~~ the Pacific Ocean, or exempt river reaches identified in Hydromodification Management Plans (HMPs) approved by the San Diego Water Board;

(ii) Discharges storm water runoff into conveyance channels whose bed and bank are ~~concrete lined~~artificially hardened all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, ~~or~~ the Pacific Ocean; ~~or~~or exempt river reaches identified in HMPs approved by the San Diego Water Board; or

(iii) Discharges storm water runoff into other areas identified by the San Diego Water Board as exempt from the requirements of Provisions E.3.c.(3)(a)-(c)~~.~~, ~~S~~such areas include those identified in HMPs approved by the San Diego Water Board.

(4) Alternative Compliance for Technical Infeasibility

At the discretion of each Copermittee, alternative compliance may be allowed for certain Priority Development Projects to comply with Provisions E.3.c.(2) and E.3.c.(3), subject to the following requirements:

(a) Applicability

Priority Development Projects may be allowed alternative compliance if:

(i) The Copermittee reviews and approves site-specific hydrologic and/or design analysis performed by a registered professional engineer, geologist, architect, or landscape architect;

(ii) The project applicant demonstrates, and the Copermittee determines and documents, that retention LID, flow-through LID treatment control BMPs, and/or hydromodification management BMPs per Provisions E.3.c.(2) and E.3.c.(3) were incorporated into the project design to the maximum extent technically feasible given the project site conditions;

(iii) The project applicant is required to perform mitigation described in Provision E.3.c.(4)(c) with a net result of at least the same level of water quality protection as would have been achieved if the Priority Development Project had fully implemented the retention LID, flow-through LID treatment control BMPs, and hydromodification management BMP requirements under Provisions E.3.c.(2) and E.3.c.(3) onsite.

(b) Criteria For Technical Infeasibility

Each Copermittee must develop, or develop in collaboration with the other Copermittees, criteria to determine technical infeasibility for fully implementing the retention LID and hydromodification management BMP requirements under Provisions E.3.c.(2) and E.3.c.(3) and include these requirements in the Permanent BMP Sizing Criteria Design Manual pursuant to Provision E.3.d. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in Provision E.3.a.(5) due to the presence of shallow bedrock, contaminated soils, near surface groundwater, underground facilities, or utilities;

(ii) Brownfield development sites or other locations where pollutant mobilization is a documented concern;

(iii) The design of the site precludes the use of soil amendments, plantings of vegetation, or other designs that can be used to infiltrate and evapotranspirate runoff;

(iv) Soils cannot be sufficiently amended to provide for the requisite infiltration rates;

(v) Locations with geotechnical hazards;

(vi) Insufficient onsite and/or offsite demand for storm water use;

(vii) Modifications to an existing building to manage storm water are not feasible due to structural or plumbing constraints; and

(viii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with Provisions E.3.c.(2) and E.3.c.(3) onsite.

(c) Mitigation

Priority Development Projects that meet the Copermittee's technical infeasibility criteria developed pursuant to Provision E.3.c.(4)(b) must be required to mitigate for the increased flow rates, increased flow durations, and/or increased pollutant loads expected to be discharged from the site. For the pollutant load in the volume of storm water not retained onsite with retention LID BMPs treated with flow-thru LID treatment control BMPs sized for the portion of the design capture volume that is not retained onsite, ~~, tre~~ or increased potential erosion of downstream receiving waters not fully controlled onsite with hydromodification management BMPs, the Copermittee must require the project applicant to either 1) implement an offsite mitigation project, and/or 2) provide sufficient funding for a public or private offsite mitigation project via a mitigation fund.

(i) *Mitigation Project Locations*

Offsite mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project, and preferably within the same hydrologic subarea. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project applicant demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar potential impacts expected from the Priority Development Project.

(ii) *Mitigation Project Types*

Offsite mitigation projects must include, where applicable and feasible, retrofitting opportunities and stream and/or habitat rehabilitation or restoration opportunities identified in the Water Quality Improvement Plans, identified pursuant to Provision B.3.a. Other offsite mitigation projects may include green streets or infrastructure projects, or regional BMPs upstream of receiving waters. In-stream rehabilitation or restoration measures to protect or prevent adverse physical changes to creek bed and banks must not include the use of non-naturally occurring hardscape material such as concrete, riprap, or gabions. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of Provision E.3.c.(4)(a).

(iii) *Mitigation Project Timing*

The Copermittee and/or project applicant must develop a schedule for the completion of offsite mitigation projects, including milestone dates to identify, fund, design, and construct the projects. Offsite mitigation projects must be completed upon the granting of occupancy for the first project that contributed funds toward the offsite mitigation project, unless a longer period is authorized by the San Diego Water Board.

(iv) *Mitigation Fund*

A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as a means for developing and implementing offsite mitigation projects, provided the projects conform to the requirements for project locations, types, and timing described above.

(5) Alternative Compliance for Watershed-Based Planning

Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the Regional Board, such standards shall govern review of projects with respect to Provision E.3. of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in Provision E.3.c. and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration sized for the design capture volume that has not been retained. Where regional LID implementation has been shown to be technically infeasible (per Provision E.3.c.(4)(b)) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Provision E.3.c.(2)(d) and participation in the mitigation program in Provision E.3.c.(4)(c).

Walsh, Laurie@Waterboards

From: Mike McSweeney <MMcSweeney@biasandiego.org>
Sent: Friday, September 14, 2012 2:02 PM
To: Walsh, Laurie@Waterboards
Cc: Matt Adams; Borre Winckel; Rosenbaum, Wayne
Subject: BIA Comment Letter
Attachments: Stormwater-RWQCB comment letter-Final draft.pdf

Laurie:

Attached is the BIA's Coalition comment letter regarding the Administrative Draft MS4 permit. I will also be hand delivering one to you in a few minutes.

Enjoy your weekend,

Michael McSweeney
Sr. Public Policy Advisor
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Building Industry Association of San Diego County
Building Industry Association of Southern California
Associated General Contractors, San Diego
San Diego Regional Chamber of Commerce
Building Owners and Managers Association
San Diego Association of Realtors
Associated Builders and Contractors
Business Leadership Alliance
NAIOP

September 12, 2012

VIA E-MAIL AND HAND DELIVERY

Ms. Laurie Walsh
WRC Engineer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Re: REVISED ADMINISTRATIVE DRAFT REGIONAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) (Tentative Order No. R9-2012-0011)

Dear Ms. Walsh:

The following trade and professional associations, for the purposes of this communication known as, the regulated community, are responding as a Coalition. Spearheaded by the Building Industry Association of San Diego County (BIASD), Business Leadership Alliance (BLA), Associated General Contractors, San Diego (AGC), NAIOP (National Association of Industrial & Office Properties), Associated Builders & Contractors (ABC), the San Diego Regional Chamber of Commerce, the San Diego Association of Realtors® (SDAR), and the Building Owners & Managers Association (BOMA) and the members thereof, we appreciate the opportunity to provide comments on the Administrative Draft of the San Diego County Regional MS4 Permit (Administrative Draft Permit). We submit these comments in addition to and in support of comments made by our affiliate the Building Industry Association of Southern California and its coalition partners. This Coalition employs over 200,000 San Diegans and generates in excess of $ 3 billion dollars of economic activity in the San Diego region.

Alternative Methodologies to Address Water Quality and Hydromodification Concerns

The Coalition supports stream and habitat restoration/rehabilitation as an essential part of hydromodification control, and recommends that alternative compliance presented in the Administrative Draft permit Section E.3.c.(4)(c), Mitigation, should be encouraged. Hydromodification management is an issue that is larger than the individual discharger and needs to be addressed at the local watershed level. Within a watershed, a combination of conventional on-site controls for some projects and alternative compliance for other projects is appropriate.

In some cases, restoration/rehabilitation projects can provide more benefit to the receiving waters than conventional on-site low impact development (LID) and hydromodification management practices. For example, new developments in watersheds that are already experiencing hydromodification from existing development could potentially provide a greater benefit to the receiving water by directing funds to alternative compliance mitigation projects in the stream rather than conventional BMPs on the project site. Within already developed watersheds, the benefit of conventional on-site BMPs may be measurable when compared to the hydromodification effect of existing development.

The Coalition recommends that alternative compliance should be an option accorded equal status with conventional on-site low impact development and hydromodification management practices, and that the permit should provide a simple path or "off-ramp" to alternative compliance. The permit Sections discussed below should be modified to simplify the path to alternative compliance, which would encourage project applicants to pursue this path.

Section E.3.c.(4)(a)(i) of the Administrative Draft permit requires a site-specific and/or design analysis performed by a registered professional engineer, geologist, architect, or landscape architect be provided by the project applicant in order for a Copermittee to approve alternative compliance. The analysis would be required to prove technical infeasibility of retention LID and hydromodification management BMPs. If stream and habitat restoration/rehabilitation projects enhance the beneficial uses within the watershed and provide the same or better level of water quality protection, they should not require proof of infeasibility of on-site retention LID and hydromodification management BMPs.

Section E.3.c.(4)(a)(ii) of the Administrative Draft permit requires a project applicant to demonstrate that retention LID and/or hydromodification management BMPs per Provisions E.3.c.(2) and E.3.c.(3) were incorporated into the project design to the maximum extent technically feasible given the project site conditions. Section E.3.c.(2)(c) requires the project must implement flow-thru LID BMPs for the portion of the design capture volume of runoff that is not retained on-site. Altogether this means the project must implement a mix of conventional retention LID BMPs and flow-thru LID BMPs in addition to alternative compliance. In some cases the benefit of conventional BMPs may be unmeasurable in the context of a watershed that is already experiencing hydromodification, and it would be more beneficial to direct all funds toward stream restoration/rehabilitation (alternative compliance). If stream and habitat restoration/rehabilitation projects enhance the beneficial uses within the watershed and provide the same or better level of water quality protection, projects should not be required to provide a mix of conventional retention LID BMPs and flow-thru LID BMPs in addition to alternative compliance.

The following are recommended changes to the language of the Administrative Draft permit. In addition to the suggested revisions below, the permit should clarify when and how the Regional

Water Quality Control Board will be involved in the review and approval of alternative compliance projects.

PROPOSED CHANGES TO PRIORITY DEVELOPMENT PROJECT PERMANENT BMP PERFORMANCE AND SIZING REQUIREMENTS

Section E.3.c.(2)

In addition to the BMP requirements listed for all development projects under Provision E.3.a, Priority Development Projects must also implement permanent BMPs that conform to performance and sizing requirements.

(2) Retention and Treatment Control BMP Requirements Each Copermittee must require each Priority Development Project to implement BMPs to retain and treat pollutants onsite in the following order or provide alternative compliance pursuant to Provision E.3.c.(4):

Section E.3.c.(4)(a)

(a) Applicability

Priority Development Projects may be allowed alternative compliance if:

(i) ~~The Copermittee reviews and approves site-specific hydrologic and/or design analysis performed by a registered professional engineer, geologist, architect, or landscape architect;~~ The project applicant is required to perform mitigation described in Provision E.3.c.(4)(c) with a net result of at least the same level of water quality protection as would have been achieved if the Priority Development Project had fully implemented the retention LID and hydromodification management BMP requirements under Provisions E.3.c.(2) and E.3.c.(3) onsite; or ~~;~~

(ii) The project applicant demonstrates, and the Copermittee determines and documents, that retention LID and/or hydromodification management BMPs per Provisions E.3.c.(2) and E.3.c.(3) were incorporated into the project design to the maximum extent technically feasible given the project site conditions~~;~~ and the project applicant is required to perform mitigation described in Provision E.3.c.(4)(c) for the balance of the project design capture volume that is not retained on-site.

(iii) ~~The project applicant is required to perform mitigation described in Provision E.3.c.(4)(c) with a net result of at least the same level of water quality protection as would have been achieved if the Priority Development Project had fully implemented the retention LID and hydromodification management BMP requirements under Provisions E.3.c.(2) and E.3.c.(3) onsite.~~

Illicit Discharge Detection and Elimination

The Coalition is concerned about the unanticipated consequences associated with the Permit's definition of "illicit discharges" and the application of that definition to discharges of ground water through subsurface drains. The permit defines an "illicit discharge" as "Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from firefighting activities [40 CFR 122.26(b)(2)]." The permit goes on to define a non-storm water discharge as "All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges and NPDES permitted discharges." Finally, the permit presumes that any flow in a storm drain that occurs seventy two hours after a rain event is a non-storm water flow and thus an illicit flow in violation of the permit and the clean water act. For the reasons described below, this interpretation is neither enforceable nor technically feasible.

The proposed permit requires development and redevelopment projects to retain the 85th percentile storm event on the project site and either use or infiltrate that water. [Citation] The available area where soil is conducive to infiltration within the County of San Diego is extremely limited. These available areas include soil adjacent to river or stream beds, coastal sandy deposits, and valleys (e.g. along San Luis Rey River, beaches, and Mission Valley) and are a small fraction of the County area. Therefore, the parameters in the permit cannot be met on most projects. About 90 percent of the area of San Diego County belonging to Region 9 is likely deemed unfeasible for infiltration (soils Type C and D, see California Geological Survey - Preliminary Surface Geological Materials Map attached hereto).

Normally, these areas where infiltration can be performed are protected for environmental purposes (i.e. canyon drainages where the existing vegetation protects animal and waterway environments) However, in those areas where the native soils are permeable and development or redevelopment are permitted, building ordinances and design specifications require compacted fill at grade for higher density projects. The compacted fill has a reduced void structure and therefore does not facilitate water infiltration. Thus, this infiltration requirement as written pits the goal of minimizing urban sprawl though high density development with an attempt to infiltrate precipitation.

Because of the soil conditions in the geographic area regulated by this permit, much of the infiltrated water does not reach ground water aquifers but rather becomes perched water which tends to collect around subsurface utility lines, foundations and other structures. Unless the perched water can be allowed to escape there is a high probability of damage to critical infrastructure such as roads, utilities necessary to protect the health, safety and welfare of the community.

The Permit offers the alternative of retention and use of water on site. As discussed at the Permit workshops, this alternative is both impractical and likely in violation of California law. First, because of the unique rain patterns in Southern California the scale of any retention structures would be enormous and costly well beyond any benefit to water quality particularly as applied to critical infrastructure projects such as roads and airports. Second, assuming that it is technically feasible to capture the runoff, doing so is likely to contravene other state laws and policies such as protection of wetland habitats[1], and previously granted water rights.[2]

The permit impermissibly assumes that any water flowing in a storm drain seventy two hours after an arbitrary 0.1 inch storm event is non-storm water. First, the natural drainage from even an undeveloped site can take more than seventy two hours in many cases. As a matter of fact, a simple review of USGS precipitation and runoff records in a natural watershed in the area, such a San Mateo Creek, proves without a doubt that wet periods may take more than a month to fully drain natural runoff especially in wet years even for relatively small watersheds. Second, natural precipitation which is infiltrated on site is likely to emerge as perched water and enter the storm drain system day, weeks or months after was originally infiltrated. Third, hydromodification BMPs may take much more than 72 hours to drain, especially for those BMPs were a significant volume of detention occurs under amended soil and the drainage is constrained by a very small orifice. Thus, the seventy two hour definition after a 0.1 inch storm event lacks any scientific bases and is, therefore, both arbitrary and capricious.

For the reasons stated above, the Coalition recommends that the Permit language be modified as follows:

ILLICIT DISCHARGE DETECTION AND ELIMINATION -- NON-STORM WATER DISCHARGES

Section 2.a.1

(1) Discharges of non-storm water to the MS4 from the following categories must be addressed as illicit discharges unless the discharge has coverage under NPDES Permit No. CAG919001 (Order No. R9-2007-0034, or subsequent order) for discharges to San Diego Bay, or NPDES Permit No. CAG919002 (Order No. R9-2008-0002, or subsequent order) for discharges to surface waters other than San Diego Bay:

(a) Uncontaminated pumped ground water;

~~(b) Discharges from foundation drains;~~

~~(c) Water from crawl space pumps; and~~

~~(d) Water from footing drains.~~

[1] By capturing all events smaller or equal than the 85th percentile rain event, the runoff volumes are likely to be less than they were in the predevelopment condition, thereby drying up streams and valuable wetland habitat. The use of a universally accepted rainfall-runoff methodology such as the NRCS Method proves that events smaller than the 85th percentile rainfall event may generate a significant percentage of their volume as a runoff, depending on the soil type, antecedent conditions and vegetation type.

[2] If the amount of water being retained on site exceeds the amount of water retained in pre development condition, the additional water being retained will likely violate the prior appropriation rights and pueblo rights of others.

(2) Discharges of non-storm water from water line flushing and water main breaks to the MS4 must be addressed as illicit discharges unless the discharge has coverage under NPDES Permit No. CAG 679001 (Order No. R9-2010-0003, or subsequent order). This includes water line flushing and water main break discharges from water purveyors issued a water supply permit by the California Department of Public Health or federal military installations. Discharges from recycled or reclaimed water lines to the MS4 must be addressed as illicit discharges, unless the discharges have coverage under a separate NPDES permit.

(3) Discharges of non-storm water to the MS4 from the following categories must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a source of pollutants to receiving waters:

(a) Diverted stream flows;

(b) Rising ground waters;

(c) Uncontaminated ground water infiltration to MS4s;

(d) Springs;

(e) Flows from riparian habitats and wetlands; ~~and~~

(f) Discharges from potable water sources~~.~~;

(g) Foundation and footing drains

(h) Water from crawl space or basement pumps

(i) Hillside/canyon drains

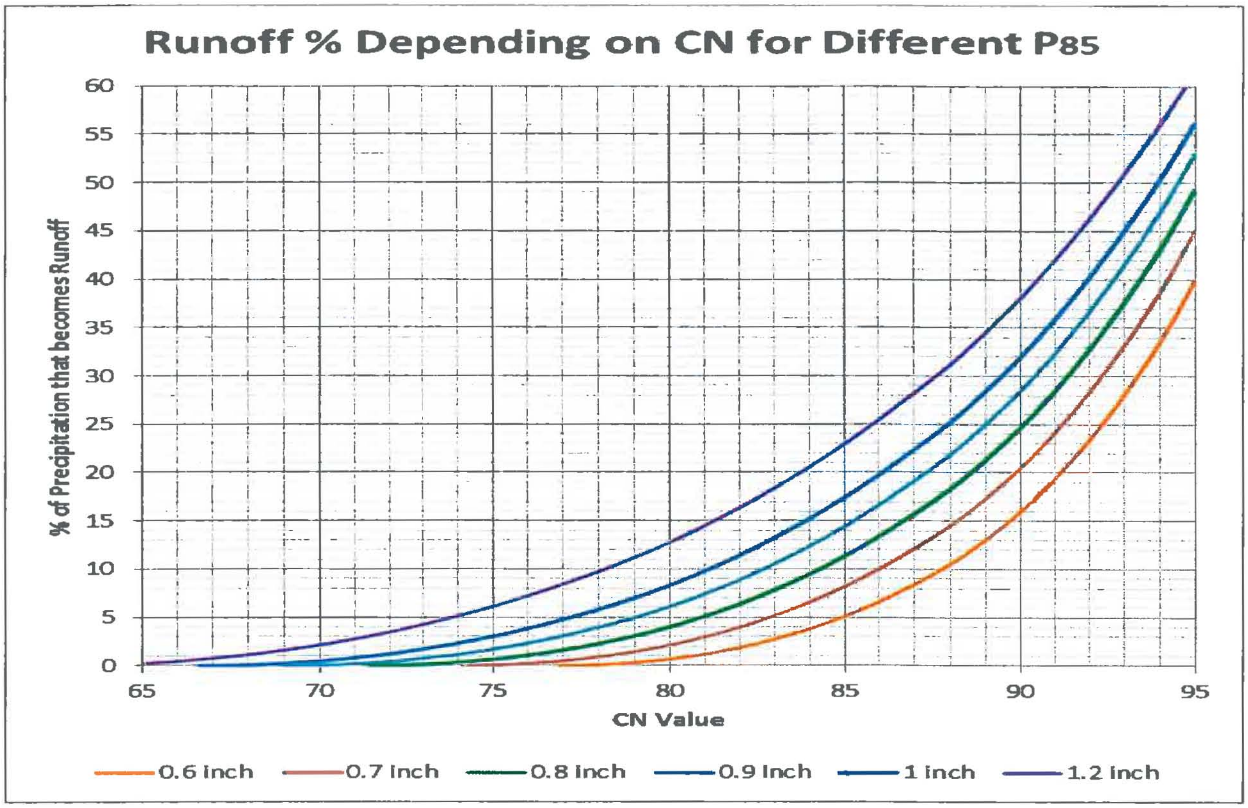
Add to Appendix C – Definitions:

Groundwater – water that occurs beneath the water table in soil and geologic formation that are fully saturated as evaluated by a licensed geotechnical consultant or geologist.

BMP Performance and Sizing Requirements

The Coalition is concerned about the unintended consequences associated with the Permit's definition of LID implementation. We propose a more detailed and clear definition of the volume required for LID, as runoff should not be reduced below the expected runoff produced by the 24 hour – 85th percentile storm in natural conditions (nor the runoff produced by smaller storms in those cases where they indeed generate runoff). In natural conditions, runoff is not only a function of the precipitation event (the main variable) but also a function of the soil type, the natural vegetation type, and the Antecedent Moisture Condition (AMC) before the storm event (degree of saturation of the soil at the beginning of the storm). The current definition also lacks clarity in terms of the intent of the infiltration/retention LID: it is not clear if the volume retained is associated with the first storms of the season, or if it is associated with all storms smaller or equal than the 24 hour – 85th percentile storm event.

In San Diego County, many times the 24 hour - 85th percentile precipitation event (P_{85}) generates runoff in natural conditions, as impervious soils (Type D) are predominant in the County, and poor or fair natural vegetation is common in many areas. The Coalition has prepared a figure that illustrates the percentage of runoff as a function of the Curve Number value (a well-known parameter for hydrologists and engineers to determine runoff via NRCS (SCS) method, which is a function of soil type, vegetation, and AMC), for different values of P_{85}. It is clear that runoff as a percentage of the precipitation can be as small as 0% or as large as 60% depending on the conditions of the natural terrain and the size of P_{85}.



Removal of naturally occurring flows generated by storms similar to the 24 hour – 85th percentile storm for those natural environments where such flows do occur may have negative impacts to existing habitats, as excessive retention may alter the natural water balance. Additionally, excessive retention in soils that have a naturally limited capacity for infiltration increases the risks of failure on vital infrastructure due to lateral water migration.

Also, the intent of the permit to retain the seasonal first flush only (and not all runoff from all events smaller or equal than the 24 hour – 85th percentile event) is not clear in the current language. It is clear in the technical literature (see for example CALTRANS CTSW-RT-05-73-02.6) that first flush treatment has a justification based on the fact that most of the time, in Southern California, treating the first storm of the season may remove built up contamination. Additionally, the first 20% - 40% of the storm volume may remove 50% - 70% of the total contaminant load (excluding sediments and trash). Finally, first flush treatment is justified by the theory of diminishing returns, because

BMPs have a better efficiency removing higher loads, and the cost of treatment is more dependent on the volume of water than on the concentration of contaminants.

For the reasons stated above, the Coalition recommends that the Permit language be modified as follows:

Section E.3.c.(2)(b)

Each Priority Development Project must be required to implement LID BMPs that are sized and designed to retain the volume equivalent to the runoff volume produced from a 24-hour 85th percentile storm event produced in natural conditions. 15 ("design capture volume");

Footnote 15~~: This volume is not a single volume to be applied to all areas covered by this Order. The size of the 85th percentile storm event is different for various parts of the San Diego Region. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its BMP Design Manuals.~~ – Runoff volumes must be calculated using the NRCS Method applying average AMC-II conditions, natural NRCS soil types, and the corresponding natural vegetation that exist or existed prior to development; a different hydrologic method could be approved by the Copermittees. LID is not intended to retain the runoff of all events that generate a runoff volume equal to or smaller than the runoff produced by the 24 hour - 85th percentile storm event; rather to retain the first flush up to the 85th percentile runoff difference. The 85th percentile runoff in natural conditions could be 0 or larger depending on the original natural vegetation and soil type. The time needed to use the totality of volume retained must be compatible with current regulations and water usage in the area. Proper vector control will be required in the retention facility if usage and infiltration of the retained water is expected to exceed 96 hours.

Sediment Supply Requirements

The requirement to address sediment balance is briefly mentioned in the new permit in the form of compensation of the potential sediment supply loss due to the proposal of a priority project. The sediment balance within a watershed (or the establishment of new sediment equilibrium as a consequence of many years of development in multiple watersheds) is an extremely complex issue. The Coalition is therefore very concerned about the lack of direction regarding this issue, the myriad of factors affecting a highly variable phenomena and the possibility of wasting valuable resources preparing a useless Sediment Management Plan for Priority Projects. Such plans lack direction, proper design equations, and basic understanding of the sediment transport phenomena in Mediterranean climates.

Sediment yield and sediment transport are functions of the geology of the terrain, the topography of the watershed and the slope of the main channels, the grain size distribution of the sediments existing in the network of channels, the vegetation, the annual precipitation and its distribution, the state of the vegetation prior to the rainfall (burned, dry, stable), the geometry of the main creeks and channels, the Antecedent Moisture Condition of the soil, the equilibrium conditions of slopes and of the sediments already in the network of channels in terms of stability, the existence of reservoirs or dams and the frequency and duration of their discharges in extreme events, and many other factors.

Trying to accommodate such complex factors into a one-size-fits-all solution is a recipe for disaster. Also, trying to deal with the sediment problem in a typical pre-formatted Sediment Management Plan is not only impractical, but also ineffective and resource-consuming. Sediment transport analysis made in the Tijuana River with 73 years of daily runoff data has proven, for example, that more than 70% of the sediment transport occurs less than 0.15% of the time; sediment analysis in the Santa Clara watershed has generated very similar results, with the added complication of hyperpycnal flow transport (flows with density higher than the salt water due to high sediment content), generating significant geomorphological changes in the watershed.

In addition to the complexity of the problem, many proposed solutions (such as the use of the Lane Relationship) denote the lack of understanding of sediment transport theory, as the Lane Relationship is not a quantitative equation that can be used for design, but a qualitative relation that only can be used for the purposes of discussion about the main factors affecting sediment equilibrium.

An added difficulty is related to the compensation process. It is evident that, even if sediment supply loss can be proven for a given project, adding artificial sediments to a natural creek triggers so many permits and environmental and water quality constraints, that such an alternative is infeasible. Even if the sediment addition is allowed, it is not clear what amount, size distribution, and time-variable sediment injection is required to mimic a naturally variable sediment production and transport condition that is not clearly measured nor understood.

For the above stated reason, the Coalition recommends that the permit language be modified as follows:

Section E.3.C(3)(b)

First option:

Eliminate the language until a more comprehensive and reasonable approach is developed to deal with restoration/rehabilitation projects and measurement of loss of sediment supply:

(~~b)~~ ~~Post-project runoff flow rates and durations must compensate for the loss of sediment supply due to the development project, should loss of sediment supply occur as a result of the development project.~~

Second option:

Incorporate rehabilitation/restoration projects and/or protection of clearly identifiable sediment producing areas as the only feasible alternative to deal with sediment supply:

(b) Post-project runoff flow rates and durations must compensate for the loss of sediment supply due to the development project, should loss of sediment supply occur as a result of the development project. Redevelopment projects that increase pervious areas from pre-development conditions are not subject to such compensation. Compensation should be tied to restoration/rehabilitation projects for downstream creeks and/or funding for protection of identified sediment-supply areas in the watershed.

Thank you for consideration of the Coalition's comments on the Administrative Draft of the Permit. We look forward to working with the Regional Quality Control Board and its staff on improving the final draft with a goal toward achieving improved water quality in harmony with the Regional Board's Basin Plan.

Very truly yours,

Borre Winckel
President & CEO of the BIASD
On behalf of the Coalition

Walsh, Laurie@Waterboards

From: Laurie Madigan <lmadigan@pointcpartners.com>
Sent: Friday, September 14, 2012 12:58 PM
To: Walsh, Laurie@Waterboards
Subject: MS4 Permit letter to Board
Attachments: Gibson.MS4Letter.9.14.12.pdf

Ms. Walsh -

Please accept the attached letter from the San Diego Business Leadership Alliance (BLA) expressing our concern regarding and comments to the currently-proposed MS4 stormwater permit. Thank you for the opportunity to comment and please let me know by response to this email that you recieved out letter.

Yours,

Laurie Madigan
Executive Director
Business Leadership Alliance
lmadigan@sdbla.org

Business Leadership
ALLIANCE
Strengthening the voice of business

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BLA Member Organizations
Asian Business Association
Associated Builders & Contractors
Associated General Contractors
BIOCOM
Building Industry Association of San Diego
Building Owners & Managers Association
California Apartment Association, SD Chapter
California Restaurant Association, SD Chapter
CleanTECH San Diego
CommNexus
CanaMexa
CONNECT
Downtown San Diego Partnership
Engineering & General Contractors Association
Filipino American Chamber of Commerce
Hospital Association of San Diego & Imperial Co's
Klein Leadership Foundation
NAIOP San Diego
NextGen
San Diego Association of Realtors
San Diego County Apartment Association
San Diego East County Chamber of Commerce
San Diego East County EDC
San Diego North Chamber of Commerce
San Diego Port Tenants Association
San Diego Regional Chamber of Commerce
San Diego Regional EDC
San Diego Software Industry Council
San Diego Sports Innovators
San Diego Venture Group
Strategic Roundtable
Tech America
Tijuana EDC
Union of Pan Asian Communities
Urban League of San Diego County

Ex Officio
Junior Achievement
LEAD San Diego
San Diego County Taxpayers Association
San Diego Workforce Partnership
Urban Land Institute, San Diego / Tijuana

September 14, 2012

David Gibson
Executive Director
San Diego Regional Water Quality Control Board
9174 Sky Park Ct., Suite 100
San Diego, CA 92123-4340

Dear Mr. Gibson

The purpose of this communication is to add the voices of our member organizations in opposition to the Draft Administrative MS 4 permit released on April 9th of this year. Our organization includes over forty business organizations throughout the San Diego region, including Chambers of Commerce, Economic Development Corporations and trade organizations that range from CleanTech to the Hospital Association of San Diego and Imperial Counties. Our member organizations in turn represent over 17,000 businesses that provide jobs to San Diego County residents.

On August 4, 2012, our member organizations voted unanimously to support the BIA's coalition comment letter advocating a regional, watershed-based approach to improving stormwater water quality. Our member organizations fully support efforts to reduce pollution to our watershed, beaches and bays, but we believe in a realistic, regional approach rather than a property-by-property approach. The lot-by-lot approach proposed in the draft administrative permit is cumbersome, unrealistic to implement, costly to local business, and will take more than a lifetime to achieve actual positive results.

The BLA supports the BIA coalition comment letter and the solutions presented there. We believe this regional approach is the most wide-reaching, direct and cost effective solution to a problem that has been years in the making, yet minimizes the negative effects that a proscriptive permit will cause to employers and local governments in the region. Please consider incorporating the comments provided by the BIA and supported by the Business Leadership Alliance when revising your Administrative Draft MS4 permit.

Working collaboratively, we can achieve better water quality faster with more reasonable financial impacts to our communities.

Sincerely,

Laurie Madigan

Laurie Madigan
Executive Director

Walsh, Laurie@Waterboards

From: Cindy Cekander <Cindy.Cekander@bbklaw.com>
Sent: Friday, September 14, 2012 3:41 PM
To: Walsh, Laurie@Waterboards
Cc: Devin E. Slaven (dslaven@ci.lake-forest.ca.us); 'Julie Procopio'; 'myahya@cityofalisoviejo.com'; Shawn Hagerty; Andre Monette
Subject: Comments on Administrative Draft San Diego Regional MS4 Permit
Attachments: Comments Adm Draft SD Regional MS4 Permits.PDF

Please find attached the above referenced comment letter. Thank you.

CINDY CEKANDER
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File No. 55136.00511

September 14, 2012

Via E-Mail [lwalsh@waterboards.ca.gov]

David Gibson
Executive Officer
San Diego Regional Water Quality Control Board
Sky Park Court
San Diego CA

Re: Comments on Administrative Draft San Diego Regional MS4 Permit

Dear Mr. Gibson,

The purpose of this letter is to submit limited legal comments[1] on the Administrative Draft Permit ("Draft Permit") issued by the San Diego Regional Water Quality Control Board ("Regional Board") on April 9, 2012. I am submitting these comments on behalf of the Cities of Aliso Viejo, Lake Forest, and Santee. Each City may ultimately be regulated under the Draft Permit, if adopted, and each City therefore has a significant interest in the Draft Permit's development. My limited legal comments on the Draft Permit follow.

I. THE RECEIVING WATER LIMITATIONS PROVISIONS IN THE DRAFT PERMIT NEED TO BE REVISED.

The current language in the Draft Permit (Provision A) might be interpreted to require strict compliance with the water quality standards established by the San Diego Basin Plan and with other receiving water limitations established by other specified documents. The State Board has determined that its mandatory receiving water limitations language "does not require strict compliance with water quality standards." Rather, it is State Board policy that compliance with water quality standards is "to be achieved over time, through an iterative approach requiring improved BMPs." (State Water Board Order WQ 2001-15.) Because, as discussed below, the current language in the Draft Permit has been interpreted by the Ninth Circuit in a manner that is not consistent with State Board policy, it must be revised.

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[1] The Draft Permit raises many other legal issues not addressed in this letter. Additional legal comments will be submitted if and when the Draft Permit is reissued for public review as a Tentative Order. We believe that a meeting with legal counsel for the Regional Board would be beneficial to address the limited issues expressed in this letter as well as the broader legal issues raised by the Draft Permit.

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State Board policy is, and has been, that water quality standards are to be achieved over time through the iterative process. In State Board Order WQ 2001-15, *In the Matter of the Petitions of Building Industry Assoc. of San Diego County and Western States Petroleum Assoc.* (2001), the State Board explained, in the context of its review of the 2001 San Diego MS4 Permit, that:

> In reviewing the language in this permit, and that in Board Order WQ 99-05, we point out that our language, similar to U.S. EPA's permit language discussed in the *Browner* case, does not require strict compliance with water quality standards. Our language requires that storm water management plans be designed to achieve compliance with water quality standards. Compliance is to be achieved over time, through an iterative approach requiring improved BMPs.
>
> (*Id.*, at 7.)

The State Board's explanation that water quality standards were to be achieved over time through the iterative process was set forth in response to BIA's claim that the Ninth Circuit's decision in *Defenders of Wildlife v. Browner* rendered requirements in the San Diego County MS4 Permit unnecessary and contrary to the MEP standard. While retaining the requirement that the San Diego permit prohibit discharges that cause or contribute to violations of water quality standards, the State Board made clear that compliance with this requirement was to be achieved through the iterative process, and that the water quality standards themselves were not hard compliance targets. The State Board thus established a "middle ground" position where MS4 permits had to require compliance with water quality standards but where compliance was to be achieved over time in recognition of the unique nature of stormwater discharges. As the State Board explained:

> We are concerned, however, with the language in Discharge Prohibition A.2, which is challenged by BIA. This discharge prohibition is similar to the Receiving Water Limitation, prohibiting discharges that cause or contribute to exceedance of water quality objectives. The difficulty with this language, however, is that it is not modified by the iterative process. To clarify that this prohibition also must be complied with through the iterative process, Receiving Water Limitation C.2 must state that it is also applicable to Discharge Prohibition A.2. The permit, in Discharge Prohibition A.5, also incorporates a list of Basin Plan prohibitions, one of which also prohibits discharges that are not in

> compliance with water quality objectives. (See, Attachment A, prohibition 5.) Language clarifying that the iterative approach applies to that prohibition is also necessary.
>
> (*Id*., at 8-9.)

The State Board's position on the receiving water limitations language has thus been consistent and clear: water quality standards are to be achieved over time through the iterative process.

Unfortunately, the Ninth Circuit Court of Appeals, in *NRDC v County of Los Angeles*, 673 F.3d 880 (9th Cir., 2011), interpreted the State Board's mandatory language in a manner inconsistent with State Board policy. The Ninth Circuit held that the State Board's mandatory language requires strict compliance with water quality standards and that such compliance was not modified by the iterative process. Because the language in the Draft Permit is modeled after the State Board's language, it must be revised in light of the Ninth Circuit's decision to align the language with the State Board's policy.

Several interested parties have submitted suggestions on how to revise the Draft Permit's language. These submittals include sample language prepared by the City of San Diego, the City of Dana Point, and the California Stormwater Quality Association ("CASQA"). The purpose of this letter is not to advocate for one of these suggested revisions over the others but to bring to the Regional Board's attention the importance of revising the existing requirements, and to remind the Regional Board that *existing* State Board policy is to allow municipal dischargers to attain compliance through the iterative process. The Regional Board should also consider delaying the reissuance of the Draft Permit until after the State Board completes its review of this issue. As the Regional Board is likely aware, the State Board will be holding a workshop on this issue on November 20th of this year.

II. "EFFECTIVELY PROHIBIT" DOES NOT REQUIRE AN ABSOLUTE PREVENTION OF DISCHARGES INTO THE MS4.

The Draft Permit misapplies the provision contained in 33 U.S.C. § 1342(p)(3)(B)(ii) that MS4 permits "include a requirement to effectively prohibit non-stormwater discharges into the storm sewers" and needs to be revised. Section 1342(p)(B)(ii) is simple and straightforward. It requires that the Draft Permit include a single requirement that the dischargers shall effectively prohibit dischargers into their MS4. Compliance with this requirement can be attained through an ordinance, regulation or policy of the discharger that effectively prohibits discharges to the MS4. It is *not* an absolute prohibition such that the dischargers are in violation of their permit if any unauthorized discharge into their system occurs.

This issue was also addressed by the State Board in Order No. WQ-2001-15, *In the Matter of the Petitions of Building Industry Assoc. of San Diego County and Western States Petroleum Assoc.* (2001). The State Board clarified that discharges into the MS4 are allowed, and are to be controlled through the use of BMPs and other control techniques. The State Board held:

> An NPDES permit is properly issued for "discharge of a pollutant" to waters of the United States. (Clean Water Act § 402(a).) The Clean Water Act defines "discharge of a pollutant" as an "addition" of a pollutant to waters of the United States from a point source. (Clean Water Act section 502(12).) Section 402(p)(3)(B) authorizes the issuance of permits for discharges "from municipal storm sewers."
>
> We find that the permit language is overly broad because it applies the MEP standard not only to discharges "from" MS4s, but also to discharges "into" MS4s. . . [T]he specific language in this prohibition too broadly restricts all discharges "into" an MS4, and does not allow flexibility to use regional solutions, where they could be applied in a manner that fully protects receiving waters. It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control. In particular, dischargers subject to industrial and construction permits must comply with all conditions in those permits prior to discharging storm water into MS4s.
>
> (*Id.*, at 9-10.)

The State Board's decision in the *BIA* matter makes clear that the Clean Water Act does not include a blanket prohibition on discharges of non-stormwater into the MS4. Of course, source control and illicit discharge detection play a vital role in an effective MS4 program. However, to the extent the Draft Permit would hold the dischargers liable in the event that any discharge into the MS4 occurs, the Draft Permit exceeds the requirements of the Clean Water Act.

To avoid this outcome, the text of Section II.A of the Draft Permit needs to be revised to remove prohibitions on discharges into the MS4. These references need to be replaced with a requirement and acknowledgement that non-exempt, non-stormwater discharges into the MS4 are to be effectively prohibited by the dischargers, meaning that the dischargers must adopt ordinances and implement programs to control such discharges.

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III. THE CLEAN WATER ACT'S GOALS ARE NOT AN INDEPENDENT SOURCE OF AUTHORITY TO REGULATE MS4 DISCHARGES

Section 101 of the Clean Water Act (33 U.S.C. § 1251) states the goals and the national policy of the Clean Water Act. Section 1251 states:

> The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective it is hereby declared that, consistent with the provisions of his Act
>
> (1) it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;
>
> (2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;

These goals are a cornerstone of the Clean Water Act. They play a key role in the development of water quality standards across the United States. They are not, however, an independently enforceable requirement that may be imposed upon municipal dischargers in their NPDES permits. To the contrary, compliance with the Clean Water Act, and its stated goals, is to be attained through compliance with the permitting and water quality planning programs contained in the Act itself. For MS4 permits, the program is set forth in Section 402(p)(3)(B)(i)-(iii). This portion of the Act, and not the overarching goals of the Act, provides the regulatory structure in which the Regional Board must operate.

The Courts have made it very clear that the goals of the Act are not an independent source of regulatory authority. For example, in *National Wildlife Federation v. Gorsuch* (D.C. Cir. 1982) 693 F.2d 156, the Court held that the general goals of the Act did not trump express provisions of the Act or provide separate regulatory authority. The Court noted that "[c]aution is always advisable in relying on a general declaration of purpose to alter the apparent meaning of a specific provision." The Court further noted that "it is one thing for Congress to announce a grand goal, and quite another for it to mandate full implementation of that goal. Read as a whole, the Clean Water Act shows not only Congress' determined effort to clean up our polluted lakes and rivers but also its practical recognition of the economic, technological, and political limits on total elimination of all pollution from all sources."

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That the goals of the Act do not provide an independent basis for regulation applies with even greater force in the context of MS4 permits. As the Ninth Circuit expressly held in the *Browner* decision (discussed more fully below), the MEP standard applicable to MS4 permits is a "lesser standard" than the standard applicable to other NPDES dischargers. It is thus particularly important to apply the standard adopted by Congress for MS4 discharges, and not to augment that standard by reference to the goals of the Act.

Despite this legal authority, the Draft Permit seeks to directly apply these goals to the dischargers through, among other things, the discharge prohibitions and water quality improvement plan requirements. These aspects of the Draft Permit would require the dischargers to seek restoration opportunities as a matter of permit compliance. Regional Board staff has stated that these requirements are necessary to meet the goals set forth in Section 1251. Nowhere does the Clean Water Act impose the policy statements of Section 1251 directly onto MS4 dischargers.

The NPDES program is a technology based program designed to limit the discharge of pollutants into the waters of the United States. (*Defenders of Wildlife v. Browner* 191 F.3d 1159, 1163 (9th Cir. 1999).) The relevant standard that must be applied to MS4 discharges is the maximum extent practicable standard set forth in 33 U.S.C. § 1342(p). (*Id.*, at 1166-67.) Moreover, the Clean Water Act "unambiguously" does not require MS4 discharges to comply strictly with water quality standards or other more stringent limitations that apply to other NPDES dischargers. (*Id.*, at 1164.) This would include the stated goals set forth at Section 1251, or the water quality standards adopted to achieve those goals. (*Id.*)

For these reasons, the Draft Permit's reliance on the goals of the Clean Water Act as a source of authority to impose restoration or other requirements not required by Section 402(p)(3)(B) on the Co-permittees is misplaced and needs to be revised consistent with the MEP standard. Ultimate achievement of the goals of the Act is a shared value. However, the manner in which those goals are to be achieved has been established by Congress through the MS4 program.

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CONCLUSION

We appreciate the opportunity to submit these limited legal comments on the Draft Permit and would be happy to work with the Regional Board and its legal counsel on resolving these and other legal issues. If you have any questions on these comments, please do not hesitate to contact me.

Very truly yours,

Shawn Hagerty
of BEST BEST & KRIEGER LLP

cc: Mr. Devin E. Slaven (via e-mail)
Mr. Moy Yahya (via e-mail)
Ms. Julie Procopio (via e-mail)

Walsh, Laurie@Waterboards

From: Godby, Kim <kgodby@coronado.ca.us>
Sent: Friday, September 14, 2012 4:18 PM
To: Walsh, Laurie@Waterboards
Cc: Little, Matt; Lyon, Cecilia; Herrera, Maria; 'Rosanna Lacarra'
Subject: City of Coronado Comments on Administrative Draft, Tentative Order No. R9-2012-0011
Attachments: Coronado Comments on Administrative Draft, Tentative Order No. R9-2012-0011.pdf

Ms. Walsh,

Please find attached Coronado's comment letter. Do not hesitate to contact me.

Respectfully,

Kim Godby
Services Supervsior
City of Coronado
619-522-7380

CITY OF CORONADO

101 "B" Avenue
CORONADO, CALIFORNIA 92118-1510

DEPARTMENT OF PUBLIC SERVICES
(619) 522-7380

September 14, 2012

Laurie Walsh, PE
San Diego Regional Water Quality Control Board
9174 Sky Park Court
San Diego, CA 92123

SUBJECT: Comments on Administrative Draft, Tentative Order No. R9-2012-0011

Dear Ms. Walsh:

The City of Coronado (City) appreciates the opportunity the San Diego Regional Water Quality Control Board (Regional Board) has provided to the City and the Copermittees to provide initial comments on the Administrative Draft of Tentative Order No. R9-2012-0011, NPDES No. CAS0109266 for Discharges from the Municipal Separate Storm Sewer Systems (MS4s).

City representatives participated in the expanded public involvement efforts lead by the Regional Board through the focused meetings held between June and September 2012. We found the meetings to be very productive and informative, and an excellent approach that promises to result in an improved permit for the San Diego region. We encourage Regional Board staff to continue the dialogue with Copermittees and stakeholders during the next phase of Permit preparation so that we may provide clarification of permit language or explanations of the recommended changes, as necessary.

The County of San Diego, as the Principal Copermittee for the San Diego Copermittees, has submitted a comment document on behalf of the 21 Copermittees in San Diego County. The comment submittal represents a consensus opinion of the San Diego Copermittees and includes comments prepared by the City. The City may provide additional comments in the future when the proposed requirements are presented in the next draft of the permit and public comment period. The City's goal is to recommend language that best addresses any potential differences in the implementation strategies for the City and its unique population, land use, location, and characteristics.

The City's key areas of concern in the Administrative Draft of the permit are listed below.

1. **Adaptive Management.** The City supports the San Diego Copermittees comments and recommendations for adaptive management strategies as submitted by the County of San Diego. In addition, we respectfully recommend that the Regional Board take into consideration the overall approach to the requirements in the permit to clearly identify and consider the distinction between mandatory provisions and requirements, and procedural

and program management requirements imposed on the Copermittees. For example, the permit should direct Copermittees to develop, implement and manage an existing development management program (as part of their jurisdictional runoff management program or JRMP) that addresses the commercial and industrial sectors. The permit should refrain from listing the specific programmatic requirements to be included in the JRMP, such as, types and frequency of inspections, documentation entries (inspection date, time, weather conditions, etc.). The permit should target the highest level requirements and goals within each provision or program, and allow the Copermittees to define the details of program implementation and operational procedures as part of the development of the JRMP. This example is typical of the current prescriptiveness of the permit requirements associated with the JRMP (Permit Section II.E).

We believe that long-term adaptive management will only be possible if the day-to-day operational procedures are set forth in JRMP, as the programmatic document, that demonstrates compliance with the permit requirements. Otherwise, adaptive management may be stifled by the prescriptiveness of the program implementation requirements and operational procedures, and not allow Copermittees the needed flexibility and responsiveness required to adapt programs to changing water quality and other conditions.

2. **Development Planning.** Numerous modifications to the Administrative Draft have been proposed by the San Diego Copermittees. The City has specific concerns with the following new proposed program requirements: (1) single-family residential redevelopment, and (2) alternative compliance program options.

    a. **Single-family residential redevelopment.** The City is mainly residential land use and experiences numerous redevelopment projects of single-family residences per year. The exclusion of single-family residential properties from the priority development project category will allow for these properties to be improved compared to existing conditions by meeting specific requirements to be defined in the BMP Design Manual without the prohibitive and stringent retention and treatment control BMPs that are known to have existing infeasibility conditions of shallow groundwater levels and other physical constraints. We strongly support the San Diego Copermittees recommendation to exempt single-family residential projects from the priority project category. This will support single-family residential development without the need for costly, extensive engineering and technical documentation of infeasibility for this category.

    b. **Alternative compliance program options.** The City's redevelopment of commercial properties may be severely limited, to the possible detriment of water quality, if land-locked commercial properties are limited in their redevelopment options as a result of stringent priority development project on-site retention, treatment control BMP and off-site mitigation requirements currently presented in the Administrative Draft. We encourage the Regional Board to consider the proposed language that allows alternative compliance program options and to weigh the benefits of redevelopment that includes minimum treatment BMPs compared with very stringent, costly on-site retention and treatment BMPs designed to a specified design capture volume, and/or off-site mitigation that limit redevelopment of properties that currently have no treatment BMPs. Costly,

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comprehensive infeasibility evaluations and documentation should be exempt for redevelopment projects in areas already known for having shallow groundwater and other conditions as long as established minimum LID and treatment BMPs to the MEP are implemented per the BMP Design Manual.

The City looks forward to the next phase of collaborative effort with the Regional Board in the permit reissuance process.

Please feel free to contact me at 619.522.7380 if you have any questions.

Respectfully submitted,

Kim Godby

Kim Godby
Services Supervisor
City of Coronado

cc Matt Little, Director of Public Services
Cecilia Lyon, Management Analyst
Maria Herrera, Management Assistant
Rosanna Lacarra, LaRoc Environmental

Walsh, Laurie@Waterboards

From: Mikhail Ogawa <mikhail@mogawaeng.com>
Sent: Friday, September 14, 2012 12:25 PM
To: Walsh, Laurie@Waterboards
Subject: Administrative Draft Tentative Order R9-2012-0011
Attachments: 120914 DM Admin Draft Letter.pdf

Hi Laurie,

Please find attached a letter regarding the Admin Draft.

Thanks for the good discussions – I really look forward to seeing the tentative order and more discussions.

Have a great weekend!

Mikhail

City of Del Mar

September 14, 2012

Ms. Laurie Walsh
WRC Engineer C
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123

SUBJECT: ADMINISTRATIVE DRAFT MUNICIPAL SEPARATE STORM SEWER PERMIT TENTATIVE ORDER NO. R9-2012-0011

Dear Ms. Walsh:

Thank you for the opportunity to engage in the focused meeting process regarding the Administrative Draft Tentative Order R9-2012-0011. The process has allowed stakeholders to participate in shaping the Public Draft Tentative Order by providing ideas and concepts that support an MS4 Permit that moves us towards our goal – improved water quality and receiving water conditions.

The City of Del Mar has participated in the development of the San Diego County Regional Copermittees comment process. Those comments, including an electronic version of recommended changes (e.g., redline/strikeouts), are to be submitted under separate cover by the County of San Diego on behalf of the San Diego County Regional Copermittees.

The City of Del Mar looks forward to reviewing the Public Draft Tentative Order upon its release and continuing our dialog with Regional Water Quality Control Board staff during the next phases of the permit reissuance process. If you have any questions, please contact me at (619) 994-7074.

Sincerely,

Mikhail Ogawa, P.E.
City of Del Mar
Clean Water Manager

Walsh, Laurie@Waterboards

From:	Cynthia Mallett <CMallett@ci.oceanside.ca.us>
Sent:	Friday, September 14, 2012 4:08 PM
To:	Walsh, Laurie@Waterboards
Cc:	Mo Lahsaiezadeh; Scott Smith
Subject:	Oceanside Comments on Draft MS4 Admin Permit
Attachments:	Oceanside Comments on 2012 Draft MS4 Administrative Permit.pdf

Dear Laurie Walsh,

Please find attached the City of Oceanside's comments on the proposed 2012 Administrative Draft Municipal Separate Storm Sewer (MS4) Permit.

Thank you for considering our comments.

Sincerely,

Cynthia Mallett
Environmental Specialist
Oceanside Clean Water Program
760-435-5807
Urban Runoff Hotline
760-435-5800

September 14, 2012

Ms. Laurie Walsh
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Ms. Walsh,

CITY OF OCEANSIDE COPERMITTEE COMMENT SUBMITTAL ON THE ADMINISTRATIVE DRAFT MUNICIPAL SEPARATE STORM SEWER (MS4) PERMIT (TENTATIVE ORDER NO. R9-2012-0011)

Dear Ms. Walsh,

Thank you for the opportunity to comment on the Administrative Draft Municipal Separate Storm Sewer (MS4) Permit. As participants in the Project Planning Subcommittee, Monitoring and Land Development Workgroups, and focused meetings, the City of Oceanside – Clean Water Program staff have been able to work closely with the San Diego Copermittees, the Regional Water Quality Control Board (Regional Board) staff, and other stakeholders to create a revised Administrative Draft MS4 permit which is sustainable in terms of meeting the "triple bottom line" of integrating the economic, environmental, and social needs in our communities. As a Copermittee the City of Oceanside submits the attached comments for your consideration.

We appreciate the opportunity to participate in the focused meetings and acknowledge the verbal consensus that has been reached on many permit concepts between the San Diego Copermittees and the Regional Board. The County of San Diego, as the lead Copermittee, has submitted Copermittee comments and the City of Oceanside supports these comments, except as follows:

1. Inclusion of Single-Family Development (SFD) in the Priority Development Project (PDP) with Commercial and Industrial uses with a 10,000 square foot impervious area threshold (Section E.3.b.(2)(a)).

   The inclusion of SFD in the same PDP category with Commercial and Industrial development, and the application of a 10,000 square foot impervious area threshold, is not consistent with the separate Residential category and incremental reduction in impervious area cited in preceding the San Diego County MS4 Permits (Orders No. 2001-01 and R9-2007-0001). The two preceding San Diego County MS4 Permits cite SFD PDP as a subdivision of 10 or more units.

To be consistent with the "watershed approach" to regulation, the City of Oceanside submits that the San Diego County watersheds continue the separate categorization of SFD and the PDP be defined as residential development of five (5) or more parcels or condominiums, consistent with a final map. This approach represents a compromise that reflects the incremental reduction in SFD PDP contained in previous San Diego County MS4 Permits.

Implementation of a lower impervious area threshold may reduce land development and redevelopment activities, and negatively affect funding sources that subsidize storm water programs.

2. Onsite retention of the 85th percentile volume (Section E.3.c.(2)(b)).

   Retention of 85th percentile volume has the potential to negatively affect habitat located in and adjacent to receiving waters by creating reduced runoff conditions that mimic a drought state. A review of historic rainfall data indicates that more than two-thirds of annual rainfall events do not meet the 85th percentile volume. The requirement to capture low-flow runoff has the potential to negatively affect habitat quality and may reduce the size of sensitive habitats.

3. Application of the "Naturally occurring pre-development condition" to Hydromodification Management Plan (HMP) calculations (Section E.3.c.(3)(a)).

   The proposed naturally occurring condition requirement will remove the incentive to redevelop existing sites by significantly increasing development costs. The application of the "naturally occurring pre-development condition" to HMP calculations is not consistent with the goals of the HMP, does not foster improvements in water quality, and conflicts with the recently implemented five (5) year HMP monitoring plan. Whereas, redevelopment of existing sites promotes improved water quality by decreasing pre-project impervious area, requires the implementation of Low Impact Development (LID) practices, and necessitates the installation of HMP facilities. Without redevelopment of existing projects, receiving waters will remain subject to unmitigated discharges.

   The adoption of a naturally occurring pre-development condition may cause a reduction in the redevelopment of existing sites and negatively affect funding sources that subsidize storm water programs.

The Administrative Draft MS4 Permit indicates the "San Diego Water Board recognizes that the degradation of water quality and impacts to beneficial uses of the waters in the San Diego Region [have] occurred over several decades" and "further recognizes that a decade or more may be necessary to realize demonstrable improvement to the quality of waters in the Region." The Permit "includes a long term planning and implementation approach that will require more than a single permit term to complete."

The City of Oceanside supports the long term planning and implementation approach to improving water quality. Support of this approach is reflected in the proposed changes to the Administrative Draft MS4 Permit. The proposed changes discussed in this correspondence continue to represent a reduction in possible impacts due to development, as compared to previous Permits, and provides incentive to foster improvement in water quality through the redevelopment of existing unmitigated sites.

The City of Oceanside – Clean Water Program extends its gratitude to the Regional Board for providing a forum for open discussion as part of the permit reissuance process. We respectfully submit these comments for your consideration. Please contact me if you have questions.

Sincerely,

M. A. Lahsaiezadeh

Mo Lahsaie, Ph.D., REHS, Environmental Officer
Water Utilities Department

cc: Scott O. Smith, PE, PLS, City Engineer, Development Services Department
Billy Walker CPSWQ, QSD, Env. Asst, Development Services Department

THE CITY OF SAN DIEGO

September 14, 2012

Mr. David Gibson
Executive Officer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Subject: Administrative Draft Tentative Order No. R9-2012-0011

Dear Mr. Gibson:

Thank you for the opportunity to comment on the Regional Water Quality Control Board's Administrative Draft San Diego County Municipal Storm Water Permit (Tentative Order No. R9-2012-0011, hereinafter referred to as "Draft Permit"), released April 9, 2012. The City of San Diego (City) is committed to protecting and improving water quality in the San Diego Region. The Draft Permit represents a significant opportunity for the City to more efficiently achieve our storm water quality goals by facilitating a paradigm shift from prescriptive requirements to outcome-based goals that allow for innovation through adaptive management. Regional Board staff, including David Barker, Eric Becker, Wayne Chiu, Laurie Walsh, and Christina Arias should be commended for their efforts in meeting with the City and other Copermittees to better understand our opportunities and constraints. We are hopeful that together we are helping to improve the Draft Permit.

Attached to this letter are the City's requested changes to the Draft Permit with supporting rationale (see Attachments 1 and 2). Key recommendations in the City's comment table are summarized below.

- *Direct Regional Board staff to work with the Copermittees to update the Receiving Water Limitations language.* A key area of input requested by your staff during the review process is how the Draft Permit can be written so that jurisdictions can more clearly articulate their funding needs. The City believes the primary way is to ensure that compliance is clearly defined through implementation requirements. However, the "cause or contribute" language in Provision A has been judicially interpreted to prohibit any discharge from an MS4 outfall which exceeds a receiving water standard. Copermittees now face immediate and substantial liability if there is a single exceedance, irrespective of the City's efforts adhering to the Draft Permit's implementation requirements. This lack of a clear compliance pathway will make funding our compliance implementation programs and meeting our shared storm water quality goals more difficult. Specifically, required implementation activities would have to compete for limited funding with the need to respond to every exceedance, in order to avoid liability. To facilitate continued discussions with your staff, the Copermittees have proposed a redline of Provision A that remedies this problem and achieves the stated intent of Regional Board staff to support adaptive management and priority setting based on water quality needs. In addition, the City recommends incorporating any updated language that is developed as a result of the State Board's Receiving Water Limitations Language workshop scheduled for November 20, 2012.

- *Revise the land development requirements to provide more opportunities to comply on-site.* The City recommends an approach that encourages applicants to comply on-site, rather than offering off-site mitigation as the first compliance option. For example, the City supports encouraging implementation of Low Impact Development practices on development sites by providing alternative design standards that are reasonable and achievable on-site (see proposed revisions to Section II.E.3).

- *Replace the monitoring requirements in the Draft Permit with the strategic monitoring approach developed collectively by the Copermittees.* The Copermittees' approach will more efficiently and effectively address critical questions necessary to adaptively manage the City's programs and realize our storm water quality goals.

We appreciate this opportunity to share our comments and look forward to continued discussions in finding ways to improve and protect water quality. If you have any questions please contact Drew Kleis, Program Manager at (858) 541-4329.

Sincerely,

Kris McFadden

Kris McFadden
Deputy Director

KM:dk

Attachments: 1. City of San Diego comment table
2. City of San Diego proposed changes to Draft Permit

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
Cover Page	1-2	Cover Page	The Copermittees request clarification that waste discharge requirements are for their respective jurisdictions, in order to limit the entire permit to within each Copermittee's jurisdictional boundaries and preempt any such clauses that would extend requirements beyond the Copermittee's jurisdiction.	**As shown in the attached revised Permit, revise the cover page as follows:** "The San Diego County Copermittees in Table 1a are subject to waste discharge requirements <u>within their respective jurisdictions</u> set forth in this Order" This change is also requested for other sections of the Permit, including Provision A. Add the same language for Orange and Riverside County Copermittees. **Also make this change to the cover page:** This Order provides permit coverage for the Copermittee discharges described in Table 2. <u>"Copermittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.26(a)(3)(vi).</u>
General Comment	Multiple	Multiple	The term "prohibit" is broader than Clean Water Act requirements, and should be changed to "effectively prohibit." CWA section 402(p) (3) (B) (ii) reads as follows: (B) Municipal Discharge – Permits for discharges from municipal storm sewers – (ii) shall include a requirement to <u>effectively prohibit</u> non-stormwater discharges into the storm sewer; (<u>Emphasis</u> added)	**Revise language throughout the Permit to read as follows:** Change "prohibit" to "effectively prohibit."

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
			The provision does not provide any reference to exemptions. Rather the section may be read that a permit shall "effectively prohibit non-stormwater discharges" but may exempt certain discharges that are not significant sources of pollutants from the prohibition. The section does not require a full prohibition but rather an effective prohibition. The operative word is "effective". The more precise and correct finding/provision should note that non-stormwater discharges are effectively prohibited (per 402 (p) (3) (B) (ii)). However discharges that are not significant sources of pollutants are exempted from the prohibition. In a practical sense the use of word "effective" provides flexibility to assess the impacts of relatively benign discharges such as landscape irrigation, air condition condensate, individual car washing, and non-emergency fire fighting flows or non-anthropogenic sources before instituting a prohibition.	
General Comment	Multiple	Multiple	Jurisdictional boundaries only partially define the geographic extent of areas where Copermittees can control, reduce, or prohibit stormwater pollutants. The other component that must be incorporated into the Permit language is ownership/operation. There can be multiple MS4s within a municipal boundary (e.g., Phase 2 MS4s), and some MS4 areas are neither owned nor operated by Copermittees, preventing them from controlling pollutants or flows. The	**Clarify/Make distinction between different MS4 classifications:** Throughout the Permit replace "MS4s" with "MS4s owned and operated by the Copermittee".

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
			Permit should clarify that Permit requirements apply to MS4s owned and operated by the Copermittees. Other MS4 permits in California, including the Los Angeles County MS4 permit, include the "owned and operated" distinction.	
I. FINDINGS				
8	2	Jurisdiction	40 CFR 131.10(a) is applicable to waters of the U.S. for beneficial use designations. Application to waters of the state, which the Regional Board has asserted includes the MS4, beyond beneficial use designations is too broad of an interpretation. It could mean that, for example, storm drain inlet drainage inserts are no longer allowed as they would be a TCBMP in a waters of the state. This finding also conflicts with other Provisions requiring TCBMPs.	**As shown in the attached revised Permit, revise the sentence as follows**: Treatment control best management practices (BMPs) must not be constructed in waters of the U.S.
9	2	Discharge Characteristics and Runoff Management	Discharges may contain waste or pollutants, but it should not be presumed that they necessarily always contain waste or pollutants.	**As shown in the attached revised Permit, revise the section to:** "Discharges from the MS4s <u>may</u> contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the state. A discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. Storm water and non-storm water discharges from the MS4s <u>may</u> contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Basin Plan."
11	3	Discharge Characteristics and Runoff Management	This finding does not apply to developed area that is subject to SUSMP or HMP requirements. These requirements are specifically designed to reduce loads.	**As shown in the attached revised Permit, revise the section to:** "Therefore, runoff leaving a developed area <u>not subject to SUSMP or HMP requirements</u> contains greater pollutant loads and is significantly greater in runoff volume velocity, and peak flow rate than pre-development runoff from the same area."
II. PROVISIONS				
A. Prohibitions and Limitations				

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
A	9	Prohibitions and Limitations	The goals of Provision A are multiple, and the Copermittees appreciate the Regional Board's mission to "protect, preserve, enhance, and restore" water quality. For NPDES compliance purposes, however, a concise goal statement that is more central to MS4 permitting is requested. This goal statement provides context to several requested revisions to subsequent provisions. This goal statement is consistent with the intent of the permit program established by Section 402(p)(3)(B) of the Clean Water Act.	**As shown in the attached revised Permit, revise the second sentence of the introductory paragraph of Provision A to:** "The goal of this provision is to ~~protect, preserve, enhance, and restore the~~ address the impacts of MS4 discharges so that such discharges do not impair water quality and designated beneficial uses of waters of the U.S."
A	9	Prohibitions and Limitations	The proposed Prohibitions and Limitation provisions may be construed as stand-alone provisions that could expose the Copermittees to state and federal enforcement actions, as well as to third party actions under the federal Clean Water Act's citizen suit provisions. Consistent with the recent 9th Circuit Court of Appeal decision, each provision of the permit could be read separately so if provision A.2.a states that "the MS4 must not cause or contribute to a violations of a water quality standard" then that is the stand-alone provision, and the accompanying language found in A.4 (Compliance with Discharge Prohibitions) regarding compliance may be considered irrelevant. As such, a clear linkage between the compliance provisions and the prohibitions, receiving water limitations, and effluent limitations must be	**As shown in the attached revised Permit, insert the following sentence at the end of the introductory paragraph of Provision A:** "The process for determination of compliance with the Discharge Prohibitions (A.1), Receiving Water Limitations (A.2), and Effluent Limitations (A.3) is defined in Provision A.4." In this manner, Provisions A.1, A.2, and A.3 are clearly linked to A.4, as opposed to being standalone provisions.

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
			established.	
A.1.a (and throughout)	9	Prohibitions and Limitations	Discharge prohibitions in this section should be limited to discharges from MS4s owned and operated by a Copermittee into waters of the U.S.	"Discharges ~~into and~~ from MS4s owned and operated by a Copermittee "
A.1.a (and throughout)	9	Prohibitions and Limitations	Provision A.1.a prohibits certain discharges into waters of the state. NPDES permits under the authority of the Clean Water Act regulate discharges into navigable (surface) waters. Expanding the scope of the Discharge Prohibitions to waters of the state would expand the scope of the Permit to protect groundwater. While the Board has legal authority to protect groundwater under Porter-Cologne, this exceeds federal requirements and would represent an unfunded mandate. Other MS4 permits in California, including the Los Angeles County MS4 permit, protect "waters of the United States." Also, see comment A.1.a.	Throughout the Permit, change "waters of the state" to "waters of the United States", where applicable (and throughout the Administrative Draft). The change for Provision A.1.a is as follows:
A.1.a	9	Prohibitions and Limitations	The Discharge Prohibitions do not establish a sufficient linkage with approved compliance schedules for TMDLs that have been incorporated into the Basin Plan. TMDLs adopted within the region include a schedule to provide MS4 Permittees the time necessary to develop and implement a plan to achieve water quality standards in impaired waters. The compliance schedules for effective TMDLs have been incorporated into Attachment E and language is included in the RWLs provisions (A.2.c.) and the Effluent	**As shown in the attached revised Permit:** "…in receiving waters of the United States ~~state~~ are effectively prohibited, unless the Copermittee is addressing the discharges through Provision A.1.e or A.4 through the process set forth in Provision A.4."

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			Limitations provisions (A.3.b.) pointing to the TMDL compliance schedules. However, by not including similar language within Discharge Prohibitions, these provisions could result in violations of the permit even though the implementation compliance dates have not yet passed. Without modification, the Discharge Prohibitions *conflict* with TMDL compliance schedules. Language should be included to clarify that in instances where a TMDL is in place, or a TMDL is being developed, the permittees shall achieve compliance with these provisions as outlined in Attachment E (Specific Provisions for Total Maximum Daily Loads).	
A.1.c	9	Prohibitions and Limitations	See comment A.1.a	Add the following: "…included in Attachment A to this Order<ins>, unless the Copermittee is addressing the discharges through Provision A.1.e or A.4 through the process set forth in Provision A.4.</ins>"
A.1.d	9	Discharge Prohibitions	The first sentence seems to conflict with the remainder of the paragraph and may create a conflict with the State Water Board's policy if not clarified. The revised language clarifies authorized and unauthorized discharges to the ASBS and limits the jurisdiction. Furthermore, this Discharge Prohibition covers MS4 impacts on ASBS, and thus the Receiving Water Limitation is unnecessary and conflicting.	**As shown in the attached revised Permit, revise A.1.d as follows:** "~~Discharges from MS4s to ASBS are prohibited.~~ Stormwater discharges-from the City of San Diego's MS4 to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's MS4 to the Heisler Park ASBS are authorized under this Order subject to the Special Protections contained in Attachment B to State Water Board Resolution No. 2012-0012 applicable to these discharges, included in Attachment A to this Order. <ins>All other discharges from MS4s to ASBS are prohibited, unless authorized by a subsequent order.</ins>" In addition, A.2.c should be deleted.
	9		See comment A.1.a	**Add new part 1.e as follows:** "For discharges associated with

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
A.1.e (new)		Prohibitions and Limitations		water body pollutant combinations addressed in a TMDL in Attachment E of this Order, the affected Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions).
A.2.a	9-10	Receiving Water Limitations	The receiving water limitations language contained in Provision A raises significant legal and policy issues that require further discussion and revision. The receiving water limitations language in Provision A generally follows the language required by the State Board's precedential Order WQ 99-05. In the State Board's precedential Order WQ 2001-15, the State Board determined that the mandatory receiving water limitations language found in Order 99-05 "does not require strict compliance with water quality standards." Instead, the State Board concluded that compliance with water quality standards is "to be achieved over time, through an iterative approach requiring improved BMPs." Despite this policy statement from the State Board, in 2011, the 9th Circuit interpreted the State Board's mandatory language in a manner that requires strict and immediate compliance with water quality standards. The State Board has recently scheduled a workshop for November 20 to address the receiving water limitations language. The San Diego Co-Permittees support revisions to the receiving water limitations language that align the language with the State Board's policy that compliance with water quality standards is "to be achieved over time, through an iterative approach	**To provide a more direct tie in between Provision A.2.a, TMDL compliance schedules and A.4.a. the following language is proposed, as shown in the attached revised Permit**. Provision A.2.a should be revised to make clear that compliance with the Receiving Water Limitations is determined by compliance with the iterative process. The City of San Diego has proposed redline language, however, at this time in anticipation of the State Board's forthcoming November workshop on this important issue, which will presumably inform the development of state-wide language, the City of San Diego requests the Regional Board staff coordinate with the City and the Copermittees to develop updated RWL language.. The proposed language provided in the strikeout version of Provision A.1.a provides an example of an approach for addressing this issue in Provision A.2.a.

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			requiring improved BMPs." The redlines submitted with these comments are not designed to address all the issues raised by this conflict. Instead, the redlines address, for this draft permit, how compliance with water quality standards will be achieved for water bodies covered by an adopted TMDL or covered in the WQIPs. The City of San Diego will participate in the State Board process regarding the larger issues involving the receiving water limitations language, and encourage the Regional Board to do so as well. Without modification to the RWLs, they conflict with TMDL compliance schedules. Language should be included to clarify that in instances where a TMDL is in place, or a TMDL is being developed, the permittees shall achieve compliance with these provisions as outlined in Attachment E (Specific Provisions for Total Maximum Daily Loads). Without the requested change, the RWLs put the municipalities in immediate and ongoing non-compliance with the permit, as opposed to incorporating TMDL implementation schedules.	
A.2.a.3.b	10	Receiving Water Limitations	The Sediment Quality Control Plan applies specifically to bays and estuaries and only and subtidal surficial sediments that have been deposited or emplaced seaward of the intertidal zone. Many Copermittees do not discharge to the intertidal zone. Text must	**As shown in the attached revised Permit, revise A.2.a.3.b as follows**: "Sediment Quality Control Plan which includes the following narrative objectives <u>for bays and estuaries:"</u>

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			be revised to clarify that this does not apply to inland MS4 discharges.	
A.2.a.4.b.	10	Receiving Water Limitations	Footnote to A.2.a.4.b requires Copermittees to not cause or contribute to the more stringent of a water quality objective or a CTR criterion. Instances may exist where it has been determined that one or the other is more appropriate given site specific conditions or analysis (i.e., a TMDL has been established).	**As shown in the attached revised Permit, attach the following to the end of footnote 3 regarding the California Toxics Rule**: "unless a previous regulatory action (i.e., TMDL) has specified otherwise."
A.2.b	10	Receiving Water Limitations	See Comment A.2.a	**As shown in the attached revised Permit, add the following as A.2.b**: "For receiving water limitations associated with a water body pollutant combination addressed in a TMDL in Attachment E of this Order, the Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions)."
A.3	11	Effluent Limitations	Two types of effluent limitations, technology-based and water-quality based, are described in A.3, which should be reflected in the Permit.	**As shown in the attached revised Permit, add subsections (a) for Technology-based and (b) and Water Quality-based Effluent Limitations, respectively.**
A.3	11	Effluent Limitations	Similar to the WQBELs, the technology-based effluent limits should be linked to Provision A.4 as described in the comment A.3 below.	**As shown in the attached revised Permit, please add the following language to the end of the sentence that ends with "must be reduced to the MEP":** "reduced to the MEP~~.~~, through timely implementation of control measures and other actions as specified in Provisions B and E as described in Provision A.4."
A.3	11	Effluent Limitations	The effluent limitations and compliance with limitations should be more accurately linked to Attachment E; currently the language reads in a manner that is stand-alone from Attachment E. Instead, the language should reference Attachment E	**As shown in the attached revised Permit, revised the WQBEL language in A.3(b) as follows to better reflect the role of Attachment E:** "For a water body-pollutant combination addressed in a TMDL in Attachment E of this Order, ~~Pollutants~~ pollutants in discharges from MS4s must be reduced to comply with ~~any~~ effluent

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			and the compliance determination language the Copermittees propose for inclusion therein. The language should say "as described in" Attachment E rather than "in." In addition, compliance with effluent limitations should be linked to Provision A.4 as described in the next comment.	limitations expressed as WQBELs required to meet the WLAs established for ~~the~~ those TMDLs as described in Provision A.4 and Attachment E to this Order, pursuant to the applicable TMDL compliance schedules."
A.4	11	Compliance with Discharge Prohibitions and Receiving Water Limitations	The intent of Provision A.4 is to determine compliance with A.1, A.2, and A.3 through the Water Quality Improvement Plan(s). As such, the title should reference all three Provisions. References should also be added in the introductory paragraph for clear linkage with the applicable Provisions (A.1, A.2, A.3, B, and F.1).	Change Provision A.4 title to : "Compliance with Discharge Prohibitions, Receiving Water Limitations, and Effluent Limitations" Modify language as follows: "Each Copermittee must comply with the discharge prohibitions (A.1), ~~and~~ receiving water limitations (A.2), and effluent limitations (A.3) of this Order through timely implementation of strategies, control measures, and other actions as specified in Provisions B and E of this Order, including any modifications. The Water Quality Improvement Plans described in Provision B shall be designed to achieve compliance with the discharge prohibitions, receiving water limitations, and effluent limitations. Copermittees shall be considered in compliance with A.1, A.2, and A.3 unless the Regional Board has denied approval of a Water Quality Improvement Plan or subsequent update as described in Provisions B and F.1."
A.4.a.1	11	Compliance with Discharge Prohibitions and Receiving Water Limitations	Provision A.4 describes the iterative process for MS4s to respond to exceedances of water quality standards that persist. However, the language in A.4 appears too broad and suggests the Copermittees should revise their WQIPs even in cases when (1) TMDL pollutant WLAs are exceeded but the TMDL compliance date has not yet occurred and (2) non-TMDL pollutant RWLs are exceeded and the pollutant is a	**As shown in the attached revised Permit, modify language as follows:** "For pollutants that are not in the process of being addressed via specific, scheduled actions in the Water Quality Improvement Plan, u ~~U~~pon determination by either the Copermittees or the San Diego Water Board that discharges from the MS4 are causing or contributing to an exceedance of an applicable water quality standard…"

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
			WQIP priority but the BMP implementation schedule described in the WQIP has not yet been exhausted. In these two cases, the water quality standards exceedances are "expected" and no WQIP update is needed; instead the Copermittees should simply complete the implementation of actions identified in the WQIP.	**Insert a new A.4.a.(2) as follows:** "For pollutants in the process of being addressed via a specific, scheduled program in a Water Quality Improvement Plan, the Copermittee(s) shall continue to implement that program as described in the Water Quality Improvement Plan approved by the Regional Board."
A.4.a.1	11	Compliance with Discharge Prohibitions and Receiving Water Limitations	Provision A.4.a.1 states that in the case of persistent water quality standard exceedances, Copermittees shall update their WQIPs in their Annual Reports, "unless the San Diego Water Board directs an earlier submittal." This provision should also consider the scenario where a TMDL is in the process of being developed. In this case, the Copermittees should update their numeric targets/goals to reflect the TMDL WLAs. However, until the TMDL is adopted, the Copermittees have no TMDL WLAs on which to base their numeric goals.	**As shown in the attached revised Permit, add an exception to Provision A.4.a.(1) to acknowledge forthcoming TMDLs, as follows:** "…the Copermittees must submit the following updates to the Water Quality Improvement Plan required under Provision B as part of the Annual Report required under Provision F.3.b<u>, or Water Quality Plan Update Provision B.5.a,</u> unless the San Diego Water Board <u>either:</u> <u>1)</u> directs an earlier submittal; <u>or 2) allows for the adoption of a forthcoming TMDL to establish wasteload allocations that will form the basis of revisions to the Water Quality Improvement Plan</u>:"
A.4.a.1.b	11	Compliance with Discharge Prohibitions and Receiving Water Limitations	Language clarification.	**As shown in the attached revised Permit, revise wording, as follows:** "~~Additional w~~ <u>W</u>ater quality improvement strategies (<u>e.g.,</u> BMPs, retrofitting projects, stream and/or habitat rehabilitation, restoration projects<u>, etc.</u>)"
A.4.a.1.e and A.4.a.1.f	12	Compliance with Discharge Prohibitions and Receiving Water Limitations	Copermittees need more than 30 days to update and implement their plans. The San Diego Water Board should also provide a timeline for providing comments and requesting modifications. The timeline should be reasonable and consistent with the Copermittee implementation timeline. Most importantly, the revision process should be identical to the modification and submission	**As shown in the attached revised Permit, revise section A.4.A.2., as follows:** Strike the current language in sub-bullet (e) and replace it, as follows: (e) "<u>As described in Provision B.6, Copermittees must submit requested modifications to the Water Quality Improvement Plan either in the Annual Report required pursuant to Provision F.3.b,</u>

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
			process described in Provision B.	<u>or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b</u>." Replace the language in sub-bullet (f) with language that is identical to the language in Provision B, as follows: (f) "<u>As described in Provision B.6, upon</u> ~~Within 30 days of the~~ San Diego Water Board determination that the update to the Water Quality Improvement Plan meets the requirements of this Order, the Copermittees must <u>submit requested modifications to the jurisdictional runoff management programs either in the Annual Report or Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b.</u>" Strike the remaining language in (f).
A.4.b	12	Compliance with Discharge Prohibitions and Receiving Water Limitations	Provision A.4.b notes that should water quality exceedances continue to occur even after the MS4 has engaged in the "iterative" process and is implementing enhanced water quality improvement strategies, the MS4 must still redo the "iterative" process unless the Regional Board decides otherwise. This approach is not consistent with other stormwater permits (e.g., the recent Caltrans permit) in which the Copermittee does not have to reinstitute the iterative process unless directed to do so by the Regional Board. This distinction is important, as the WQIP process will be underway throughout the course of the Permit, and being required to "re-iterate" when a process is already underway to address exceedances is unreasonable.	**To match the language in Order 99-05, as shown in the attached Revised, replace A.4.b with the following language:** "<u>So long as the Copermittees have complied with the procedures set forth above and are implementing the Water Quality Improvement Plan(s) approved by the Regional Board, the Copermittees do not have to repeat the same procedure for continuing or recurring exceedances of the same discharge prohibitions, effluent limitations, and receiving water limitations unless directed to by the San Diego Water Board</u>. "
A.4.c	12	Compliance with Discharge Prohibition and	The Copermittees envision WQIPs as the foundation for a BMP-based compliance	**Remove Section A.4.c.**

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		Receiving Water Limitations	approach for the Discharge Prohibitions and RWLs. However, the language in the Provision A does not clearly link compliance with the iterative process set forth in the WQIPs. In essence, the language suggests that even if Copermittees expend significant resources to develop and fully implement WQIPs that are progressing towards attainment of water quality standards, they may still be found to be out of compliance for single exceedances. The iterative process is a fundamental aspect of MS4 programs, as envisioned by State Water Board Order 99-05 and later reconfirmed in Order WQ 2001-15 (BIA Order), and is the mechanism by which MS4 Permittees should <u>demonstrate</u> compliance (i.e., implementation of the iterative process equals compliance). The WQIPs now provide a mechanism to "raise the bar" with regards to the detail and quantitative analyses used to identify pollutant sources, implement BMPs to address those sources, and increase the number or size of BMPs until water quality standards are attained. However, as Provision A.4 is written, the envisioned strategic compliance process falls short, and the WQIPs are simply documents that do not appear to have a meaningful linkage to MS4 compliance. An unintended but potentially significant consequence of this compliance uncertainty is that Copermittees will be faced with	

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			increased difficulty successfully securing program funding because even substantial increases in funding would not eliminate the potential for non-compliance.	
B. Water Quality Improvement Plans				
B	13	Water Quality Improvement Plans	Similar to comments regarding the goal statement in Provision A, the Copermittees request a revision to the WQIP goal statement. A concise goal statement that is more central to MS4 permitting is requested. This goal statement provides context to several requested revisions to subsequent provisions.	**As shown in the attached revised Permit, revise the second sentence of the first paragraph of Provision B as follows:** "The goal of the Water Quality Improvement Plan is to 1) effectively prohibit non-storm water discharges into the MS4s, 2) reduce pollutants in storm water discharges from the MS4s to the MEP, and 3) support the attainment and reasonable protection, preservation, and enhancement ~~and restoration~~ of water quality and designated beneficial uses of waters of the state."
B	13	Water Quality Improvement Plans	Similarly, the Copermittees request revisions to the required/critical elements of the WQIPs. These elements reflect several requested revisions to the WQIP process (e.g., B.2), described below.	**As shown in the attached revised Permit, revise the second paragraph of Provision B as follows:** The Copermittees must develop Water Quality Improvement Plans for each Watershed Management Area that 1) prioritize water quality ~~issues~~conditions resulting from the Copermittee's MS4 discharges to and from the MS4s within each Watershed Management Area, 2) identify MS4 pollutant sources and other stressors associated with ~~those~~the water quality priorities, 3) define numeric ~~targets~~goals and schedules to ~~achieve improvement of~~address water quality priorities, 4) describe water quality improvement strategies to achieve numeric ~~targets~~goals, and 5) develop and execute a coordinated monitoring and assessment program to facilitate adaptive management of the Water Quality Improvement Plans and ~~determine progress towards achieving improved water quality~~those goals.
B	13	Water Quality	The Copermittees envision the WQIPs as the foundation for a BMP-based compliance	**As shown in the attached revised Permit, insert the following into the first paragraph of Provision B:**

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		Improvement Plans	approach for the Discharge Prohibitions and RWLs. However, language needs to be added to Provision B to provide a clear linkage between Provision A and B. Note that Provision A.2 is excluded to acknowledge the State's November workshop regarding Receiving Water Limitations. However, it seems logical that RWLs would be included, and we request that Regional Board staff coordinate with the Copermittees to develop updated RWL language.	Therefore, implementation of the WQIPs also provides the basis for complying with Provisions A.1 and A.3, as described in Provision A.4.
B	13	Water Quality Improvement Plans	It is unclear whether the 12-month timeline identified in the third paragraph of Provision B applies to the development of the WQIP or the implementation of the BMPs identified in the WQIP. It would appear that the provision requires that the MS4s must *implement* all the requirements (including BMPs) of Provision B within 12 months of permit adoption.	**As shown in the attached revised Permit, revise the last introductory paragraph of Provision B, as follows:** The Copermittees must submit Water Quality Improvement Plans for public review and Regional Board Executive Officer review and approval per the schedule outline in Provision B.
B	13	Water Quality Improvement Plans	The development of a WQIP will require at a minimum of 18 months and BMP implementation will likely be staggered over a certain time frame. Once the permit is adopted, Copermittees will begin the planning process. However, Copermittees must have at least one full fiscal year budgeting cycle within which to seek additional funding to implement the WQIP from our governing bodies (i.e., City councils and County supervisors). Thus the more reasonable time schedule is to require	**See the proposed changes to the last paragraph of the opening section of Provision B in the attached revised Permit.** Also see the new Section B.6, which combines the submittal, modification, and implementation requirements. 1. The complete WQIPs and corresponding jurisdiction measures are submitted within 18 months. (B.6.a) 2. WQIP implementation is initiated at the beginning of the next fiscal year. (B.6.a) 3. JRMPs are modified in accordance with WQIP

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			the development of the WQIP within 18 months and the implementations of the BMPs to occur consistent with the final approved WQIP.	modifications (B.6.b)
B.1	13-14	Watershed Management Areas	Several changes to Table B-1 are requested. The Copermittees request addition of a tenth WMA, for Mission Bay which is entirely in the jurisdiction of the City of San Diego. Furthermore, the City of Poway is not a responsible Copermittee for San Diego River. City of Escondido is not a responsible Copermittee for San Luis Rey River. Finally, the waterbody Loma Alta Slough should be listed under the Carlsbad WMA. Peñasquitos WMA includes Miramar Reservoir HA and Poway HA.	**Make the following changes to Table B-1, per the attached revised Permit:** 1. Add a WMA for Mission Bay which includes Scripps HA, Miramar HA, and Tecolote HA. 2. Remove Peñasquitos HA and Mission Bay HA from Peñasquitos WMA and insert Miramar Reservoir HA and Poway HA. 3. Remove City of Poway from San Diego River 4. Remove City of Escondido from San Luis Rey River. 5. Add the waterbody "Loma Alta Slough" to the Carlsbad WMA.
B.2	15-18	Identification of Water Quality Priorities	The Copermittees have fully embraced the concept of WQIPs and appreciate the Regional Board's approach to identifying priorities, setting goals, and developing a strategy and schedule to meet those goals. The Copermittees have identified an alternative to Provision B.2, which follows the general approach proposed by the Regional Board but increases focus on addressing MS4 impacts.	The following changes are requested, as detailed in the attached revised Permit section B and further described in subsequent comments: 1. Revisions are proposed to section B.2.a to refine the purpose and add considerations for assessing receiving water conditions. 2. A new section B.2.b is proposed to provide a linkage between receiving water conditions and corresponding impacts from the MS4s (versus other sources). 3. Section B.2.c is expanded to describe the considerations when identifying priority receiving water conditions. 4. Section B.2.d is refined to focus on MS4 impacts and pollutant generating activities. 5. Section B.2.e is refined to elucidate the meaning of numeric goals and their implication for MS4 compliance. 6. The schedule component of B.2.e is moved to a new section B.6 to improve organization of WQIP concepts.

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B.2.a	15-16	Assessment of Receiving Water Conditions	The assessment of receiving water conditions is a critical first step to WQIP development. Changes to purpose of this step are proposed, to focus on water quality issues related to MS4s. Further, data quality and relevance are critical to this assessment, and requirement to consider "all available data" should be refined to address accessibility and quality control issues. Finally, whether a receiving water condition can be achieved and maintained should be assessed.	**As shown in the attached revised Permit, the following changes/revisions were made in Permit section B.2.a:** **Revise the opening paragraph**: "The Copermittees must consider the following, at a minimum, to support the identification of water quality priorities based on the impacts of MS4 discharges on receiving water beneficial uses:" **Under part (7):** replace "All available data" with "Available, relevant, and appropriately collected…data meeting appropriate QA/QC standards" **Insert a new part (10):** "The potential for long-term achievement and maintenance of beneficial use attainment in the Watershed Management Area."
Language Addition B.2.b	Not in original 16	Assessment of MS4 Discharge Quality and Impacts	For WQIP development, it is critical to differentiate between receiving water conditions and MS4 discharges and impacts. Many receiving water conditions are not driven by MS4 impacts, and Copermittees can have the greatest effect on receiving water quality by focusing on reduction of pollutants discharged by their MS4s.	**As shown in the attached revised Permit, add a new section B.2.b titled "Assessment of MS4 Discharge Quality and Impacts", as follows:** "To support the identification of priorities based on the impacts of MS4 discharges on receiving water beneficial uses, the Copermittees must review appropriately collected MS4 discharge quality data and consider the extent to which MS4s cause or contribute to the adverse impacts to receiving water beneficial uses identified in B.2.a. Considerations include: (1) Locations of the Copermittees' MS4 discharges with respect to receiving waters; (2) MS4 discharge quality results relevant to impacts in receiving waters and action levels, including the temporal and geographic variation of the results: (3) The requirements of Provisions A.1 and A.3.; and (4) Whether MS4 discharge quality is sufficiently well known or other information is available to assess whether MS4 discharges are causing or contributing to specific receiving water

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				conditions, or whether additional data need to be collected through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan."
B.2.b	16-17	Identify Priority Pollutants and Receiving Water Conditions	We appreciate the Regional Board's approach to identifying priorities for receiving water conditions. Our proposed revisions to the Permit add several elements that should be included by Copermittees when identifying priority receiving water conditions. Following the Regional Board's approach, "priorities" are also differentiated from "highest priorities." Note the proposed revision to the title of the section, which better reflects the envisioned effort/outcome.	Move B.2.b down to B.2.c. **As shown in the attached revised Permit, make two changes:** **#1: Revise the last paragraph of B.2.c as follows:** The Copermittees must identify the highest water quality priorities to be addressed by the Water Quality Improvement Plan, <u>and describe the reasoning for selecting a subset of receiving water conditions as the highest priority(ies).</u> **#2: Rename section to "Identification of Priority Receiving Water Conditions" and add the following to the end of the Section B.2., as follows:** The Water Quality Improvement Plans shall describe the following for the highest priority receiving water condition(s): (1) The beneficial use(s) and pollutant(s) associated with the priority receiving water condition(s); (2) The geographic extent of the priority receiving water condition(s)within the WMA, if known; (3) The Copermittees with MS4s that contribute discharges to the priority water receiving condition(s); (4) The temporal extent of the priority receiving condition(s) (i.e., dry weather and/or wet weather); and (5) Whether receiving waters have been monitored sufficiently to adequately characterize the priority receiving condition(s), including a consideration of spatial and temporal variation"
B.2.c	16-17	Pollutant Source and/or Stressor	The success of WQIPs will hinge on the ability of MS4s to identify and abate	**As shown in the attached revised Permit, rename section to**

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		Identification	sources of pollutants within the MS4s. The pollutant source identification process proposed by the Regional Board is too broad and inhibits the Copermittees from focusing on the sources they are most able to control. In addition, some pollutants are poorly understood and need to be further investigated to allow for design of pollutant control strategies [new sub-bullet d.(4).(5)]. The proposed revisions to the Source ID section are intended to effectively focus the WQIP prioritization process.	**"MS4 Pollutant Source Identification" and revise the section, as follows:** See the changes proposed in the attached revised Permit, which focuses the Source ID section on MS4 sources and impacts. **The new section B.2.d follows:** "The Copermittees must identify <u>and prioritize </u>known and suspected storm water and non-storm water pollutant sources within the MS4 associated with the highest priority receiving water conditions identified under B.2.c. The identification of known and suspected sources of the highest water quality priorities as identified for Provision B.2.c shall consider the following : (1) Land uses and their potential contribution to the highest priority receiving water conditions; (2) Pollutant generating facilities, areas, and/or activities within the Watershed Management Area;: (3) Locations of the Copermittees' MS4s outfalls. (4) Review of available data, including: (a) Findings from the Copermittees' illicit discharge detection and elimination programs, (b) Findings from the Copermittees' MS4 outfall monitoring, (c) Other available, relevant, and appropriately-collected data, information, or studies related to pollutant sources and pollutant-generating activities that contribute to the highest priority receiving water conditions identified in Provision B.2. (5) Whether MS4 sources are sufficiently well known to design an effective, directed control strategy, or whether additional source/stressor identification needs to be conducted through the Monitoring and Assessment Program developed as part of the Water

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				Quality Improvement Plan to identify and prioritize sources/stressors within the watershed."
B.2.d	17-18	Numeric Targets and Schedules	We appreciate the Board staff efforts to allow the MS4s to prioritize their water quality issues and to develop a plan to address these issues. However, the terminology in Provision B.2.d regarding interim and final targets are terms used in TMDL program and their use here confuses the issue. In fact, Provision 2.d (3)(e) clearly ties the numeric "targets" with a TMDL. The WQIP should identify interim and final numeric "goals" to keep the distinction clear between a TMDL and a WQIP. It is entirely possible that the interim goal may in fact be the same as an interim TMDL target but not necessarily.	**Replace "numeric target" with "numeric goal" throughout Provision B.**
B.2.e	17-18	Numeric Targets and Schedules Numeric Goals (Title Revision)	It will be critical to quantify the expected outcomes of WQIP implementation efforts, and numeric goals serve to elucidate those expected outcomes. Based on the proposed revisions to the WQIP goals and elements, revisions to the description of the purpose of numeric goals are also proposed. Furthermore the notation of "target" implies a compliance effluent limit and thereby subject to enforcement action, versus goals set by the Copermittees that do not trigger any enforcement action by themselves.	**As shown in attached revised Permit, revise section B.2.e.(1)-(2), as follows:** The Copermittees must develop and incorporate interim and final numeric goals into the Water Quality Improvement Plans. Numeric goals and schedules are intended to support Water Quality Improvement Plan development and to measure progress towards addressing the highest priority receiving water conditions identified under B.2.b. Numeric goals are not enforceable compliance standards, effluent limitations, or receiving water limitations. When establishing numeric goals and corresponding schedules, the Copermittees must consider the following: (1) Final numeric goals must be based on measureable criteria or indicators, to be achieved in the receiving waters and/or MS4 discharges for the highest priority receiving water conditions which will be capable of demonstrating progress toward the achievement of the

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				restoration and/or protection of water quality standards in receiving waters; and (2) Interim numeric goals must be based on measureable criteria or indicators that can demonstrate incremental progress toward achieving the final numeric goals in the receiving waters and/or MS4 discharges. **Footnote 7:** "Interim and final numeric goals may take a variety of forms such as TMDL targets, TMDL wasteload allocations, TMDL based WQBELs incorporated in Attachment E of this Order, action levels, pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric goals are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators. To the extent that a goal is not based on an enforceable regulatory mechanism (i.e., TMDL, WLA), WQIP goals and schedules may be revised through the iterative process. Numeric goals are not subject to enforcement or non-compliance actions under this Order."
B.3	18-19	Water Quality Improvement Strategies and Schedules	The current version of B.3 requires that the MS4s have all of the following water quality improvement strategies in their WQIP (sub-bullets B.3.a.1 through B.3.a.4): structural and non-structural BMPs, retrofit projects, stream and/or habitat rehabilitation, and other water quality improvements associated with eliminating non-stormwater discharges to the MS4s. This may be an appropriate menu of actions to choose from, but pending the water quality issues and the watershed, the WQIP strategies may include all or only one of the	**As shown in the revised Permit, revise section B.3, as follows:** See the changes proposed in the attached revised Permit section B.3. Sub-bullets B.3.a.1 through a.4 are revised and condensed into two sub-bullets, one for JRMP activities and one for other structural and non-structural BMPs. The two sub-bullets (1) and (2) compose the universe of BMPs that would be implemented by the Copermittees to meet the WQIP numeric goals. **a. WATER QUALITY IMPROVEMENT STRATEGIES** The water quality improvement strategies must prioritize, based on their likely effectiveness and efficiency, and

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			strategies listed.	implement measures, as appropriate, to effectively prohibit non-storm water discharges into its MS4, reduce pollutants in storm water discharges from its MS4 to the MEP, and achieve the interim and final numeric goals in accordance with the schedules in Provision B.2.e. Measures include: (1) Copermittee-selected activities identified in Provision E ,either as described in the jurisdictional runoff management programs or as modified with justification, that will address priority receiving water conditions; and (2) Additional structural and/or non-structural BMPs, as selected by the Copermittee, that are designed to achieve the interim and final numeric goals identified in Provision B.2.e.
B.3.b	19	Implementation Schedules	The requirement that "Final dates for achieving final numeric targets must not extend more than 10 years..." may be broadly misinterpreted as currently written with major implications. Based on conversations with Regional Board staff, it is understood that goals can take a number of forms and the "10 year" requirement is not intended as a requirement to attain all Basin Plan water quality standards within 10 years. However, to ensure this requirement is not misinterpreted by third parties, language should be added to make this clarification.	**As shown in the attached revised Permit, add a footnote to sub-bullet (5), as follows:** "Achievement of final numeric goals within 10 years represents progress towards attainment of water quality standards, but is not a requirement to fully attain all applicable water quality standards or all priority receiving water conditions within 10 years."
B.4	19-20	Water Quality Improvement	Monitoring and assessment will be a critical component of the WQIP process. The vision for WQIP monitoring and assessment is	As shown in the attached revised Permit revise section B.4, as follows:

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		Monitoring and Assessment	reflected in the proposed revised language for Permit section B.4. A major aspect of this vision is that monitoring requirements in Provision D will be fully integrated into the WQIPs and modified as the WQIPs evolve. The proposed language clarifies the Copermittee's vision for purpose and components of WQIP monitoring and assessment. The requested linkage with Provision D is highlighted through the proposed revision.	The Copermittees in each Watershed Management Area must develop an integrated Water Quality Improvement Plan Monitoring and Assessment Program that assesses: 1) progress toward achieving the numeric goals and schedules, 2) progress toward addressing the highest priority receiving water conditions for each Watershed Management Area, and 3) each Copermittee's overall efforts implementing the requirements of Provision B[10]. The water quality improvement monitoring and assessment program must include the monitoring and assessment requirements of Provision D, which may be modified for consistency with the priority receiving water conditions of each Watershed Management Area and associated Copermittees. For Watershed Management Areas with applicable TMDLs, the water quality monitoring and assessment program must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-0012 (see Attachment A).
B.5	20-21	Adaptive Management Process	The WQIPs provide an opportunity to synchronize water quality improvement strategies (e.g, TMDL implementation) and jurisdictional runoff management programs. The Adaptive Management section B.5 proposed by the Regional Board has two components: WQIP adaptive management and JRMP adaptive management. With the proposed expanded scope of the WQIPs proposed by the Copermittees, the two components of the adaptive management process are not WQIP and JRMP, instead the components are (1)	**As shown in the attached revised Permit revise section B.5, as follows:** The Copermittees in each Watershed Management Area must implement the iterative process, adapting the Water Quality Improvement Plan, jurisdictional runoff management programs and monitoring and assessment programs, as necessary, to become more effective and meet the requirements of Provisions A, and shall consider the following: **a. PRIORITY RECEIVING WATER CONDITIONS AND NUMERIC GOALS** The priority receiving water conditions and numeric goals, developed pursuant to B.2.c. and B.2.e respectively, shall guide jurisdictional implementation efforts for the duration of this Order. Recommendations

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			Priority Receiving Water Conditions and Numeric Goals and (2) Water Quality Improvement Strategies and Schedules. The proposed revisions to section B.5 reflect the Copermittee's vision for WQIP implementation. Most of the components of the adaptive management process proposed by the Regional Board (sub-bullets B.5.a.1.a thru h and B.5.b.1.a thru e) are included. The proposed language adds clarification on the purpose of the adaptive management process and re-organizes into two alternative management categories: (1) Priority Receiving Water Conditions and Numeric Goals and (2) Water Quality Improvement Strategies and Schedules. Note that these two management categories are adapted on different timelines: • Priority Receiving Water Conditions and Numeric Goals would be adapted, at a minimum, on a frequency that corresponds to Permit cycles (every 5 years). In this manner the ROWD for future permits is supported by the WQIP process. It is <u>not</u> expected that priority receiving water conditions and numeric goals would vary on a shorter frequency, and thus resources for adaptive management should be focused on the strategies/BMPs used to *achieve* the	for changes to priority receiving water conditions and numeric goals shall be provided in the Report of Waste Discharge and shall consider the following: (1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan; (2) Progress toward achieving interim and final numeric goals in receiving waters and/or MS4 discharges for the highest water quality priorities in the Watershed Management Area (3) New scientific information or new or updated policies or regulations that affect identified numeric goals including revised water quality objectives or TMDLs; (4) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality problems and implementation measures to address the highest priority receiving water conditions; (5) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees; (6) The factors listed in Provision B.2.a.(1)-(10); (7) San Diego Water Board recommendations; and

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			numeric goals. • Water Quality Improvement Strategies and Schedules would be adapted annually, allowing modification to the JRMP elements, structural BMPs, and non-structural BMPs for achieving numeric goals. Finally, to improve organization, it is proposed that the requirements regarding WQIP and JRMP modification and submittals (sub-bullets B.5.a.2 thru 3 and B.5.b.2 thru 3) be moved to a new section B.6.	(8) Recommendations for modifications solicited through a public participation process. **b. WATER QUALITY IMPROVEMENT STRATEGIES AND SCHEDULES** The water quality improvement strategies and schedules required pursuant to B.3and B.4 shall be adapted as new information becomes available to inform more effective and efficient means of achieving the numeric goals established in B.2.e. Copermittees shall consider adaptation to jurisdictional programs and monitoring and assessment strategies and schedules at least annually considering the following when applicable: (1) Changes to priority receiving water conditions and numeric goals based on recommendations from B.5.a.; (2) Measurable or demonstrable reductions of non-storm water discharges to each Copermittee's MS4; (3) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP; (4) Information on the MS4 sources and/or pollutant-generating activities determined to be most significantly contributing to priority receiving water conditions; (5) Efficiency in implementing the Water Quality Improvement Plan; (6) San Diego Water Board recommendations; and

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				(7) Recommendations for modifications solicited through a public participation process.
B.6	21	Water Quality Improvement Plan Implementation	The development of a WQIP will require at a minimum of 18 months and BMP implementation will likely be staggered over a certain time frame. Once the permit is adopted, Copermittees will begin the planning process. However, Copermittees must have at least one full fiscal year budgeting cycle within which to seek additional funding to implement the WQIP from our governing bodies (i.e., City councils and County supervisors). Thus the more reasonable time schedule is to require the development of the WQIP within 18 months and the implementations of the BMPs to occur consistent with the final approved WQIP. Furthermore, adaptive management submittals (i.e., WQIP, JRMP and monitoring modifications) and modifications should be specified under Provision F. In this manner, submittal requirements will be organized and easier for Permittees to follow. As such, the submittal requirements that were previously described under section B.5.a.2 thru 3 and section B.5.b.2 thru 3 were modified and moved to Provision F.	**As shown in the attached revised Permit revise section B.6, as follows:** **6. Water Quality Improvement Plan Submittal, Implementation, and Modifications** Requirements for Water Quality Improvement Plan submittals and modifications are described in Provision F. Requirements for corresponding modifications to the jurisdictional runoff management programs and monitoring and assessment program are also described in Provision F. Copermittees must commence with implementation of the Water Quality Improvement Plan no later than the fiscal year (July 1) following San Diego Water Board approval of the Water Quality Improvement Plan.
C. Action Levels				
C. (Intro)	22	Action Levels	The Draft Order in Provision B states that	**As shown in the attached revised Permit, revise introductory**

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			the goal of the WQIP is to identify the highest water quality priorities within a watershed and implement strategies to achieve improvements in the quality of discharge and receiving waters. Furthermore in Provision B.2.d the Permittees are required to develop and use *interim and final numeric targets/goals* to measure progress towards the protection/enhancement of the receiving waters and beneficial uses. The choice of the target/goals of the watershed may be biological, chemical, or physical based and may include multiple criteria and/or indicators. The permit should provide a clear linkage between Provision B and Provision C and state that the WQIP should guide the customization of the NALs/SALs to meet the highest water quality priorities in a given watershed and that NALs/SALs will be used to assist Copermittees in reaching the goals specified in the WQIP. The introduction to Provision C indicates that the *action levels* (NALs and/or SALs) will be incorporated into the WQIPs (B.2.d) and used to: a) Measure progress towards the protection/ enhancement of the receiving waters and beneficial uses (B.4) ; b) Direct and focus the JRMP implementation efforts for addressing MS4 discharges (D.4.a); and	**paragraphs of section C, as follows:** "The purpose of this provision is for the Copermittees to incorporate numeric non-storm water and storm water action levels in the Water Quality Improvement Plans. The action levels shall be used to guide the following program planning efforts and measure progress towards attaining the reasonable protection, preservation, and enhancement of water quality and designated beneficial uses of waters of the state: 1) Support development and prioritization of water quality improvement strategies through the Water Quality Improvement Plans. Discharge data above action levels can be evaluated using a statistical approach considering the frequency, magnitude, and loading of discharges to the receiving waters to support development of actions and prioritization of their implementation. 2) Assist in the effective prohibition of non-stormwater discharges from the MS4 pursuant to Provision E.2. 3) Support the detection and elimination of illicit discharges to the MS4 pursuant to Provision E.2. These goals will be accomplished through monitoring and assessing the quality of the MS4 discharges prior to and during the implementation of the Water Quality Improvement Plans. Exceedances of action levels are not subject to enforcement or non-compliance actions under this Order. "

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			c) Detect and eliminate non-stormwater and illicit discharges to the MS4 (E.2) Although action levels will be used for several different purposes, the action levels defined in Provision C.1 and C. 2 are chemically based and may be in conflict with the selected watershed metrics. As an example, if the watershed metric is improved IBI scores for a water body, then NALs and SALs associated with water chemistry are unlikely to be the best metric to evaluate progress towards improving IBI scores or for assessing our implementation efforts. Thus, the chemically based NALs/SALs may direct resources away from the watershed priorities. Since Provision C indicates that there are three different purposes for the action levels, the permit should recognize that the action levels for each permit provision (B.4, D.4.a, and/or E.2) may be based on different constituents, metrics, and/or may be different values. As a result, the permit should establish the purposes of the action levels and then allow the Copermittees to establish the numeric action levels. For our purpose we would submit that the action levels should be developed to support program planning and measure progress towards attaining the protection of the beneficial uses.	
C. (Intro)	22	Action Levels	The development of action levels, including	**As shown in the attached revised Permit, revise concluding**

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			the timeline should be clearly linked to the Water Quality Improvement Plans. A timeline that is separate and different from the development of the Water Quality Improvement Plans is not necessary. Previously developed action levels should serve as interim action levels until the Water Quality Improvement Plans are completed.	**paragraph of section C, as follows:** Action levels will be developed and incorporated into the Water Quality Improvement Plans (Provision B) including the Illicit Discharge Detection and Elimination (IDDE) Program (Provision E.2). Depending upon the goals/objectives for the use of the action levels and the priority receiving water conditions, the constituents and values at which they are set may differ between watersheds. Copermittees may develop Watershed Management Area specific numeric action levels for non-storm water and storm water MS4 discharges using an approach approved by the Regional Board or use the default non-stormwater and stormwater action levels prescribed within C.1 and C.2 below, respectively. The Copermittees will submit action levels as part of their Water Quality Improvement Plan(s). The action levels established as part of R9-2007-0001 will serve as the interim action levels until the Water Quality Improvement Plans are completed and approved.
C.1	22-24	Non-Stormwater Action Levels	Referencing the CTR as a "source" is misleading. It is unclear why the Board is excluding the conversion factor from the CMC and CCC Metals Criteria equations from the CTR to generate total recoverable metals criteria. Table notes need to be updated to explain how NALs were derived. It should be made clear that the MDALs and AMALs were calculated using State Implementation Standard (SIP) procedures.	Add appropriate references to the State Implementation Standard procedures and provide a narrative explanation for reasoning and application in the fact sheet, when provided.
C.1	22-24	Non-Stormwater Action Levels	Provision C.1.b of the permit requires that additional NALs must be incorporated into the Permit for any constituents causing or contributing to conditions associated with the highest non-stormwater related water quality priorities. However the provision	The permit should provide a clear linkage between Provision B and Provision C and allow the WQIP to guide the customization of the NALs based on the watershed needs. Furthermore the permit should identify past and current dry weather monitoring as a basis for the development of NALs that are watershed specific.

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			does not identify other options for the development of NALs. The Copermittees believe it necessary to have the flexibility to develop NALs that are relevant to their watershed issues.	
C.2	25	Storm Water Action Levels	Provision C.2.b requires that additional SALs must be incorporated into the Permit for any constituents causing or contributing to conditions associated with the highest non-stormwater related water quality priorities. The development of SALs may be based on one of 3 options: 1) water quality standards; 2) site specific conditions; and 3) numeric WQBELs. As noted previously the Copermittees believe that it is critical that flexibility be provided in the development and implementation of the SALs to allow the Copermittees to address their highest water quality issue(s). Consequently the Copermittees support other options for developing SALs.	Other options that should be included for the development of the SALs in the Permit are the approaches identified in the California Storm Water Panel in its report, "The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities" (June 2006). As previously noted, if the Copermittees do not establish action levels to support the WQIP then the Copermittees must use the SALs identified in Provision C.
D. Monitoring and Assessment Requirements				
D	26-52	Monitoring and Assessment Requirements	Current provisions are overly prescriptive and constrain the efficient or best use of Copermittee resources or for adaptive management. Significant efforts have been invested by the State and Regional Boards as well as Copermittees to develop a structured, question-driven monitoring approach. These efforts provide for the development of an effective and appropriate alternative to address the monitoring needs of the permit, which include an evaluation of the effective prohibition of non-stormwater discharges, attainment of MEP, evaluation of impacts to and improvements	Remove current Provision D and replace with the Provision D attached.

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			in receiving waters, and collection of data to support management of stormwater programs.	
D.1.a	26	Jurisdictional Non-Stormwater Monitoring	The Copermittees' past monitoring results illustrate that chemical water quality monitoring data for dry weather inter-MS4 flows is not effective for eliminating dry weather discharges. The approach outlined in the Administrative Draft Tentative Order would generate a great deal of water quality data for dry weather flows and identify some IC/IDs. However, since the purpose of the program is to eliminate dry weather flows and IC/ID flows entirely, there is little value to collecting extensive dry weather water quality data for MS4 sites. Very little of the water quality data collected would support assessment of the stated program management objective to effectively prohibit non-storm water discharges to the MS4s. Consequently, this extremely resource intensive approach will be relatively inefficient in eliminating the MS4 flows and IC/IDs with any potential to adversely impact receiving waters. *See the Dry Weather Outfall Monitoring and Discussion of IDDE Program Efficiency and Effectiveness Sections of the Alternative Provision D Supporting Documentation for additional details.*	*If Provision D is not replaced, modify language to allow greater flexibility in monitoring to eliminate IC/IDs based on Copermittees' experience and understanding of how to effectively address non-stormwater discharges.*
D.1.a.1.a.	26	Jurisdictional Monitoring Requirements	Guideline ii is worded (i.e., must be selected) to require a station in each cell; however, guideline vi appears to provide some off ramps to this requirement and guideline vii sets an upper limit on the	If Provision D is not replaced, the following language should be revised: (ii) At least one non-storm water MS4 station must be selected in each cell containing a segment of the Copermittee's MS4, subject

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			number of stations even if the number of cells is greater than 500.	to the provisions in guidelines vi and vii, which must ….
D.1.a.1.a.	26	Jurisdictional Monitoring Requirements	Guideline ii requires sampling through manholes if outfalls are not available in a grid cell. Such confined space sampling can be very expensive because of additional safety requirements for the crew and the need to coordinate with police regarding traffic impacts. It can also be more hazardous for crews because they are climbing in and out of manholes in the middle of the street.	If Provision D is not replaced, the following language should be revised: (ii) [c] Other point of access (e.g., manhole) if absolutely necessary to investigate contributions from upstream sources based on downstream data from an outfall
D.1.a.1.a.	26	Jurisdictional Monitoring Requirements	Guideline ii potentially contradicts guideline iii; areas defined in iii may not exist in each cell.	If Provision D is not replaced, the following language should be revised: (iii) Where applicable, each non-storm water MS4 monitoring station ….
D.1.a.1.a.	26	Jurisdictional Monitoring Requirements	Guideline vi lists factors such as safety and traffic to consider in the location of each monitoring station. However, it does not say that these factors could result a decision to not monitor in a cell if, for example, the only potential access point was a manhole in the middle of a major arterial.	If Provision D is not replaced, the following language should be revised: vi) The following factors should be considered in determining the location and feasibility of sampling of each non-storm water…
D.1.a.1.c.i.a.3.A	29	Jurisdictional Monitoring Requirements	It is not clear if the total number of stations is 5 or if 5 stations in each of the three land use types is required, for a total of 15 stations.	If Provision D is not replaced, the following language should be revised: Add clarification that only 5 stations are required.
D.1.a.2	32	Dry Weather Ambient Receiving Water Monitoring Program	TO Provision D does not take advantage of the current state of knowledge of receiving water conditions and does not integrate the many existing receiving water monitoring efforts. The proposed monitoring would result in a significant and unnecessary duplication of monitoring efforts by the Copermittees in receiving waters.	*If Provision D is not replaced, modify language to allow greater flexibility and coordination of monitoring to achieve program objectives considering existing receiving water programs that may already meet the goals of Provision D.*

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			Copermittees propose to integrate the numerous receiving waters programs at the WMA level. *See the Receiving Water Monitoring Section of the Alternative Provision D Supporting Documentation for additional details.*	
D.1.a.2	32	Dry Weather Jurisdictional Receiving Water Boundary Monitoring	Jurisdictional receiving water dry weather boundary monitoring proposed in the TO does not support the three key monitoring goals. Monitoring conducted by the Copermittees' and others have shown jurisdictional boundary monitoring of the type proposed in the TO to be ineffective in estimating water quality impacts and loading from MS4 discharges (particularly from one jurisdiction to the next). This is due to a combination of factors, including high variability of the constituent concentrations in receiving waters and discharges, typically small percentages of MS4 discharge flows and pollutant loads in the receiving waters, and uncertainty of the source of flow changes within jurisdictional boundaries. The combination of high variability and relatively small impacts or differences requires high numbers of samples to detect significant and programmatically relevant differences and would be unlikely to support programmatic changes or guide improvements to water quality. *See the Discussion of Jurisdictional Boundary Monitoring of the Alternative Provision D Supporting Documentation for*	*If Provision D is not replaced, remove the jurisdictional receiving water boundary monitoring.*

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			additional details.	
D.1.a.2	32	Jurisdictional Monitoring Requirements	It would be useful to call for the monitoring program to adhere to the design recommendations in the SWAMP Assessment Framework, which calls for structured, question-driven monitoring.	If Provision D is not replaced, the following language should be revised: "…within and through its jurisdiction. <u>The design of the receiving water monitoring program should follow the guidance on structured question-driven monitoring outlined in the SWAMP Assessment Framework. In addition, the design should be comparable with, to the extent practicable, regional scale monitoring designs and approaches being developed for the San Diego River watershed and coastal estuaries in the San Diego Region.</u> Any available monitoring …"
D.1.a.2.a.	32	Jurisdictional Monitoring Requirements	Add an emphasis on improving comparability of data and coordination of sampling.	If Provision D is not replaced, the following language should be revised: "…may be utilized as a dry weather ambient receiving water monitoring station<u>, with an emphasis on improving coordination among sampling efforts and the comparability of monitoring data.</u>"
D.1.a.2.a.ii and iii	32	Jurisdictional Monitoring Requirements	It is not clear what question(s) this requirement is meant to address and it seems arbitrary. Recommend deleting unless question(s) can be stated explicitly.	If Provision D is not replaced, Delete or modify to clarify monitoring question(s).
D.1.b	34-38	Jurisdictional Monitoring Requirements	Proposed monitoring of five MS4 outfalls in every jurisdiction is greatly in excess of the monitoring needed to characterize similar land uses and drainages. Monitoring of representative sites for homogeneous land uses or mixed-use land uses can be coordinated and the results shared among jurisdictions. *See the Wet Weather Outfall Monitoring section of the Alternative Provision D Supporting Documentation for additional details.*	*If Provision D is not replaced, modify language to allow greater flexibility and coordination of monitoring (i.e., site selection, frequency, and parameters) to achieve program objectives while focusing resources on receiving water priorities and supporting development and implementation of management actions.*

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D.1.b.1.a.iii	35	Jurisdictional Monitoring Requirements	It is not clear if the total number of stations is 5 or if 5 stations in each of the three land use types is required, for a total of 15 stations	If Provision D is not replaced, Add clarification that only 5 stations are required.
D.2	38-42	Watershed Monitoring Requirements	Section D.2 of the Tentative Order requires more reference watershed monitoring stations (one for each WMA) than are needed to assess receiving water conditions and establish reference conditions for the region. The Copermittees propose to use the results of the San Diego Region Stream Reference Study in lieu of this requirement. Regional reference sites that are based on similar geology and watershed size will provide an appropriate measure of the expected receiving water conditions achievable in Copermittees' jurisdictions as a result of the future implementation of their WQIPs. *See the Receiving Water Monitoring Section of the Alternative Provision D Supporting Documentation for additional details.*	*If Provision D is not replaced, modify language to allow for the use of the San Diego Region Stream Reference Study results to meet the reference watershed requirements.*
D.2	38-42	Watershed Monitoring Requirements	Monitoring proposed for MLS sites is more frequent than required to answer relevant management questions about trends in receiving water conditions. Wet weather monitoring at MLS sites can be reduced to once every five years, based on the statistical simulations conducted for development of the ROWD (2011 and included in Attachment 2-1). *See the Receiving Water Monitoring Section of the Alternative Provision D Supporting Documentation for additional details.*	*If Provision D is not replaced, reduce wet weather monitoring frequency at MLS sites to once every five years.*

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D.2.a	38	Watershed Monitoring Requirements	There is no additional value to continuing the TWAS monitoring in its current form because the constituent concentrations and patterns are generally similar at the TWAS and MLS (and especially within a watershed), (See Attachment 2-1 from the ROWD (2011)). Additional focused receiving water monitoring to address information needs should be evaluated and addressed by Copermittee Program Managers in the WQIP Monitoring and Assessment Plans. *See the Receiving Water Monitoring Section of the Alternative Provision D Supporting Documentation for additional details.*	*If Provision D is not replaced, modify language to allow greater flexibility and coordination of monitoring to achieve program objectives consistent with the determination of receiving water priorities through the WQIP development process.*
D.2.a	38	Watershed Monitoring Requirements	The distinction between these stations and those called for in D.1.a.2 is not clear, partly because the channel types have not been more completely defined but also because no monitoring questions have been stated. There could be overlap between these two types of stations, especially because the receiving water stations are to be located in natural or undisturbed areas.	If Provision D is not replaced, Clarify the distinction between receiving water and watershed stations. Define management / monitoring questions that follow the SWAMP Assessment Framework guidance.
D.2.a.1	38	Watershed Monitoring Requirements	It is not clear how the data from the mass loading stations will be used; as there is no monitoring question or link to a management issue or decision.	If Provision D is not replaced, Define management / monitoring questions that follow the SWAMP Assessment Framework guidance. Show how the mass loading data will be used. Delete these stations if the value of the data cannot be demonstrated.
D.2.a.4	38	Watershed Monitoring Requirements	A single reference station is not very useful and has all sorts of statistical problems if used in isolation. It would be better to use regional reference data, where available.	If Provision D is not replaced, use the San Diego Stream Reference Study for Reference Stations.
D.2.a.5	38	Watershed	The rationale for this station is not clear.	If Provision D is not replaced,

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		Monitoring Requirements	There is no management / monitoring question or link to a management issue or decisions. In addition, there is no readily obvious scientific reason why a midpoint station would be useful.	Delete this requirement.
D.2.e and D.3	45-46	WMA Special Studies and Regional Special Studies	Reduce the number of Special Studies from 3 to 2 per WMA in consideration of the planning period required to develop the Monitoring and Assessment Plan required as part of the WQIP. *See the Source/Stressor ID and Special Studies section of the Alternative Provision D Supporting Documentation for additional details.*	Reduce the number of Special Studies from 3 to 2 per WMA.
D.4.b and D.4.c	51-52	Assessment Requirements	See comment A.4. Language should be added to limit Copermittees responsibilities to within their jurisdiction.	*If Provision D is not replaced, the following language should be revised:* "The Copermittees, within <u>their respective jurisdictions of</u> ~~in~~ each Watershed Management Area, must…"
E. Jurisdictional Runoff Management Programs				
E	53-89	Jurisdictional Runoff Management Programs	Minor grammatical correction in the first sentence.	"The purpose of this provision is for each Copermittee to implement a program to control the contribution of pollutants to and the discharges from the MS4 with<u>in</u> its jurisdiction."
E	53-89	Jurisdictional Runoff Management Programs	As stated in the second introductory paragraph in Provision E "The jurisdictional runoff management programs implemented by each Copermittee must be consistent with the Water Quality Improvement Plan for the applicable Watershed Management Area required by Provision B." Additionally, as stated in the introduction to the WQIP (Provision B) "The purpose of this provision is to develop Water Quality Improvement Plans that guide the Copermittees' jurisdictional runoff	Include language into the introductory paragraph that clearly indicates that the JRMP requirements contained in Provision E may be modified to allow for implementation of the JRMP consistent with the WQIP if appropriate justification is provided. In addition, add the following: "<u>**Modification of Jurisdictional Runoff Management Program Requirements**</u> <u>Modifications shall be considered and where selected, proposed according to the process in Provision B.5. Proposed modifications may increase, decrease, and/or replace minimum requirements</u>

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			management program implementation efforts…" However, the provisions do not clearly allow for the appropriate modification of the JRMP requirements (increases, decreases, and/or replacement of activities) contained in the permit.	identified in Provision E."
E and Attachment C	Throughout	Jurisdictional Runoff Management Programs	Clarification.	Refer to Permanent BMPs as Structural BMPs and add a definition for structural BMPs into Attachment C.
E	Throughout	Jurisdictional Runoff Management Programs	Clarification for consistency.	Change "~~Permanent BMP Sizing Criteria Design Manual~~" to "BMP Design Manual" and make reference to the current design requirements under R9-2007-0001.
E.1.a.2	53	Legal Authority Establishment and Enforcement	Sites regulated under the Construction and Industrial General Permits are regulated elsewhere and through alternative means. Clarification is necessary for sites that are not regulated under the respective General Permits.	"Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites that do not~~, including industrial and construction sites which~~ have coverage under the statewide General Permit for Discharges of Storm Water Associated with Industrial Activities (Industrial General Permit) or General Permit for Discharges of Storm Water Associated with Construction Activities (Construction General Permit)~~, as well as to those sites which do not~~; "
E.1.a.4 and E.1.a.5	53-54	Legal Authority Establishment and Enforcement	The Copermittees do not have jurisdiction to control MS4 discharges outside of their respective MS4s and the Regional Board does not have the authority to require interagency agreements to grant such jurisdiction, particularly for those agencies not subject to the Order (Caltrans, Native American Tribes, Military installations, etc.)	Remove, reword, and/or combine the two subsections as follows : ~~"Control through interagency agreements among Copermittees the contribution of pollutants from one portion MS4 to another portion of the MS4;"~~ and ~~"Control through interagency agreements with other owners of the MS4 such as Caltrans, the U.S. federal government, or sovereign Native American Tribes, where possible, the contribution of pollutants from one portion of the MS4 to another portion of the MS4;"~~ "Coordinate, as possible, with other agencies to minimize the contribution of pollutant discharges from the Copermittee's

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				portion of the MS4 to portions of the MS4 under another agency's jurisdiction and from other agency's portions of the MS4 to the portion of the MS4 under the Copermittee's jurisdiction"
E.2.a	54-57	Illicit Discharge Detection and Elimination	The addition of "to the extent allowable by law", as referenced from the Phase II Regulations, limits Copermittees responsibility to those that they have the legal authority to implement. Copermittees cannot implement programs outside of what they have legal authority to do. In addition, some non-storm water discharges are authorized under the permit unless the Copermittee or San Diego Water Board determines they are a source of pollutants in receiving waters. Language should be provided to account for subsection E.2.a.(3).	"To the extent allowable by law, ~~E~~each Copermittee must address all non-storm water discharges as illicit discharges, where the likelihood exists that they are a source of pollutants to waters of the U.S."
E.2.a.1	55	Illicit Discharge Detection and Elimination	Uncontaminated pumped groundwater is the only category under this section that is required to be permitted under an NPDES Permit. It should be added to the initial paragraph and the remainder of the bullets should be added to E.2.a.(3), as they are impractical to be permitted and are currently not required to be permitted.	"Discharges of non-storm water to the MS4 from uncontaminated pumped groundwater ~~the following categories~~ must be addressed as illicit discharges where there is evidence that suggests that they are the source of pollutants to waters of the U.S., unless the discharge has coverage under NPDES Permit No. CAG919001 (Order No. R9-2007-0034, or subsequent order) for discharges to San Diego Bay, or NPDES Permit No. CAG919002 (Order No. R9-2008-0002, or subsequent order) for discharges to surface waters other than San Diego Bay: ~~(a) Uncontaminated pumped ground water;~~ ~~(b) Discharges from foundation drains;~~ ~~(c) Water from crawl space pumps; and~~ ~~(d) Water from footing drains."~~
E.2.a.2	55	Illicit Discharge Detection and	Limit to within the Copermittee's jurisdiction per prior comments and reword	Discharges of non-storm water from water line flushing and water main breaks to the MS4 must be addressed as illicit discharges

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		Elimination	the applicable permitting portion to allow flexibility for any subsequent NPDES permits that may be issued.	unless the discharge has coverage under a valid NPDES Permit, ~~No. CAG 679001 (~~Order No. R9-2010-0003, or a subsequent order~~)~~. This includes water line flushing and water main break discharges from water purveyors under the Copermittee's jurisdiction that has been issued a water supply permit by the California Department of Public Health or federal military installations.
E.2.a.3	55	Illicit Discharge Detection and Elimination	Non-storm water sources should be limited to anthropogenic sources within the Copermittees jurisdiction to enable to Copermittees to address those sources in which they have control over. Also, see comment E.2.a.1.	Limit the source of pollutants in receiving waters to anthropogenic sources identified as an illicit discharge within the Copermittees jurisdiction and add discharges from foundation drains, water from crawl space pumps, and water from footing drains.
E.2.a.4	56	Illicit Discharge Detection and Elimination	See comment E.2.a.	Add "or similar means where there is evidence that those discharges are a source of pollutants to waters of the U.S."
E.2.a.4.a	56	Illicit Discharge Detection and Elimination	Individual buildings may require substantial structural modifications to redirect air conditioning condensation to landscaped areas. Redirection should be encouraged instead of required.	"The discharge of air conditioning condensation ~~must~~ should be directed to landscaped areas or other pervious surfaces where feasible;"
E.2.a.4.b	56	Illicit Discharge Detection and Elimination	Complete removal of residential car washing activities is unrealistic and resources would be better used to educate the public. Public outreach has proven to be also effective in minimizing water and detergent use and encouraging the use of commercial facilities.	"~~(i)~~ The discharge of wash water must be encouraged through public outreach and education (i) to be directed to landscaped areas or other pervious surfaces where feasible, and (ii) to m~~M~~inimize the use of water for vehicle washing, use as little washing detergent and other vehicle wash products as possible, wash vehicles at commercial wash facilities, and implement other practices or behaviors that will prevent the discharge of pollutants associated with individual residential vehicle washing from entering the MS4; and"
E.2.a.4.c.ii	56	Illicit Discharge Detection and Elimination	Clarify. Discharges of saline water to the MS4 cannot be directed out of the MS4 once the discharge has occurred. Allow saline discharges to salt water receiving waters.	"The discharge of saline swimming pool water ~~to the MS4~~ must be directed to the sanitary sewer, landscaped areas, or other pervious surfaces that can accommodate the volume of water or to the MS4 if the MS4 discharges to a saltwater receiving water."

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E.2.a.5.a.1	56	Illicit Discharge Detection and Elimination	Building fire suppression system maintenance discharges should not be considered an illicit discharge if BMPs are implemented to prevent discharge of pollutants to the MS4.	Add "where BMPs are implemented."
E.2.a.5.b	57	Illicit Discharge Detection and Elimination	Emergency firefighting discharges are exempted in the Clean Water Act. BMPs should be encouraged, not required to be implemented, particularly in emergency situations that may result in the destruction of life and property.	"Each Copermittee ~~must~~ should develop"
E.2.b.1.d	57	Illicit Discharge Detection and Elimination	MS4 and Private Outfalls should be clearly defined. The Clean Water Act definition of MS4 Outfalls limits outfalls to "major outfalls", limiting the responsibility of Copermittees' mapping of outfalls to "major outfalls" and clarifying the definition of what constitutes a "private outfall".	"All known locations of MS4 outfalls as defined by 40 CFR §122.26(b)(5-6) and private outfalls, as defined by 40 CFR 122.26(b)(9), that discharge runoff collected from areas within the Copermittee's jurisdiction,"
E.2.b.1.e	58	Illicit Discharge Detection and Elimination	Clause is redundant and confusing.	~~(i.e., receiving water segments that are both a receiving water and part of the MS4),~~
E.2.b.2	58	Illicit Discharge Detection and Elimination	Clarification is necessary to limit employee responsibilities to within the terms of their employment.	"Each Copermittee must use Copermittee personnel and contractors to assist in identifying and reporting illicit discharges and connections, if observed during the course of their daily employment activities;"
E.2.b.4	58	Illicit Discharge Detection and Elimination	The addition of language is necessary to limit Copermittees responsibility to standards that may reasonably be met.	"Each Copermittee must implement practices and procedures (including a notification mechanism) to prevent, respond to, contain, and clean up any spills that may discharge into the MS4 within their jurisdiction from any source. The Copermittee must coordinate with spill response teams to prevent to the extent possible entry of spills into the MS4, and prevent contamination of waters of the U.S. ~~surface water, ground water, and soil~~."
E.2.b.5	58	Illicit Discharge Detection and	Clarification is needed for circumstances where the source of an illicit connection	Add language to clarify responsibility: (5) Copermittees are responsible for control of discharges to their

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		Elimination: Prevent and Detect	and/or discharge is from another MS4. Add language to E.2.b(5) and move current E.2.b(5) to E.2.b(6).	MS4. In the event that the source of an illicit discharge or connection is from another MS4, the Copermittee shall notify and, if necessary coordinate, with the upstream MS4 to implement and/or enforce corrective actions. Move current E.2.b(5) to E.2.b(6).
E.2.c	58	Illicit Discharge Detection and Elimination: Field Screening and Monitoring	Visual observations should be acknowledged as a way to detect non-storm water and illicit discharges and connections.	Add "Visual Observations" to the provision header and acknowledge within the text.
E.2.d	58-61	Investigate and Eliminate Illicit Discharges and Connections	See the comments above for C.1. NALs should guide JRMP implementation and management actions through the iterative process set forth in the WQIP and may trigger follow up investigations, but may trigger other alternative actions. Actions taken based on NAL exceedances should be defined in the WQIP and/or JRMP based on the most effective actions to reach their watershed-based goals.	Clarify language to state that NAL exceedances during IDDE monitoring/investigations may trigger action levels, including but not limited to follow-up investigations based on the highest watershed priorities set forth and the iterative process provided in the WQIP. In addition, limit E.2.d.1.d to exclude identified natural sources.
E.2.d.2 and E.2.d.3	59 – 61	Illicit Discharge Detection and Elimination: Investigate and Eliminate	Sections 2 and 3 outline the procedures that Copermittees must have in place. Not all language under these headers speak to procedures. Additionally, some overlap exists between these two sections.	Edits were made to ensure that requirements addressed the development of procedures. Additional edits made for clarity and to reduce overlap between sections. See the strikeout document of the admin draft for specifics.
E.2.d.2	59	Illicit Discharge Detection and Elimination	TCBMPs may be part of the MS4 and specifically designed to receive and contain pollutants. The language, as written, is inconsistent with the TCBMP requirements prescribed in Provision E.3.a of the proposed permit. Limiting language should also be added for discharges to receiving waters within the jurisdiction of the Copermittee.	"Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on reports or notifications, field screening and monitoring, or other appropriate information, indicate a reasonable potential of ~~receiving, containing, or~~ discharging pollutants to receiving waters within the Copermittees jurisdiction due to illicit discharges, illicit connections, or other sources of non-storm water."
E.2.d.4	61	Illicit Discharge Detection and	Language used in the current Orange County Permit (Provision R9-2009-0002)	Use Orange County permit language instead: If the Copermittee suspects the source of the non-storm water

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		Elimination	provides clearer language regarding follow through.	discharge as natural in origin (i.e. non-anthropogenically influenced) and in conveyance into the MS4, then the Copermittee must ~~collect the data and evidence necessary to demonstrate to the San Diego Water Board that it is natural in origin; and~~ document the rationale for why the discharge does not need further investigation. This documentation shall be included in the Annual Report.
E.3	61	Permanent BMP Requirements for All Development Projects	No jurisdictional limitations are provided in this section. As a result, language in the subsections may be interpreted as expanding Copermittee requirements outside their MS4 jurisdiction. In addition how the Copermittees implement their program should be a decision left to the Copermittees.	Reword to "Each Copermittee, within their respective jurisdictions, must ~~use their land use/planning authorities to~~ implement a development planning program…"
E.3.a	61	Permanent BMP Requirements for All Development Projects	Added language to clarify that not all the prescribed BMPs in Section E.3.a. are applied to every project. These BMPs are applied as practical and feasible and as applicable based on the sites condition and nature of development.	"Each Copermittee, as practical and feasible, must prescribe the following BMP requirements during the planning process (i.e. prior to project approval and issuance of grading or building permits) for all development projects (regardless of project type or size), where local permits are issued, including unpaved roads and flood management projects, except emergency projects implemented for the protection of persons and property:
E.3.a.2	62	Permanent BMP Requirements for All Development Projects	Source control BMP requirements apply to all projects and should be located in one place in the Provision. Language regarding source control BMPs from E.3.c should be moved here. A definition of "properly designed" should also be provided in Attachment C.	Add "Each Copermittee must require each Priority Development Project to implement applicable source control BMPs." A definition of properly designed has been added to Attachment C.
E.3.a.5.a.vi	64	Permanent BMP Requirements for All Development Projects	Treatment for infiltration BMPs should only be required if significant pollutant levels are present.	"Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities as designated by each Copermittee, unless runoff does not exceed Basin Plan water quality standards or runoff is first treated or filtered to remove pollutants prior to infiltration; and"

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E.3.b.1.b and E.3.b.1.c	64-65	Definition of Priority Development Project	Since SUSMP requirements have been in effect since 2001, will start seeing some redevelopment projects that were subject to previous SUSMPS. Therefore, the 50% rule for redevelopment projects should apply only to projects that were not subject to any previous SUSMP requirements.	Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development and was not subject to previous Priority Project Development requirements, the performance and sizing requirements apply to the entire development. Add the following: (c) Projects where redevelopment results in an increase of more than fifty percent of impervious surfaces of a previously existing development, and the existing development *was* subject to previous Priority Project Development Requirements, only the altered portion of development is subject to the new Priority Development Project requirements.
E.3.b.2	65-66	Priority Development Project Categories	The definition of a direct discharge has been established to mean that the project is releasing flows directly into the receiving water. If the project drains into an MS4 connection which serves existing developed areas before discharging to receiving water, this is not a direct discharge. Added language for clarification	Add language to E.3.b.2.e to clarify that applicable discharges to an ESA are "not commingled with flows"
E.3.b.2.g	66	Priority Development Project	This requirement was present in the prior permit; however, the residential driveways clause was added under the proposed permit. Including residential driveways as a PDP will require unnecessary, burdensome PDP process without proportional water quality benefits. Residential driveways experience low daily traffic trips compared to highways and roads.	"Streets, roads, highways, and freeways, ~~and residential driveways~~. This category is defined as any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles."
E.3.b.3.c and E.3.b.3.d	66	Priority Development Project	An exemption for Priority Development Projects should be provided for driveways constructed with permeable surfaces.	Add driveways to (c) and (d). Add parking lots to (d).
E.3.b.3.e	66	Priority	This exemption allows small individual	Add language as follows:

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		Development Project Categories	residential projects to apply minimum BMPs that meet a minimum performance standards without going through the burdensome PDP review and approval process including; preparation of a full PDP study, and maintenance, verifications, and inspection of permanent treatment control BMPs. Under the current proposed language, single family residence as small as 5,000sf may be subject to PDP requirements, and is lumped in with industrial and commercial development; The potential pollutants generated by small residential are not as significant as industrial or commercial and can be effectively reduced by effective source control and minimum permanent BMPs.	(e) Single-family residential projects that are not part of a larger development or proposed subdivision and implement BMPs that meet minimum performance standards, as outlined in the BMP Design Manual.
E.3.b.3.f	66	Priority Development Project Exemption	This exemption provides an alternative design standard for smaller roadway projects. Existing roads may provide a great retrofit opportunity, but have many challenges due to physical constraints. Existing roads are considered utility corridors, in addition to being adjacent to buildings and structures which makes it physically impossible to fit BMPs that meet PDP sizing criteria. Therefore, Green Street concept is a design alternative.	Add language as follows: (f) Any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles~~.~~ that follows the USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets[1] to the MEP. 1:http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm
E.3.c.1	66	Source Control BMP Requirements	See comment E.3.a.2	Remove Section and move language to Provision E.3.a.2.
E.3.c.2	66-67	Retention and Treatment Control BMP Requirement	A second tier standard is proposed for sites where on site retention is not feasible due to adverse soils or other conditions. The proposed language allows projects to provide pollutant removal equal to the	See Redlines to Section E.3.c (1) , page 86 of City of SD version

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			retention standard by capturing and treating a larger volume. Since equal pollutant removal is to be achieved, offsite mitigation should not be required if the second tier standard is met. This also provides flexibility to achieve retention of the design capture volume utilizing different design alternatives such as bioretention or biofiltration.	
E.3.c.2.b	67	Priority Development Project	Proposed language requires retention of the differential runoff volume to mimic natural hydrology. The main principle of LID is to mimic natural hydrology.	"Each Priority Development Project must be required to implement LID BMPs that are sized and designed to retain the difference in volume ~~equivalent to~~ between the runoff volume produced in the post-project condition as compared to the pre-project condition resulting from a 24-hour 85th percentile storm event ("design capture volume"). A footnote should also be provided clarifying that the "Design capture volume is a single event based volume available after an extended dry period".
E.3.c.3	68	Hydromodification Management BMP Requirements	The Regional Board adopted the San Diego Hydromodification Management Plan (HMP) in July 2010. Significant work, technical analysis and input have gone into the development of the HMP and these requirements have been in effect for only 16 months. Rather than providing separate criteria, the permit should acknowledge implementation of the Regional Board approved HMP as a sufficient mechanism for meeting hydromodification requirements.	Add the following: "Each Copermittee must require each Priority Development Project disturbing greater than one acre to implement hydromodification management BMPs, as described in the Copermittees current HMP, as applicable."
E.3.c.3	68	Hydromodification Management BMP Requirements	The requirement to match naturally occurring pre-development runoff conditions holds redevelopment to a higher standard than new development and mandates redevelopment projects to mitigate beyond site's impact. Redevelopment is widely accepted as	Add the following: "Post-project runoff flow rates and durations do not exceed pre-development ~~(naturally occurring)~~ runoff flow rates and durations by more than 10 percent (for the range of flows that result in increased potential for erosion or degraded channel conditions downstream of Priority Development Projects)."

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			benefiting water quality along with providing other environmental benefits. Redevelopment should be incentivized to ensure an overall improvement of water quality by proposing HMP requirements that are reasonable and achievable on site.	
E.3.c.3	68	Hydromodification Management BMP Requirements	Flexibility is needed since available research and study has not determined the most appropriate methods for sediment supply compensation. Reworded the paragraph to allow assessment, preservation and compensation at a regional level rather than project level.	Add the following: "Projects shall preserve, where feasible, or provide compensation for significant losses of sediment supply anticipated as a result of development."
E.3.c.4	69	Alternative Compliance for Technical Infeasibility: Mitigation	The proposed language allows the alternative compliance program to be optional and gives copermittees the discretion to exercise the program if it is determined to be beneficial and practical for the municipality. The City wants to ensure that the offsite mitigation does not end up in the permit where it becomes expectation that the City manages offsite mitigation for private developments. There are many factors to be taking into consideration in administering a mitigation program including: overhead cost to manage such a program, availability of land, long term maintenance responsibilities & cost, variability and lack of accurate cost estimate of BMPs construction & maintenance cost.	Add "Alternative compliance is an optional program for the Copermittees to utilize if it is determined to provide an equal or greater benefit than onsite compliance. Where alternative compliance is allowed, it is the sole responsibility of the project applicant to execute the alternative compliance and comply with the following requirements: ~~subject to the following requirements:~~"
E.3.c.4.c	70	Alternative Compliance for Technical Infeasibility: Mitigation	This section was revised to reflect the proposed revisions to the Retention requirements.	Modify language as follows: and/or ~~increased pollutant loads~~ water quality equivalence expected to be discharged from the site. The Project applicant must perform offsite mitigation for: [a] The portion of the pollutant load in the design capture volume that is not retained or equally treated onsite,

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				and/or [b] The portion of the increased potential erosion of downstream receiving waters not fully controlled with hydromodification management BMPs onsite. ~~For the pollutant load in the volume of storm water not retained onsite with retention LID BMPs, or increased potential erosion of downstream receiving waters not fully controlled onsite with hydromodification management BMPs, the Copermittee must require the project applicant to either 1) implement an offsite mitigation project, and/or 2) provide sufficient funding for a public or private offsite mitigation project via a mitigation fund.~~
E.3.c.4.c.iii	71	Mitigation Project Timing	The requirement that offsite mitigation projects "be completed upon the granting of occupancy for the first project that contributes funds towards the offsite mitigation project…" is not feasible. Due to the length of time it takes to acquire all of the necessary permits, this timeline is not realistic for regional facilities and will serve as a deterrent to their construction as an alternative compliance mechanism. Additionally, it may take several years for a Copermittee to accumulate the funds necessary for the design, construction and permitting of a regional facility.	Modify as follows: Offsite mitigation funding ~~projects~~ must be secured by the applicant and verified by the Copermittee prior to granting construction permits or recording of maps,whichever comes first, for each ~~completed upon the granting of occupancy for the first project that contributed funds toward the offsite mitigation project, unless a longer period is authorized by the San Diego Water Board.~~
E.3.e.2.a	73	Priority Development Project BMP Implementation and Oversight	Removal of the term "continuously" is suggested so ensure Copermittees do not have to allocate resources for incessant updates to the database. Language should also be added to clarify that, although the database will be watershed-based, each	"Each Copermittee must develop and ~~continuously~~ regularly maintain a watershed-based database to track and inventory all Priority Development Projects and associated structural ~~permanent~~ BMPs within their jurisdiction. Inventories must be accurate and complete beginning from January 2002 for the San Diego County Copermittees, February 2003 for the Orange

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			Copermittee is responsible only for inventory under their jurisdiction.	County Copermittees, and July 2005 for the Riverside County Copermittees. The database must include, at a minimum, the following information:"
E.4	75	Construction Management	Storm Water Pollution Prevention Plan (SWPPP) is a State General Construction Permit term, and should not be used within the MS4 permit so that there is no confusion. Replace with Pollution Control Plan.	Replaced SWPPP with Pollution Control Plan
E.4	75	Construction Management	The language has been updated so that the Copermittee can define which construction projects will be inventoried within its jurisdictional program. Not all jurisdictions apply permits the same way, therefore each needs the ability to address their processes in regards to construction projects. This will eliminate projects in the inventory that are issued local building or construction permits but have no ground disturbance, e.g. plumbing, electrical, mechanical, decks, patios, etc.	Add the following: a. "<u>Construction Program Management</u> <u>Each copermittee must define in the Jurisdictional Runoff Management Plan the following:</u> (1) <u>Define construction sites to be inventoried, such as sites that involve any ground disturbance or soil disturbing activities.</u> (2) <u>Define a process for ensuring adequate construction BMP implementation for non-inventoried sites. Non-inventoried sites involve minor construction activities that are not anticipated to create storm water pollution such as interior improvements, plumbing, electrical and mechanical work. "</u>
E.5	79-85	Existing Development Management	After years of implementation of existing development programs, the Copermittees have the knowledge and experience to implement programs consistent with the goals of the Order and the adaptive management process required under the Order. In order to accomplish this goal, the Copermittees have reorganized and provided a concise existing development section as an alternative to the current	Replace the current provision E.5 with the proposed Provison E.5 located in the strikeout version provided.

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			provision E.	
E.5.a	79	Existing Development Management	Adding the term "reasonable potential to discharge" allows flexibility for the Copermittees to determine priorities. Practically all existing properties have the potential to generate pollutant loads and the inspection program will be ineffective and impractical to implement as written. The focus needs to be on significant pollutant load discharges so inspections and enforcement can actually succeed in receiving water pollutant load reductions versus spending an exhaustive amount of time and money inspecting sites that discharge no pollutant loads, but have the potential to generate minimal loads.	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must maintain an updated watershed-based inventory of all its existing development that has the reasonable potential to ~~may potentially~~ ~~generate~~ discharge a pollutant load to and from the MS4".
E.5.a.1.c	79	Existing Development Management	The SIC Code system was replaced by the NAICS Code system in 1997. As a result, the use of the SIC Code system is being phased out.	*If the current Provision E.5 is not replaced, modify as follows:* c) SIC Code or NAICS Code, if applicable;
E.5.a.4, E.5.a.7	79	Existing Development Management	Mobile home parks are outside the jurisdiction of Copermittees. Also, minor grammatical corrections.	*If the current Provision E.5 is not replaced, modify as follows:* "(4) Identification ~~if a business is a~~ of mobile businesses; " "(7) ~~Identification if an area is a~~ Common Interest Areas (CIAs) / Home Owner Associations (HOAs)~~, or~~ and ~~mobile home parks~~; "
E.5.a.13	80	Existing Development Management	The continual requirement for map updating is excessive. Regularly updated maps should be sufficient for up-to-date information without requiring Copermittees to expend excessive resources.	*If the current Provision E.5 is not replaced, modify as follows:* "A ~~continually~~ regularly updated map showing the location of inventoried existing development, watershed boundaries, water bodies, and pollutants generated at the inventoried existing development."
E.5.b	80	Retrofitting and Channel	This is a new requirement, as compared to the prior permit, which only requires an	*If the current Provision E.5 is not replaced, modify as follows:*

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		Rehabilitation in Areas of Existing Development	evaluation of channels that may be retrofitted. In many instances, channel rehabilitation may not be feasible and other options for improving discharge water quality would need to be considered. Language should be clarified to indicate retrofit and channel rehabilitation are options the Copermittees have at their disposal, but are not necessarily obligatory.	Remove this Provision entirely or include it as an option for compliance as stated below: "…and rehabilitate–channels and/or receiving waters to restore impaired beneficial uses of streams within its jurisdiction, as feasible."
E.5.b.3	80	Existing Development Management	The proposed permit requires the Copermittees to "encourage" landowner retrofit to private property through the "Copermittee's use of subsidies, penalties, or other incentives." Copermittees will face serious enforcement (and possibly legal) issues if they attempt to penalize private landowners for failing to expend their own time, effort, and money retrofitting properties that landowners had no intention of altering in the first place. In addition, water quality, feasibility, cost effectiveness, and community acceptance should be considered when a strategy is developed for retrofit and/or channel rehabilitation.	*If the current Provision E.5 is not replaced, modify as follows:* Each Copermittee must implement retrofit and channel rehabilitation projects, as feasible, that address the highest water quality priorities identified in the Water Quality Improvement Plan pursuant to Provision B.3.a. Ranking may also take into account water quality, project feasibility cost effectiveness, and community acceptance. The Copermittee ~~must~~ should encourage private landowners to implement retrofit designs, at minimum, through the use of public education and outreach. ~~and channel rehabilitation projects whenever practical. Private landowners should be encouraged through the Copermittee's use of subsidies, penalties, or other incentives.~~
E.5.b.5	81	Existing Development Management	See comments for Provision E.5.b.	*If the current Provision E.5 is not replaced, modify as follows:* "Where retrofitting and channel rehabilitation within specific areas of existing development under the Copermittees jurisdiction are determined to be infeasible to restore and protect receiving waters from the highest water quality priorities identified in the Water Quality Improvement Plan, each Copermittee ~~must~~ may identify, develop, and implement regional retrofitting and channel rehabilitation projects..."
E.5.b.7	81	Existing	Resource re-allocation will assist in	*If the current Provision E.5 is not replaced, modify as follows:*

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		Development Management	neutralizing costs for any channel rehabilitation/retrofit projects undertaken by the Copermittees and will have a more significant likelihood of improving water quality than monitoring. Add.	<u>(7) Upon Regional Board approval and in lieu of monitoring during any given year, the Copermittees may reallocate resources originally authorized for water quality monitoring for retrofit and/or rehabilitation project(s), for a maximum of two nonconsecutive years during the permit term.</u>
E.5.c.1	81	Existing Development Management	Required use of pollution prevention methods will be extremely difficult to enforce, particularly if residential land uses are included.	*If the current Provision E.5 is not replaced, modify as follows:* Each Copermittee must ~~require~~ <u>promote</u> the use of pollution prevention methods by the inventoried existing development <u>through public outreach</u>.
E.5.c.2	81	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development <u>with the reasonable potential to discharge pollutant loads to their MS4</u>, including special event venues ~~that have the potential to generate pollutants~~."
E.5.c.3	81	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* Each Copermittee must implement, or require the implementation of, designated BMPs at inventoried existing development that have the <u>reasonable</u> potential to ~~generate~~ <u>discharge</u> pollutant~~s~~ <u>loads</u> <u>from their MS4</u>.
E.5.c.4	82	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* Each Copermittee must operate and maintain, or require the operation and maintenance of designated BMPs at all inventoried existing development <u>that have been identified by the Copermittee as having the reasonable potential to discharge pollutant loads to their MS4</u>.
E.5.c.4.b	82	Existing Development Management	Clarification is necessary that Copermittees are only responsible for the work conducted within their jurisdiction and under their	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must implement procedures during the

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			authority.	operation and maintenance of public streets, unpaved roads, paved roads, and paved highways and freeways, conducted under their authority and within their jurisdiction, that will reduce the contribution of storm water pollutants to the MEP and effectively prohibit the discharge of non-storm water pollutants from the MS4 to receiving water bodies. During maintenance of unpaved roads, each Copermittee must examine the feasibility of replacing existing culverts or designing new culverts/bridge crossings to maintain natural stream geomorphology.
E.5.c.5	82	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must implement procedures, or require the implementation of procedures, to reduce the contribution of pollutants in storm water to the MEP and effectively prohibit non-storm water discharges associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from inventoried existing development ~~into and from the MS4s.~~ identified by the Copermittee as having the reasonable potential to discharge pollutant loads into or from their MS4."
E.5.d	83	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must conduct inspections of inventoried existing development that have been identified by the Copermittee as having the reasonable potential to discharge pollutant loads from their MS4 to ensure compliance with applicable local ordinances and permits, and the requirements of this Order."
E.5.d.1	83	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must establish appropriate inspection frequencies for inventoried existing development based on the priorities set forth in the Water Quality Improvement Plan, and the potential for discharging pollutants via storm water and non-storm water runoff. At a minimum, inventoried existing development that has been identified by the Copermittee as having the reasonable potential to discharge pollutant loads to and from their MS4 must be inspected once ~~every five years~~ during

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				<ins>the permit term</ins>. Inventoried existing development must also be inspected within six months of any change in property ownership or ~~change~~ <ins>increase</ins> in pollutant generating activity..”
E.5.d.2.d through E.5.d.2.f	83-84	Existing Development Management	The addition of “if present” is necessary for clarification.	*If the current Provision E.5 is not replaced, modify as follows:* “(d)Visual observations of actual non-storm water discharges<ins>, if present</ins>; (e)Visual observations of actual or potential discharge of pollutants<ins>, if present</ins>; (f)Visual observations of actual or potential illicit connections<ins>, if present</ins>; and…”
E.5.e	85	Existing Development Management	Limiting language should be included for the Copermittee’s jurisdiction. The existing development inventory and enforcement should be limited to development with the reasonable potential to discharge pollutants.	*If the current Provision E.5 is not replaced, modify as follows:* “Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried existing development <ins>identified by the Copermittee as having the reasonable potential to discharge pollutant loads from the MS4 within their jurisdiction</ins>, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.”
E.6	85	Enforcement Response Plans	Enforcement response plans are already codified in Copermittees’ municipal codes. This section increases requirements for enforcement response and should be made more concise.	Recommend replacement of Enforcement Response Plan Provision with Copermittee streamlined provision, contained in the strikeout provided.
E.6.b.5	87	Enforcement Response Plans	Two weeks compliance is an extremely short time period for maintenance of TCBMPs and reasonable only if the next rain event is within that two week period. One month is much more reasonable and realistic for confirmation of TCBMP maintenance and is consistent with Copermittee implementation experience and	*If the current Provision E.6 is not replaced, modify as follows:* “For violations of permanent BMP maintenance requirements, all violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than than ~~10 business~~ <ins>30 calendar</ins> days after the violations are discovered. If more than ~~10 business~~ <ins>30 calendar</ins> days are required for compliance, a rationale must be recorded in the electronic

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			existing ordinances.	database or equivalent tabular system used to track permanent BMP inspections. "
E.6.c.2	87-88	Enforcement Response Plans	Criminal penalties should be limited to intentional or criminally negligent acts.	*If the current Provision E.6 is not replaced, modify as follows:* The enforcement process must include, at a minimum, appropriate sanctions to compel compliance, such as: (a) Verbal and written notices of violation; (b) Cleanup requirements; (c) Fines; (d) Bonding requirements; (e) Administrative and criminal <u>(if intentional or criminally negligent)</u> penalties; (f) Liens; (g) Stop work orders; and (h) Permit and occupancy denials.
E.6.c.4	88	Enforcement Response Plans	See comment E.6.b.5.	*If the current Provision E.6 is not replaced, modify as follows:* Change 10 business days to 30 calendar days.
E.6.d.1	88	Enforcement Response Plans	San Diego Water Board notice should be consistent with 40 CFR §122.41(l)(6) and the State of California Construction General Permit. Generally, the requirements should be 24 hour verbal notice and five day written notification. Also, email should suffice as written notice.	"Each Copermittee must notify the San Diego Water Board in writing within ~~48 hours~~ <u>5 calendar days</u> of issuing ~~high level~~ <u>escalated</u> enforcement (as defined in the Copermittee's Enforcement Response Plan) to a construction site that poses a significant threat to water quality as a result of violations or other non-compliance with its permits and applicable local ordinances, and the requirements of this Order. <u>Written notification may be provided electronically in email form."</u>
E.7.b.	89	Public Education and Participation	Public participation activities are more closely related to education and outreach, and are inherently different from intergovernmental coordination. Therefore public participation should be included with outreach activities. Move from E.7.b. to E.7.a.	"Each Copermittee must implement a public education <u>and participation program</u>, as appropriate, to promote and encourage <u>the development of programs</u>, management practices, control techniques and systems, design and engineering methods, and behaviors that reduce the discharge of pollutants in storm water to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving

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				waters. The public education program must include~~, at minimum,~~ the following:”
E.7.a.(1)	89	Public Education and Participation	There is specific emphasis on pesticides, herbicides and fertilizers. The rationale for the specificity of these topics is unclear. Given the emphasis on showing changes in water quality, education efforts should be focused on activities that address the pollutants of concern and behaviors that are tied to water quality issues. Therefore, each Copermittee, by jurisdiction and watershed, should identify, determine and prioritize the activities that address priorities consistent with Provision B.	Educational activities, public information activities, and other appropriate outreach activities intended to reduce pollutants ~~associated with the application of pesticides, herbicides and fertilizer in storm water discharges~~ of concern from the MS4 to the MEP. Activities shall be determined and prioritized by Copermittees by jurisdiction and/or watershed (Section 5.c.(5) to address the highest threats to water quality, such as pesticides, herbicides and fertilizers, used oil, toxic waste, etc.;
E.7.a (2)	89	Public Education and Participation	There is specific emphasis on used oil and toxic material disposal. The rationale for the specificity in education topics is unclear. As stated above, Copermittees should be able to target education efforts on the pollutants and behaviors most commonly linked to the water quality issues within their respective jurisdictions and watersheds. Thus, this section is incorporated in the changes proposed above and would become part of E.7.a.1.	Move section E.7.a(2) into E.7.a(1).
E.7.a(3)	89	Public Education and Participation	There is specific emphasis on construction site operators as a target audience, with “other target audiences as determined by the Copermittee(s)”. The rationale for this is unclear. Per the justification above, each Copermittee should be able to determine target audiences in accordance with high risk activities and high priority pollutants within their jurisdiction and watershed(s). Once re-worded, this paragraph then becomes E.7.a (2), because the first two	“Appropriate education and training measures ~~for construction site operators and other~~ specific target audiences, as determined and prioritized by the Copermittees by jurisdiction and watershed, based on high risk behaviors and pollutants of concern, such as construction site operators, residents, underserved target audiences and school-aged children.”

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			paragraphs have been combined per the comments above. .	
E.7.b	89	Public Education and Participation	Inclusion of evaluation and assessment for education and outreach activities is a critical tool for adaptive management and should be addressed. Use of assessment is heavily cited in the development of the overall Water Quality Improvement Plan strategy. In addition, the purpose of intergovernmental coordination on respective JRMPs is unclear. Append to allow for watershed and regional collaboration of education and outreach activities based on effectiveness as determined by the Copermittees. Remove requirement for intergovernmental collaboration on jurisdictional runoff management programs. Add E.7.b as evaluation and assessment and move the current E.7.b to E.7.c.	Include the following language as E.7.a(3): b. "<u>Each Copermittee shall incorporate a mechanism for evaluation and assessment of educational and other outreach activities, as needed, to identify progress and incorporate modifications necessary to increase the effectiveness of the public education program.</u>" c. "Each Copermittee<u> may determine, where appropriate and effective, mechanisms for intergovernmental coordination on education and outreach activities</u>. ~~must incorporate a mechanism for public participation and where necessary intergovernmental coordination in updating, developing, and implementing its jurisdictional runoff management program.~~
F. Reporting				
F.1 and F.2	90	Reporting	Changes for consistency with Provision B.6.	Change timeframe from 12 to 18 months.
F.1	90	Reporting	Minor changes incorporated for consistency with Provision B.	Incorporate timeline consistent with Provision B.
F.2.a	90	Reporting	Additional language is necessary to clarify that modification of program elements of the jurisdictional runoff management program will include rationale for any changes to program elements prescribed in Provision E.	Add "Jurisdictional Runoff Management Program document updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents." Add similar language for the BMP design manual and the Water Quality Improvement updates.
F.2.b	90	Reporting	See F.2.a.	See F.2.a.
F.2.c	91	Reporting	See F.2.a.	See F.2.a.
F.3.b	91	Reporting	Clarification.	"…The first Annual Report must be prepared for the reporting period beginning <u>July 1 after adoption of the permit, and upon</u>

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				San Diego Water Board determination that ~~the date the San Diego Water Board determines that~~…"
F.3.b.	91-92	Reporting	The San Diego Water Board should provide flexibility to allow updates to the Jurisdictional Runoff Management Program Annual Report Form (Attachment D).	Clarify "(Attachment D or approved revision" throughout the Provision.
F.3.b.1 (a through c)	91	Reporting	Monitoring data should be discussed under proposed modifications of the WQIP.	Move a through c under (iii) in original document (now iv).
F.3.b.1.d	92	Reporting	See F.2.a.	Add: (iii) "Proposed modifications to water quality improvement or jurisdictional strategies with associated rationale for such modifications,"
F.3.b.2	92	Reporting	Each Copermittee must submit the report form for each WMA in which they have jurisdiction. Language has been clarified.	Add: "Each Copermittee's Annual Report form must summarize the jurisdictional activities in the WMAs in which the Copermittee has jurisdiction."
F.4	93	Reporting	The Copermittees require language clarification that the regional clearinghouse may be maintained by another agency.	Add a footnote: "The Copermittee may elect to develop and maintain the clearinghouse(s) provided by other Copermittees or agencies."
F.5	93	Reporting	See F.4.	Add similar language from F.4.
G. Principal Watershed Copermittee Responsibilities				
G	96	Principal Watershed Copermittee Responsibilities	Coordinating and developing, with the other Copermittees, the requirements of Provisions F.3.c, F.4, and F.5.b of this Order.	Remove requirement that Principal Copermittee can only be Principal Copermittee for 2 watersheds. Clarify that all Copermittees have some level of commitment, not just the Principal Watershed Copermittee.
H. Modification of Programs				
H	97	Modification of Programs	Modifications of programs are allowed under the WQIP as part of the iterative process and adaptive management. Language should be added to that effect or there may be annual amendments to the Order.	"Proposed modifications outside of the WQIP process that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures."
I. Standard Permit Provisions and General Provisions				
			N/A	None.
Attachment A. Discharge Prohibitions				
Attachment A,	A-1	Attachment B to	The Resolution has been adopted as 2012-	Reference adopted SWRCB Resolution 2012-0012.

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2		State Water Board Resolution 2012-001X	0012 and should be updated accordingly throughout the document. Order should be incorporated by reference instead duplication.	
Attachment B. Standard Permit Provisions and General Provisions				
Attachment B	B1-B5	Standard Permit Provisions and General Provisions	This attachment incorporates the standard NPDES permit provisions as identified in 40 CFR 122.41. Although correctly transposed from the regulations the provisions are obviously developed for a traditional point source permit (i.e. wastewater permit). As such there are a number of standard provision that pose challenges to the Copermittees to comply with. Clarification is requested on a number of the provisions.	See specific changes noted below.
Attachment B, 1.m	B-7	Bypass	This provision requires the Copermittees to notify the Regional Board whenever an anticipated or unanticipated bypass will occur. Given the nature of storm events and the fact that stormwater treatment BMPs include bypass provisions to protect the BMP integrity it would appear that the Copermittees should notify the Regional Board anytime a storm is predicted to ensure compliance with the provision (whether anticipated or unanticipated). This provision was crafted for typical wastewater discharges and has little relevance to stormwater.	Delete this provision.
Attachment C. Acronyms, Abbreviations and Definitions				
Attachment C	C1-C10	Definitions	Definitions need to be added for: properly designed, BMP Design Manual, Public Education, Outreach, and Participation channel rehabilitation and improvement, and retrofit. As currently written, the permit authorizes subjective broad authority and	Suggested definitions are provided in the strikeout.

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			deference to the Regional Board in interpretation of the definitions, if not included. Minor clarifications and grammatical corrections are also included.	
Attachment C	C-6	Definitions – MS4	The addition of CWA language to the definition of MS4 limits Copermittees' responsibilities to within their jurisdiction and strengthens support that Copermittees are not responsible for discharges in MS4s that they do not operate.	Add "Copermittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.21(a)(vi).
Attachment C	C-7	Definitions – Pre-Development Runoff Conditions	The definition for Pre-Development Runoff Conditions should be the exact language codified in the Federal Register at 64 FR §68761.	**Replace the definition as follows:** **Pre-Development Runoff Conditions** – "Runoff conditions that exist onsite immediately before the planned development activities occur. Pre-development is not intended to be interpreted as that period before any human-induced land disturbance activity has occurred." 64 FR §68761.
Attachment C	C-7	Definitions – Public Education, Outreach, and Participation	Neither Public Education and Outreach, nor Public Participation are mentioned in the definitions section of Attachment C. Please add definitions for these non-structural BMPs.	**Add "Public Education, Outreach and Participation –** Programs to educate residents, businesses and visitors about the importance of water quality and water quality programs so that they will support local efforts and understand their role in protecting receiving waters. The Education and Outreach Program will increase knowledge and awareness, improve attitudes toward storm pollution prevention, and provide a foundation for changing behaviors that contribute to storm water pollution."
Attachment C	C-10	Definitions – Waters of the state	Current permit language, citing the California Water Code, presupposes that all portions of the MS4 are considered waters covered by the definition of waters of the state, "Any water, surface or underground, including saline waters within the boundaries of the State [CWC Provision 13050 (e)]." This language should be	**"Waters of the State** - Any water, surface or underground, including saline waters within the boundaries of the State [CWC Provision 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State ~~regardless of circumstance or condition~~. Under this definition, portions of a MS4 may be ~~is always~~ considered to be a Waters of the State. However, man-made portions of the MS4 constructed

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			limited based on the intent of the definition (natural water sources) and should not include dry man-made structures that collect runoff for the sole purpose of flow volume/velocity and/or pollutant reduction.	<u>for the sole purpose of flow and/or pollutant reduction will not be considered Waters of the State.</u>"
Attachment D. Jurisdictional Runoff Management Program Annual Report Form				
			N/A	None.
Attachment E. Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011				
Attachment E	E-1 to E-30	Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	Most requirements are outlined already in the TMDLs and the redundancy of this Attachment is unnecessary. In fact, Attachment E *adds* many TMDL requirements not provided in the TMDL Resolutions, circumventing the TMDL public process. Implementation will be inconsistent with previously adopted resolutions and CLRPs and MPs already drafted, submitted, approved, and/or implemented. A summary of inconsistencies between the TMDLs and Attachment E, where the City of San Diego is listed as a responsible party, are provided as an attachment to this table.	On page E-1, reword to clarify that TMDL implementation must be incorporated into the WQIP and Monitoring sections by the Copermittees and reference the Resolution Numbers in the TMDL list and add recommended compliance language per comments below. Address all inconsistencies with the TMDL Resolutions (provided as attachment).
Attachment E	E-1	Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	The Rainbow Creek TMDL for Total Nitrogen and Phosphorous does not include Wasteload Allocations for the County of San Diego Copermittees. The TMDL only contains Load Allocations. Load allocations should not be implemented through an NPDES permit. It is inappropriate to simply "re-name" the Load Allocations as Wasteload Allocations.	Strike the following TMDL from Attachment E in its entirety: Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed
Attachment E	E-1 to E-30	Specific Provisions for	State and federal law do not require the use	See recommended changes in the attached revised Permit to the

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		Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	of numeric effluent limitations for MS4 permittees, but rather encourage flexible implementation of best management practices through an iterative process. Specifically, the choice to include either management practices or numeric limitations in MS4 permits is within the regulatory agency's discretion, and on the question of whether MS4 permits must contain numeric effluent limitations, the court upheld EPA's use of iterative BMPs in place of numeric effluent limitations for storm water discharges. (See *Defenders of Wildlife v. Browner*, 191 F.3d 1159, 1166-1167 (9th Cir. 1999)[1] Given the challenges with meeting the numeric WQBELs (even with the implementation of a comprehensive suite of BMPs) and the flexibility allowed by State and federal regulations and guidance, a BMP-based WQBEL approach should be allowed for complying with TMDLs. Removing the numeric WQBELs is not proposed. Rather, inclusion of a WQIP-based "compliance path" is recommended. The WQIPs can and should be used as the basis for establishing WQBELs expressed as BMPs. The WQIPs can satisfy the necessary elements of BMP-based WQBELs. For example, the WQIPs would meet the requirements described in the 2010 EPA memo (which updated key aspects of	following: • Provision A.4.c • Provision A.4.d • Provision B (first paragraph) • Provision B.3 Additionally, within the requirements for each individual TMDL in Attachment E, include language similar to the following,: Compliance may be demonstrated via any one of the following methods: 1. There is no discharge from the MS4, or 2. Applicable effluent limitations are met, or 3. Receiving waters meet the applicable receiving water limitations or water quality objective, or 4. Loading from the MS4 is such that it does not cause water quality objective exceedances, or 5. For Copermittee(s) that are implementing a Regional Board-approved WQIP, WQBELs will be implemented as BMPs and compliance will be based upon implementing all provisions of the WQIP in accordance with the approved milestones and schedule.

[1] See also California Regional Water Quality Control Board San Diego Region - Fact Sheet / Technical Report For Order No. R9-2010-0016 / NPDES NO. CAS0108766.

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
			the 2002 memorandum) regarding federal expectations for incorporation of TMDLs WLAs into NPDES stormwater permits as BMP-based WQBELs.	
Attachment E	E-1 to E-30	Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	The findings of California's Stormwater Blue Ribbon Panel, which was convened specifically to examine the feasibility of incorporating numeric effluent limits in stormwater permits, ultimately concluded that numeric limits were generally infeasible across all three stormwater activities (municipal, industrial, and construction), with a few exceptions (*The Feasibility of Numeric Effluent Limits Applicable to Discharges of Stormwater Associated with Municipal, Industrial and Construction Activities, June 19, 2006*). Additionally, state law and policy does not require the use of numeric effluent limitations in MS4 permits. In 2009, the State Water Board affirmed this approach in a precedential order, stating: [i]t is our intent that federally mandated TMDLs be given substantive effect. Doing so can improve the efficacy of California's NPDES storm water permits. This is not to say that a wasteload allocation will result in numeric effluent limitations for municipal storm water dischargers. Whether a future municipal storm water permit requirement appropriately implements a storm water wasteload	See recommended changes in the attached revised Permit to the following: • Provision A.4.c • Provision A.4.d • Provision B (first paragraph) • Provision B.3 Additionally, within the requirements for each individual TMDL in Attachment E, include language similar to the following,: Compliance may be demonstrated via any one of the following methods: 1. There is no discharge from the MS4, or 2. Applicable effluent limitations are met, or 3. Receiving waters meet the applicable receiving water limitations or water quality objective, or 4. Loading from the MS4 is such that it does not cause water quality objective exceedances, or 5. For Copermittee(s) that are implementing a Regional Board-approved WQIP, WQBELs will be implemented as BMPs and compliance will be based upon implementing all provisions of the WQIP in accordance with the approved milestones and schedule.

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
			allocation will need to be decided on the regional water quality control board's findings *supporting either the numeric or non-numeric* effluent limitations contained in the permit. (Order WQ 2009-0008, In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District, at p. 10 (emphasis added).)	
Attachment E. Part 1.b, 2.b, 3.b, 4.b, 5.b, and 6.b	E-2, E-4, E-6, E-9, E-13, and E-19	Water Quality Based Effluent Limitations	Federal regulations (40 CFR 122.44(d)(1)(vii)(B)) require inclusion of effluent limits that are "consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA." Attachment E outlines the requirements of effective TMDLs and appears to incorporate numeric receiving water limitations (RWL) <u>and</u> effluent limitations, where the effluent limitations are set equal to the TMDL Waste Load Allocations (WLAs) and the RWLs are set equal to the TMDL numeric targets. This approach results in a situation where the Copermittees are in double jeopardy. Copermittees should not be put in double jeopardy by being required to meet both RWLs and effluent limitations. Rather, attainment of either RWLs <u>**or**</u> effluent limitations should represent compliance with the permit and the requirements of the TMDL.	See recommended changes in the attached revised Permit. Additional language should be added to the WQBELs sections for all TMDLs in Attachment E to clearly define compliance with WQBELs via any of the following methods: - There is no discharge from the MS4, **OR** - Applicable effluent limitations are met, **OR** - Receiving waters meet the applicable receiving water limitations or water quality objective, **OR** - Loading from the MS4 is such that it does not cause water quality objective exceedances, **OR** - For Copermittee(s) that are implementing a Regional Board-approved WQIP, WQBELs will be implemented as BMPs and compliance will be based upon implementing all provisions of the WQIP in accordance with the approved milestones and schedule.
Attachment E	E-1 to E-30	Multiple	Attachment E specifies outfall monitoring	Modify the Specific Monitoring and Assessment Requirements

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			requirements for several TMDLs, "in accordance with the requirements of Provisions D.1, D.4.a.(1)(b), and D.4.a.(3)(b) of this Order." Adding outfall monitoring to the TMDL provisions is inappropriate and unnecessary. Attachment E should focus on integrating the monitoring requirements *specified in the TMDL Basin Plan Amendments.* The monitoring requirements for TMDLs were developed through a public comment process and adopted by the Regional Board, and are the only monitoring requirements that should be specified in Attachment E. Furthermore, there is no reason to re-state the requirements from Provision D, which makes it likely that Attachment E and Provision D will have inconsistencies. Provision D requirements should only be listed in Provision D.	for the following TMDLs: 1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed 2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin 3. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek 4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Specifically, for each of these TMDLs, the sub-bullet under section (d) regarding effluent monitoring should be stricken and replaced with the following: "The Responsible Copermittees must implement the monitoring and assessment requirements issued under Order No. XXXX. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.", where "XXXX" reflects the order numbers for each TMDL, shown in the attached revised Permit on Page E-1. For the Chollas Creek Metals and Diazinon TMDLs, the XXX refers to the order number for the issued Investigation Orders. For the Project I Bacteria TMDL, specific changes to the monitoring requirements are requested to reflect those specified in the TMDL Basin Plan Amendment, as described below.
Attachment E. Part 4.b.	E-10	Water Quality Based Effluent Limitations	The TMDL for Dissolved Copper, Lead, and Zinc in Chollas Creek states that "If all copper, lead, and zinc concentrations in urban runoff to Chollas Creek meet their respective TMDL concentrations, the	If WQBELs are to be expressed as numeric effluent limits consistent with the WLAs, then mass-based WQBELs should be included as a mechanism for demonstrating compliance to allow for options to demonstrate load-based pollutant reductions. As described above, the mass-based WQBELs should only be included with an "or" statement (not an "and" statement).

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			loading capacity of the creek should not be exceeded" (Section 8). The TMDL further states that "because this WLA is concentration-based it will apply to each land use and each sub-watershed at all times and will not be specific to any land use or sub-watershed (Section 8.1)." Requiring all land uses and sub-watersheds to meet effluent limits consistent with RWLs is not a cost-effective or practicable approach to BMP strategy development. Volume reduction strategies such as Low Impact Development and Green Infrastructure should be a viable compliance path for the San Diego region. The WQBELs should include the mass-load based WLAs to consider the pollutant loads reduced, which will be impacted by both pollutant concentration reductions *and* stormwater volume reductions. Alternatives for load-based approaches should be included as effluent limitations, which will correspond to targets for meaningful CLRP and WQIP development.	The recommended Compliance Determination language in the attached revised Permit addresses this issue.
Attachment E. Part 6.a	E-19	Applicability	Since adoption of the Project I Bacteria TMDL, the Copermittees have submitted data analysis to the Regional Board to demonstrate that 303(d) listings for San Marcos HA, San Dieguito River HA, and Los Penasquitos HA were incorrectly applied to REC beneficial uses. The Regional Board has concurred with the findings for each HA and stated that these HAs are "not subject to further action under Resolution No. R9-2010-0001." Similar	In Table 6.0, the San Dieguito River WMA and Carlsbad WMAs should be deleted. The Los Penasquitos WMA should be re-named to the Mission Bay WMA and Torrey Pines State Beach at Del Mar should be removed. The recommended language in the attached revised Permit addresses this issue by also adding the following to Specific Provision 6.a.(5): "Subsequent to TMDL adoption, it has been established by the Regional Board that the following water bodies are not subject

<table>
<tr><th>Permit Section</th><th>Permit Page (Original)</th><th>Section Title</th><th>Reason for Proposed Changes/Comments</th><th>Proposed Changes</th></tr>
<tr><td></td><td></td><td></td><td>responses are expected for the other HAs.</td><td>to further action under Resolution No. R9-2010-001, and therefore are not subject to Bacteria TMDL requirements described herein and are not included in Table 6.0:
<table><tr><th>Watershed Management Area</th><th>Water Body</th><th>Segment or Area</th></tr><tr><td>Carlsbad</td><td>Pacific Ocean Shoreline</td><td>at Moonlight State Beach</td></tr><tr><td>San Dieguito River</td><td>Pacific Ocean Shoreline</td><td>at San Dieguito Lagoon mouth</td></tr><tr><td>Peñasquitos</td><td>Pacific Ocean Shoreline</td><td>Torrey Pines State Beach at Del Mar (Anderson Canyon)</td></tr></table></td></tr>
<tr><td>Attachment E. Part 6.b</td><td>E-19</td><td>Receiving Water Limitations</td><td>The Basin Plan Amendment for the Project I Bacteria TMDL contains Receiving Water Limitations. These Receiving Water Limitations should be incorporated directly into the Permit. However, Attachment E contains Receiving Water Limitations that do <u>not</u> match those from the TMDL. The Regional Board should not revise or translate the RWLs from the TMDL, they should be incorporated directly. The RWLs incorporated into Attachment E have several discrepancies with the RWLs in the TMDL, including application of single sample targets to the dry weather RWLs and application of total coliform RWLs for inland waters.</td><td>Replace entirely the RWLs in the Permit with those from the TMDL.

The attached revised Permit incorporates RWLs for beaches (Table 6.1) and RWLs for Creeks (Table 6.2). Note these RWLs were pasted directly from the Basin Plan Amendment (Attachment A, page 52).</td></tr>
<tr><td>Attachment E. Part 6.b</td><td>E-19 and E-20</td><td>Water Quality Based Effluent</td><td>Attachment E specifies WQBELs for dry weather flows as both receiving water and</td><td>It is recommended that the single sample maximum not be used for dry weather WQBELs. At a minimum, an acceptable dry</td></tr>
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Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
		Limitations	effluent limitations for the Project I Bacteria TMDL, in terms of zero allowable exceedances of the single sample maximum and the 30-day geometric mean. However, the dry weather component of the TMDL only considered the 30-day geometric mean, and did not consider the single sample maximum within its calculation. Incorporating single sample effluent limitations into the Permit goes beyond the TMDL requirements. In addition, if the TMDL had included single sample limits, there would have been a corresponding allowable exceedance frequency, just as for wet weather. The 22% allowable exceedance rate for wet weather was based on a reference beach within the Los Angeles Region, and although not used in the technical approach for the San Diego Beaches and Creeks TMDL, the reference beach also exhibits exceedances during dry weather, which is incorporated into beach TMDLs in the Los Angeles region.	weather exceedance frequency should be assumed and applied. Specific Provision 6.b.(2) of the attached revised Permit addresses this issue by (1) incorporating the RWLs directly from the TMDL, and (2) linking the receiving water limitations and effluent limitations.
Attachment E. Part 6.b	E-20	Water Quality Based Effluent Limitations	The Project I Bacteria TMDL applies mass-load based TMDLs to point sources. Many of the BMPs used for achieving pollutant reductions, such as structural BMPs and green infrastructure, emphasize infiltration and associated volume reduction as the primary mechanism for reducing urban runoff. A significant investment could be made to implement structural BMPs to reduce urban runoff to meet the mass-load based WLAs assigned in the TMDL. These reductions could result in meeting the mass-	If WQBELs are to be expressed as numeric effluent limits consistent with the WLAs, the mass based WLAs for both dry and wet weather presented in the TMDL should be included as a mechanism for demonstrating compliance to 1) be consistent with the assumptions of the WLAs and 2) allow for options to demonstrate load based pollutant reductions. The attached revised Permit addresses this issue by incorporating the mass-based wasteload allocations into Section 6.b.(2).

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
			based WLA and have a positive impact on receiving waters by significantly reducing urban loads to receiving waters. However, even the small amount of flows remaining could exceed the numeric effluent limitations currently in the Permit, but not cause or contribute to WQO exceedances. In this manner, a violation of the numeric WQBELs would result in zero credit for the millions invested and penalty for discharges that did not negatively impact attainment of WQ standards. Volume reduction strategies such as Low Impact Development and Green Infrastructure should be a viable compliance path for the San Diego region. The WQBELs should include the mass-load based WLAs to consider the pollutant loads reduced, which will be impacted by both pollutant concentration reductions *and* stormwater volume reductions.	
Attachment E. Part 6.b	E-20	Water Quality Based Effluent Limitations	The reference conditions and associated allowable exceedance frequencies for WQBELs addressing Project I Bacteria TMDL were based on a marine reference beach within Los Angeles, and are not necessarily applicable to fresh water flows in the San Diego Region. The Los Angeles reference beach was influenced by salt water (increasing bacterial die-off) and mixing/dilution from wave action that likely resulted in lower exceedances of REC-1 objectives than would be found in a freshwater stream. Freshwater TMDLs in the Los Angeles region now incorporate	The permit should include language that allows for update of the allowable exceedance frequencies as these results become available. The attached revised Permit addresses this issue by added the following paragraph to Specific Provision 6.b.(1).(a): "The allowable exceedance frequencies in Table 6.1 and Table 6.2 can be updated by the Regional Board Executive Officer if sufficient data is provided regarding reference systems in the San Diego Region."

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			freshwater reference systems (instead of a marine reference system), and the marine beach exceedance rates have been updated through a recent TMDL reopener for Santa Monica Bay. In addition, a reference study is currently underway for the San Diego Region.	
Attachment E. Part 6.c	E-21	Compliance Schedule	Total coliform WQOs do not apply to inland waters.	As shown in the attached revised Permit, add a footnote to Table 6.3 as follows: "Total coliform receiving water limitations apply only to segments of areas of Pacific Ocean Shoreline listed in Table 6.0."
Attachment E. Part 6.c	E-21	Compliance Schedule	The CLRPs to be submitted by Copermittees will propose interim compliance dates, as allowed by the Project I Bacteria TMDL, generally 7 and 10 years, respectively, to meet the 50% reduction milestone for dry and wet weather. The CLRPs submitted by Copermittees may not all propose the same interim compliance dates and the Permit should acknowledge the flexibility allowed by the TMDL (see page 68 of Attachment A of the Basin Plan Amendment). In fact, this scheduling flexibility was a primary "incentive" for Copermittees to develop CLRPs instead of BLRPs.	The interim compliance dates should not be specified in the Permit. Instead, the Permit should reference the submitted and Regional Board-approved CLRPs. This approach will avoid conflict between the TMDL, Permit, and CLRPs. The attached revised Permit addresses this issue by revising the opening of Section 6.c.(2): "The Responsible Copermittees must comply with the following interim WQBELs by the interim compliance dates <u>submitted in the Regional Board-approved CLRPs and supported by Order No. R9-2010-0001</u>:" Table 6.5 should be deleted from Attachment E to allow the CLRPs the scheduling flexibility provided in the TMDL adopted by the Regional Board.
Attachment E. Part 6.c	E-21 thru E-27	Compliance Schedule	Similar to the flexibility allowed for scheduling, the TMDL allows CLRPs flexibility in expressing and achieving TMDL milestones/interim requirements. Furthermore, the wet weather interim compliance dates are well-beyond the term of this Permit, and should be not included in	Delete Table 6.4 because (1) the CLRPs have flexibility to express interim milestones and (2) the wet weather interim requirements do not apply until 2022, well beyond the term of this Permit.

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
			Attachment E.	
Attachment E. Part 6.c	E-27	Compliance Schedule	The Copermittees request an acknowledgement of the TMDL reopener scheduled for April 2016 which falls within the term of this Permit.	Add a part (3) to Specific Provision 6.c: "(3) Submittals to Support TMDL Basin Plan Amendment The Responsible Copermittees are encouraged to submit data to support the TMDL reopener scheduled for April 2016 including but not limited to data related to reference watershed monitoring and beneficial use usage frequency."
Attachment E. Part 6.d (new section added to revised)	E-27	Compliance Determination	The BPA for the Project I Bacteria TMDL contains specific language regarding MS4 compliance determination in the case that receiving water limitations are not attained. This language should be added directly to the Permit.	As shown in the attached revised Permit, add the following language to Section 6 of Attachment E, which is *pasted directly* from the BPA: "The municipal MS4s may demonstrate that their discharges are not causing the exceedances in the receiving waters by providing data from their discharge points to the receiving waters, by providing data collected at jurisdictional boundaries, and/or by using other methods accepted by the San Diego Water Board. Otherwise, at the end of the wet weather TMDL compliance schedule, the municipal Phase I MS4s will be held responsible and considered out of compliance unless other information or evidence indicates another controllable or uncontrollable source is responsible for the exceedances in the receiving waters. If controllable sources other than discharges from the municipal Phase I MS4s are identified before or after the end of the wet weather TMDL Compliance Schedules as causing the exceedances, those controllable sources will be responsible for reducing their bacteria loads and/or demonstrating that discharges from those sources are not causing the exceedances. If controllable sources other than the Phase I MS4s are identified as causing the exceedances, and the Phase I MS4s have demonstrated they are not causing or contributing to the exceedances, the Phase I MS4s will not be considered out of compliance. The San Diego Water Board shall implement additional actions (e.g., issue enforcement actions, amend existing NPDES requirements or conditional waivers), as needed, to bring all those controllable sources into

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
				compliance with the wet weather TMDLs."
Attachment E. Part 6.d	E-27	Specific Monitoring and Assessment Requirements	As described above, the CLRPs envisioned in the Project I Bacteria TMDL include flexibility to develop certain components based on watershed-specific issues and conditions. Each CLRP submitted by the Copermittees will include a monitoring and assessment component. It is important to allow the CLRP process to drive the monitoring programs.	As shown in the attached revised Permit, include the following at the beginning of the Monitoring and Assessment section: "The BLRPs and CLRPs to be submitted by the Copermittees and approved by the Regional Board Executive Officer contain monitoring programs. Implementation of those Regional Board-approved monitoring programs constitutes compliance with the Monitoring Station and Monitoring Procedure requirements, described below."
Attachment E. Part 6.d	E-27	Specific Monitoring and Assessment Requirements	The Project I Bacteria TMDL included specific beach monitoring requirements, which were subject to a public comment process and adopted by the Regional Board. Attachment E adds many additional components to these requirements, which undermines the TMDL adoption and public commenting process. Instead of re-interpreting and adding onto the TMDL monitoring requirements in the Basin Plan Amendment, the Permit should adopt those requirements directly (BPA Attachment A, page 50-51).	As shown in the attached revised Permit, the beach monitoring requirement should be incorporated directly from the TMDL. The following language/requirement for beaches is *pasted directly* from the TMDL: "(1) Monitoring and Assessment Requirements for Beaches (a) Monitoring Stations For beaches addressed by these TMDLs, monitoring locations should consist of, at a minimum, the same locations used to collect data required under MS4 NPDES monitoring requirements and beach monitoring for Health and Safety Code section 115880.75 If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters. (b) Monitoring Procedures (i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly.

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
				(ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations at least once within the first 24 hours of the end of a storm event that occurs during the rainy season (i.e., October 1 through April 30). (iii) Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria."
Attachment E. Part 6.d	E-27	Specific Monitoring and Assessment Requirements	Similarly, the creek monitoring requirements should reflect the TMDL that was approved and subject to public comment (BPA Attachment A, page 50-51). Note that total coliform should not be a requirement for creek monitoring, as creeks are not subject to total coliform WQOs, RWLs, or WLAs.	As shown in the attached revised Permit, the creek monitoring requirement should be incorporated directly from the TMDL. The following language/requirement for creeks is *pasted directly* from the TMDL: "Monitoring and Assessment Requirements for Creeks and Creek Mouths (a) Monitoring Stations For creeks addressed by these TMDLs, monitoring locations should consist of, at a minimum, a location at or near the mouth of the creek (e.g., Mass Loading Station or Mass Emission Station) and one or more locations upstream of the mouth (e.g., Watershed Assessment Stations). If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters. (b) Monitoring Procedures (i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly. (ii) The Responsible Copermittees must collect wet weather

Permit Section	Permit Page (Original)	Section Title	Reason for Proposed Changes/Comments	Proposed Changes
				monitoring samples from the receiving water monitoring stations within the first 24 hours of the end of a storm event that occurs during the rainy season (i.e., October 1 through April 30) (iii) Samples collected from receiving water monitoring stations must be analyzed for fecal coliform and *Enterococcus* indicator bacteria.”

ADMINISTRATIVE DRAFT MS4 PERMIT INCONSISTENCIES WITH TMDL REQUIREMENTS

Section (Att. E)	Sub-Section	Admin. Draft MS4 Permit Summary	Inconsistency/Issue
1	B(3)(a) Best Management Practices	The Responsible Copermittees must implement BMPs capable of achieving the WQBELs under Specific Provision 1.b	Issue with “must implement BMPs” BMPs are not mentioned in Resolution R9-2002-0123. Copermittees are required to: 1.Enforce existing local ordinances and adopt new legal authority as needed. 2) implement a “Diazinon Toxicity Control Plan”, and 3) conduct a focused Public Outreach/Education Program. However, the TMDL technical report suggests but does not require the use of BMPs. “Proposed implementation measures to meet the TMDL include implementation of best management practices (BMPs) and public outreach by the dischargers. Dischargers are responsible for taking measures, such as implementing BMPs, to reduce and manage their input of diazinon.”, per the San Diego Water Board Basin Plan Amendment and Technical Report for Resolution No. R9-2002-0123. Additionally, the Regional Water Board cannot dictate the method of implementation.
1	D(b).	“The responsible Copermittees must monitor the effluent of the MS4 outfalls for diazinon within the Chollas Creek Watershed, and calculate or estimate the monthly and annual diazinon loads”	Monitoring requirements are incorrect. Compliance monitoring includes flow-weighted composite sampling at the receiving water. Also, the TMDL is a concentration based TMDL; therefore, load calculations are not required and inappropriate. The Numeric Targets and WLAs are all defined in terms of concentrations.
2	B(3). Best Management Practices	“The responsible copermittee must implement BMPs…”	In resolution R9-2005-0019 there is no mention of BMPs. In the technical TMDL report there is also no requirement of BMP implementation, though pollution prevention practices and source control BMPs “can be developed and implemented”. Additionally, the Regional Water Board cannot dictate the method of implementation. Discharger strategies to reduce copper leading to SIYB are discussed, however, they are more applicable to boating. MS4 discharger mitigation is not discussed.
2	c. Compliance Schedule	The Responsible Copermittee was required to achieve its WLA upon the effective date of the TMDL, December 2, 2005.	Compliance schedule is incorrect. The compliance deadline is 2022. Attachment A to resolution No. R9-2005-0019 states that “copper load and wasteload reductions are required over a 17-year staged compliance schedule period.”

Section (Att. E)	Sub-Section	Admin. Draft MS4 Permit Summary	Inconsistency/Issue
2	d. Specific Monitoring and Assessment Requirements	The Responsible Copermittee must monitor the effluent of its MS4 outfalls for dissolved copper, and calculate the monthly and annual dissolved copper loads"	There are no specific monitoring requirements other than to monitor SIYB waters (receiving waters).
4	b. (3)a.	The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 4.b for Chollas Creek.	Issue with must implement BMPs. Mitigation and consideration of alternative projects (i.e. CEQA requirements) "should" be incorporated; however, BMPs are not specifically called out in the TMDL beyond any relevance to restoration projects that would fall under CEQA. Additionally, the Regional Water Board cannot dictate the method of implementation. (Order No. R9-2007-0043).
4	d. Specific Monitoring and Assessment Requirements.	RPs "must monitor the effluent of the MS4 outfalls discharging to Chollas Creek for dissolved copper, lead, and zinc or estimate the monthly and annual dissolved copper, lead, and zinc loads"	Outfall monitoring is not required in the TMDL. Flow-weighted composite sampling for 3 storms at the receiving water is required. No monthly or annual loads are required in the concentration based TMDL which is based on the hardness-dependent CTR water quality criteria for dissolved metals. However, "Storm water samples shall be collected using a flow-weighted composite sampling strategy during the wet-weather season in a manner identical to the current municipal storm water-monitoring program" so what the "current permit" says is what is required. (Order No. R9-2007-0043, Order No. R9-2004-0277.
6	Table 6.0	South Orange County Watershed Management Area (WMA) – Pacific Shoreline related to Laguna Beach includes 5 of 6 segments are listed	Segment Laguna Beach @ Laguna Avenue is not listed in the MS4 Permit (and is included in the TMDL on the List of Impaired Segments).
6	Table 6.0	South Orange County WMA – Pacific Shoreline related to San Clemente	Responsible Party Dana Point is not listed in MS4 Permit (as listed in the TMDL)
6	Table 6.0	Carlsbad WMA RPs include Cities of Oceanside, Solana Beach, and Vista.	These 3 cities are not located within the Moonlight HA. RPs <u>did not</u> include Cities of Oceanside, Solana Beach, and Vista in the TMDL.
6	Table 6.0	Peñasquitos WMA (Miramar Reservoir HA) includes Los Peñasquitos Watershed, Scripps, and Tecolote.	The City of San Diego would not agree with merging all three listings into one WMA. Peñasquitos WMA is appropriate for the Pacific Shoreline Listing at Torrey Pines State Beach; however, not for Scripps and Tecolote. Mission WMA is appropriate for both the Scripps and Tecolote listings. In the TMDL: Miramar HA is listed for the Pacific Shoreline Listing at Torrey Pines State Beach. Scripps HA is listed for Pacific Shoreline Listing at La Jolla and PB segments. Tecolote HA is listed for Tecolote Creek.

Section (Att. E)	Sub-Section	Admin. Draft MS4 Permit Summary	Inconsistency/Issue
6	Table 6.0	San Diego River WMA for Forrester Creek Responsible Parties include City of La Mesa	The TMDL does not list the City of La Mesa as a RP.
6	B. (1) Receiving Water Limitations (RWL) Table 6.1	Note 1: Only the single sample maximum (SSM) is required to be achieved during wet weather.	To focus on the SSM and not be required to address the 30-day geomean for wet weather. Note C of both Tables on p. A52 of the TMDL "Receiving Water Limitations for Beaches and Creeks" states that the 30-day geomean must also be met.
6	Limitations (RWL) Table 6.1	Note 2: Both the SSM and Geomeans are required to be achieved during dry weather.	Adding SSM to the required WQBELs goes beyond the TMDL. The SSM should not be used for a dry weather WQBEL. Note E of both Tables on p. A52 of the TMDL "Receiving Water Limitations for Beaches and Creeks" states that the 30-day geomean must be met. The SSM is not a dry weather numeric target.
6	B. (2) Effluent Limitations	The Permit assigned RWLs to the MS4 discharges. Is not conditional upon causing or contributing to an exceedance in the RW.	Beyond the TMDL requirements, which requires compliance based on the receiving water and follow up based on exceedances in the receiving water. The TMDL allows the RPs the flexibility to design their follow-up program, which is also consistent with the WQIP.
6	B. (3) BMPs	This section does not acknowledge the timeline discrepancy between the WQIP and CLRP and the exhaustive resources that have been expended to date.	The CLRPs are in progress – resources and funding have been committed by the RPs to develop CLRPs. The City will incorporate the CLRPs into the WQIPs. The CLRPs address 3 (b) and (c) (Appendix P of Technical Report), and include a Monitoring Plan and QAPP designed to meet the compliance requirements of the TMDL.
6	C. Compliance Schedule (2) Interim Compliance dates	(2) Interim Compliance dates are provided based on the priorities listed in the TMDL for each listed segment. These do not reflect the CLRP process and remove the flexibility meant to encourage a CLRP approach.	Interim Dry Weather WQBELs provided for City WMAs San Dieguito, Peñasquitos/Miramar, Scripps, and Tecolote are set at year 5, rather than year 7. It should be year 7 to allow for the CLRP process per the TMDL. TMDL allows RPs to propose an alternative compliance schedule when developing a CLRP (pA68-69). The schedule is to be included in the CLRP due October 2012. If the Regional Board doesn't accept the proposed schedule a default CLRP schedule was provided on p A68 (pA69). This allows 7 years to comply with an interim 50% reduction for Dry Weather.
6	C. (1) and (2)	Interim and Final Compliance Dates	Permit is inconsistent in selecting/applying them per the TMDL. (See prior two comments)

Section (Att. E)	Sub-Section	Admin. Draft MS4 Permit Summary	Inconsistency/Issue
6	D. Monitoring and Assessment Requirements (1) Beaches (a) Monitoring Stations	Does not specify AB411 monitoring locations for beach listings.	Inconsistent with the TMDL. AB411 locations provide a possible cost-savings by overlapping with the existing program and a benefit to assessment since there is a historical data set. The TMDL states monitoring locations "…should consist of, at a minimum, the same locations used to collect data required under the MS4 NPDES monitoring requirements and beach monitoring for AB411 monitoring." (pA50). CLRP monitoring has already been designed to monitor at the AB411 locations. Stakeholders agreed to monitor AB411 locations for regional consistency and allow for comparison between watersheds.
6	D. (1) (a) Monitoring Stations	Requires coastal outfall monitoring during wet and dry weather simultaneous to receiving water monitoring. Requires analysis of all 3 analytes regardless of exceedances in the receiving water.	(1) Beyond the requirements of the TMDL. While the TMDL is ambiguous as to whether outfall monitoring is required prior to the end of the compliance period, it states "If at the end of the wet TMDL Compliance schedule the receiving waters exceed the SSM more than the allowable exceedance frequency, all controllable sources are responsible for demonstrating their discharges into the RW are not causing the exceedances or they will be considered out of compliance. (p. A54)." (3) Requires costly, routine monitoring on an annual basis, instead of follow up/source identification based on receiving water monitoring. (4) Follow up monitoring should be based on the exceedance frequency of the receiving water numeric targets. The CLRP monitoring plans design follow up monitoring to address receiving water exceedance frequency of the numeric targets after interim milestone of 50% reduction. This approach allows the RPs to implement BMPs and assess water quality improvements prior to the interim milestones. Focus on BMP implementation and compliance monitoring. Limit the cost of follow up monitoring and source tracking.
6	D. (1) (b) Monitoring Procedures	Must monitor each storm event.	This is a costly requirement and not feasible to execute. The TMDL, as written, has contradictory language regarding the number of wet events. The CLRP monitoring approach identifies a set number of monitoring events to be sampled that should be sufficient to characterize the quality of wet weather discharges. The CLRP monitoring approach should be followed, when submitted.

Section (Att. E)	Sub-Section	Admin. Draft MS4 Permit Summary	Inconsistency/Issue
	D. (1) (b) Monitoring Procedures	Does not specify minimum frequency for dry weather monitoring.	Not consistent with TMDL. Doesn't include a reference to the TMDL. Provides inconsistent guidance to the RPs regarding when to monitor per the Permit versus TMDL requirements. "The method and number of samples needed for calculating the 30-day geomean should be consistent with the number of samples required by the Ocean Plan for beaches and Basin Plan for Creeks (TMDL pA53)." Beaches will utilize data collected under the AB411 program, as specified in the CLRP.
6	D. Monitoring and Assessment Requirements (2) Creeks and Creek Mouths (a) Monitoring Stations	Additional outfall stations and jurisdictional monitoring stations. Two Jurisdictional monitoring sites per City.	Increase monitoring requirements. Removes flexibility for RPs to develop follow up monitoring and special studies based on watershed priorities and available resources. The TMDL, as written, requires monitoring one receiving monitoring location at the mouth and one upstream. It does not require outfall or jurisdictional monitoring, giving RPs the flexibility to design their follow up monitoring and source id studies.
6	D. (2) (b) Monitoring Procedures	Must monitor each storm event.	This is a costly requirement and not feasible to execute although the TMDL has contradictory language regarding the number of wet events. The CLRP monitoring approach identifies a set number of monitoring events to be sampled that should be sufficient to characterize the quality of wet weather discharges.
6	D. (2) (b) Monitoring Procedures	Inconsistent in the level of details provided for outfall and jurisdictional monitoring than provided in D. Monitoring and Assessment Requirements (1) Beaches (a) Monitoring Stations.	Monitoring procedures only apply to receiving water monitoring locations. Does not provide analytes or event frequency requirements for outfall or jurisdictional monitoring.
	D.(2) (c) Assessment and Reporting	Assess interim and final receiving whether WQBELs have been achieved. Requires additional outfall monitoring if the receiving water WQBELs have not been achieved.	This is overly prescriptive monitoring requirements to try and identify sources each year of compliance monitoring. Need to add language to clarify that this assessment is not required until after the interim and final compliance dates. Follow up monitoring and source id studies should not be required until after the interim and final compliance dates. The TMDL requires the Copermittees to "demonstrate progress until the exceedance frequencies ultimately are achieved at the end of the TMDL Compliance Schedule (pA55)." Follow up and Source Id approach should be flexible and adaptive to allow the RPs to implement BMPs and assess water quality improvements prior to the interim milestones, as specified in the CLRP. Focus on BMP implementation and compliance monitoring. Limit the cost of follow up monitoring and source tracking. CLRPs will provide an annual summary of monitoring data and findings.

Section (Att. E)	Sub-Section	Admin. Draft MS4 Permit Summary	Inconsistency/Issue
6	D.(1) and (2) (c) Assessment and Reporting	Inconsistent requirements between the two permit sections.	Section D.(1)c does not require reporting of outfall data or additional sites to address RW exceedances as required in Section D(2)c.

ADMINISTRATIVE DRAFT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN DIEGO REGION

TENTATIVE
ORDER NO. R9-2012-0011
NPDES NO. CAS0109266

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHEDS WITHIN THE SAN DIEGO REGION

The San Diego County Copermittees in Table 1a are subject to waste discharge requirements within their respective jurisdictions set forth in this Order.

Table 1a. San Diego County Copermittees

City of Carlsbad	City of Oceanside
City of Chula Vista	City of Poway
City of Coronado	City of San Diego
City of Del Mar	City of San Marcos
City of El Cajon	City of Santee
City of Encinitas	City of Solana Beach
City of Escondido	City of Vista
City of Imperial Beach	County of San Diego
City of La Mesa	San Diego County Regional Airport Authority
City of Lemon Grove	Unified Port District of San Diego
City of National City	

The Orange County Copermittees in Table 1b are subject to waste discharge requirements within their respective jurisdictions set forth in this Order upon expiration of Order No. R9-2009-0002, NPDES No. CAS0108740 on December 16, 2014.

Table 1b. Orange County Copermittees

City of Aliso Viejo	City of Ranch Santa Margarita
City of Dana Point	City of San Clemente
City of Laguna Beach	City of San Juan Capistrano
City of Laguna Hills	City of Laguna Woods
City of Laguna Niguel	County of Orange
City of Lake Forest	Orange County Flood Control District
City of Mission Viejo	

The Riverside County Copermittees in Table 1c are subject to waste discharge requirements within their respective jurisdictions set forth in this Order upon expiration of Order No. R9-2010-0016, NPDES No. CAS0108766 on November 10, 2015.

Table 1c. Riverside County Copermittees

City of Murrieta	County of Riverside
City of Temecula	Riverside County Flood Control and Water Conservation District
City of Wildomar	

The Orange County Copermittees and Riverside County Copermittees may enroll under this Order at a date earlier than the expiration date of their current Orders subject to the conditions described in Provision F.6 of this Order and the Copermittees in the respective county receive a Notice of Enrollment (NOE) from the San Diego Water Board.

The term Copermittee in this Order refers to any San Diego County, Orange County, or Riverside County Copermittee enrolled under this Order, unless specified otherwise.

This Order provides permit coverage for the Copermittee discharges described in Table 2. "Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.26(a)(3)(vi).

Table 2. Discharge Locations and Receiving Waters

Discharge Points	Locations throughout San Diego Region
Discharge Description	Municipal Separate Storm Sewer System (MS4) Discharges
Receiving Waters	Waters of the U.S.: Inland Surface Waters, Enclosed Bays and Estuaries, and Coastal Ocean Waters of the San Diego Region

Table 3. Administrative Information

This Order was adopted by the San Diego Water Board on:	**Month Day, 2012**
This Order will become effective on:	**Month Day, 2012**
This Order will expire on:	**Month Day, 2017**
The Copermittees must file a Report of Waste Discharge (ROWD) in accordance with Title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than 180 days in advance of the Order expiration date.	

I, David W. Gibson, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on Month Day, 2012.

TENTATIVE

David W. Gibson
Executive Officer

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ADMINISTRATIVE DRAFT

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I. FINDINGS

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board), finds that:

JURISDICTION

1. **MS4 Ownership or Operation.** Each of the Copermittees owns or operates an MS4, through which it discharges storm water and non-storm water into waters of the U.S. within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

2. **Legal and Regulatory Authority.** This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations (Code of Federal Regulations [CFR] Title 40, Part 122 [40 CFR 122]) adopted by the United States Environmental Protection Agency (USEPA), and chapter 5.5, division 7 of the California Water Code (CWC) (commencing with section 13370). This Order serves as an NPDES permit for discharges from MS4s to surface waters. This Order also serves as waste discharge requirements (WDRs) pursuant to article 4, chapter 4, division 7 of the CWC (commencing with section 13260).

3. **CWA Technology Based Standards and Prohibitions.** Pursuant to CWA section 402(p)(3)(B), NPDES permits for storm water discharges from MS4s must include requirements to effectively prohibit non-storm water discharges into MS4s, and require controls to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP).

4. **CWA NPDES Permit Conditions.** Pursuant to CWA section 402(a)(2), NPDES permits must prescribe conditions to assure compliance with CWA section 402(p)(3)(B) and 40 CFR 122.26(d)(2)(iv)(B). This Order prescribes conditions to assure compliance with the CWA requirements for owners and operators of MS4s to effectively prohibit non-storm water discharges in to the MS4s, and require controls to reduce the discharge of pollutants in storm water from the MS4s to the MEP.

5. **CWA and CWC Monitoring Requirements.** Pursuant to 40 CFR 122.48, NPDES permits must specify requirements for recording and reporting monitoring results. In addition, CWC sections 13267 and 13383 authorize the San Diego Water Board to require technical and monitoring reports. This Order establishes monitoring and reporting requirements to implement federal and State requirements.

6. **Total Maximum Daily Loads.** CWA section 303(d)(1)(A) requires that "[e]ach state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Clean Water Act Section 303(d) List of Water Quality Limited Segments, commonly referred to as the 303(d) List. The CWA requires the 303(d) List to be updated every two years. Requirements of this Order implement the TMDLs adopted by the San Diego Water Board and approved by USEPA.

7. **Non-Storm Water Discharges.** Pursuant to CWA section 402(p)(3)(B)(ii), this Order requires each Copermittee to effectively prohibit discharges of non-storm water into its MS4. Nevertheless, non-storm water discharges into and from the MS4s continue to be reported to the San Diego Water Board by the Copermittees and other persons. Monitoring conducted by the Copermittees, as well as the 303(d) List, have identified dry weather, non-storm water discharges from the MS4s as a source of pollutants causing or contributing to receiving water quality impairments in the San Diego Region. The federal regulations [40 CFR 122.26(d)(2)(iv)(B)] require the Copermittees to have a program to prevent all types of non-storm water discharges, or illicit discharges, from entering the MS4. The federal regulations, however, allow for specific categories of non-storm water discharges or flows to be addressed as illicit discharges only where such discharges are identified as sources of pollutants to waters of the U.S.

8. **In-Stream Treatment Systems.** Pursuant to federal regulations [40 CFR 131.10(a)], in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of a runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Runoff treatment must occur prior to the discharge of runoff into receiving waters. Treatment control best management practices (BMPs) must not be constructed in waters of the U.S. ~~or state.~~ Construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body.

DISCHARGE CHARACTERISTICS AND RUNOFF MANAGEMENT

9. **Point Source Discharges of Pollutants.** Discharges from the MS4s may contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the state. A discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. Storm water and non-storm water discharges from the MS4s may contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4s are subject to the

conditions and requirements established in the Basin Plan for point source discharges.

10. **Potential Beneficial Use Impairment.** The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution, contamination, or nuisance.

11. **Pollutants Generated by Land Development.** Land development has created and continues to create new sources of non-storm water discharges and pollutants in storm water discharges as human population density increases. This brings higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, and trash. Pollutants from these sources are dumped or washed off the surface by non-storm water or storm water flows into and from the MS4s. When development converts natural vegetated pervious ground cover to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area not subject to SUSMP or HMP requirements contains greater pollutant loads and is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area.

12. **Runoff Discharges to Receiving Waters.** The MS4s discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within the eleven hydrologic units comprising the San Diego Region. Numerous receiving water bodies and water body segments have been designated as impaired by the San Diego Water Board pursuant to CWA section 303(d).

13. **Pollutants in Runoff.** The most common pollutants in runoff discharged from the MS4s include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., cadmium, copper, lead, and zinc), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

14. **Human Health and Aquatic Life Impairment.** Pollutants in runoff discharges from the MS4s can threaten and adversely affect human health and aquatic organisms. Adverse responses of organisms to chemicals or physical agents in runoff range from physiological responses such as impaired reproduction or growth anomalies to mortality. Increased volume, velocity, rate, and duration of storm water runoff greatly accelerate the erosion of downstream natural channels. This alters stream channels and habitats and can adversely affect aquatic and terrestrial organisms.

15. **Water Quality Effects.** The Copermittees' water quality monitoring data submitted to date documents persistent exceedances of Basin Plan water quality objectives for runoff-related pollutants at various watershed monitoring stations. Persistent toxicity

has also been observed at several watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity (IBI) ratings. These findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in the San Diego Region. Non-storm water discharges from the MS4s have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds, and contribute significantly to exceedances of applicable receiving water quality objectives.

16. **Non-Storm Water Discharges.** ~~Non-storm water discharges from the MS4s are not considered storm water discharges and therefore are not subject to the MEP standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4s.~~ Pursuant to CWA 402(p)(3)(B)(ii), non-storm water discharges into the MS4s must be effectively prohibited.

17. **Best Management Practices.** Pollutants can be effectively reduced in runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and runoff, therefore keeping pollutants onsite and out of receiving waters. Treatment control BMPs remove pollutants that have been mobilized by storm water or non-storm water flows.

18. **BMP Implementation.** Runoff needs to be addressed during the three major phases of development (planning, construction, and use) in order to reduce the discharge of storm water pollutants to the MEP, effectively prohibit non-storm water discharges, and protect receiving waters. Development which is not guided by water quality planning policies and principles can result in increased pollutant load discharges, flow rates, and flow durations which can negatively affect receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development can generate substantial pollutant loads which are discharged in runoff to receiving waters.

19. **Long Term Planning and Implementation.** Federal regulations require municipal storm water permits to expire 5 years from adoption, after which the permit must be renewed and reissued. The San Diego Water Board recognizes that the degradation of water quality and impacts to beneficial uses of the waters in the San Diego Region occurred over several decades. The San Diego Water Board further recognizes that a decade or more may be necessary to realize demonstrable improvement to the quality of waters in the Region. This Order includes a long term planning and implementation approach that will require more than a single permit term to complete.

WATER QUALITY STANDARDS

20. **Basin Plan.** The San Diego Water Board adopted a Water Quality Control Plan for the San Diego Basin (Basin Plan) on September 8, 1994 that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for receiving waters addressed through the plan. The Basin Plan was subsequently approved by the State Water Resources Control Board (State Water Board) on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and approved by the State Water Board. Requirements of this Order implement the Basin Plan.

    The Basin Plan identifies the following existing and potential beneficial uses for inland surface waters in the San Diego Region: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Freshwater Replenishment (FRSH), Hydropower Generation (POW), and Preservation of Biological Habitats of Special Significance (BIOL). The following additional existing and potential beneficial uses are identified for coastal waters of the San Diego Region: Navigation (NAV), Commercial and Sport Fishing (COMM), Estuarine Habitat (EST), Marine Habitat (MAR), Aquaculture (AQUA), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction, and/or Early Development (SPWN), and Shellfish Harvesting (SHELL).

21. **Ocean Plan.** The State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, and 2005. The State Water Board adopted the latest amendment on April 21, 2005 and it became effective on February 14, 2006. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean. Requirements of this Order implement the Ocean Plan.

    The Ocean Plan identifies the following beneficial uses of ocean waters of the state to be protected: Industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture; preservation and enhancement of designated Areas of Special Biological Significance; rare and endangered species; marine habitat; fish spawning and shellfish harvesting

22. **Sediment Quality Control Plan**. On September 16, 2008, the State Water Board adopted the Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality (Sediment Quality Control Plan). The Sediment Quality Control Plan became effective on August 25, 2009. The Sediment Quality Control Plan establishes 1) narrative sediment quality objectives for benthic community protection from exposure to contaminants in sediment and to protect human health, and 2) a program of implementation using a multiple lines of evidence approach to interpret

the narrative sediment quality objectives. Requirements of this Order implement the Sediment Quality Control Plan.

23. **National Toxics Rule and California Toxics Rule.** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the National toxics Rule (NTR) applied in California. On May 18, 2000, USEPA adopted the California Toxics Rule (CTR). The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants

24. **Antidegradation Policy.** This Order is in conformance with the federal Antidegradation Policy described in 40 CFR 131.12, and State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*. Federal regulations at 40 CFR 131.12 require that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The San Diego Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies.

CONSIDERATIONS UNDER FEDERAL LAW

25. **Coastal Zone Act Reauthorization Amendments.** Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This Order addresses the management measures required for the urban category, with the exception of septic systems. The runoff management programs developed pursuant to this Order fulfill the need for coastal cities to develop a runoff non-point source plan identified in the Non-Point Source Program Strategy and Implementation Plan. The San Diego Water Board addresses septic systems through the administration of other programs.

26. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 USCA sections 1531 to 1544). This Order requires compliance with receiving water limits, and other requirements to protect the beneficial uses of waters of the State. The Copermittees are responsible for meeting all requirements of the applicable Endangered Species Act.

CONSIDERATIONS UNDER STATE LAW

27. **Unfunded Mandates.** This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following:

    a. This Order implements federally mandated requirements under CWA section 402. (33 USC 1342(p)(3)(B).)

    b. The local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges.

    c. The local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order.

    d. The Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301(a) (33 USC 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations).

    e. The local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

    f. The provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 USC 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions and requirements of any applicable wasteload allocation. (40 CFR 122.44(d)(1)(vii)(B).)

28. **California Environmental Quality Act.** The issuance of WDRs and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with CWC section 13389.

STATE WATER BOARD DECISIONS

29. **Compliance with Prohibitions and Limitations.** The receiving water limitation language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The receiving water limitation language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the

implementation of improved and better-tailored BMPs over time. Implementation of the iterative approach to comply with receiving water limitations based on applicable water quality standards is necessary to ensure that storm water discharges from the MS4 ultimately will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

30. **Special Conditions for Areas of Special Biological Significance.** On March 20, 2012, the State Water Board approved Resolution No. 2012-0012~~X~~ approving an exception to the Ocean Plan prohibition against discharges to Areas of Special Biological Significance (ASBS) for certain nonpoint source discharges and NPDES permitted municipal storm water discharges. The Resolution requires monitoring and testing of marine aquatic life and water quality in several ASBS to protect California's coastline during storms when rain water overflows into coastal waters. Specific terms, prohibitions, and special conditions were adopted to provide special protections for marine aquatic life and natural water quality in ASBSs. The City of San Diego's municipal storm water discharges to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's municipal storm water discharges to the Heisler Park ASBS are subject terms and conditions of the Resolution. The Special Protections contained in Attachment B to the Resolution applicable to these discharges are hereby incorporated in this Order as if fully set forth herein.

ADMINISTRATIVE FINDINGS

31. **Executive Officer Delegation of Authority.** The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC section 13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC section 13223 or this Order explicitly states otherwise.

32. **Standard Provisions.** Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment B to this Order.

33. **Fact Sheet.** The Fact Sheet for this Order contains background information, regulatory and legal citations, references and additional explanatory information and data in support of the requirements of this Order. The Fact Sheet is hereby incorporated into this Order and constitutes part of the Findings of this Order.

34. **Public Notice.** The San Diego Water Board notified the Copermittees, and interested agencies and persons of its intent to prescribe WDRs for MS4 discharges of pollutants to waters of the U.S. and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet.

35. **Public Hearing.** The San Diego Water Board held a public hearing on Month Day, 2012 and heard and considered all comments pertaining to the terms and conditions of this Order. Details of the public hearing are provided in the Fact Sheet.

II. PROVISIONS

THEREFORE, IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND LIMITATIONS

The purpose of this provision is to describe the conditions under which storm water and non-storm water discharges into and from MS4s are prohibited or limited. The goal of this provision is to ~~protect, preserve, enhance, and restore~~ address the impacts of MS4 discharges so that such discharges do not impair water quality and designated beneficial uses of waters of the U.S. This goal will be accomplished through implementation of control measures that effectively prohibit non-storm water discharges into and from the Copermittees' MS4s, and reduce pollutants in storm water discharges from the Copermittees' MS4s to the MEP. The process for determination of compliance with the Discharge Prohibitions (A.1), Receiving Water Limitations (A.2), and Effluent Limitations (A.3) is defined in Provision A.4.

1. Discharge Prohibitions

a. Discharges ~~into and~~ from MS4s owned and operated by a Copermittee in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance in receiving waters of the ~~state~~ U.S. are effectively prohibited, unless the Copermittee is addressing the discharges through Provision A.1.e or A.4 through the process set forth in Provision A.4.

b. Non-storm water discharges into ~~and from~~ MS4s are effectively prohibited, unless such discharges are either authorized by a separate NPDES permit, or the discharge is a category of non-storm water discharges or flows that must be addressed pursuant to Provisions E.2.a.(1)-(5) of this Order.

c. Discharges from MS4s are subject to all waste discharge prohibitions in the Basin Plan, included in Attachment A to this Order, unless the Copermittee is addressing the discharges through Provision A.1.e or A.4 through the process set forth in Provision A.4.

d. ~~Discharges from MS4s to ASBS are prohibited.~~ Storm water discharges from the City of San Diego's MS4 to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's MS4 to the Heisler Park ASBS are authorized under this Order subject to the Special Protections contained in Attachment B to State Water Board Resolution No. 2012-0012~~X~~ applicable to these discharges, included in Attachment A to this Order. All other discharges from MS4s to ASBS are prohibited, unless authorized by a subsequent order.

e. For discharges associated with water body pollutant combinations addressed in a TMDL in Attachment E of this Order, the affected Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions).

2. Receiving Water Limitations

a. Discharges from MS4s owned and operated by a Copermittee must not cause or contribute to the violation of water quality standards in any receiving waters, including ~~but not limited to~~ all applicable provisions contained in the list below including any modifications, unless the Copermittee is addressing the discharges through Provision A.2.b or A.4 through the process set forth in Provision A.4:

(1) The San Diego Water Board's Basin Plan, including beneficial uses, water quality objectives, and implementation plans;

(2) State Water Board plans for water quality control including the following:

(a) Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries (Thermal Plan), and

(b) The Ocean Plan, including beneficial uses, water quality objectives, and implementation plans;

(3) State Water Board policies for water and sediment quality control including the following:

(a) Water Quality Control Policy for the Enclosed Bays and Estuaries of California,

(b) Sediment Quality Control Plan which includes the following narrative objectives for bays and estuaries:

(i) Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities, and

(ii) Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health,

(c) The Statement of Policy with Respect to Maintaining High Quality of Waters in California (State Water Board Resolution No. 68-16).:

(4) Priority pollutant criteria promulgated by the USEPA through the following:

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(a) National Toxics Rule (NTR)[1] (promulgated on December 22, 1992 and amended on May 4, 1995), and

(b) California Toxics Rule (CTR)[2,3]

~~a. Discharges from MS4s composed of storm water runoff must not alter natural ocean water quality in an ASBS.~~

~~b. Discharges from MS4s must not cause or contribute to the violation of any receiving water limitations expressed as water quality based effluent limitations (WQBELs) required to meet the WLAs established for the TMDLs in to this Order, pursuant to the applicable TMDL compliance schedules.~~

b. For receiving water limitations associated with a water body pollutant combination addressed in a TMDL in Attachment E of this Order, the Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions).

3. Effluent Limitations

a. Technology Based Effluent Limits

Pollutants in storm water discharges from MS4s must be reduced to the MEP~~.~~[4], through timely implementation of control measures and other actions as specified in Provisions B and E as described in Provision A.4.

b. Water Quality Based Effluent Limits

For a water body-pollutant combination addressed in a TMDL in Attachment E of this Order, ~~P~~pollutants in discharges from MS4s must be reduced to comply with ~~any~~ effluent limitations expressed as WQBELs required to meet the WLAs established for those TMDLs as described in Provision A.4 and Attachment E to this Order, pursuant to the applicable TMDL compliance schedules.

4. Compliance with Discharge Prohibitions, ~~and~~ Receiving Water Limitations, and Effluent Limitations

Each Copermittee must comply with the discharge prohibitions (A.1), ~~and~~ receiving water limitations (A.2), and effluent limitations (A.3) of this Order through timely

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[1] 40 CFR 131.36
[2] 65 Federal Register 31682-31719 (May 18, 2000), adding Section 131.38 to 40 CFR
[3] If a water quality objective and a CTR criterion are in effect for the same priority pollutant, the more stringent of the two applies, unless a previous regulatory action (i.e., TMDL) has specified otherwise.
[4] This does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment must occur prior to the discharge of runoff into receiving waters per Finding 8.

implementation of strategies, control measures, and other actions as specified in Provisions B and E of this Order, including any modifications. The Water Quality Improvement Plans described in Provision B shall be designed to achieve compliance with the discharge prohibitions, receiving water limitations, and effluent limitations. Copermittees shall be considered in compliance with A.1, A.2, and A.3 unless the Regional Board has denied approval of a Water Quality Improvement Plan or subsequent update as described in Provisions B and F.1.

a. If exceedance(s) of water quality standards persist in receiving waters notwithstanding implementation of this Order, the Copermittees must comply with the following procedures:

(1) For pollutants that are not in the process of being addressed via specific scheduled actions in a Water Quality Improvement Plan, ~~U~~upon a determination by either the Copermittees or the San Diego Water Board that discharges from the MS4 are causing or contributing to an exceedance of an applicable water quality standard, the Copermittees must submit the following updates to the Water Quality Improvement Plan required under Provision B as part of the Annual Report required under Provision F.3.b~~,~~ or Water Quality Improvement Plan update Provision B.5.a, unless the San Diego Water Board either: 1) directs an earlier submittal; or 2) allows for the adoption of a forthcoming TMDL to establish wasteload allocations that will form the basis of revisions to the Water Quality Improvement Plan:

(a) The water quality improvement strategies being implemented that are effective and will continue to be implemented;

(b) ~~Additional w~~Water quality improvement strategies (~~i.~~e.g. BMPs, retrofitting projects, stream and/or habitat rehabilitation, ~~or~~ restoration projects, etc.) that will be implemented to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards;

(c) Updates to the schedule for implementation of the existing and additional water quality improvement strategies; and

(d) Updates, when necessary, to the schedule for achieving compliance with the discharge prohibitions and receiving water limitations of this Order;

(e) As described in Provision B.6, Copermittees must submit requested modifications to the Water Quality Improvement Plan either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b~~The San Diego Water Board may require the incorporation of additional modifications to the Water Quality Improvement Plan required under Provision B. The applicable Copermittees must submit any modifications~~

~~to the update to the Water Quality Improvement Plan within 30 days of notification that additional modifications are required by the San Diego Water Board, or as otherwise directed~~;

(f) As described in Provision B.6, upon ~~Within 30 days of the~~ San Diego Water Board determination that the update to the Water Quality Improvement Plan meets the requirements of this Order, the Copermittees must submit requested modifications to the jurisdictional runoff management programs either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b.~~revise the jurisdictional runoff management program documents to incorporate the updated water quality improvement strategies that have been and will be implemented, the implementation schedule, and any additional monitoring required~~; and

(g) The Copermittees must implement the revised jurisdictional runoff management programs and updated jurisdictional monitoring and assessment component of the Water Quality Improvement Plan.

(2) For pollutants in the process of being addressed via a specific, scheduled program in a Water Quality Improvement Plan, the Copermittee(s) shall continue to implement that program as described in the Water Quality Improvement Plan approved by the Regional Board;

b. So long as the Copermittees have complied with the procedures set forth above and are implementing the Water Quality Improvement Plan(s) approved by the Regional Board, the Copermittees ~~must~~ do not have to repeat the same procedure ~~set forth above to comply with~~ for continuing or recurring exceedances of the same discharge prohibitions, effluent limitations, and receiving water limitations ~~of this Order for continuing or recurring exceedances of the same water quality standard(s) following implementation of scheduled actions~~ unless directed to ~~do otherwise~~ by the San Diego Water Board.

~~**a.** Nothing in Provisions A.4. and A.4. prevents the San Diego Water Board from enforcing any provision of this Order while the applicable Copermittees prepare and implement the above update to the Water Quality Improvement Plan and jurisdictional runoff management programs.~~

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B. WATER QUALITY IMPROVEMENT PLANS

The purpose of this provision is to develop Water Quality Improvement Plans that guide the Copermittees' jurisdictional runoff management program implementation efforts towards achieving the outcome of improved water quality in MS4 discharges and receiving waters. The goal of the Water Quality Improvement Plan is to 1) effectively prohibit non-storm water discharges into the MS4s, 2) reduce pollutants in storm water discharges from the MS4s to the MEP, and 3) support attainment and ~~the~~ reasonable protection, preservation~~,~~, and enhancement~~, and restoration~~ of water quality and designated beneficial uses of waters of the state. Therefore, implementation of the WQIPs also provides the basis for complying with Provisions A.1 and A.3, as described in Provision A.4. This goal will be accomplished through an adaptive planning and management process that identifies the highest water quality priorities within a watershed and implements strategies, control measures, and BMPs to achieve improvements in the quality of discharges from the MS4s and receiving waters.

The Copermittees must develop Water Quality Improvement Plans for each Watershed Management Area that 1) prioritize water quality ~~issues~~conditions resulting from the Copermittee's MS4 discharges ~~to and from the MS4s with~~in each Watershed Management Area, 2) identify MS4 pollutant sources ~~and other stressors~~ associated with ~~those~~the water quality priorities, 3) define numeric ~~targets~~goals and schedules to ~~achieve improvement of~~address water quality priorities, 4) describe water quality improvement strategies to achieve numeric ~~targets~~goals, and 5) develop and execute a coordinated monitoring and assessment program to facilitate adaptive management of the Water Quality Improvement Plans and determine progress towards achieving improved water quality in MS4 discharges and receiving waters ~~improved water quality.~~

The Copermittees must ~~implement all~~submit Water Quality Improvement Plans for public review and Regional Board Executive Officer review and approval per the ~~requirements of~~ schedule outline in Provision ~~no later than 12 months after the adoption of this Order, or in accordance with Provision F.5~~B.~~6 of this Order.~~

1.
Watershed Management Areas

The Copermittees must develop Water Quality Improvement Plans for each of the Watershed Management Areas in Table B-1. A total of ~~nine~~ten Water Quality Improvement Plans must be developed for the San Diego Region.

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Table B-1. Watershed Management Areas (continued)

Watershed Management Area	Hydrologic Unit(s)	Major Surface Water Bodies	Responsible Copermittees
South Orange County	San Juan (901.00)	Aliso Creek San Juan Creek San Mateo Creek Pacific Ocean	- City of Aliso Viejo[1] - City of Dana Point[1] - City of Laguna Beach[1] - City of Laguna Hills[1] - City of Laguna Niguel[1] - City of Laguna Woods[1] - City of Lake Forest[1] - City of Mission Viejo[1] - City of Rancho Santa Margarita[1] - City of San Clemente[1] - City of San Juan Capistrano[1] - County of Orange[1] - Orange County Flood Control District[1]
Santa Margarita River	Santa Margarita (902.00)	Murrieta Creek Temecula Creek Santa Margarita River Santa Margarita Lagoon Pacific Ocean	- City of Murrieta[2] - City of Temecula[2] - City of Wildomar[2] - County of Riverside[2] - County of San Diego[3] - Riverside County Flood Control and Water Conservation District[2]
San Luis Rey River	San Luis Rey (903.00)	San Luis Rey River San Luis Rey Estuary Pacific Ocean	~~- City of Escondido~~ - City of Oceanside - City of Vista - County of San Diego
Carlsbad	Carlsbad (904.00)	Loma Alta Slough Buena Vista Lagoon Agua Hedionda Lagoon Batiquitos Lagoon San Elijo Lagoon Pacific Ocean	- City of Carlsbad - City of Encinitas - City of Escondido - City of Oceanside - City of San Marcos - City of Solana Beach - City of Vista - County of San Diego
San Dieguito River	San Dieguito (905.00)	San Dieguito River San Dieguito Lagoon Pacific Ocean	- City of Del Mar - City of Escondido - City of Poway - City of San Diego - City of Solana Beach - County of San Diego
Penasquitos	~~Penasquitos~~ Reservoir HA (906.~~00~~10) Poway HA (906.20) Miramar HA (906.40)	Los Penasquitos Lagoon ~~Mission Bay~~ Pacific Ocean	- City of Del Mar - City of Poway - City of San Diego - County of San Diego
Mission Bay	Scripps HA (906.30) Miramar HA (906.40) Tecolote HA (906.50)	Mission Bay Pacific Ocean	-City of San Diego
San Diego River	San Diego (907.00)	San Diego River Pacific Ocean	- City of El Cajon - City of La Mesa ~~- City of Poway~~ - City of San Diego - City of Santee - County of San Diego

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Table B-1. Watershed Management Areas (continued)

Watershed Management Area	Hydrologic Unit(s)	Major Surface Water Bodies	Responsible Copermittees
San Diego Bay	Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)	Sweetwater River Otay River San Diego Bay Pacific Ocean	- City of Chula Vista - City of Coronado - City of Imperial Beach - City of La Mesa - City of Lemon Grove - City of National City - City of San Diego - County of San Diego - San Diego County Regional Airport Authority - Unified Port of San Diego
Tijuana River	Tijuana (911.00)	Tijuana River Tijuana Estuary Pacific Ocean	- City of Imperial Beach - City of San Diego - County of San Diego

Notes:
1. The Orange County Copermittees will be enrolled under this Order upon expiration of Order No. R9-2009-0002, or earlier if the Orange County Copermittees meet the conditions in Provision F.6.
2. The Riverside County Copermittees will be enrolled under this Order upon expiration of Order No. R9-2010-0016, or earlier if the Riverside County Copermittees meet the conditions in Provision F.6.
3. The County of San Diego will not be required to implement the requirements of Provision B for the Santa Margarita River Watershed Management Area until the Riverside County Copermittees are enrolled under this Order. Until then, the County of San Diego is responsible for implementing and complying with the requirements of Provisions D.1, D.4.a.(1)&(3), E, F.2.a-b, F.3.b, and F.4 for the areas of the Santa Margarita River Watershed Management Area within its jurisdiction.

2. Identification of Water Quality Priorities

The Copermittees must identify the water quality priorities within each Watershed Management Area that will be addressed by the Water Quality Improvement Plan. Where appropriate, Watershed Management Areas may be separated into subwatersheds to focus water quality prioritization and jurisdictional ~~runoff management program~~ implementation efforts by receiving water.

a. Assessment of Receiving Water Conditions

The Copermittees must ~~review pollutant sources, discharges, and receiving water conditions and assess~~consider the following, at a minimum, to ~~determine~~support the ~~degree~~identification of ~~adverse~~water quality priorities based on the impacts ~~to~~of MS4 discharges on receiving water beneficial uses:

(1) Receiving waters listed as impaired on the CWA Section 303(d) List of Water Quality Limited Segments (303(d) List);

(2) TMDLs adopted and under development by the San Diego Water Board;

(3) The requirements of Provision A.2;

~~(3)~~(4) Receiving waters recognized as sensitive or highly valued by the Copermittees, including estuaries designated under the National Estuary Program under CWA section 320, wetlands defined by the State or U.S. Fish and Wildlife Service's National Wetlands Inventory as wetlands, and receiving waters identified as ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-0012~~X~~ (Attachment A);

~~(4)~~(5) Water quality standards established in the Basin Plan;

~~(5)~~(6) Known historical versus current physical, chemical, and biological water quality conditions;

~~(6)~~(7) ~~All available~~ Available, relevant, and appropriately collected physical, chemical, and biological receiving water monitoring data meeting appropriate QA/QC standards, including~~, but not limited to,~~ data describing:

(a) Chemical constituents;

(b) Water quality parameters (i.e. pH, temperature, conductivity, etc.);

(c) Toxicity Identification Evaluations for both receiving water column and sediment;

(d) Trash impacts;

(e) Bioassessments; and

(f) Physical habitat.

~~(7)~~(8) Available evidence of erosional impacts in receiving waters due to accelerated flows (i.e. hydromodification); ~~and~~

~~(8)~~(9) Available evidence of adverse impacts to the chemical, physical, and biological integrity of receiving waters~~.~~; and

(10) The potential for long-term achievement and maintenance of beneficial use attainment in the Watershed Management Area.

b. ASSESSMENT OF MS4 DISCHARGE QUALITY AND IMPACTS

To support the identification of priorities based on the impacts of MS4 discharges on receiving water beneficial uses, the Copermittees must review appropriately collected MS4 discharge quality data and consider the extent to which MS4s cause or contribute to the adverse impacts to receiving water beneficial uses identified in B.2.a. Considerations include:

(1) Locations of the Copermittees' MS4 discharges with respect to receiving waters;

(2) MS4 discharge quality results relevant to impacts in receiving waters and action levels, including the temporal and geographic variation of the results;

(3) The requirements of Provisions A.1 and A.3.; and

(4) Whether MS4 discharge quality is sufficiently well known or other information is available to assess whether MS4 discharges are causing or contributing to specific receiving water conditions, or whether additional data need to be collected through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan.

c. IDENTIFICATION OF ~~IDENTIFY~~PRIORITY ~~POLLUTANTS AND~~ RECEIVING WATER CONDITIONS

The Copermittees must use the information gathered in Provision B.2.a~~.~~ and B.2.b. to develop a list of water quality priorities as pollutants and/or receiving water conditions that are the highest threat to receiving water quality or that most adversely affect the physical, chemical, and biological integrity of receiving waters. The Copermittees must identify the highest water quality priorities to be addressed by the Water Quality Improvement Plan, and describe the reasoning for selecting a subset of receiving water conditions as the highest priority(ies)~~.~~ The Water Quality Improvement Plans shall describe the following for the highest priority receiving water condition:

(1) The beneficial use(s) and pollutant(s) associated with the priority receiving water condition(s);

(2) The geographic extent of the priority receiving water condition(s)within the WMA, if known;

(3) The Copermittees with MS4s that contribute discharges to the priority water receiving condition(s);

(4) The temporal extent of the priority receiving condition(s) (i.e., dry weather and/or wet weather); and

(5) Whether receiving waters have been monitored sufficiently to adequately characterize the priority receiving condition(s), including a consideration of spatial and temporal variation.

d. MS4 POLLUTANT SOURCE ~~AND/OR STRESSOR~~ IDENTIFICATION

The Copermittees must identify and prioritize known and suspected storm water and non-storm water pollutant sources ~~and any other stressors causing or contributing to~~within the MS4 associated with the highest priority receiving water conditions identified under B.2.c~~quality priorities.~~ . The identification of known and suspected sources of the highest water quality priorities as identified for Provision B.2.c ~~must~~ shall consider the following :

(1) Land uses and their potential contribution to the highest priority receiving water conditions;

(2) Pollutant generating facilities ~~or~~, areas, and/or activities within the Watershed Management Area~~, including:~~;

~~Each Copermittee's inventory of construction, municipal, commercial, industrial, and residential facilities, areas, and/or activities,~~

~~Publicly owned parks and/or recreational areas,~~

~~Open space areas,~~

~~All currently operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, and~~

~~Areas not within the Copermittees' jurisdictions (e.g., tribal lands, state lands, federal lands) that may be pollutant sources related to the highest water quality priorities within the Watershed Management Area;~~

Locations of the Copermittees' MS4s~~, including the following:~~

(3) ~~All MS4~~ outfalls ~~that discharge to receiving waters, and~~ .

~~Locations of major structural controls for storm water and non-storm water (e.g., retention basins, detention basins, major infiltration devices, etc.);~~

~~Other known and suspected sources of non-storm water or pollutants in storm water discharges to receiving waters within the Watershed Management Area, including the following:~~

~~Other MS4 outfalls (e.g., Phase II Municipal and Caltrans),~~

~~Other NPDES permitted discharges,~~

~~Any other discharges that may be considered point sources (e.g., private outfalls), and~~

~~Any other discharges that may be considered non-point sources (e.g., agriculture, wildlife or other natural sources);~~

(4) Review of available data, including ~~but not limited to~~:

(i) Findings from the Copermittees' illicit discharge detection and elimination programs,

(ii) Findings from the Copermittees' MS4 outfall monitoring,

~~(iii) Findings from the Copermittees' receiving water monitoring,~~
~~(iv)~~
~~(v) Findings from the Copermittees' MS4 discharges and receiving water assessments, and~~
~~(vi)~~
~~(vii)~~(iii) ~~Any other~~Other available, relevant, and appropriately-collected data, information, or studies related to pollutant sources and ~~conditions~~ pollutant-generating activities that contribute to the highest priority receiving water ~~quality priorities as~~conditions identified ~~for~~ in Provision B.2.c~~ce~~.

(5) Whether MS4 sources are sufficiently well known to design an effective, efficient[5], directed control strategy, or whether additional source/stressor identification needs to be conducted through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan to identify and prioritize sources/stressors within the watershed.

e. NUMERIC ~~TARGETS AND SCHEDULES~~GOALS

The Copermittees must develop and incorporate interim and final numeric ~~targets[6] and schedules~~ goals[67] into the Water Quality Improvement Plans. Numeric ~~targets~~goals and schedules ~~must be used~~are intended to support Water Quality Improvement Plan development and to measure progress towards addressing the highest priority receiving water conditions identified under B.2.c~~water quality priorities and an ultimate outcome of protections, preservation, enhancement, and restoration of~~. Numeric goals are not enforceable compliance standards, effluent limitations, or receiving water ~~beneficial uses.~~ limitations. When ~~developing~~establishing numeric ~~targets~~goals and corresponding schedules, the Copermittees must consider the following:

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[5] Copermittees are encouraged to use a sustainability analysis, or Triple Bottom Line analysis, that considers environmental, social and economic factors when estimating the potential efficiency of control strategies.

~~[6] Interim and final numeric targets may take a variety of forms such as pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric targets are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators.~~

[6] Interim and final numeric goals may take a variety of forms such as TMDL targets, TMDL wasteload allocations, TMDL based WQBELs incorporated in Attachment E of this Order, action levels, pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric goals are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators. To the extent that a goal is not based on an enforceable regulatory mechanism (i.e., TMDL, WLA), WQIP goals and schedules may be revised through the iterative process. Numeric goals are not subject to enforcement or non-compliance actions under this Order.

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PROVISION B: WATER QUALITY IMPROVEMENT PLANS

(1) Final numeric ~~targets~~goals must be based on measureable criteria or indicators, to be achieved in the receiving waters and/or MS4 discharges for the highest priority receiving water ~~quality priorities~~conditions which will ~~result in~~be capable of demonstrating progress toward the achievement of the restoration and/or protection of water quality standards in receiving waters; and

(2) Interim numeric ~~targets~~goals must be based on measureable criteria or indicators that can demonstrate incremental progress toward achieving the final numeric ~~targets~~goals in the receiving waters and/or MS4 discharges~~;~~. ~~and~~

(3) Schedules must be adequate for measuring progress toward achieving the interim and final numeric ~~targets~~ goals required for Provisions B.2.d. ~~and B.2.d..~~ Schedules must incorporate the following:

(i) Interim dates for achieving the interim numeric goals~~targets~~,

(ii) Compliance schedules for any applicable TMDLs in Attachment E to this Order,

(iii) Compliance schedules for any ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-0012~~X~~ (see Attachment A),

(iv) Achievement of the final numeric goals ~~targets~~ in the receiving waters and/or MS4 discharges for the highest water quality priorities must be as soon as possible, and

~~(iv)~~(v) Final dates for achieving the final numeric goals ~~targets~~ must not extend more than 10 years beyond the date this Order is adopted, unless the schedule includes an applicable TMDL in Attachment E to this Order[7][8].

3. Water Quality Improvement Strategies and Schedules

The Copermittees must develop specific water quality improvement strategies to address the highest ~~water quality~~ priority~~ies~~ receiving water conditions identified within a Watershed Management Area. The water quality improvement strategies must address the highest water quality priorities by preventing or eliminating non-storm water discharges to and from the MS4, reducing pollutants in storm water discharges from the MS4 to the MEP, and restoring and/or

[7] Achievement of final numeric goals within 10 years represents progress towards attainment of water quality standards, but is not a requirement to fully attain all applicable water quality standards or all priority receiving water conditions within 10 years.

protecting the water quality standards of receiving waters.

a. Water Quality Improvement Strategies

The Copermittees must prioritize water quality improvement strategies, ~~must prioritize~~based on their likely effectiveness and efficiency, and implement ~~the following~~ measures, as appropriate, to effectively prohibit non-storm water discharges into its MS4, reduce pollutants in storm water discharges from its MS4 to the MEP, and achieve the interim and final numeric ~~targets~~goals in accordance with the schedules ~~required for~~in Provision B.2~~.:~~.e. Measures include:

(1) Copermittee-selected activities identified in Provision E ,either as described in the jurisdictional runoff management programs or as modified with justification, that will address priority receiving water conditions; and

~~(2)~~ Additional ~~S~~structural and/or non-structural BMPs (to include public outreach and participation programs), as selected by the Copermittee, that are designed to achieve the interim and final numeric goals identified in Provision B.2.e.~~targets in the receiving waters and/or MS4 discharges;~~

~~Retrofitting projects for areas of existing development known or suspected to contribute to the highest water quality priorities, and where retrofitting will contribute to reducing or eliminating non-storm water discharges to the MS4 and/or reducing pollutants in storm water discharges from the MS4 to the MEP;~~

~~(3)~~(2) ~~Stream and/or habitat rehabilitation or restoration projects where stream and/or habitat rehabilitation or restoration are necessary for, or will contribute to demonstrable improvements in the physical, chemical, and biological receiving water conditions and restoration and/or protection of water quality standards in receiving waters; and~~

~~Other water quality improvement strategies that will result in preventing or eliminating non-storm water discharges to and from the MS4, reducing pollutants in storm water discharges from the MS4 to the MEP, and restoring and/or protecting the water quality standards of receiving waters.~~

b. Implementation Schedules

~~(1)~~ The Copermittees must develop schedules for implementing the water quality improvement strategies identified under Provision B.3.aa~~a~~ to achieve the interim and final numeric ~~targets~~goals identified in ~~the receiving waters and/or MS4 discharges for the highest water quality priorities~~B.2.e in the Watershed Management Area. Schedules must be developed for both the water quality improvement strategies implemented by each Copermittee within its jurisdiction and for strategies that ~~will be implemented by multiple Copermittees~~ Copermittees' choose to implement on a collaborative basis~~.~~

~~(2)~~(1) .

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~~(3)~~(2) The Copermittees must incorporate the implementation compliance schedules for any ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-001~~X~~2 (see Attachment A).

4. Water Quality Improvement Monitoring and Assessment

The Copermittees in each Watershed Management Area must develop an integrated ~~program to assess the~~Water Quality Improvement Plan Monitoring and Assessment Program that assesses: 1) progress toward achieving the numeric ~~targets~~goals and schedules, ~~and~~2) ~~the~~ progress toward addressing the highest priority receiving water ~~quality priorities~~conditions for each Watershed Management Area, and 3) each Copermittee's overall efforts implementing the requirements of Provision B. The water quality improvement monitoring and assessment program must include the monitoring and assessment requirements of Provision D~~.~~, which may be modified for consistency with the priority receiving water conditions of each Watershed Management Area and associated Copermittees. For Watershed Management Areas with applicable TMDLs, the water quality monitoring and assessment program must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-0012~~X~~ (see Attachment A).

5. Iterative and Adaptive Management Process

~~a. Water Quality Improvement Plan Adaptive Management Process~~

The Copermittees in each Watershed Management Area must implement the iterative process, ~~at least once every 3 years,~~ adapting the Water Quality Improvement Plan, jurisdictional runoff management programs and monitoring and assessment programs, as necessary, to become more effective~~, based on, but not limited to~~ and meet the requirements of Provisions A, and shall consider the following~~ considerations~~:

a. Priority Receiving Water Conditions and Numeric Goals

The priority receiving water conditions and numeric goals, developed pursuant to B.2.c. and B.2.e respectively, shall guide jurisdictional implementation efforts for the duration of this Order. Recommendations for changes to priority receiving water conditions and numeric goals shall be provided in the Report of Waste Discharge and shall consider the following:

(1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan;

(2) Progress toward achieving interim and final numeric ~~targets~~goals in receiving waters and/or MS4 discharges for the highest water quality priorities in the Watershed Management Area~~,~~

~~Appropriateness of the highest water quality priorities identified for the Watershed Management Area;~~

~~Progress toward achieving outcomes according to established schedules;~~

(3) New scientific information or new or updated policies or regulations that affect identified numeric goals including revised water quality objectives or TMDLs;

~~(3)~~(4) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality problems and implementation measures to address the highest priority receiving water ~~quality problems~~conditions;

~~(4)~~(5) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees;

(6) The factors listed in Provision B.2.a.(1)-(10);

~~(5)~~(7) San Diego Water Board recommendations; and

~~(6)~~(8) Recommendations for modifications ~~to the Water Quality Improvement Plan~~ solicited through a public participation process.

b. ~~BASED ON THE RESULTS OF THE ITERATIVE PROCESS~~ WATER QUALITY IMPROVEMENT STRATEGIES AND SCHEDULES

~~(1)~~ The water quality improvement strategies and schedules required pursuant to ~~Provision B.5.a., the~~Provisions B.3 and B.4 shall be adapted as new information becomes available to inform more effective and efficient means of achieving the numeric goals established in Provision B.2.e. Copermittees ~~must report any modifications necessary~~shall consider adaptation to ~~improve the effectiveness of the Water Quality Improvement Plan in the Annual Report required pursuant to Provision , or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5..~~

~~(2) The Copermittees must implement any modifications to the Water Quality Improvement Plan in accordance with the schedules developed pursuant to Provisions B.2. and B.3., unless directed otherwise by the San Diego Water Board.~~

~~**b. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ADAPTIVE MANAGEMENT PROCESS**~~

~~Each Copermittee in the Watershed Management Area must implement the iterative process,~~jurisdictional runoff management programs and monitoring and assessment strategies and schedules at least annually~~, adapting its jurisdictional runoff management program to become more effective, based on, but not limited to~~ considering the following:

(1) Changes to priority receiving water conditions and numeric goals based on recommendations from B.5.a.;

(2) Measurable or demonstrable reductions of non-storm water discharges to ~~and from~~ each Copermittee's MS4;

(3) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;

(4) Information on the MS4 sources and/or pollutant-generating activities determined to be most significantly contributing to priority receiving water conditions;

~~(4)~~(5) Efficiency in implementing the Water Quality Improvement Plan;

~~(5)~~(6) San Diego Water Board recommendations; and

~~(6)~~(7) Recommendations for modifications ~~to each Copermittee's jurisdictional runoff management program~~ solicited through a public participation process~~.~~.

6. Water Quality Improvement Plan Submittal, Implementation, and Modifications

Requirements for Water Quality Improvement Plan submittals and modifications are described in Provision F. Requirements for corresponding modifications to the jurisdictional runoff management programs and monitoring and assessment program are also described in Provision F.

~~The~~ Copermittees must commence with implementation of the Water Quality Improvement Plan no later than ~~180 days after submission, unless otherwise directed in writing by the San Diego Water Board.~~ the fiscal year (July 1) following San Diego Water Board approval of the Water Quality Improvement Plan.

~~(1) modifications necessary to improve the effectiveness its jurisdictional runoff management program document in the Annual Report required pursuant to Provision , or as part of the ROWD required pursuant to Provision F.5..~~

~~Each Copermittee must implement any modifications to its jurisdictional runoff management program in accordance with the schedules developed pursuant to~~

~~Provisions B.2. and B.3., unless directed otherwise by the San Diego Water Board.~~

~~5. Water Quality Improvement Plan Implementation~~

~~Copermittees must commence with implementation of the Water Quality Improvement Plan no later than 180 days after submission, unless otherwise directed in writing by the San Diego Water Board.~~

ADMINISTRATIVE DRAFT

C. ACTION LEVELS

The purpose of this provision is for the Copermittees to incorporate numeric non-storm water and storm water action levels in the Water Quality Improvement Plans. The action levels ~~will~~shall be used to guide the following program planning efforts and measure progress towards attaining the reasonable protection, preservation, and enhancement~~, and restoration~~ of water quality and designated beneficial uses of waters of the state~~. This goal will be accomplished through monitoring and assessing the quality of the MS4 discharges during the implementation of the Water Quality Improvement Plans.~~:

1. ~~The Copermittees must incorporate numeric action levels in the~~ Support development and prioritization of water quality improvement strategies through the Water Quality Improvement Plans ~~to direct and focus~~. Discharge data above action levels can be evaluated using a statistical approach considering the ~~Copermittees' jurisdictional runoff management program implementation efforts for addressing MS4~~ frequency, magnitude, and loading of discharges to the receiving waters~~. The numeric action levels will be used as part of the MS4~~ to support development of actions and prioritization of their implementation.

2. Assist in the effective prohibition of non-stormwater discharges ~~assessments required under~~ from the MS4 pursuant to Provision ~~, and each Copermittee's program to detect and eliminate non-storm water~~ E.2.

3. Support the detection and elimination of illicit discharges to the MS4 ~~required under~~pursuant to Provision ~~. Numeric~~E.2.

These goals will be accomplished through monitoring and assessing the quality of the MS4 discharges prior to and during the implementation of the Water Quality Improvement Plans. Exceedances of action levels are not subject to enforcement or non-compliance actions under this Order.

Action levels will be developed and incorporated into the Water Quality Improvement Plans (Provision B) including the Illicit Discharge Detection and Elimination (IDDE) Program (Provision E.2). Depending upon the goals/objectives for the use of the action levels ~~must be developed~~ and the priority receiving water conditions, the constituents and values at which they are set may differ between watersheds. Copermittees may develop Watershed Management Area specific numeric action levels for non-storm water and storm water MS4 discharges~~,~~ using an approach approved by the Regional Board or use the default non-stormwater and stormwater action levels prescribed within C.1 and C.2 below, respectively. The Copermittees will submit action levels as part of their Water Quality Improvement Plan(s). The action levels established as ~~follows:~~part of R9-2007-0001 will serve as the interim action levels until the Water Quality Improvement Plans are completed and approved.

PROVISION C: ACTION LEVELS

ADMINISTRATIVE DRAFT

1. Non-Storm Water Action Levels

a. The following non-storm water action levels (NALs) must be incorporated ~~in the Water Quality Improvement Plan~~:

(1) Non-Storm Water Discharges from MS4s to Ocean Surf Zone

Table C-1. Non-Storm Water Action Levels for Discharges from MS4s to Ocean Surf Zone

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Total Coliform	MPN/100 ml	1,000	-	10,000/1,000[1]	OP
Fecal Coliform	MPN/100 ml	200[2]	-	400	OP
Enterococci	MPN/100 ml	35	-	104[3]	OP

Abbreviations/Acronyms
AMAL – average monthly action level
MDAL – maximum daily action level
OP – Ocean Plan water quality objective
MPN/100 ml – most probable number per 100 milliliters

Notes:
1. Total coliform density ~~shall not exceed~~NAL is 1,000 MPN/100 ml when the fecal/total coliform ratio exceeds 0.1
2. Fecal coliform density ~~may not exceed~~ NAL is 200 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas"

~~(3)~~
~~(4)~~(2) Non-Storm Water Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Table C-2. Non-Storm Water Action Levels for Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Turbidity	NTU	75	-	225	OP
pH	Units	Within limit of 6.0 to 9.0 at all times			OP
Fecal Coliform	MPN/100 ml	200[1]	-	400[2]	BP
Enterococci	MPN/100 ml	35	-	104[3]	BP
Priority Pollutants	ug/L	See Table C-3			

Abbreviations/Acronyms:
AMAL – average monthly action level
OP – Ocean Plan water quality objective
NTU – Nephelometric Turbidity Units
ug/L – micrograms per liter
MDAL – maximum daily action level
BP – Basin Plan water quality objective
MPN/100 ml – most probable number per 100 milliliters

Notes:
1. Based on a minimum of not less than five samples for any 30-day period
2. ~~No~~NAL is reached if more than 10 percent of total samples ~~may~~ exceed 400 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas" and is not applicable to waterbodies that are not designated REC-1.

ADMINISTRATIVE DRAFT

Table C-3. Non-Storm Water Action Levels for Priority Pollutants

Parameter	Units	Freshwater (CTR)		Saltwater (CTR)	
		MDAL	AMAL	MDAL	AMAL
Cadmium	ug/L	**	**	16	8
Copper	ug/L	*	*	5.8	2.9
Chromium III	ug/L	**	**	-	-
Chromium VI	ug/L	16	8.1	83	41
Lead	ug/L	*	*	14	2.9
Nickel	ug/L	**	**	14	6.8
Silver	ug/L	*	*	2.2	1.1
Zinc	ug/L	*	*	95	47

Abbreviations/Acronyms:

CTR – California Toxic Rule
ug/L – micrograms per liter
AMAL – average monthly action level
MDAL – maximum daily action level

Notes:

* Action levels developed on a case-by-case basis (see below)

** Action levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels (MCLs) under the California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431

The Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc NALs for MS4 discharges to freshwater receiving waters will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

~~(5)~~(3) Non-Storm Water Discharges from MS4s to Inland Surface Waters

Table C-4. Non-Storm Water Action Levels for Discharges from MS4s to Inland Surface Waters

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BP
Turbidity	NTU	-	20	See MDAL	BP
pH	Units	Within limit of 6.5 to 8.5 at all times			BP
Fecal Coliform	MPN/100 ml	200[1]	-	400[2]	BP
Enterococci	MPN/100 ml	33	-	61[3]	BP
Total Nitrogen	mg/L	-	1.0	See MDAL	BP
Total Phosphorus	mg/L	-	0.1	See MDAL	BP
MBAS	mg/L	-	0.5	See MDAL	BP
Iron	mg/L	-	0.3	See MDAL	BP
Manganese	mg/L	-	0.05	See MDAL	BP
Priority Pollutants	ug/L	See Table C-3			

Abbreviations/Acronyms:
AMAL – average monthly action level
BP – Basin Plan water quality objective
COLD – cold freshwater habitat beneficial use
NTU – Nephelometric Turbidity Units
mg/L – milligrams per liter
MDAL – maximum daily action level
WARM – warm freshwater habitat beneficial use
MBAS – Methylene Blue Active Substances
MPN/100 ml – most probable number per 100 milliliters
ug/L – micrograms per liter

Notes:
1. Based on a minimum of not less than five samples for any 30-day period
2. ~~No~~NAL is reached if more than 10 percent of total samples ~~may~~ exceed 400 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for freshwater "designated beach areas" and is not applicable to waterbodies that are not designated REC-1.

b. If not identified in Provision C.1.a, NALs must be identified and incorporated in the Water Quality Improvement Plan for any pollutants or waste constituents causing or contributing, or threatening to cause or contribute to a condition of pollution or nuisance in waters of the ~~state~~ U.S. associated with the highest water quality priorities related to non-storm water discharges from the MS4s. NALs must be based on:

(1) Applicable water quality standards which may be dependent upon site-specific or receiving water-specific conditions or assumptions to be identified by the Copermittees; or

(2) Applicable numeric WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order.

c. Dry weather monitoring and assessment data from MS4 outfalls collected in accordance with Provision D.1 may be used to develop or revise NALs based upon watershed-specific data. Revision of NALs is subject to Regional Board EO approval.

~~3.~~

~~4.~~2. Storm Water Action Levels

a. The following storm water action levels (SALs) for discharges of storm water from the MS4 must be incorporated ~~in the Water Quality Improvement Plan:~~:

Table C-5. Storm Water Action Levels for Discharges from MS4s to Receiving Waters

Parameter	Units	Action Level
Turbidity	NTU	126
Nitrate & Nitrite (Total)	mg/L	2.6
Phosphorus (Total P)	mg/L	1.46
Cadmium (Total Cd)*	µg/L	3.0
Copper (Total Cu)*	µg/L	127
Lead (Total Pb)*	µg/L	250
Zinc (Total Zn)*	µg/L	976

Abbreviations/Acronyms:
NTU – Nephelometric Turbidity Units
mg/L – milligrams per liter
ug/L – micrograms per liter

Notes:
* The sampling must include a measure of receiving water hardness at each MS4 outfall. If a total metal concentration exceeds the corresponding metals SAL in Table C-5, that concentration must be compared to the California Toxics Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific metal exceeds that SAL, but does not exceed the applicable USEPA 1-hour maximum concentration criterion for the measured level of hardness, then the sample result will not be considered ~~as an excursion~~ above the SAL for that measurement.

b. If not identified in Provision C.2.a, SALs must be identified and incorporated in the Water Quality Improvement Plan for pollutants or waste constituents causing or contributing, or threatening to cause or contribute to a condition of pollution or nuisance in waters of the state associated with the highest water quality priorities related to storm water discharges from the MS4s. SALs must be based on:

(1) Federal and State water quality guidance and/or water quality standards; ~~and~~or

(2) Site-specific or receiving water-specific conditions; or

(3) One of the approaches recommended by the California Water Board's Storm Water Panel in its report, "The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities" (June 2006).

~~(3)~~(4) Applicable numeric WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order.

c. Wet weather monitoring and assessment data from MS4 outfalls collected in accordance with Provision D.1.b may be used to develop or revise SALs based upon watershed-specific data. Revision of SALs is subject to San Diego Water Board approval.

PROVISION C: ACTION LEVELS

D. MONITORING AND ASSESSMENT REQUIREMENTS

[*Note: This entire section has been replaced with a proposed alternative version of provision D.*]

Water quality monitoring and assessment shall be question-driven and designed to support adaptive storm water management and the iterative process outlined in Provision B. The monitoring and assessment activities shall be based on a logical hierarchy in which overall management goals help define clear management questions, which are addressed by specific monitoring activities designed to produce data targeted to defined assessment needs. The monitoring and assessment activities shall follow relevant and applicable guidance provided in the SWAMP Assessment Framework (Bernstein, 2010[8]), A Framework for Monitoring and Assessment in the San Diego Region (SDRWQCB, 2011[9]), and the Southern California Stormwater Monitoring Coalition's (SMC) Model Monitoring Program (SMC, 2004[10]).

The monitoring and assessment shall be designed in two phases. A transitional program shall be implemented beginning the first day of October in the year following permit adoption, and continue until the first day of October following commencement of Water Quality Improvement Plan implementation, pursuant to Provision B. The transitional ("pre-WQIP") program shall build on the experience gained implementing water quality monitoring programs under previous Orders and shall address the SMC questions as described below. The second ("post-WQIP") phase of the Monitoring and Assessment Program shall address the watershed priorities identified in the Water Quality Improvement Plans as developed for each watershed pursuant to Provision B. This phase of monitoring shall begin with implementation of the approved WQIPs. The transitional (pre-WQIP) phase of monitoring and assessment applies only to the San Diego County Copermittees; the Orange County and Riverside County permittees affected by this regional permit are expected to participate during the post-WQIP phase, after officially enrolling under the regional permit.

As a starting point, the Monitoring and Assessment Program shall be designed to address the overarching management questions developed by the SMC:

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[8] Bernstein, Brock, 2010. "SWAMP Assessment Framework." Prepared for the Surface Water Ambient Monitoring Program (SWAMP). December, 2010). http://www.swrcb.ca.gov/water_issues/programs/swamp/docs/reports/app_c_assess_frmwrk.pdf.

[9] SDRWQCB, 2011. "A Framework for Monitoring and Assessment in the San Diego Region." California Regional Water Quality Control Board, San Diego Region, Staff Report, Working Draft. May 2012. Prepared by Lilian Busse and Bruce Posthumus. http://www.waterboards.ca.gov/sandiego/board_info/agendas/2012/Jun/item9/eosr0612MonitoringFramework.SD1.pdf

[10] SMC, 2004. "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California." A report from the Stormwater Monitoring Coalition's Model Monitoring Technical Committee. August 2004. Technical Report #419. http://www.lmtf.org/FoLM/Poliact/EColi/419_smc_mm.pdf

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? This question will be addressed by comparing indicator values to the relevant benchmarks or objectives and/or to background conditions.

2. What is the extent and magnitude of the current or potential receiving water problems? This question will be addressed by mapping the spatial extent and/or temporal persistence of problems, the severity of impacts, and/or the degree to which benchmarks are exceeded.
3. What is the relative urban runoff contribution to the receiving water problem(s)? This question will be addressed by comparing concentrations and loads of priority constituents to those from other sources, including background.

4. What are the sources of urban runoff that contribute to receiving water problem(s)? This question will be addressed by characterizing and prioritizing discharges and using targeted source identification protocols to track the origin of specific constituents.

5. Are conditions in receiving waters getting better or worse? This question will be addressed by time series analyses of individual indicators and/or of aggregate or cumulative indices of condition.

Given that substantial work has already been accomplished and other work is ongoing to address the questions related to receiving water condition assessment (questions 1, 2, 5), the Copermittees shall focus their efforts principally on questions 3 and 4. All five questions need not be addressed simultaneously to the same degree. As watershed problems are identified, effort should shift to diagnosis (questions 4 and 5) until the problems have been addressed, at which point effort may shift back to broader assessment (questions 1 and 2) in search of other problems to address.

During the transitional (pre-WQIP) period, where feasible the Copermittees shall develop more specific monitoring questions to guide the design of specific monitoring activities and address specific assessment needs. The information so generated will be used to guide management actions, based on the results of the monitoring data assessments.

As part of each WQIP, the Copermittees shall develop a water quality Monitoring and Assessment Program (Monitoring and Assessment Program) for each Watershed Management Area (WMA), as provided in Table B-1. Using the overarching SMC management questions as guidance, each Monitoring and Assessment Program shall include specific monitoring questions appropriate to address the assessment needs of each specific WMA. The monitoring activities shall be designed to generate data needed to address priority issues identified in the WQIPs, and the resulting monitoring data and assessments shall be supplied to program planners to help inform management actions. If a WMA has an approved Comprehensive Load Reduction Plan (CLRP), the CLRP shall be incorporated into the WQIP.

Each Copermittee covered by this permit shall participate in development and implementation of the Monitoring and Assessment Program for each WMA in which they have jurisdiction. The Copermittees shall consider the needs of regional monitoring and assessment activities in the development of each Monitoring and Assessment Program and make allowances as needed for regional coordination.

1. Receiving Waters Monitoring

Until approval and implementation of the WQIPs, the Copermittees shall perform receiving water monitoring to address management questions and specific questions, as specified in Provisions D.1.a-D.1.g below:

a. SMC Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall participate in the SMC Regional Monitoring Program through its planned completion. The SMC monitoring program seeks to coordinate and leverage existing monitoring efforts to produce regional estimates of condition, improve data comparability and quality assurance, and maximize data availability, while conserving monitoring expenditures. The primary goal of this program is to implement an ongoing, large scale regional monitoring program for southern California's coastal streams and rivers. A comprehensive program was designed by the SMC, in which each participating group assesses its local watersheds and then contributes their portion to the overall regional assessment. The SMC Regional Monitoring Program involves a probabilistic design for characterization of coastal watersheds using bioassessment metrics and related analyses, including, but may not be limited to: physical habitat characterization, Southern California Index of Biological Integrity scoring, macroinvertebrate and algal taxonomy, algal biomass, water chemistry, and toxicity. The study incorporates both reference and non-reference streams and may identify additional biological and/or chemical stressors affecting stream health, such as channel alteration and presence of invasive species.

b. Southern California Bight Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall participate in the Southern California Bight Regional Monitoring program as a trade-off with other routine monitoring requirements. The Bight program involves detailed characterization of coastal and offshore receiving waters, as well as targeted special studies. The Bight regional monitoring effort is designed to build upon the data collected during the previous Bight regional programs, to assess the extent of contamination in the Southern California Bight. Receiving water samples are collected in or near coastal areas, bays, estuaries, offshore islands, and open water/deep ocean within the Bight. Water quality and sediment samples may be collected to provide data for model input, to assess long-term trends, and to answer management questions developed by the diverse group of stakeholders in the Southern California Bight Region as part of the program. In addition, special studies such as potential new technology implementation (i.e. bioanalytical screening and/or genetic coding) may be conducted as part of the Bight Regional Monitoring.

c. SEDIMENT QUALITY MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

Specific Question: What is the condition of sediments in enclosed bays and estuaries with respect to the statewide sediment quality objectives?

Copermittees shall perform monitoring of bay and lagoon sediments, as applicable, under the Copermittees' responsibility to conform to the requirements of the Statewide Sediment Quality Objectives regulatory program, per State Water Resources Control Board Resolution No. 2008-0070 – Adoption of a Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality.

d. HYDROMODIFICATION MANAGEMENT PLAN (HMP) MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall perform receiving water monitoring as required per their Hydromodification Management Plan Monitoring Plans, as approved by the California Regional Water Quality Control Board, San Diego Region.

e. TMDL MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

Specific question: What is the progress in achieving and complying with adopted TMDL targets?

The Copermittees shall conduct receiving water monitoring to address monitoring requirements associated with TMDLs as specified below.

(1) The Copermittees shall perform water quality monitoring as required per the Implementation Plans or approved CLRPs of effective TMDLs, including compliance monitoring for the following TMDLs:

(a) TMDL for Diazinon in Chollas Creek Watershed Resolution No. R9-2002-0123; Effective as of September 11, 2003.

(b) TMDLs for Dissolved Copper in Shelter Island Yacht Basin Resolution No. R9-2005-0019; Effective as of December 2, 2005.

(c) TMDLs for Dissolved Copper, Lead, and Zinc in Chollas Creek Resolution No. R9-2007-0043; Effective as of October 22, 2008.

(d) TMDLs for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Resolution No. R9-2008-0027; Effective as of September 15, 2009.

(e) Revised TMDLs for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) Resolution No. R9-2010-0001; Effective as of April 4, 2011.

(2) TMDL monitoring shall be coordinated and/or integrated with monitoring specified in an approved CLRP or equivalent implementation plan.

f. ASBS SPECIAL PROTECTIONS MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

The Copermittees responsible for discharges to Areas of Special Biological Significance (ASBS) as regulated per the Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges, State Water Resources Control Board Resolution No. 2012-0012, shall perform receiving water monitoring as required, per the adopted ASBS Special Protections.

g. SAN DIEGO REGIONAL REFERENCE STREAM STUDY

Management Question: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

Specific Question: What are the concentrations/loads of bacteria, nutrients, and metals in reference streams in Southern California?

The Copermittees shall participate in reference stream receiving water monitoring and data analysis under the San Diego Regional Reference Stream Study as a Regional Study. The San Diego Regional Reference Stream Study is intended to characterize background concentrations of bacteria, nutrients, and metals in natural streams within the jurisdiction of the San Diego Water Board (Region 9). Samples shall be collected during wet and dry weather at sites considered representative of natural conditions (a contributing drainage area at least 95 percent undeveloped) and that vary in regards to hydrology, catchment size, and geology. The results of the study may be used to assist determination of scientifically-based reference stream numeric goals for indicator bacteria, nutrients, and metals.

h. Long-Term Receiving Water Monitoring, Post-WQIP Adoption

(1) Management Question: Are conditions in receiving waters getting better or worse?

(2) Following adoption of the WQIPs, the Copermittees shall conduct long-term receiving water monitoring to be performed in each WMA during WQIP implementation, for assessment of long-term trends, as specified below:

(3) The Copermittees in each Watershed Management Area shall select one long-term receiving water station from among the existing mass loading stations (MLS) and temporary watershed assessment stations (TWAS) to be representative of receiving water quality within the WMA.

(4) During the permit term, the Copermittees shall perform monitoring during three wet weather events and three dry weather events at each of the long-term stations selected by the Copermittees and approved by the San Diego Water Board.

(5) Dry Weather Receiving Water Monitoring

During the permit term, the Copermittees shall perform monitoring during three dry weather events, at minimum, at each of the long-term stations. One event must be conducted during the dry season (May 1-September 30) and one event must be conducted during a dry weather period during the wet season (October 1 –April 30), after the first wet weather event of the season, with an antecedent dry period of at least 72 hours following any storm event producing measurable rainfall of greater than 0.1 inch.

(a) For each dry weather receiving water monitoring event, the Copermittees must record field observations consistent with Table D-1 at each monitoring station.

Table D-1. Field Observations for Dry Weather Ambient Receiving Water Monitoring Stations

Field Observations
• Station identification and location. • Presence of flow, or pooled or ponded water. • If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate), - Flow characteristics (i.e. presence of floatables, surface scum, or sheens, odor, color), • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, or sheens, odor, color). • Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology). • Presence and assessment of trash in and around station.

(b) If flow is present during the dry weather watershed monitoring event, and conditions allow the collection of the data, the Copermittee must monitor and record the parameters in Table D-2.

Table D-2. Field Monitoring Parameters for Receiving Water and Persistent MS4 Monitoring Stations

Parameters
• pH • Temperature • Specific conductivity • Dissolved oxygen • Turbidity

(c) Samples must be collected and analyzed as follows:

(i) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, indicator bacteria, and toxicity. Analytes that are field measured do not need to be analyzed by a laboratory.

(ii) For all other constituents, composite samples shall be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques: time-weighted composites composed of 24 discrete hourly samples, or flow-weighted composites collected over a typical 24 hour period. Only one analysis of the composite of aliquots is required.

(d) Samples shall be collected for analysis of the following parameters: TMDL or CLRP constituents in watersheds where the Copermittees are responsible parties in an adopted TMDL Implementation Plan, constituents listed as a cause of impairment on a CWA Section 303(d) listing for the receiving water body reach to which the outfall discharges, applicable NAL constituents, and constituents identified by the Copermittees as the watershed priorities in their respective WQIPs, as well as the constituents listed in Table D-3.

Table D-3. Analytical Monitoring Constituents for Receiving Water Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Metals (Total and Dissolved)	Pesticides	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Turbidity[1] • Total Organic Carbon • Dissolved Organic Carbon • Sulfate • Methylene Blue Active Substances (MBAS) • Total Phosphorus[1] • Orthophosphate • Nitrite[1,2] • Nitrate[1,2] • Total Kjeldahl Nitrogen • Ammonia	• Arsenic • Cadmium[1] • Chromium • Copper[1] • Iron • Lead[1] • Mercury • Nickel • Selenium • Thallium • Zinc[1]	• Organo-phosphate pesticides • Pyrethroid pesticides	•Total Coliform • Fecal Coliform[3] •*Enterococcus*

Notes:
1. Constituent with a storm water action level (SAL) specified under Provision C.2.
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
3. *E. Coli* may be substituted for Fecal Coliform.

(e) Dry Weather Receiving Water Toxicity Monitoring:

For each dry weather monitoring event, grab or composite samples from each monitoring station must be collected and analyzed for toxicity in accordance with Table D-4.

Table D-4. Toxicity Testing for Receiving Water Monitoring Stations

Freshwater Organism	Test Approach per Event	EPA Protocol[1]
Pimephales promelas (fathead minnow)	Wet: 1 acute Dry: 1 acute and chronic	EPA-821-R-02-012
Hyalella azteca	Wet: 1 acute Dry: 1 acute and chronic	EPA-821-R-02-012
Psuedokirchneriella subcapitata (formerly *Selenastrum capricornutum*, unicellular algae)	Wet: 1 acute Dry: 1 acute and chronic	EPA-821-R-02-013

Notes:
1. EPA protocols shall be utilized for toxicity testing unless alternate toxicity testing protocols have been approved by the San Diego Regional Water Quality Control Board. Chronic toxicity testing will also be conducted at dry weather mass loading stations unless the channel flows are diverted year-round during dry weather conditions to the sanitary sewer for treatment

(f) Receiving Water Bioassessment Monitoring:

Copermittees shall perform Bioassessment monitoring once during the permit term in accordance with the SMC Model Monitoring Program “Triad” assessment approach (SMC, 2004). Copermittees shall conduct sampling, analysis, and reporting of specified in-stream biological and habitat data according to the protocols specified in the SCCWRP Tech Report No. 539, or subsequent protocols, if developed, that have been widely-accepted as an appropriate alternative for Southern California receiving waters. Bioassessment monitoring may be conducted in conjunction with SMC Regional Monitoring and/or other dry weather receiving water monitoring. A physical assessment shall be conducted that will include details of the channel condition including channel dimensions, hydrologic and geomorphic conditions, and presence and condition of vegetation and habitat.

(6) Wet Weather Receiving Water Monitoring

During the permit term, Copermittees shall perform monitoring during three wet weather events at each of the long-term receiving water monitoring stations. Each monitoring station must be monitored during the wet season beginning October 1 and ending April 30.

(a) For each wet weather monitoring event, the following narrative descriptions and observations must be recorded at each monitoring station:

(i) A narrative description of the station that includes the location, date and duration of the storm event(s) sampled, rainfall estimates of the storm event, and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(ii) The flow rates and volumes measured or estimated. Data from nearby USGS gauging stations may be utilized, or flow rates may be measured or estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), section 3.2.1, or other method proposed by the Copermittees that is acceptable to the San Diego Water Board;

(iii) Station condition (i.e. deposits or stains, vegetation condition, structural condition, observable biology); and

(iv) Presence and assessment of trash in and around station.

(b) For each wet weather receiving water monitoring event, the parameters in Table D-2 must be monitored and recorded in the field.

(c) Samples must be collected and analyzed as follows:

(i) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, indicator bacteria, and toxicity. Analytes that are field measured do not need to be analyzed by a laboratory.

(ii) For all other constituents, composite samples shall be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques: time-weighted composites composed of 24 discrete hourly samples, or flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter. Only one analysis of the composite of aliquots is required.

(iii) Copermittees should implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods.

(d) Samples shall be collected for analysis of the following parameters: TMDL or CLRP constituents in watersheds where the Copermittees are responsible parties in an adopted TMDL Implementation Plan, constituents listed as a cause of impairment on a CWA Section 303(d) listing for the receiving water body reach to which the outfall discharges,

applicable SAL constituents, and constituents identified by the Copermittees as the watershed priorities in their respective WQIPs, as well as the constituents listed in Table D-3.

(e) Wet Weather Receiving Water Toxicity Monitoring

Grab samples or composites from each monitoring station must be collected and analyzed for toxicity in accordance with Table D-4.

i. OTHER RECEIVING WATER MONITORING, POST-WQIP ADOPTION

After adoption of the WQIPs, the Copermittees shall conduct monitoring based on the approved WQIPs, in addition to long-term receiving water monitoring as described in Provision D.1.h, to include constituents identified by the Copermittees as the watershed priorities in their respective WQIPs. Nothing in this Provision is intended to prevent Copermittee collection of additional receiving water data, as necessary, to support and implement respective WQIPs. This monitoring shall include, at minimum, integration of the following receiving water requirements within the WQIPs, as appropriate for specific watersheds:

(1) Participation in SMC Regional Monitoring Program, where applicable

(2) Sediment Quality Monitoring in applicable estuaries

(3) Hydromodification Management Plan (HMP) Monitoring as applicable

(4) TMDL Monitoring where implementation plans have been approved and are under implementation, and

(5) ASBS Special Protections Monitoring, where applicable.

j. RECEIVING WATER MONITORING REPORTING

The Copermittees shall report on the progress of the receiving water monitoring and the results or findings of such monitoring, when completed, in the Annual Report pursuant to Provision F.3.b.

2. MS4 Outfall Discharge Monitoring

Discharge monitoring shall involve both Non-Storm Water (Dry Weather) and Storm Water (Wet Weather) components. The Copermittees shall perform monitoring, as necessary, to identify non-storm water discharges and illegal connections/illicit discharges (IC/IDs) pursuant to Provision E.2 of this Order. To accomplish this, the monitoring may include a variety of water quality and other monitoring techniques, including visual and other observations. Copermittees shall investigate dry weather flows and prioritize outfalls with observed flows for follow-up action as detailed below.

a. STORM WATER OUTFALL INVENTORY

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

(1) Each Copermittee shall identify all major outfalls, as defined by 40 CFR §122.26(b)(5-6), that discharge directly to named receiving waters within its jurisdiction, and geo-locate those outfalls on a map of the MS4 pursuant to Provision E.2.b of this Order. This information shall be compiled in a storm water outfall inventory, which also shall include applicable information including HSA, jurisdiction, outlet size, and approximate drainage area. Only MS4 outfalls with safe access and for which access is gained without disturbing critical habitat will be considered in the number of eligible major MS4 outfalls.

b. NON-STORM WATER TRANSIENT FLOW (DRY WEATHER) MONITORING, IDDE INVESTIGATION

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which non-storm water discharges are transient and which are persistent? Which discharges should be investigated as potential IDDEs? Which outfalls exhibit persistent dry weather flows?

The Copermittees shall perform non-storm transient flow discharge monitoring to address the above management and specific questions as follows:

(1) Each Copermittee shall prioritize the major MS4 outfalls within its jurisdiction from the list of major outfalls developed pursuant to Provision D.a., based on criteria and rationale that include potential threat to water quality.

(2) Copermittees with less than 125 major MS4 outfalls that discharge to a

receiving water shall visually inspect 80% of the outfalls twice per year during dry weather.

(3) Copermittees with 125 or more but less than 250 major MS4 outfalls that discharge to a receiving water shall visually inspect a prioritized list of major MS4 outfalls that discharge to a receiving water annually. The total number of inspections per Copermittees with 125 or more but less than 250 major MS4s will be a minimum of the total number of all major MS4 outfalls locations once with annual visual inspections Where possible, inspections will be conducted year round. Major MS4 outfalls shall be prioritized based on threat to water quality and will consider factors such as:

(a) Assessment of connectivity of the discharge to a flowing receiving water

(b) Reported exceedances in water quality data

(c) Surrounding land use

(d) Presence of watershed priority constituents, TMDLs & CWA 303(d) list of impaired water bodies

(e) Flow rate

(4) Copermittees with 250 or more major MS4 outfalls that discharge to a receiving water shall visually inspect a prioritized list of major MS4 outfalls that discharge to a receiving water annually. The total number of inspections per Copermittees with 250 or greater major MS4s will be a minimum of 250 to a maximum of 500 locations with annual visual inspections. Where possible, inspections will be conducted year round. Major MS4 outfalls shall be prioritized based on threat to water quality and will consider factors such as:

(a) Assessment of connectivity of the discharge to a flowing receiving water

(b) Reported exceedances in water quality data

(c) Surrounding land use

(d) Presence of watershed priority constituents, TMDLs & CWA 303(d) list of impaired water bodies

(e) Flow rate

(5) Obvious illicit discharges (i.e., unusual color, unusual odor, or high flow) shall be investigated immediately pursuant to Provision E.2.

(6) An antecedent dry period of at least 72 hours following any storm event producing measurable rainfall of greater than 0.1 inch is required prior to conducting dry weather visual inspections.

(7) During a visual inspection, field personnel shall note visual and other observations, including those provided in Table D-5 of this Order.

(a) During a visual inspection, an inspection form will be filled out documenting observations in conformance with table D-5.

(b) Inspections of major outfalls conducted pursuant to Provision E of this order, including but not limited to complaint follow-ups, may be accounted for as the visual inspection for the major outfall under this Provision.

Table D-5. Field Observations for Non-Storm Water MS4 Monitoring Stations

Field Observations
• Station identification and location. • Presence of flow, or pooled or ponded water from the outfall. • If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate), - Flow characteristics (i.e. presence of floatables, surface scum, or sheens, odor, color), - Flow source(s) suspected or identified from non-storm water source investigation, and - Flow source(s) eliminated during non-storm water source identification. • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, or sheens, odor, color), and - Known or suspected source(s) of pooled or ponded water. • Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology). • Presence and assessment of trash in and around station. • Evidence or signs of illicit connections or illegal dumping.

(8) Evidence of obvious illegal discharges, such as obvious odor, discoloration, or floating foam or scum, shall be followed up immediately.

~~(7)~~(9) The field observations shall be evaluated together with existing information available from prior inspections and prior monitoring results to determine whether the non-storm water (dry weather) discharge flow is likely to be transient or persistent[11].

[11] Persistent flow, as modified from the SMC Model Monitoring Program definition of persistent WQO exceedance, is defined as “the presence of flow, pooled, or ponded water more than 72 hours after a measureable rainfall event of

(a) If the flow is deemed to be transient, observations shall be used to conduct IDDE investigations where warranted pursuant to Provision E.2.

(b) If the nature and source of the observed flow is already known, this shall be noted on the field log, including whether the observed flow results from a non-storm water discharge conditionally allowed per Provision E.2.a.

(10) Where the non-storm water (dry weather) discharge flow is deemed to be persistent in Provision D.2.a.(8), the outfall shall be referred to the characterization and prioritization process described in Provision D.2.c. .

(11) The framework developed in the transitional monitoring program shall be used as a basis to design a continuing IDDE monitoring program as part of the Monitoring and Assessment Program in each WQIP.

c. NON-STORM WATER PERSISTENT FLOW (DRY WEATHER) OUTFALL MONITORING

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which outfalls exhibit persistent dry weather flows? Do discharge concentrations at MS4 outfalls meet applicable permit action levels? Which MS4 outfalls impact receiving water quality during dry weather?

The Copermittees shall perform non-storm water persistent flow discharge monitoring to address the above-listed management and specific questions as follows:

(1) Based upon the results of the investigation conducted pursuant to Provision D.2.b., each Copermittee shall add to the storm water outfall inventory compiled pursuant to Provision D.2.a., a classification of whether the outfall produces persistent discharge flow, transient flow, or no dry weather flow. The inventory shall provide notations on the basis for that classification; the classification may be based on historical data and/or contemporary observations, including information generated per Provision D.2.b..

0.1 inch of precipitation during three consecutive monitoring and/or inspection events". All other flow is considered transient.

(2) The Copermittees shall prioritize the outfalls identified as having persistent dry weather in the stormwater outfall inventory, pursuant to Provision D.2.c.(1). Historical data may be used to assist prioritization, where available. The prioritization shall be prepared based on criteria to be developed by the Copermittees, and a brief rationale for the prioritization shall be provided to accompany the map.

(3) Based on the prioritization of major outfalls developed under Provision D.2.c.(2), the Copermittees shall identify, at minimum, a number of major outfalls to monitor within each watershed management area equivalent to the number of urbanized HSAs within the WMA. The selected outfalls shall be listed by urbanized HSA and indicated on the map prepared pursuant to Provision D.2.a.

(4) The Copermittees shall monitor each major outfall identified in Provision D.2.c.(3) two times annually under dry weather conditions until one of the following occurs, at which point the outfall may be removed from the list:

(a) Flows are reduced to near-zero for three consecutive visits, or

(b) The source(s) of flows are determined to be derived from a non-storm water discharge source conditionally allowed per Provision E.2.a, or

(c) The source of the discharge is determined to be covered by a separate NPDES permit.

(d) The Copermittees shall document any such removal of sites from the outfall monitoring list in their annual report. Outfalls so removed must be replaced with then next highest prioritized MS4 outfall in the WMA per Provision D.2.c.(3), unless there are no remaining qualifying outfalls within the urbanized HSAs of the WMA.

(e) Where these criteria are not met but the threat to water quality is reduced, the outfall may be prioritized accordingly for continued follow up activity.

(5) During each semi-annual visit, the Copermittee must record field observations consistent with Table D-5 at each non-storm water MS4 monitoring station within its jurisdiction.

(6) Prior to WQIP approval, each semi-annual visit in which measurable flow is present from an outfall listed under Provision D.2.c.(3) must include the following:

(a) Grab samples shall be collected for analysis for the constituents listed in Table D-6, unless the Copermittee has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary.

Table D-6. Analytical Monitoring Constituents for Non-Storm Water MS4 Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Total Phosphorus • Ortho-phosphate • Nitrite[1] • Nitrate[1] • Total Kjeldahl Nitrogen • Ammonia as N • Chlorine	• Cadmium • Copper • Lead • Zinc	• Total Coliform • Fecal Coliform[2] • *Enterococcus*

Notes:
1. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
2. *E. Coli* may be substituted for Fecal Coliform.

(b) Field measurements shall be collected for the parameters listed in Table D-2.

(c) If the Copermittee identifies and eliminates the source of non-storm water discharge, analysis of the sample is not required.

(7) As part of the WQIP, Copermittees must develop a program to characterize the persistent non-storm water discharges and pollutant loads from the Copermittee's major MS4 outfalls. As part of the development of the Monitoring and Assessment Program for each WMA, the number and selection of outfalls shall be re-evaluated and determined anew for each WMA, along with the appropriate monitoring frequency and methods.

(8) After WQIP approval, each visit in which measurable flow is present from an outfall listed under Provision D.2.c.(3), as modified by approved changes pursuant to Provision D.2.c.(7) must include the following:

a. Samples shall be collected for analysis of the following parameters:

(i) Constituents identified by the Copermittees as highest watershed priorities,

(ii) TMDL constituents in watersheds where the Copermittees are responsible parties in an effective TMDL Implementation Plan for the receiving water body reach to which the outfall discharges,

(iii) Constituents listed as a cause of impairment on a CWA Section 303(d) listing for the receiving water body reach to which the outfall discharges, and

(iv) Applicable NAL constituents.

b. Field measurements shall be collected for the parameters listed in Table D-2.

(9) Annually, the Copermittees shall evaluate the data produced by the persistent flow outfall monitoring and inspections, rank the outfalls according to potential threat to receiving water quality, and produce a prioritized list of major outfalls for follow-up action. The prioritized list shall be used to update the WQIP, with the goal of reducing flows and/or loads in order of the ranked priority list through targeted programmatic actions and source investigations.

d. Storm Water (Wet Weather) Outfall Monitoring

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which MS4 outfalls impact receiving water quality during wet weather? Do discharge concentrations at MS4 outfalls meet applicable permit action levels? How do representative MS4 outlet discharge concentrations, loads, and flows change over time?

The Copermittees shall perform storm water discharge monitoring to address the above-listed management and specific questions as follows:

(1) Prior to adoption of the WQIPs, the San Diego Copermittees shall continue the MS4 outfall monitoring program implemented under Order No. R9-2007-0001 per RWQCB approved plan through its planned completion to continue to obtain data from a representative cross-section of discharges.

(2) Prior to adoption of the WQIPs, the San Diego Copermittees shall perform storm water discharge monitoring based on representative outfalls to address the above-listed management questions as follows:

(a) The Copermittees shall select, at minimum, three monitoring stations at representative major MS4 outfalls with homogenous land use types and/or typical mixed-use drainage areas per WMA from the map developed pursuant to Provision D.2.a. Historical data may be used to assist site selection, where available. These outfalls shall be geo-located on a map showing the urban hydrologic sub-areas (HSAs), land use drainage areas, and jurisdictional boundaries within the permitted area.

(b) Each selected monitoring station must be monitored twice during the wet season, beginning October 1 and ending April 30.

(c) For each wet weather monitoring event, the following narrative descriptions and observations must be recorded at each monitoring station:

(i) A narrative description of the station that includes the location, date and duration of the storm event(s) sampled, rainfall estimates of the storm event, and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(ii) The flow rates and volumes measured or estimated. Data from nearby USGS gauging stations may be utilized, or flow rates may be measured or estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), section 3.2.1, or other method proposed by the Copermittees that is acceptable to the San Diego Water Board;

(d) For each wet weather monitoring event, the parameters in Table D-2 must be monitored and recorded in the field. Samples shall be collected for analysis of parameters listed in Table D-7, according to the following methods:

(i) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, and indicator bacteria. Analytes that are field measured do not need to be analyzed by a laboratory.

(ii) For all other constituents, composite samples shall be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques:

[a] Through use of automated equipment to collect time-weighted composites composed of 24 discrete hourly samples, or flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter. Only one analysis of the composite of aliquots is required.

[b] If automated compositing is not feasible, a composite sample may be collected using a minimum of 4 grab samples, collected during the first 24 hours of the storm water discharge, or for the entire storm water discharge if the storm event is less than 24 hours. Only one analysis of the composite of aliquots is required.

(iii) Copermittees should implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods.

Table D-7. Analytical Monitoring Constituents for Wet Weather MS4 Outfall Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Turbidity[1] • Total Organic Carbon • Dissolved Organic Carbon • Sulfate • Methylene Blue Active Substances (MBAS) • Total Phosphorus[1] • Orthophosphate • Nitrite[1,2] • Nitrate[1,2] • Total Kjeldahl Nitrogen • Ammonia	• Arsenic • Cadmium[1] • Chromium • Copper[1] • Iron • Lead[1] • • Nickel • Selenium • Thallium • Zinc[1]	•Total Coliform • Fecal Coliform[3] •*Enterococcus*

Notes:
1. Constituent with a storm water action level (SAL) specified under Provision C.2.
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
3. *E. Coli* may be substituted for Fecal Coliform.

(3) After adoption of the WQIPs, the Copermittees shall perform storm water discharge monitoring based on representative major MS4 outfalls to address the above-listed management questions, and according to the needs for outfall monitoring as defined in the monitoring and assessment sections of the WQIPs. Samples shall be collected for analysis of parameters identified by the Copermittees as watershed priorities in the WQIP. Copermittees shall consider constituents based on factors including, but not limited to:

(a) Constituents identified as the highest water quality priorities.

(b) TMDL constituents in watersheds where the Copermittees are responsible parties in an effective TMDL Implementation Plan for the receiving water body reach to which the outfall discharges,

(c) Constituents listed as a cause of impairment on a CWA Section 303(d) listing for the receiving water body reach to which the outfall discharges, and

(d) Applicable SAL constituents.

e. MS4 Outfall Discharge Monitoring Reporting

The Copermittees shall report on the progress of the MS4 outfall monitoring and the results or findings of such monitoring, when completed, in the Annual Report pursuant to Provision F.3.b.

3. Source/Stressor Identification

Management Question: What are the sources of urban runoff that contribute to receiving water problem(s)?

The Copermittees shall perform Source/Stressor Identification studies as needed to investigate sources of pollutants or stressors in cases where MS4 discharges are deemed to be causing or contributing to receiving water priorities, based on monitoring performed under Provisions D.1 and D.2. The results of the Stressor/Source Identification studies may be shared regionally among the Copermittees to provide information useful in improving adaptive management of urban runoff through implementation of the WQIPs.

The principal role of Source/Stressor Identification is to identify and prioritize pollutant generating activities and source categories. Identification of high-priority sources is an important step in support of the WQIP process, to help inform the development of effective pollutant reduction strategies for particular priority constituents on a watershed-specific basis.

Source identification shall be conducted on a constituent-specific basis. The source identification efforts shall focus on constituents identified as watershed priorities, and include prioritization of sources based on magnitude, controllability, and other factors. The constituent-specific source identification process shall include, at a minimum, the following steps:

- Step 1: Compile known information on the specific priority constituent. This information includes data on potential sources and movement of a particular constituent within the urban watershed. Data generated by the Copermittees and others, as well as information available from a literature research on the priority constituent shall be compiled and analyzed as appropriate.

- Step 2: Based on the compiled information generated on the priority constituent, identify data gaps, if any. Targeted studies may be planned where appropriate to fill identified data gaps; such studies would be performed as Special Studies per

Provision D.4. For example, targeted studies may be performed to quantify the relative loading of a priority constituent from a particular pollutant generating activity, or to improve understanding of the fate of a constituent in the environment.

- Step 3: Based on the information compiled, develop an inventory of sources and consider how to prioritize them within the watershed for potential follow-up action. Examples of prioritization criteria for sources include relative magnitude in discharges, geographical distribution (i.e., regional or localized), frequency of occurrence in discharges, human health risk, and controllability.

- Step 4: Develop a prioritized list of sources for the priority constituent and deliver to the Copermittee staff responsible for implementing WQIPs.

Prior to adoption of the WQIPs, the San Diego Copermittees shall continue source identification studies pertaining to compliance with TMDLs and the development of the CLRP implemented under Order No. R9-2007-0001.

Following adoption of the WQIPs, the Copermittees shall conduct source/stressor identification studies as necessary to support the WQIP watershed priorities and strategies. The plans for source/stressor ID studies must be submitted as part of the Monitoring and Assessment Programs included as part of the WQIPs required pursuant to Provision B of this Order.

The Copermittees shall report on the progress of the source/stressor ID studies and the results or findings of such studies, when completed, in the Annual Report pursuant to Provision F.3.b.

4. Special Studies

The Copermittees shall conduct Special Studies to address information needs as identified for receiving waters per monitoring performed pursuant to Provision D.1, for MS4 outfall discharges per monitoring performed pursuant to Provision D.2, and in Source/Stressor Identification studies per Provision D.3; to provide information on BMP effectiveness; and otherwise as needed to support implementation or evaluation of the WQIP strategies for the identified highest water quality priorities.

Within the permit term, two Special Studies shall be conducted within each Watershed Management Area, to address specific questions developed for each Watershed Management Area, and two regional special studies shall be conducted to answer regional questions.

a. The monitoring plans for the special studies must be submitted as part of the Monitoring and Assessment Programs included as part of the Water Quality Improvement Plans required pursuant to Provision B. The special studies must, at a minimum, be in conformance with the following criteria:

(1) The special studies must be related to water quality priorities identified by the Copermittees within the Watershed Management Area or San Diego Region, and the monitoring plans for the special studies must address specific watershed or regional questions;

(2) The special studies must be implemented within specific Watershed Management Areas or regionally within the San Diego Region;

(3) The special studies must include some form of participation by all Copermittees within the Watershed Management Area or San Diego Region, as applicable;

(4) One of the two required special studies within each Watershed Management Area may be replaced by a regional special study pursuant to D.4.a. (1) through D.4.a.(3); and

(5) A special study done pursuant to D.4.a. (1) through D.4.a.(4) that is started prior to the submittal of the WQIP, but is completed during the permit term, shall meet the requirements of a special study for a Watershed Management Area or San Diego Region, as applicable.

b. The Copermittees shall report on the progress of the special studies and the results or findings of such studies, when completed, in the Annual Report pursuant to Provision F.3.b.

Examples of special studies include:

- Enhance outreach & education by expanding residential BMP rebate programs (irrigation, rainwater harvesting and turf conversion) to multi-family housing
- Enhance outreach & education by increasing enforcement of over-irrigation regulation
- Conduct Catch Basin Inlet Cleaning Study assessment
- Implement Residential & Commercial Area Patrolling
- Implement Targeted Aggressive Street Sweeping Study
- Develop Watershed Urban Runoff Management Program Inspection Program (separate from commercial/industrial inspections, targets all businesses in specific areas)
- Conduct an investigation to improve the understanding of the linkage between groundwater and surface water hydrology and potential impacts to receiving water beneficial uses
- Conduct targeted field investigations to provide additional spatial or temporal information on the highest priority constituents or activities to inform or improve the efficiency of implementation efforts in the WMA.

The Regional Reference Stream Study is an example of a regional special study.

5. Assessment Requirements

The Copermittees must report the progress and findings of the following assessments, when available and as applicable to each WMA, as part of the Annual Report for each WMA, as required pursuant to Provision F. Assessments that occur only once per permit term, or are based on monitoring that occurs only once per permit term, shall be reported as part of the applicable Annual Report, or included within the Copermittees' Report of Waste Discharge, prior to commencement of the subsequent permit term.

a. Receiving Water Monitoring

The Copermittees shall perform analysis and assessments of data and information produced per Provision D.1, addressing for each Receiving Water Monitoring element the management and specific questions as shown in Provision D.1 and below. The analysis and assessments shall relate the monitoring data compiled for each component to the conditions of affected receiving waters and status of relevant receiving water beneficial uses.

(1) SMC Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall incorporate results of the SMC Regional Monitoring Program, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The SMC Program is designed to provide a representative sampling of receiving water quality in coastal rivers and streams in the region's watersheds, based on a probabilistic design for characterization of coastal watersheds, using bioassessment metrics and related analyses. The analysis and assessments of the data shall relate the SMC monitoring data to the condition of receiving waters and status of receiving water beneficial uses.

(2) Bight Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall incorporate results of the Bight Regional Monitoring Program, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The Bight regional monitoring effort involves detailed characterization of coastal and offshore receiving waters, as well as targeted special studies. The analysis and assessments of the data shall relate the Bight monitoring data to the condition of receiving waters and status of receiving water beneficial uses.

(3) Sediment Quality

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

Specific Question: What is the condition of sediments in enclosed bays and estuaries with respect to the statewide sediment quality objectives?

The Copermittees shall incorporate results of the sediment quality monitoring of bay and estuarine sediments, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the data shall relate sediment quality data to the condition of receiving waters and status of receiving water beneficial uses.

The analysis of sediment quality data also shall conform to the requirements of the Statewide Sediment Quality Objectives regulatory program, per State Water Resources Control Board Resolution No. 2008-0070 – Adoption of a Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(4) Hydromodification Management Plan (HMP) Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall incorporate results of the receiving water monitoring required per their Hydromodification Management Monitoring Plans, as approved by the California Regional Water Quality Control Board, San Diego Region, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the data shall relate HMP monitoring data to the condition of receiving waters and status of receiving water beneficial uses. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(5) TMDL Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

Specific question: What is the progress in achieving and complying with adopted TMDL targets?

The Copermittees shall incorporate results of TMDL monitoring, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the TMDL monitoring data shall be integrated with other receiving water data in assessments of the condition of receiving waters and status of receiving water beneficial uses.

The Copermittees shall annually evaluate receiving water data produced per Provision D.1.e. to determine whether TMDL targets are being met, for applicable receiving waters as specified in adopted TMDLs and include the results of this evaluation, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

The analysis of TMDL monitoring data also shall conform to the requirements of the adopted TMDLs and associated Implementation Plans, to demonstrate compliance with the applicable terms of adopted TMDLs and Implementation Plans.

(6) ASBS Special Protections Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

The Copermittees responsible for discharges to Areas of Special Biological Significance (ASBS) as regulated per the Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges, State Water Resources Control Board Resolution No. 2012-0012, shall incorporate results of ASBS monitoring, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the ASBS monitoring data shall be integrated with other receiving water data in assessments of the condition of receiving waters and status of receiving water beneficial uses.

The Copermittees for whom ASBS monitoring is required under the terms of the adopted ASBS Special Protections shall evaluate the data as required per State Water Resources Control Board Resolution No. 2012-0012, and include the results of this evaluation, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(7) Long-Term Receiving Water Monitoring

Management Question: Are conditions in receiving waters getting better or worse?

The Copermittees shall incorporate the results of the Long-Term Receiving Water Monitoring into the analysis and assessments conducted as part of the adaptive management process. The analysis and assessments of the Long-Term monitoring data shall be integrated with other receiving water data in assessments of the condition of receiving waters and status of receiving water beneficial uses.

The Copermittees shall evaluate the data produced by the receiving water monitoring pursuant to Provision D.1.g, and incorporate new receiving water data into time series plots for each long-term monitoring constituent, for each WMA. Once per permit term the Copermittee shall perform statistical trends analysis on the cumulative long-term receiving water data set.

(8) Integrated Receiving Water Assessment

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems? Are conditions in receiving waters getting better or worse?

Once during the permit term, for each watershed management area, the Copermittees shall integrate the analyses and assessments of the results of the SMC Regional Monitoring Program, Bight Regional Monitoring Program, Sediment Quality monitoring, HMP Monitoring, TMDL monitoring, ASBS monitoring, and Long-term receiving water monitoring, as performed per Provisions D.5.a.(1)-D.5.a.(7), as well as other data as available and applicable, to assess the condition of receiving waters and status of receiving water beneficial uses, and identify data or information gaps. The integrated assessment shall include, as appropriate to address any identified data gaps, recommendations for additional monitoring as may be required to adequately characterize conditions in receiving waters, or where special studies may be needed to address specific information needs.

b. MS4 OUTFALL DISCHARGE MONITORING

The Copermittees shall perform analysis and assessments of data and information produced per Provision D.2, addressing the management and specific questions as shown in Provision D.2 and below. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(1) <u>Transient Non-Storm Water (Dry Weather) Monitoring, IC/ID Investigation</u>

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which non-storm water discharges are transient and which are persistent? Which discharges should be investigated as potential IC/IDs? Which outfalls exhibit persistent dry weather flows?

(a) Where the presence of non-storm water (dry weather) flow is noted from an outfall during a visual inspection, field personnel shall note visual and other observations (including approximate/estimated flow rate, changes in flow rate during inspection, changes in flow rate over previous inspections, color, presence of foam or sheen, and odor) on a field log. Inspectors also shall note where there is evidence of past flow and record pertinent observations at all sites visited.

(b) The field observations shall be evaluated together with existing information available from prior inspections and prior monitoring results to determine whether the non-storm water (dry weather) discharge flow is likely to be transient or persistent. If the flow is deemed to be transient as indicated by pooled or ponded water or other evidence of recent flow, and there is evidence of an illicit discharge such as obvious odor, discoloration, foam or scum, the observations shall be used to conduct IC/ID investigations pursuant to Provision E.2. If the nature and source of the observed flow is already known, this shall be noted on the field log, including whether the observed flow results from a non-storm water discharge conditionally allowed per Provision E.2.a.

(c) Where the non-storm water (dry weather) discharge flow is deemed to be persistent in Provision D.2.b.(9), the outfall shall be referred to the characterization and prioritization process described in Provision D.2.c.

(2) <u>Persistent Non-Storm Water (Dry Weather) Outfall Monitoring</u>

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which outfalls exhibit persistent dry weather flows? Do discharge concentrations at MS4 outfalls meet applicable permit action levels? Which MS4 outfalls impact receiving water quality during dry weather?

(a) Identification and Prioritization of Outfalls with Persistent Flow

Annually, the Copermittees shall evaluate the data produced by the dry weather outfall monitoring pursuant to Provision D.2.c., rank the outfalls according to potential threat to receiving water quality, and produce a prioritized list of outfalls for follow-up action. The Copermittees must analyze the non-storm water monitoring data collected pursuant to Provision D.2.c.

and consider NAL exceedances in prioritizing outfalls. The prioritized list shall be provided in the Annual Report for each WMA pursuant to Provision F.3.b. The prioritized list shall be used to update the WQIPs with the goal of reducing flows/ loads in order of the ranked priority list, through targeted programmatic actions and source investigations.

(b) Evaluate Potential Impacts to Receiving Waters from Persistent Non-Storm Water Outfall Flows

Annually, the Copermittees shall evaluate the data produced by the dry weather outfall monitoring pursuant to Provision D.2.c., and compare the outfall monitoring data to relevant receiving water quality data, to identify outfalls that may cause or contribute to receiving water quality problems.

(c) Calculate Loadings to Receiving Waters from Persistent Non-Storm Water Outfall Flows

Annually, the Copermittees shall estimate discharge loadings from the data produced by the dry weather outfall monitoring pursuant to Provision D.2.c., and rank the monitored outfalls in order from highest to lowest loading, to identify outfalls that may cause or contribute to receiving water quality problems. As part of this annual estimation, the Copermittees shall identify areas where program implementation is thought to have resulted in reductions or elimination of loads from MS4 outfalls.

(d) The Copermittees in each Watershed Management Area must review the non-storm water flow and pollutant load analyses required pursuant to Provision D.4.b.(2)(d) on an annual basis to:

(i) Identify the pollutant load reductions that are thought to be attributable to water quality management actions within the high priority outfall drainage areas

(ii) Assess the effectiveness of the water quality improvement strategies being implemented within the Watershed Management Area toward reducing or eliminating non-storm water discharges and pollutant loads discharging from the MS4 to receiving waters; and

(iii) Identify modifications necessary to increase the effectiveness of the water quality improvement strategies toward reducing or eliminating non-storm water discharges and pollutant loads discharging from the MS4 to receiving waters.

(3) Storm Water (Wet Weather) Outfall Monitoring

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Do discharge concentrations at MS4 outfalls meet applicable permit action levels? Which MS4 outfalls impact receiving water quality during wet weather? How do representative MS4 outlet discharge concentrations, loads, and flows change over time?

(a) Comparisons of Wet Weather Outfall Quality to Storm Water Action Levels

The Copermittees shall analyze the storm water monitoring data collected pursuant to Provision D.2.c and consider SAL exceedances in prioritizing outfalls for further investigation, and assessing progress towards addressing WQIP priorities.

(b) Evaluate Potential Impacts to Receiving Waters

Annually, the Copermittees shall evaluate the data produced by the wet weather outfall monitoring pursuant to Provision D.2.c, and compare the outfall monitoring data to relevant receiving water quality data, to identify outfalls that may cause or contribute to receiving water quality problems. As part of this annual estimation, the Copermittees shall identify areas where program implementation is thought to have resulted in reductions or elimination of loads from MS4 outfalls.

(c) Calculate Loadings to Receiving Waters from Storm Water Outfall Flows

Annually, the Copermittees shall estimate discharge loadings from the data produced by the wet weather outfall monitoring pursuant to Provision D.2.c.

(d) The Copermittees in each Watershed Management Area must review the storm water flow and pollutant load analyses required pursuant to Provision D.4.b.(3)(e) on an annual basis to:

  (i) Identify the pollutant load reductions that are thought to be attributable to water quality management actions within the monitored outfall drainage areas

  (ii) Assess the effectiveness of the water quality improvement strategies being implemented within the Watershed Management Area toward reducing storm water pollutant loads discharging from the MS4 to receiving waters; and

  (iii) Identify modifications necessary to increase the effectiveness of the water quality improvement strategies toward reducing storm water pollutant loads discharging from the MS4 to receiving waters.

(e) Characterization of Trends Over Time

The Copermittees shall evaluate the data produced by the wet weather outfall monitoring pursuant to Provision D.2.c, and incorporate new outfall monitoring data into time series plots for each long-term monitoring constituent, for each WMA. Once per permit term the Copermittee shall perform statistical trends analysis on the cumulative long-term MS4 outfall water quality data set.

c. SOURCE IDENTIFICATION

Management Question: What are the sources of urban runoff that contribute to receiving water problem(s)?

The principal role of Source/Stressor Identification is to identify and prioritize pollutant generating activities and source categories. Identification of high-priority sources is an important step in support of the WQIP process, to help inform the development of effective pollutant reduction strategies for particular priority constituents on a watershed-specific basis.

Source identification shall be conducted on a constituent-specific basis. The source identification efforts shall focus on constituents identified as watershed priorities, and include prioritization of sources based on magnitude, controllability, and other factors.

Following WQIP approval and implementation, source identification studies shall be used to improve WQIP effectiveness. For each Watershed Management Area, the Copermittees shall perform the investigation pursuant to Provision D.3, as necessary to address identified watershed priorities, including production of a prioritized list of sources or potential sources that warrant additional investigation and/or development of control strategies through the WQIPs.

Annually, the Copermittees shall evaluate the results and findings produced by the source/stressor identification studies conducted pursuant to Provision D.3, and inform Copermittee staff responsible for WQIP implementation of the relative magnitudes and/or priority rankings of identified sources. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

d. Special Studies

Following WQIP approval and implementation, special studies shall be identified to fill data gaps and provide targeted information to improve WQIP effectiveness. Upon completion of each Special Study conducted pursuant to Provision D.4, the Copermittees shall evaluate the study results and apply the results to the implementation of WQIPs within each Watershed Management Area as applicable.

Annually, the Copermittees shall evaluate the results and findings produced by the special studies conducted pursuant to Provision D.4, and assess their relevance to the Copermittees' efforts to better characterize WMAs and receiving water conditions, to understand urban runoff pollutant sources, and to control and limit the discharges of pollutants from MS4 outfalls to the maximum extent practicable. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

e. Integrated Evaluation of Water Quality Improvement Strategies

Once during the permit term, for each watershed management area, the Copermittees shall integrate the analyses and results of the monitoring performed pursuant to Provisions D.1-D.4, and the results of the assessments performed pursuant to Provision D.5.a.-D.5.d, as well as other data as available and applicable, to assess: 1) progress towards achieving the numeric goals and schedules established per the approved WQIPs, 2) progress toward addressing the highest priority receiving water conditions established for each Watershed Management Area, and 3) water quality improvements that are thought to be attributable to the Copermittees' implementation of the requirements of Provision B. For Watershed Management Areas with applicable TMDLs, the integrated evaluation must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-0012. The integrated evaluation shall include the following:

(1) The conditions of receiving waters and status of receiving water beneficial uses,

(2) The extent to which MS4 discharges cause or contribute to receiving water problems during both dry weather and wet weather,

(3) The estimated reductions in loadings from MS4 discharges attributable to the Copermittees' stormwater management activities, for both dry and wet weather,

(4) The principal identified sources of pollutants that are responsible for constituents in MS4 discharges that cause or contribute to receiving water problems,

(5) The results of the cumulative special studies and their application to improvement of the WQIPs for the Watershed Management Areas,

(6) Progress toward achieving the interim and final numeric targets for restoring impacted beneficial uses in receiving waters with adopted TMDL Implementation Plans;

(7) Any identified data or information gaps, along with recommendations for additional monitoring, special studies, or other investigations to address the data and information needs.

E. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAMS

The purpose of this provision is for each Copermittee to implement a program to control the ~~contribution~~discharge of pollutants to and ~~the discharges~~ from ~~the MS4 with~~ its respective MS4 to receiving waters within its jurisdiction. The goals of this ~~provision~~ program ~~is~~ are to: 1) effectively prohibit non-storm water discharges into the MS4s, 2) reduce pollutants in storm water discharges from the MS4s to the MEP, and 3) ~~to reduce the discharge of pollutants in storm water to the MEP and effectively prohibit non-storm water discharges to provide~~ support the attainment and the reasonable protection, preservation,~~,~~ and enhancement~~, and restoration of~~ water quality and designated beneficial uses of waters of the ~~state~~U.S. The~~i~~se goals will be accomplished through compliance with the jurisdictional runoff management program requirements of this Provision, and as modified or supplemented per Provision B (Water Quality Improvement Plans).

Each Copermittee must implement all the requirements of Provision E no later than ~~12~~ 18 months after the adoption of this Order, or in accordance with Provision F.5.a. Each Copermittee must update its jurisdictional runoff management program document, in accordance with Provision F.2.a, to include all the requirements of Provision E. The jurisdictional runoff management programs implemented by each Copermittee must be consistent with the Water Quality Improvement Plan for the applicable Watershed Management Area required by Provision B. Until the Copermittee has updated its jurisdictional runoff management program document with the requirements of Provision E, the Copermittee must continue implementing its current jurisdictional runoff management program.

Modification of Jurisdictional Runoff Management Program Requirements

Modifications shall be considered and where selected, proposed according to the process in Provision B.5. Proposed modifications may increase, decrease, and/or replace minimum requirements identified in Provision E.

1. Legal Authority Establishment and Enforcement

a. Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through statute, ordinance, permit, contract, order, or similar means to the extent allowable by law. This legal authority must~~, at a minimum,~~ authorize the Copermittee to:

(1) Effectively ~~P~~prohibit and eliminate all illicit discharges and illicit connections to its MS4;

(2) Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites, including industrial and construction

sites ~~which~~that do not have coverage under the statewide General Permit for Discharges of Storm Water Associated with Industrial Activities (Industrial General Permit) or General Permit for Discharges of Storm Water Associated with Construction Activities (Construction General Permit~~), as well as to those sites which do not;~~);

(3) Control the discharge of spills, dumping, or disposal of materials other than storm water into its MS4;

~~(4) Control through interagency agreements among Copermittees~~Coordinate, as possible, with other agencies to minimize the contribution of ~~pollutants~~pollutant discharges from ~~one portion MS4 to another portion of~~ the ~~MS4;~~
~~(5)~~
~~(6)~~(4) ~~Control through interagency agreements with other owners of the MS4 such as Caltrans, the U.S. federal government, or sovereign Native American Tribes, where possible, the contribution of pollutants from one~~Copermittee's portion of the MS4 to ~~another portion of~~ portions of the MS4 under another agency's jurisdiction and from the other agency's portions of the MS4 to the ~~MS4~~portion of the MS4 under the Copermittee's jurisdiction;

~~(7)~~(5) Require compliance with conditions in its statutes, ordinances, permits, contracts, orders, or similar means to hold dischargers to its MS4 accountable for their contributions of pollutants and flows;

~~(8)~~(6) Require the use of BMPs to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;

~~(9)~~(7) Require documentation on the effectiveness of BMPs implemented to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;

~~(10)~~(8) Utilize enforcement mechanisms to require compliance with its statutes, ordinances, permits, contracts, orders, or similar means; and

~~(11)~~(9) Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with its statutes, ordinances, permits, contracts, orders, or similar means and with the requirements of this Order, including the prohibition of illicit discharges and connections to its MS4; the Copermittee must also have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities, including construction sites, discharging into its MS4.

b. With the first Annual Report required by Provision F.3.b, each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected

Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in this Order.

2. Illicit Discharge Detection and Elimination

Each Copermittee must implement a program to actively detect and eliminate illicit discharges and improper disposal into the MS4, or otherwise require the discharger to apply for and obtain a separate NPDES permit. The illicit discharge detection and elimination program must include, at a minimum, the following requirements:

a. Non-Storm Water Discharges

To the extent allowable by law, ~~E~~each Copermittee must address all non-storm water discharges as illicit discharges~~,~~ where the likelihood exists that they are a source of pollutants to waters of the U.S., unless a non-storm water discharge is either identified as a discharge authorized by a separate NPDES permit, or identified as a category of non-storm water discharges or flows that must be addressed pursuant to the following requirements:

(1) Discharges of non-storm water to the MS4 from uncontaminated pumped groundwater ~~the following categories~~ must be addressed as illicit discharges where there is evidence that suggests that they are the source of pollutants to waters of the U.S., unless the discharge has coverage under NPDES Permit No. CAG919001 (Order No. R9-2007-0034, or subsequent order) for discharges to San Diego Bay, or NPDES Permit No. CAG919002 (Order No. R9-2008-0002, or subsequent order) for discharges to surface waters other than San Diego Bay:

~~(a) Uncontaminated pumped ground water;~~

~~(b) Discharges from foundation drains;~~

~~(c) Water from crawl space pumps; and~~

~~(d) Water from footing drains.~~

(2) Discharges of non-storm water from water line flushing and water main breaks to the MS4 must be addressed as illicit discharges unless the discharge has coverage under a valid NPDES Permit ~~No. CAG 679001 (~~, Order No. R9-2010-0003, or a subsequent order~~)~~. This includes water line flushing and water main break discharges from water purveyors under the Copermittee's jurisdiction that has been issued a water supply permit by the California Department of Public Health or federal military installations. Discharges from recycled or reclaimed water lines to the MS4 must be addressed as illicit discharges, unless the discharges have coverage under a separate NPDES permit.

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(3) Discharges of non-storm water to the MS4 from the following categories must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a anthropogenic source of pollutants to receiving waters within the Copermittee's jurisdiction:

(a) Discharges from foundation drains;

(b) Water from crawl space pumps;

(c) Water from footing drains.

(d) Diverted stream flows;

(e) Rising ground waters;

(f) Uncontaminated ground water infiltration to MS4s;

(g) Springs;

(h) Flows from riparian habitats and wetlands; and

(i) Discharges from potable water sources.

(4) Discharges of non-storm water to the MS4 from the following categories must be controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means where there is evidence that those discharges are a source of pollutants to waters of the~~.~~ U.S. Discharges of non-storm water to the MS4 from the following categories not controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means must be addressed by the Copermittee as illicit discharges.

(a) Air conditioning condensation

The discharge of air conditioning condensation ~~must~~ should be directed to landscaped areas or other pervious surfaces where feasible;

(b) Individual residential vehicle washing

The discharge of wash water must be ~~directed to landscaped areas or other pervious surfaces where feasible, and~~encouraged through public outreach and education:

(i) To be directed to landscaped areas or other pervious surfaces where feasible, and

(ii) To ~~M~~minimize the use of water for vehicle washing, use as little washing detergent and other vehicle wash products as possible, wash vehicles at commercial wash facilities, and implement other practices or behaviors that will prevent the discharge of pollutants associated with individual residential vehicle washing from entering the MS4; and

(c) Dechlorinated swimming pool discharges

(i) Eliminate residual chlorine, algaecide, filter backwash, or other pollutants from swimming pools prior to discharging to the MS4, and

(ii) The discharge of saline swimming pool water ~~to the MS4~~ must be directed to the sanitary sewer, landscaped areas, ~~or~~ other pervious surfaces that can accommodate the volume of water, or to the MS4 if the MS4 discharges to a saltwater receiving water.

~~(4)~~(5) Firefighting discharges to the MS4 must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a significant source of pollutants to receiving waters. Firefighting discharges to the MS4 not identified as a significant source of pollutants to receiving waters, must be addressed, at a minimum, as follows:

(a) Non-emergency firefighting discharges

(i) Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) to the MS4 must be addressed as illicit discharges where BMPs are not implemented.

(ii) Non-emergency firefighting discharges (i.e., discharges from controlled or practice blazes, firefighting training, and maintenance activities not associated with building fire suppression systems) must be addressed by a program, to be developed and implemented by the Copermittee, to reduce or eliminate pollutants in such discharges from entering the MS4.

(b) Emergency firefighting discharges

Each Copermittee ~~must~~ should develop and encourage implementation of BMPs to reduce or eliminate pollutants in emergency firefighting discharges to the MS4s and receiving waters within its jurisdiction. During emergency situations, priority of efforts should be directed toward life, property, and the environment (in descending order). BMPs ~~should~~ shall not interfere with immediate emergency response operations or impact public health and safety.

~~(5)~~(6) If the Copermittee or San Diego Water Board identifies any category of non-storm water discharges listed under Provisions E.2.a.(1)-(4) as a source of pollutants to receiving waters, the category must be prohibited through ordinance, order, or similar means and addressed as an illicit discharge.

b. Prevent and Detect Illicit Discharges And Connections

Each Copermittee must include the following measures within its program to prevent and detect illicit discharges to the MS4:

(1) Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas. The accuracy of the MS4 map must be confirmed during non-storm water MS4 monitoring events. The MS4 map must be included as part of the jurisdictional runoff management program document. Any geographic information system (GIS) layers or files used by the Copermittee to maintain the MS4 map must be made available to the San Diego Water Board upon request. The MS4 map must identify the following:

(a) All segments of the MS4 owned, operated, and maintained by the Copermittee,

(b) All known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4,

(c) All known locations of connections with other MS4s not owned or operated by the Copermittee (e.g. Caltrans MS4s),

(d) All known locations of MS4 outfalls as defined by 40 CFR §122.26(B)(5-6) and private outfalls as defined by 40 CFR §122.26(B)(9) that discharge runoff collected from areas within the Copermittee's jurisdiction,

(e) All segments of receiving waters within the Copermittee's jurisdiction that receive and convey runoff discharged from the Copermittee's MS4 outfalls~~ (i.e., receiving water segments that are both a receiving water and part of the MS4)~~, and

(f) Locations of the non-storm water MS4 monitoring stations, identified pursuant to Provision D.1.a.(1)(a), within its jurisdiction;

(2) Each Copermittee must use Copermittee personnel and contractors to assist in identifying and reporting illicit discharges and connections, if observed, during the course of their daily employment activities;

(3) Each Copermittee must promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges to or from the MS4. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by the Copermittees. All public hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week;

(4) Each Copermittee must implement practices and procedures (including a notification mechanism) to prevent, respond to, contain, and clean up any spills that may discharge into the MS4 within their jurisdiction from any source. The Copermittee must coordinate with spill response teams to prevent to the extent possible entry of spills into the MS4, and prevent contamination ~~of surface water, ground water, and soil~~waters of the ~~.~~U.S. The Copermittee must coordinate spill prevention, containment, and response activities throughout all appropriate Copermittee departments, programs, and agencies;~~ and~~

~~(4)~~(5) Copermittees are responsible for control of discharges to their MS4. In the event that the source of an illicit discharge or connection is from another MS4, the Copermittee shall notify and, if necessary coordinate, with the upstream MS4 to implement and/or enforce corrective actions; and

~~(5)~~(6) Each Copermittee must implement practices and procedures to prevent and limit infiltration of seepage from sanitary sewers (including private laterals and failing septic systems) to the MS4.

c. Visual Observations, Field Screening, And/or Monitoring

Each Copermittee must conduct visual observations, field screening and/or monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect non-storm water and illicit discharges and connections to the MS4 in accordance with the jurisdictional non-storm water MS4 monitoring program requirements in Provision D.1.a.(1).

d. Investigate and Eliminate Illicit Discharges And Connections

Each Copermittee must include the following measures within its program to investigate and eliminate illicit discharges to the MS4:

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(1) Each Copermittee must prioritize and determine when follow-up investigations will be performed in response to visual observations and/or water quality monitoring data collected during an investigation of a detected non-storm water or illicit discharge to or from the MS4. The criteria for follow-up investigations must include the following:

(a) Pollutants identified as causing or contributing to the highest water quality priorities identified in the Water Quality Improvement Plan;

(b) Pollutants identified as causing or contributing, or threatening to cause or contribute to impairments in water bodies on the 303(d) List and/or in environmentally sensitive areas (ESAs), located within its jurisdiction;

(c) Pollutants identified from sources or land uses known to exist within the area, drainage basin, or watershed that discharges to the portion of the MS4 within its jurisdiction included in the investigation; and

(d) Pollutants identified as causing or contributing to and exceedance of an NAL[12][13] where the source has not been identified as natural described in Provision C.1; and

(e) Pollutants identified as a threat to human health or the environment.

(2) Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that~~,~~ based on reports or notifications, visual observations, field screening~~ and~~, monitoring, or other appropriate information, indicate a reasonable potential of ~~receiving, containing, or~~ discharging pollutants to receiving waters within the Copermittees jurisdiction due to illicit discharges, illicit connections, or other sources of non-storm water. ~~The procedures must include the following:~~

(a) The Copermittee may develop criteria to assess the validity of, and prioritize the response to, each report or notification received. Each Copermittee must respond to each report or notification (e.g., public hotline reports, staff or contractor reports and notifications, etc.) of an incident in a timely manner. ~~The Copermittee may develop criteria to assess the validity of, and prioritize the response to, each report or notification received;~~

(b) ~~Each Copermittee must immediately investigate and seek~~Procedures should address field investigations to identify sources or potential sources for the discharge, unless the source or potential source has

[12] NAL exceedances discovered during the course of IDDE monitoring and/or investigations may trigger action levels, including but not limited to, follow-up investigations based on the highest watershed priorities set forth and the iterative process provided in the WQIP.

already been identified during previous investigations. The criteria established in Provision E.d.(2)(a) shall be used to prioritize response based on highest watershed priorities as established for the iterative process and determined in the Water Quality Improvement Plan, including:

(i) Obvious illicit discharges must be immediately investigated to identify the source(s) of discharges of non-storm water where flows are observed in and from the MS4 during the field screening and monitoring required pursuant to Provision D.1.a.(1);~~.~~

(i) The investigation must include field investigations to identify sources or potential sources for the discharge, unless the source or potential source has already been identified during previous investigations;

(ii) The investigation may include field investigations, reviewing Copermittee inventories, and other land use data to identify potential sources of the discharge; and

Procedures should address tracking of illicit discharges and connections.

~~(i)~~

~~(b) Each Copermittee must investigate and seek to identify the source(s) of non-storm water discharges from the MS4 where there is evidence of non-storm water having been discharged into or from the MS4 (e.g., pooled water). The investigation may include field investigations, reviewing Copermittee inventories, and other land use data to identify potential sources of the discharge; and~~

(3) Each Copermittee must maintain records and a database of the investigations, including the following information:

(a) Location of incident, including hydrologic subarea, portion of MS4 receiving the non-storm water or illicit discharge, and point of discharge or potential discharge from MS4 to receiving water,

(b) Source of information initiating the investigation (e.g., public hotline reports, staff or contractor reports and notifications, monitoring data, etc.),

(c) Date the information used to initiate the investigation was received,

(d) Date the investigation was initiated,

(e) Dates of follow-up investigations,

(i) Identified or suspected source of the illicit discharge or connection, if determined,

(f) Known or suspected related incidents, if any,

(g) Result of the investigation, and

(h) If a source cannot be identified and the investigation is not continued, a rationale for why a discharge does not pose a threat to water quality and/or does not require additional investigation.

(4) Each Copermittee must initiate the implementation of procedures, in a timely manner, to eliminate all detected and identified illicit discharges and connections within its jurisdiction. The procedures must include the following:

~~Each Copermittee must enforce its~~

(a) Procedures outlined by the Copermittee should address legal authority, as required under Provision E.1, to ~~eliminate~~enforce the elimination of illicit discharges and connections to ~~its~~the MS4. If the Copermittee identifies the source as a controllable source of non-storm water or illicit discharge or connection, the Copermittee must implement its Enforcement Response Plan pursuant to Provision E.6 and enforce its legal authority ~~to prohibit~~to effectively prohibit and eliminate illicit discharges and connections to its MS4~~;~~. Responses to discharges may include:

(i) If the Copermittee identifies the source of the discharge as a category of non-storm water discharges in Provision E.2.a, and the discharge ~~to or from the MS4 is~~ in exceedance of NALs developed ~~under Provision ,~~in the Water Quality Implementation Plan, then the Copermittees must determine if this is an isolated incident or set of circumstances, or if the category of discharge must be addressed through the prohibition of that category of discharge as an illicit discharge pursuant to Provision E.2.a.(6);

(ii) If the Copermittee suspects the source of the non-storm water discharge as natural in origin (i.e. non-anthropogenically influenced) and in conveyance into the MS4, then the Copermittee must ~~collect the data and evidence necessary to demonstrate to the San Diego Water Board that it is natural in origin; and~~document the rationale for why the discharge does not need further investigation. This documentation shall be included in the Annual Report.

(iii) If the Copermittee is unable to identify and document the source of a recurring non-storm water discharge to or from the MS4, then the Copermittee must address the discharge as an illicit discharge and update its jurisdictional runoff management program to address the common and suspected sources of the non-storm water discharge within its jurisdiction in accordance with the Copermittee's priorities.

(5) Each Copermittee must submit a summary of the non-storm water discharges and illicit discharges and connections investigated and eliminated within its jurisdiction with each Annual Report required under Provision F.3.b of this Order.

3. Development Planning

Each Copermittee ~~must use~~, within ~~their land use/planning authorities to~~ its respective jurisdiction, must implement a development planning program that includes, at a minimum, the following requirements.

a. Permanent BMP Requirements for All Development Projects

Each Copermittee~~,~~, as practical and feasible, must prescribe ~~the following~~ BMP requirements during the planning process (i.e. prior to project approval and issuance of grading or building permits) for all development projects ~~(regardless of project type or size),~~ where local permits are issued, including unpaved roads and flood management projects, except emergency projects implemented for the protection of persons and property:

(1) General Requirements

(a) All BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters, and as close to the source as possible;

(b) Multiple development projects may use shared permanent BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any development project from which the BMP will receive runoff; and

(c) Permanent BMPs must not be constructed within ~~a~~ waters of the U.S. ~~or waters of the state.~~

(2) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The following source control BMPs must be implemented at all development projects where applicable and feasible:

(a) Prevention of illicit discharges into the MS4;

(b) Storm drain system stenciling or signage;

(c) Properly designed outdoor material storage areas;

(d) Properly designed outdoor work areas;

(e) Properly designed trash storage areas; and

(f) Any additional BMPs necessary to minimize pollutant generation at each project.

(3) Low Impact Development (LID) BMP Requirements

The following LID BMPs must be implemented at all development projects where applicable and feasible:

(a) Maintenance or restoration of natural storage reservoirs and drainage corridors (including topographic depressions, areas of permeable soils, natural swales, and ephemeral and intermittent streams),[13]

(b) Buffer zones for natural water bodies (where buffer zones are technically infeasible, require project applicant to include other buffers such as trees, access restrictions, etc.);

(c) Conservation of natural areas within the project footprint including existing trees, other vegetation, and soils;

(d) Construction of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided public safety is not compromised;

(e) Minimization of the impervious footprint of the project;

(f) Minimization of soil compaction to landscaped areas;

(g) Disconnection of impervious surfaces through distributed pervious areas;

(h) Landscaped or other pervious areas designed and constructed to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4;

(i) Small collection strategies located at, or as close as possible to, the source (i.e. the point where storm water initially meets the ground) to minimize the transport of runoff and pollutants to receiving waters;

[13] Development projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. Projects proposing to dredge or fill waters of the State must obtain Waste Discharge Requirements.

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(j) Use of permeable materials for projects with low traffic areas and appropriate soil conditions;

(k) Landscaping with native or drought tolerant species; and

(l) Harvesting and using precipitation.

~~Long-Term Permanent BMP Maintenance~~

~~Each Copermittee must require the project applicant to submit proof of the mechanism under which ongoing long-term maintenance of all permanent BMPs will be conducted.~~

~~Infiltration and Groundwater Protection~~

~~(a) Infiltration and treatment control BMPs designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins) must not cause or contribute to an exceedance of an applicable groundwater quality objective. At a minimum, such infiltration and treatment control BMPs must be in conformance with the design criteria listed below, unless the development project applicant demonstrates to the Copermittee that one or more of the specific design criteria listed below are not necessary to protect groundwater quality. The design criteria listed below do not apply to small infiltration systems dispersed throughout a development project.~~

~~(i) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;~~

~~(ii) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;~~

~~(iii) Infiltration treatment control BMPs must be adequately maintained to remove pollutants in storm water to the MEP;~~

~~(iv) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;~~

~~(v) The soil through which infiltration is to occur must have physical and chemical characteristics (e.g., appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;~~

~~(vi) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities as designated by each Copermittee,~~

~~unless first treated or filtered to remove pollutants prior to infiltration; and~~

~~(vii) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.~~

~~(b) The Copermittees may collectively or individually develop alternative mandatory design criteria to that listed above for infiltration and treatment control BMPs which are designed to primarily function as centralized infiltration devices. Before implementing the alternative design criteria in the development planning process the Copermitee(s) must:~~

~~(i) Notify the San Diego Water Board of the intent to implement the alternative design criteria submitted; and~~

~~(ii) Comply with any conditions set by the San Diego Water Board.~~

b. Priority Development Projects

(1) Definition of Priority Development Project

Priority Development Projects include the following:

(a) All new development projects that fall under the Priority Development Project categories listed under Provision E.3.b.(2). Where a new development project feature, such as a parking lot, falls into a Priority Development Project category, the entire project footprint is subject to Priority Development Project requirements; and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site, ~~or~~ and the redevelopment project is a Priority Development Project category listed under Provision E.3.b.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to Priority Development Project requirements, the performance and sizing requirements discussed in Provisions E.3.c.(2) and E.3.c.(3) apply only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development and was not subject to previous Priority Project Development requirements, the performance and sizing requirements apply to the entire development.

(c) Projects where redevelopment results in an increase of more than fifty percent of impervious surfaces of a previously existing development, and the existing development was subject to previous Priority Project

Development requirements, only the altered portion of development is subject to the Priority Development Project requirements in this Order.

(2) Priority Development Project Categories

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This category includes commercial, industrial, residential, mixed-use, and public development projects on public or private land which fall under the planning and building authority of the Copermittee.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is 5,000 square feet or more~~.~~ of impervious surface.

(d) Hillside development projects. This category includes any development which creates 5,000 square feet or more of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally sensitive areas (ESAs). This category includes any development located within, directly adjacent to, or discharging directly to an ESA, which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent to” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that collects runoff from the subject development or redevelopment site ~~and~~ which terminates at or in receiving waters within the ESA and is not comingled with flows from adjacent lands.

(f) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce that has 5,000 square feet or more of impervious surface.

(g) Streets, roads, highways, and freeways~~, and residential driveways~~. This category is defined as any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more of impervious surface or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(i) Large development projects. This category includes any post-construction pollutant-generating new development projects that result in the disturbance of one acre or more of land.

(3) Priority Development Project Exemptions

Each Copermittee has the discretion to exempt the following projects from being defined as Priority Development Projects:

(a) Sidewalks constructed as part of new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(b) Bicycle lanes that are constructed as part of new streets or roads but are not hydraulically connected to the new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(c) Impervious trails and driveways constructed and designed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas;

(d) Sidewalks, bicycle lanes, driveways, parking lots, or trails constructed with permeable surfaces.

(e) Single-family residential projects that are not part of a larger development or proposed subdivision and implement BMPs that meet minimum performance standards, as outlined in the BMP Design Manual.[15]

(f) Any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles that follows the USEPA guidance regarding Management Wet Weather with Green Infrastructure: Green Streets[16] to the MEP.

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[15] The BMP Design Manual was formerly known as the Standard Urban Storm Water Mitigation Plan under Order Nos. R9-2007-0001, R9-2009-0002, and R9-2010-0016.
[16] http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm

c. Priority Development Project ~~Permanent~~ Structural BMP Performance and Sizing Requirements

In addition to the BMP requirements listed for all development projects under Provision E.3.a, Priority Development Projects must also implement ~~permanent~~ structural BMPs that conform to performance and sizing requirements.
~~(1) Source Control BMP Requirements~~

~~Each Copermittee must require each Priority Development Project to implement applicable source control BMPs listed under Provision E.3.a.(2).~~

(1) Retention and Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement BMPs to retain and treat pollutants onsite in the following order:

(a) Each Priority Development Project must be required to implement LID BMPs as described in Provision E.3.a.(3); and~~.~~

(b) Each Priority Development Project must be required to implement LID BMPs that are sized and designed to retain the difference in volume ~~equivalent to~~between the runoff volume produced in the post-development condition as compared to the pre-development runoff condition resulting from a 24-hour 85th percentile storm event[17] ("design capture volume"[18]), or

(c) If onsite retention of the design capture volume using LID BMPs is technically infeasible per Provision E.3.c.(4), flow-thru LID and/or conventional treatment control BMPs must be implemented to provide equal pollutant removal for ~~treat~~ the portion of the design capture volume that is not retained onsite. Flow-thru LID treatment control BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP; or~~.~~

~~(c)~~(d) If retention and/or equivalent pollutant removal of the design capture volume to meet E.3.c.(2)(a) or E.3.c.(2)(b) are infeasible

[17] This volume is not a single volume to be applied to all areas covered by this Order. The size of the 85th percentile storm event is different for various parts of the San Diego Region. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its BMP Design Manuals.
[18] Design capture volume is a single event based volume occurring after an extended dry period.

onsite~~Additionally~~, project applicants must perform mitigation for the portion of the pollutant load in the design capture volume that is not retained or equally treated onsite, as described in Provision E.3.c.(~~5~~4)c.

~~(d)~~(e) All onsite treatment control BMPs must:

(i) Be correctly sized and designed so as to remove pollutants from storm water to the MEP;

(ii) Be sized to comply with the following numeric sizing criteria:

[a] Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained onsite; or

[b] Flow-based treatment control BMPs must be designed to mitigate (filter or treat) either: 1) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or 2) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(iii) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(2) Hydromodification Management BMP Requirements

Each Copermittee must require each Priority Development ~~Project~~Project disturbing greater than one acre to implement hydromodification management BMPs, ~~so that:~~as described in the Copermittees current HMP, as applicable.

(a) Post-project runoff flow rates and durations do not exceed pre-development ~~(naturally occurring)~~ runoff flow rates and durations by more than 10 percent (for the range of flows that result in increased potential for erosion or degraded channel conditions downstream of Priority Development Projects).

(i) In evaluating the range of flows that results in increased potential for erosion of natural (non-hardened) channels, the lower boundary must correspond with the critical channel flow that

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produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks.

(ii) For artificially hardened channels, analysis to identify the lower boundary must use characteristics of a natural stream segment similar to that found in the watershed. The lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or erodes the toe of the channel banks.

~~(i)~~(iii) The Copermittees may use monitoring results pursuant to Provision D.5.a.(4) to re-define the range of flows resulting in increased potential for erosion or degraded channel conditions, as warranted by the data.

(b) Projects shall preserve (where feasible) or provide compensation for significant losses of sediment supply anticipated as a result of development. ~~Post-project runoff flow rates and durations must compensate for the loss of sediment supply due to the development project, should loss of sediment supply occur as a result of the development project.~~

(c) If hydromodification management BMPs are technically infeasible per Provision E.3.c.(~~5~~4), project applicants must perform mitigation for the portion of the runoff volume that is not controlled and will cause or contribute to increased potential for erosion of receiving waters downstream of the Priority Development Project, as described in Provision E.3.c.(~~5~~4)c.

(d) Exemptions

Each Copermittee has the discretion to exempt a Priority Development Project from the hydromodification management BMP requirements where the project:

(i) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean;

(ii) Discharges storm water runoff into conveyance channels whose bed and bank are stabilized (e.g. concrete lined, an engineered interlocking paver, gabion system etc…) all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean; or

(iii) Discharges storm water runoff into other areas identified by the San Diego Water Board as exempt from the requirements of Provisions E.3.c.(3) .

(3) Long-Term Structural BMP Maintenance

Each Copermittee must require the project applicant to submit proof of the mechanism under which ongoing long-term maintenance of all structural BMPs will be conducted.

(4) Infiltration and Groundwater Protection

(a) Infiltration and treatment control BMPs designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins) must not cause or contribute to an exceedance of an applicable groundwater quality objective. At a minimum, such infiltration and treatment control BMPs must be in conformance with the design criteria listed below, unless the development project applicant demonstrates to the Copermittee that one or more of the specific design criteria listed below are not necessary to protect groundwater quality. The design criteria listed below do not apply to small infiltration systems dispersed throughout a development project.

(i) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(ii) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(iii) Infiltration treatment control BMPs must be adequately maintained to remove pollutants in storm water to the MEP;

(iv) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(v) The soil through which infiltration is to occur must have physical and chemical characteristics (e.g., appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(vi) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities as designated by each Copermittee, unless runoff does not exceed Basin Plan water quality standards or runoff is first treated or filtered to remove pollutants prior to infiltration; and

(vii) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(b) The Copermittees may collectively or individually develop alternative mandatory design criteria to that listed above for infiltration and treatment control BMPs which are designed to primarily function as centralized infiltration devices. Before implementing the alternative design criteria in the development planning process the Copermittee(s) must:

(i) Notify the San Diego Water Board of the intent to implement the alternative design criteria submitted; and

(ii) Comply with any conditions set by the San Diego Water Board.

(5) Alternative Compliance for Technical Infeasibility

At the discretion of each Copermittee, alternative compliance may be allowed for certain Priority Development Projects to comply with Provisions E.3.c.(~~2~~1) and E.3.c.(2~~3~~)~~,~~. Alternative compliance is an optional program for the Copermittees to utilize if it is determined to provide an equal or greater benefit than onsite compliance. Where alternative compliance is allowed, it is the sole responsibility of the project applicant to execute the alternative compliance and comply with the following requirements:
~~subject to the following requirements:~~

a. Applicability

Priority Development Projects may be allowed alternative compliance if:

(i) The Copermittee reviews and ~~approves~~ accepts site-specific hydrologic and/or design analysis performed by a registered professional engineer, geologist, architect, or landscape architect;

(ii) The project applicant demonstrates, and the Copermittee determines and documents, that ~~retention LID and/or hydromodification management~~ BMPs per Provisions E.3.c.(1~~2~~) and E.3.c.(2~~3~~) were incorporated into the project design to the maximum extent technically feasible given the project site conditions;

(iii) The project applicant is required to perform mitigation described in Provision E.3.c.(5~~4~~)~~ccc~~ with a net result of at least the same level of water quality protection as would have been achieved if the Priority Development Project had fully implemented the ~~retention LID and hydromodification management~~ BMP requirements under Provisions E.3.c.(1~~2~~) and E.3.c.(2~~3~~) onsite.

b. Criteria For Technical Infeasibility

Each Copermittee must develop, or develop in collaboration with the other Copermittees, criteria to determine technical infeasibility for fully implementing the ~~retention LID and hydromodification management~~ BMP requirements under Provisions E.3.c.(1~~2~~) and E.3.c.(2~~3~~) and include these requirements in the ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual pursuant to Provision E.3.d. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in Provision E.3.c~~a~~.(4~~5~~) due to the presence of shallow bedrock, contaminated soils, near surface groundwater, underground facilities, or utilities;

(ii) Brownfield development sites or other locations where pollutant mobilization is a documented concern;

(iii) The design of the site precludes the use of soil amendments, plantings of vegetation, or other designs that can be used to infiltrate and evapotranspirate runoff;

(iv) Soils cannot be sufficiently amended to provide for the requisite infiltration rates;

(v) Locations with geotechnical hazards;

(vi) Insufficient onsite and/or offsite demand for storm water use;

(vii) Modifications to an existing building to manage storm water are not feasible due to structural or plumbing constraints;

~~(vii)~~(viii) HMP flow rate requirements that result in BMP orifice sizes too small for efficient maintenance; and

~~(viii)~~(ix) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with Provisions E.3.c.(2) and E.3.c.(3) onsite.

c. Mitigation

Priority Development Projects that meet the Copermittee's technical infeasibility criteria developed pursuant to Provision E.3.c.(~~5~~4)b must be required to mitigate for the increased flow rates, increased flow durations, and/or ~~increased pollutant loads~~water quality equivalence expected to be discharged from the site.

(i) The Project applicant must perform offsite mitigation for:

[a] The portion of the pollutant load in the design capture volume that is not retained or equally treated onsite, and/or

[b] The portion of the increased potential erosion of downstream receiving waters not fully controlled with hydromodification management BMPs onsite.

~~For the pollutant load in the volume of storm water not retained onsite with retention LID BMPs, or increased potential erosion of downstream receiving waters not fully controlled onsite with hydromodification management BMPs, the Copermittee must require the project applicant to either 1) implement an offsite mitigation project, and/or 2) provide sufficient funding for a public or private offsite mitigation project via a mitigation fund.~~

~~(i)~~(ii) Mitigation Project Locations

Offsite mitigation projects must be implemented within the same ~~hydrologic unit~~Watershed Management Area as the Priority Development Project, and preferably within the same hydrologic subarea. Mitigation projects outside of the hydrologic subarea but within the same ~~hydrologic unit~~Watershed Management Area may be approved provided that the project applicant demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar potential impacts expected from the Priority Development Project.

~~(ii)~~(iii) Mitigation Project Types

Offsite mitigation projects ~~must~~ may include, where applicable and feasible, retrofitting opportunities and stream and/or habitat rehabilitation or restoration opportunities identified in the Water Quality Improvement Plans, identified pursuant to Provision B.3.. Other offsite mitigation projects may include green streets or infrastructure projects, groundwater recharge projects, or regional BMPs upstream of receiving waters. Mitigation credit will not be given to portions of in stream mitigation projects using impervious~~In-stream rehabilitation or restoration measures to protect or prevent adverse physical changes to creek bed and banks must not include the use of non-naturally occurring~~ hardscape materials such as concrete~~, riprap, or gabions~~. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of Provision E.3.c.(4).

~~(iii)~~(iv) Mitigation Project Timing

The Copermittee and/or project applicant must develop a schedule for the completion of offsite mitigation projects, including milestone dates to identify, fund, design, and construct the projects. Offsite mitigation funding ~~projects~~ must be secured by the applicant and verified by the Copermittee prior to granting construction permits or recording of maps,whichever comes first. ~~completed upon the granting of occupancy for the first project that contributed funds toward the offsite mitigation project, unless a longer period is authorized by the San Diego Water Board.~~.

~~(iv)~~(v) Mitigation Fund

A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as a means for developing and implementing offsite mitigation projects, provided the projects conform to the requirements for project locations, types, and timing described above.

d. Update ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual

Each Copermittee must update its ~~Permanent BMP Sizing Criteria Design Manual (~~BMP Design Manual~~)~~~~[19]~~ pursuant to Provision F.2.b or Provision F.5.a. Until the Copermittee has updated its BMP Design Manual with the requirements of Provision E.3.c, the Copermittee must continue implementing its current BMP Design Manual. Unless directed otherwise by the San Diego Water Board, the Copermittee must implement the BMP Design Manual within 180 days of completing the update. The update of the BMP Design Manual must include the following:

(1) Updated procedures to determine the nature and extent of storm water requirements applicable to a potential development or redevelopment project. These procedures must inform project applicants of the storm water management requirements applicable to their project including, but not limited to, general requirements for all development projects, LID and conventional BMP design procedures and requirements, hydromodification management requirements, requirements specific to phased projects, and procedures specific to private developments and public improvement projects;

(2) Updated procedures to identify pollutants and conditions of concern for selecting the most appropriate ~~permanent~~ structural BMPs that consider, at a minimum, the following:

(a) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d));

(b) Priority pollutants or receiving water conditions contributing to the highest water quality priorities identified in the Water Quality Improvement Plan;

(c) Land use type of the project and pollutants associated with that land use type; and

(d) Pollutants expected to be present onsite.

(3) Updated procedures for designing ~~permanent~~ structural BMPs, including any updated performance and sizing requirements to be consistent with the requirements of Provision E.3.c for all BMPs listed in the BMP Design Manual;

(4) Long-term maintenance criteria for each BMP listed in the BMP Design Manual; and

~~[19] The Permanent BMP Sizing Criteria Design Manual was formerly known as the Standard Storm Water Mitigation Plan under Order Nos. R9-2007-0001, R9-2009-0002, and R9-2010-0016.~~

(5) Criteria and mitigation requirements, in accordance with the requirements under Provision E.3.c.(4), if the Copermittee elects to allow alternative compliance for technical infeasibility within its jurisdiction.

e. Priority Development Project BMP Implementation and Oversight

Each Copermittee must implement a program to ensure structural ~~permanent~~ BMPs on all Priority Development Projects are designed, constructed, and maintained to remove pollutants in storm water to the MEP.

(1) Structural~~Permanent~~ BMP Approval and Verification Process

(a) Each Copermittee must ensure that for all Priority Development Project applications that have not received prior lawful approval by the Copermittee by 18~~2~~ months after the adoption of this Order, or pursuant to Provision F.5.a~~aa~~, the requirements of Provision E.3 are implemented. For project applications that have received prior lawful approval by 18~~2~~ months after the adoption of this Order, or pursuant to Provision F.5.a~~aa~~, the Copermittee may allow previous land development requirements to apply.

(b) Each Copermittee must identify the roles and responsibilities of various municipal departments in implementing the structural~~permanent~~ BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections.

(c) Each Copermittee must ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(d) Each Copermittee must ensure that prior to occupancy and/or intended use of any portion of the Priority Development Project, each ~~permanent~~ structural BMP must be inspected to verify that they have been constructed and are operating in compliance with all of its specifications, plans, permits, ordinances, and the requirements of this Order.

(2) Priority Development Project Inventory and Prioritization

(a) Each Copermittee must develop and ~~continuously~~regularly maintain a watershed-based database to track and inventory all Priority Development Projects and associated structural~~permanent~~ BMPs within their jurisdiction. Inventories must be accurate and complete beginning from January 2002 for the San Diego County Copermittees, February 2003 for the Orange County Copermittees, and July 2005 for the Riverside County

Copermittees, where data is available. The database must include, at a minimum, the following information:

(i) Priority Development Project location (address and hydrologic subarea);

(ii) Descriptions of structural BMP type(s);

(iii) Date(s) of construction;

(iv) Party responsible for ~~permanent~~ structural BMP maintenance;

(v) Dates and findings of ~~permanent~~ structural BMP maintenance verifications; and

(vi) Corrective actions and/or resolutions.

(b) Each Copermittee must prioritize the Priority Development Projects with ~~permanent~~ structural BMPs within its jurisdiction. The designation of Priority Development Projects as high priority must consider the following:

(i) The highest water quality priorities identified in the Water Quality Improvement Plan;

(ii) Receiving water quality;

(iii) Number and sizes of ~~permanent~~ structural BMPs;

(iv) Recommended maintenance frequency of ~~permanent~~ structural BMPs;

(v) Likelihood of operation and maintenance issues of structural ~~permanent~~ BMPs;

(vi) Land use and expected pollutants generated; and

(vii) Compliance record.

(3) Structural ~~Permanent~~ BMP Maintenance Verifications and Inspections

Each Copermittee is required to verify that structural ~~permanent~~ BMPs on each Priority Development Project are adequately maintained, and continue to operate effectively to remove pollutants in storm water to the MEP through inspections, self-certifications, surveys, or other equally effective approaches.

(a) All (100 percent) of the structural ~~permanent~~ BMPs at Priority Development Projects that are designated as high priority must be inspected directly by the Copermittee annually prior to each rainy season;

(b) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be required by the Copermittee to provide assurance that the required maintenance of structural ~~permanent~~ BMPs at each Priority Development Project has been completed; and

(c) Appropriate follow-up measures (including re-inspections, enforcement, etc.) must be conducted to ensure that structural ~~permanent~~ BMPs at each Priority Development Project continue to reduce pollutants in storm water to the MEP as originally designed.

f. Development Project Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all development projects, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

4. Construction Management

Each Copermittee must implement a construction management program that includes~~, at a minimum,~~ the following requirements:

a. Construction Program Management

Each Copermittee must define in the Jurisdictional Runoff Management Plan the following:

(1) Define construction sites to be inventoried, such as sites that involve any ground disturbance or soil disturbing activities; and

(2) Define a process for ensuring adequate construction BMP implementation for non-inventoried sites. Non-inventoried sites involve minor construction activities that are not anticipated to create storm water pollution such as interior improvements, plumbing, electrical, and mechanical work.

~~a.~~**b.** Project Approval Process

Prior to ~~approval and~~ issuance of any local permit that allows commencement of construction~~, grading, or building permits~~ activities for any inventoried construction site, ~~a project~~ each Copermittee must:

(1) Require a ~~project~~site-specific ~~storm water pollution prevention plan (SWPPP)~~Pollution Control Plan, or equivalent construction BMP or erosion control plan, to be submitted by the project applicant ~~for~~ to the Copermittee~~'s approval~~;

(2) ~~Ensure~~ Confirm the Pollution Control Plan~~SWPPP~~, or equivalent construction BMP or erosion control plan, complies with the local grading ordinance, other applicable local ordinances, and the requirements of this Order; and

(3) ~~Ensure~~ Confirm the Pollution Control Plan~~SWPPP~~, or equivalent construction BMP or erosion control plan, includes seasonally appropriate and effective BMPs and management measures described in Provision E.4.c, as applicable to the project.

~~(1) Verify that the project applicant has obtained coverage under applicable permits, including, but not limited to the Construction General Permit, Clean Water Act Section 401 Water Quality Certification and Section 404 Permit, and California Department of Fish and Game Streambed Alteration Agreement.~~

c. Construction Site Inventory and Tracking

(1) Each Copermittee must maintain, and update at least monthly, a watershed-based inventory of all applicable construction sites ~~requiring construction, grading, or building permits~~ within its jurisdiction. The inventory must include:

(a) Relevant contact information for each site (e.g., name, address, phone, and email for the owner and contractor);

(b) The basic site information including location (address and hydrologic subarea), Waste Discharge Identification (WDID) number (if applicable), size of the site, and approximate area of disturbance;

(c) Whether or not the site is considered a high threat to water quality, as defined in Provision E.4.b.(2) below;

~~(a) The project start and anticipated completion dates;~~

(d) Current construction phase;

(e) The required inspection frequency, as defined in the Copermittee's jurisdictional runoff management program document;

(f) The date the Copermittee ~~approved~~ accepted the project-specific Pollution Control Plan~~SWPPP~~, or equivalent construction BMP or erosion control plan; and

(g) Whether or not there are ongoing enforcement actions administered to the site.

(2) Each Copermittee must identify all construction sites within its jurisdiction that represent a high threat to downstream surface water quality. At a minimum, high threat to water quality sites must include:

(a) Sites located within a hydrologic subarea where sediment is known o suspected to contribute to the highest water quality priorities identified in the Water Quality Improvement Plan;

(b) Sites located within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment;

(c) Sites located within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(d) Other sites determined by the Copermittees or the San Diego Water Board as a high threat to water quality.

d. Construction Site BMP and Management Measure Implementation

Each Copermittee must implement, or require the implementation of effective BMPs to reduce discharges of pollutants in storm water from construction sites to the MEP, and prevent non-storm water discharges into the MS4. These BMPs must be site specific, seasonally appropriate, and construction phase appropriate. BMPs and management measures must be implemented at each construction site year round. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30). Copermittees must implement, or require the implementation of, BMPs and management measures in the following categories:

(1) Project Planning;

(2) Good Site Management “Housekeeping”, including waste management;

(3) Non-storm Water Management;

(4) Erosion Control;

(5) Sediment Control;

(6) Run-on and Run-off Control; and

(7) Active/Passive Sediment Treatment Systems, where applicable.

e. Construction Site Inspections

Each Copermittee must conduct construction site inspections to ~~ensure~~ confirm compliance with its permits and applicable local ordinances, and the requirements of this Order. Priority for site inspections must consider threat to water quality pursuant to Provision E.4.b as well as the nature of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) Inspection Frequency

(a) Each Copermittee must conduct inspections at all inventoried sites, including high threat to water quality sites, at an appropriate frequency for each phase of construction to ~~ensure~~ confirm the site reduces the discharge of pollutants in storm water from construction sites to the MEP, and prevents non-storm water discharges from entering the MS4.

(b) Each Copermittee must establish appropriate inspection frequencies for high threat to water quality sites, and all other sites, for each phase of construction. Inspection frequencies appropriate for addressing the highest water quality priorities identified in the Water Quality Improvement Plan, and for complying with the requirements of this Order must be identified in each Copermittee’s jurisdictional runoff management program document.

ADMINISTRATIVE DRAFT

(c) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to ~~ensure~~ confirm site compliance with its permits and applicable local ordinances, and the requirements of this Order.

(2) Inspection Content

Inspections of construction sites by the Copermittee must include, at a minimum:

(a) Verification of coverage under the Construction General Permit (Notice of Intent (NOI) and/or WDID number) during initial inspections, when applicable;

(b) Assessment of compliance with its permits and applicable local ordinances related to pollution prevention, including the implementation and maintenance of applicable BMPs;

(c) Assessment of BMP adequacy and effectiveness;

(d) Visual observations of actual non-storm water discharges;

(e) Visual observations of actual or potential discharge of sediment and/or construction related materials from the site;

(f) Visual observations of actual or potential illicit connections; and

(g) If any violations are found and BMP enhancements are needed, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.

(3) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried construction sites. The Copermittee must retain all inspection records in an electronic database or tabular format, which must be made available to the San Diego Water Board upon request. Inspection records must include, at a minimum:

(a) Site name, location (address and hydrologic subarea), and WDID number (if applicable);

(b) Inspection date;

(c) Weather conditions during inspection;

~~(a) Approximate amount of rainfall since last inspection;~~

(d) Description and photo documentation of problems observed with BMPs and indication of need for BMP addition/repair/replacement and any scheduled re-inspection, and date of re-inspection;

(e) Descriptions of any other specific inspection comments which must, at a minimum, include rationales for longer compliance time~~.~~;

(f) Description of enforcement actions issued in accordance with the Enforcement Response Plan pursuant to Provision E.6; and

(g) Resolution of problems noted and date problems fixed.

f. Construction Site Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried construction sites, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

5. Existing Development Management
[Note: This section is provided as an alternative to the original language. As such, line-out strike-out is not provided.]
Each Copermittee must implement an existing development management program that includes the following requirements:

a. Industrial, Commercial, and Municipal Sources

(1) Source Identification and Prioritization

Each Copermittee must identify sources and maintain an updated watershed-based inventory of its existing industrial, commercial, and municipal development that has the reasonable potential to discharge a pollutant load to and from the MS4. The use of an automated database system, such as GIS, is highly recommended. The inventory must, at a minimum, include:

(a) Name, location (address and hydrological subarea) of each source;

(b) A designation of the source as municipal, commercial, or industrial;

(c) SIC Code or NAICS Code, if applicable;

(d) Industrial General Permit NOI and/or WDID number, if applicable;

(e) Identification of pollutants generated or potentially generated by the source;

(f) Whether the source is adjacent to an ESA;

(g) Whether the source is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates or potentially generates pollutants for which the water body segment is impaired; and

(h) Whether the source contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan;

(2) BMP Implementation and Maintenance

Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development with the reasonable potential to discharge pollutant loads from their MS4, including special event venues. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(a) Pollution Prevention

Each Copermittee must promote the use of pollution prevention methods, where appropriate.

(b) BMP Operation and Maintenance

(i) Each Copermittee must properly operate and maintain, or require the proper operation and maintenance of designated BMPs at sources within its jurisdiction.

Each Copermittee must implement a schedule of operation and maintenance activities for its MS4 and related structures (including but not limited to catch basins, storm drain inlets, detention basins, etc.), and verify proper operation of all its municipal structural treatment controls. Operations and maintenance activities may include:

[a] Inspections of MS4 and related structures;

[b] Cleaning of MS4 and related structures; and

[c] Proper disposal of materials removed from cleaning of MS4 and related structures.

(ii) Each Copermittee must implement a schedule of operation and maintenance activities for public: streets, unpaved roads, paved roads, and paved highways and freeways within its jurisdiction.

(iii) Each Copermittee must implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers. Copermittees that operate both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate seeping sewage from infiltrating the MS4. Copermittees that do not operate both a municipal sanitary sewer system and a MS4 are encouraged to coordinate with sewering agencies to keep themselves informed of relevant and appropriate maintenance activities and capital projects in their jurisdiction.

(c) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must implement procedures, or require the implementation of procedures, as appropriate, to reduce discharges of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers at sources within its jurisdiction.

(3) Measures to Address Highest Water Quality Priorities

Each Copermittee must conduct or require measures as necessary to address sources or areas that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. These measures must be identified as applicable in each WQIP strategy, and may include any of the following:

(a) Copermittee Program Activities

Each Copermittee may make modifications to its program activities (e.g. increased or focused education, inspections, etc.) to address sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(b) Additional Control Measures

Each Copermittee may require additional pollution prevention measures and control measures at sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan, including consideration of retrofit and channel rehabilitation and improvement opportunities, as identified in Provision 5.a.2.(c)

(c) Retrofit

Each Copermittee must develop a strategy to facilitate the implementation of retrofit projects. Existing development in high priority areas should be assessed for inclusion in the retrofit plan. Retrofit plans should focus on pollutants and areas identified as high priority within the Water Quality Improvement Plans, with the highest priority projects included in the Water Quality Improvement Plans.

(i) Retrofit projects may be prioritized based on their relative benefit to water quality, feasibility, cost effectiveness, and community acceptance.
(ii) Retrofit projects in the highest priority areas should be included in the review for the Water Quality Improvement Plan to provide additional pollutant removal from storm water discharges.

(d) Channel Rehabilitation and Improvement

Each Copermittee must develop a strategy to facilitate the implementation of channel rehabilitation and improvement projects. Existing channels in high priority areas should be assessed for inclusion in the channel rehabilitation and improvement plan. Channel rehabilitation and improvement plans should focus on pollutants and areas identified as high priority within the Water Quality Improvement Plans.

(i) Channel rehabilitation and improvement projects may be selected to address hydromodification, restore wetland and riparian habitat, or to address other water quality issues prioritized in the Water Quality Improvement Plan.

(ii) Channel rehabilitation and improvement projects may be prioritized based on their relative benefit to water quality, feasibility, cost effectiveness, and community acceptance.

(iii) Channel rehabilitation and improvement projects in the highest priority areas should be included in the review for the Water Quality Improvement Plan to provide additional pollutant removal from storm water discharges.

(4) Inspection Requirements:

(a) Inspection Frequency

(i) Each Copermittee must establish appropriate inspection frequencies for inventoried industrial, commercial, and municipal sources based on the potential for discharging pollutants via storm water and non-storm water discharges, and should reflect the priorities set forth in the Water Quality Improvement Plan.

(ii) Each Copermittee must conduct inspections annually with a level of effort equivalent to 20% of their industrial, commercial, and municipal inventory combined[18]. If facilities require multiple inspections during any given year, those additional inspections may count towards this total.

(iii) Inventoried existing development must be inspected, as needed, in response to valid public complaints and findings from the Copermittee's municipal and contract staff inspections.

(iv) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e. education and outreach, re-inspection, enforcement) as necessary to confirm compliance in accordance with its enforcement response plan pursuant to Provision E.6.

(b) Inspection Content

Inspections of industrial, commercial, and municipal facilities by the Copermittee may include the following:

(i) Industrial, commercial, and municipal facilities name and location (address and hydrologic subarea);

(ii) Inspection and re-inspection date(s);

(iii) Assessment of compliance with its applicable local ordinances and permits related to non-storm water and storm water discharges and runoff;

(iv) Assessment of BMPs implementation;

(v) Verification of coverage under the Industrial General Permit (NOI and/or WDID number), when applicable;

(vi) Visual observations of actual non-storm water discharges, if present;

(vii) Visual observations of actual or potential discharge of pollutants, if present; and

(viii) Visual observations of actual or potential illicit connections, if present.

[18] Excludes linear facilities (MS4 and roads).

(c) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried industrial, commercial, and municipal facilities. The Copermittee must maintain all inspection records in an electronic database or tabular format, either in paper or electronic inspection records files, which must be made available to the San Diego Water Board upon request.

Inspection records must include the information necessary to effectively manage and implement the industrial, commercial, and municipal facilities inspection program, as described in each Copermittee's jurisdictional runoff management plan

b. Residential Sources

(1) Source Identification and Prioritization:

An inventory of residential sources within each Copermittees jurisdiction must be developed as follows:

(a) Designation of Residential Management Areas

Each Copermittee must divide areas of residential development into Residential Management Areas. Residential Management Areas may be designated by one or more of the following: Hydrologic Sub Area, land use (e.g. single family, multi family, rural, Common Interest Areas, ~~or~~ Home Owner Associations), and/or residential target audiences, and/or other accepted methods to be included in each Copermittee-approved jurisdictional runoff management plan.

(b) Prioritization of Residential Management Areas

Copermittees must prioritize Residential Management Areas for the purposes of ~~prioritizing and~~ directing their residential programs. Prioritization must consider whether the Residential Management Area contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan, and consideration of other program information or information from other relevant programs:

(c) A regularly updated map must be developed showing the locations of the highest priority inventoried Residential Management Areas, watershed boundaries, and water bodies at or near them.

(2) BMP Implementation and Maintenance

(a) Designate BMPs

Each Copermittee must designate and ~~require~~ encourage the implementation of a minimum set of BMPs for all residential sources or residential target audiences with the reasonable potential to discharge significant pollutant loads from their MS4.The designated minimum BMPs must be source-specific, and must address each of the following as appropriate.

(i) Pollution Prevention

Each Copermittee must promote the use of pollution prevention methods, where appropriate.

(ii) BMP Operation and Maintenance

Each Copermittee must designate ~~operate~~ and ~~maintain, or~~ require the operation and maintenance of designated BMPs for residential sources within its jurisdiction.

(iii) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must designate ~~require~~ and encourage, as appropriate, the implementation of practices to reduce discharges of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers at residential sources within its jurisdiction.

(3) Measures to Address Highest Water Quality Priorities

Each Copermittee must designate ~~conduct~~ or require measures as necessary to address residential sources or residential target audiences ~~areas~~ that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. These measures must be identified as applicable in each WQIP strategy, and may include any of the following:

(a) Copermittee Program Activities

Each Copermittee may make modifications to its program activities (e.g. increased or focused education, inspections, etc.) to address residential sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(b) Additional Control Measures

Each Copermittee may require additional pollution prevention and control measures at sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(c) Retrofit

Each Copermittee must encourage through education or other means the implementation of retrofit projects at residential sources or areas.

(4) Residential Management Area Oversight:

(a) Residential Area Assessment

Each Copermittee must conduct representative evaluations (e.g. visual observations, water use analysis, and other historical data) of its high priority ~~prioritized~~ Residential Management Areas as defined in the Water Quality Improvement Plan to update implementation strategies. Each Copermittee must develop a program to facilitate oversight and assessment in residential areas. Oversight may include complaint investigation, IDDE Activities, follow-up on monitoring obdervations, visual observations, outreach and education, water use analysis, or other methods deemed necessary to facilitate BMP implementation. Each Copermittee should conduct assessment of its oversight activities in prioritized residential areas to inform any updates to the WQIP.

~~Residential Program Update~~

~~Within two years, each Copermittee must develop and submit for Regional Board approval an updated residential program strategy based on assessment findings. Until Copermittees implement an updated residential program, they must continue performing their existing programs.~~

(b) Follow up Actions

Each Copermittee must prioritize ~~and implement~~ its follow up actions and enforcement (e.g. education and outreach, re-assessment~~, enforcement~~) in accordance with its Enforcement Response Plan pursuant to Provision E.6.

(c) ~~Assessment Tracking and~~ Record~~-keeping~~s

~~Assessment r~~Records must be ~~tracked and~~ sufficiently detailed in order to determine compliance with the requirements of this Order and any progress made toward the modification of residential management strategies, or addressing the highest water quality priorities identified in the Water Quality Improvement Plan.

~~1) The following municipal facilities:~~

~~(a) Flood management and flood control devices and structures,~~

~~(b) Operating or closed municipal landfills,~~

~~(c) Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewer collection systems,~~

~~(d) Corporate yards, including maintenance and storage yards for materials, waste, equipment, and vehicles,~~

~~(e) Hazardous waste collection facilities, and~~

~~(f) Other treatment, storage or disposal facilities for municipal waste;~~

~~2) Identification if a business is a mobile business;~~

~~3) SIC Code, if applicable;~~

~~4) Industrial General Permit NOI and/or WDID number, if applicable;~~

~~5) Identification if an area is a Common Interest Area (CIA) / Home Owner Association (HOA), or mobile home park;~~

~~6) Identification of pollutants generated and potentially generated by the facility, area, and/or activity;~~

~~7) Status of facility, area, and/or activity as active or inactive;~~

~~8) Whether the facility, area, and/or activity is adjacent to an ESA;~~

~~9) Whether the facility, area, and/or activity is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired;~~

~~10) Whether the facility, area, and/or activity contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan; and~~

~~11) A continually updated map showing the location of inventoried existing development, watershed boundaries, water bodies, and pollutants generated at the inventoried existing development.~~
~~Retrofitting and Channel Rehabilitation in Areas of Existing Development~~

~~Each Copermittee must develop and implement a program to retrofit areas of existing development to reduce the discharge of pollutants in storm water from the MS4 to the MEP and effectively prohibit non-storm water discharges into its MS4, and rehabilitate channels to restore impaired beneficial uses of streams within its jurisdiction.~~

~~(1) Each Copermittee must identify areas of existing development as candidates for retrofitting, and channels in areas of existing development as candidates for rehabilitation within its jurisdiction. Areas of existing development must be selected based on a likelihood that retrofitting and channel rehabilitation will address the highest water quality priorities identified in the Water Quality Improvement Plan prepared pursuant to Provision B.~~

~~(2) Each Copermittee must evaluate and rank the areas of existing development identified pursuant to Provisions E.5.a and E.5.b.(1) for retrofitting and channel rehabilitation. The evaluation must include an assessment of those areas where pollutant removal from storm water and effective prohibition of non-storm water discharges through retrofitting existing development will provide the most benefit to water quality. The evaluation must also include an assessment of the channels within its jurisdiction where channel rehabilitation will improve beneficial uses of streams within the Copermittee's jurisdiction. Data collected during the implementation of the Water Quality Improvement Plan must be used to inform each area assessment and rank determination.~~

~~(3) Each Copermittee must implement retrofit and channel rehabilitation projects that address the highest water quality priorities identified in the Water Quality Improvement Plan pursuant to Provision B.3.a. The Copermittee must encourage private landowners to implement retrofit and channel rehabilitation projects whenever practical. Private landowners should be~~

~~encouraged through the Copermittee's use of subsidies, penalties, or other incentives.~~

~~(4) Each Copermittee must evaluate the flood management and flood control devices and structures in its inventory to determine if it is feasible to retrofit the device or structure, to provide additional pollutant removal from storm water. A Copermittee must consider the highest water quality priorities identified in their Water Quality Improvement Plan as part of each assessment.~~

~~(5) Where retrofitting and channel rehabilitation within specific areas of existing development are determined to be infeasible to restore and protect receiving waters from the highest water quality priorities identified in the Water Quality Improvement Plan, each Copermittee must identify, develop, and implement regional retrofitting and channel rehabilitation projects (i.e. projects that can receive and/or treat storm water from one or more areas of existing development and will result in a net benefit to water quality and the environment) adjacent to and/or downstream of the areas of existing development. The Copermittees may collaborate and cooperate with each other to develop regional retrofitting and channel rehabilitation projects. The Copermittees are also encouraged to partner with existing efforts in other Watershed Management Areas, and the Integrated Regional Water Management (IRWM) Groups in San Diego County, South Orange County, and Southwest Riverside County.~~

~~Existing Development BMP Implementation and Maintenance~~

~~**1)** Pollution Prevention~~

~~Each Copermittee must require the use of pollution prevention methods by the inventoried existing development.~~

~~**2)** Designate BMPs~~

~~Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development, including special event venues, that have the potential to generate pollutants. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.~~

~~**3)** BMP Implementation~~

~~Each Copermittee must implement, or require the implementation of, designated BMPs at inventoried existing development that have the potential to generate pollutants. A Copermittee must require additional pollution prevention measures and enhanced BMPs at inventoried existing development that discharges pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.~~

~~**4)** BMP Operation and Maintenance~~

~~Each Copermittee must operate and maintain, or require the operation and maintenance of designated BMPs at all inventoried existing development.~~

~~(b) Each Copermittee must implement a schedule of operation and maintenance activities for its MS4 and related structures (including but not limited to catch basins, storm drain inlets, detention basins, etc.), and verify proper operation of all its municipal structural treatment controls designed to reduce pollutants (including floatables) in storm water discharges to or from its MS4s and related drainage structures.~~

~~(c) Each Copermittee must implement procedures during the operation and maintenance of public streets, unpaved roads, paved roads, and paved highways and freeways that will reduce the contribution of storm water pollutants to the MEP and effectively prohibit non-storm water pollutants from the MS4 to receiving water bodies. During maintenance of unpaved roads, each Copermittee must examine the feasibility of replacing existing culverts or designing new culverts/bridge crossings to maintain natural stream geomorphology.~~

~~(d) Each Copermittee must implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers. Copermittees that operate both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate seeping sewage from infiltrating the MS4. Copermittees that do not operate both a municipal sanitary sewer system and a MS4 must keep themselves informed of relevant and appropriate maintenance activities and sanitary sewage projects in their jurisdiction that may cause or contribute to seepage of sewage into the MS4.~~

~~**5)** Pesticides, Herbicides, and Fertilizers BMPs~~

~~Each Copermittee must implement procedures, or require the implementation of procedures, to reduce the contribution of pollutants in storm water to the MEP and effectively prohibit non-storm water discharges associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from inventoried existing development into and from the MS4s. The Copermittee must require additional pollution prevention measures and enhanced BMPs at inventoried existing development that discharges pesticides, herbicides, or fertilizers identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. Such BMPs must include, as appropriate educational activities, permits, certifications and other measures for applicators and distributors.~~

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~~Existing Development Inspections~~

~~Each Copermittee must conduct inspections of inventoried existing development to ensure compliance with applicable local ordinances and permits, and the requirements of this Order.~~

~~(1) Inspection Frequency~~

~~(a) Each Copermittee must establish appropriate inspection frequencies for inventoried existing development based on the priorities set forth in the Water Quality Improvement Plan, and the potential for discharging pollutants via storm water and non-storm water runoff. At a minimum, inventoried existing development must be inspected once every five years. Inventoried existing development must also be inspected within six months of any change in property ownership or change in pollutant generating activity. The frequency of inspection at inventoried existing development must be appropriate to ensure that applied BMPs are sufficient to reduce the discharge of pollutants in storm water from the MS4 to the MEP and effectively prohibit non-storm water discharges to the MS4.~~

~~(b) Inventoried existing development must be inspected, as needed, in response to valid public complaints and findings from the Copermittee's municipal and contract staff inspections.~~

~~(c) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e. re-inspection, enforcement) necessary to ensure compliance with its applicable local ordinances and permits, the most current jurisdictional runoff management program document, the Water Quality Improvement Plan, and the requirements of this Order.~~

~~(2) Inspection Content~~

~~Inspections of existing development by the Copermittee must include, at a minimum:~~

~~(a) Assessment of compliance with its applicable local ordinances and permits related to non-storm water and storm water discharges and runoff;~~

~~(b) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;~~

~~(c) Verification of coverage under the Industrial General Permit (NOI and/or WDID number), when applicable;~~

~~(d) Visual observations of actual non-storm water discharges;~~

~~(e) Visual observations of actual or potential discharge of pollutants;~~

~~(f) Visual observations of actual or potential illicit connections; and~~

~~(g) If any violations are found and BMP enhancements are needed, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.~~

~~(3) Inspection Tracking and Records~~

~~Each Copermittee must track all inspections and re-inspections at all inventoried existing development. The Copermittee must retain all inspection records in an electronic database or tabular format, which must be made available to the San Diego Water Board upon request. Inspection records must be sufficiently detailed in order to determine compliance with the~~

~~requirements of this Order and any progress made towards addressing the highest water quality priorities identified in the Water Quality Improvement Plan. Inspection records must include, at a minimum:~~

~~(a) Existing development name and location (address and hydrologic subarea);~~

~~(b) Inspection and re-inspection date(s);~~

~~(c) Weather conditions during inspection;~~

~~(d) Description and photo documentation of problems observed with BMPs and indication of need for BMP addition/repair/replacement and any scheduled re-inspection, and date of re-inspection;~~

~~(e) Description of actions to reduce pollutants in storm water runoff to the MEP and actions to effectively prohibit non-storm discharges into the MS4 at the inventoried existing development;~~

~~(f) Photo documentation of observed actions or BMPs to reduce pollutants in storm water runoff to the MEP and actions to effectively prohibit non-storm discharges into the storm drain;~~

~~(g) If the facility, area, and/or activity has been designated or identified as a contributor to the highest water quality priorities identified in the Water Quality Improvement Plan, then the inspection report must include a description of any specific or additional actions taken to reduce or eliminate the contribution of the facility, area, and/or activity to the highest water quality priorities;~~

~~(h) Descriptions of any other specific inspection comments which must, at a minimum, include rationales for longer compliance time;~~

~~(i) Description of enforcement actions issued in accordance with the Enforcement Response Plan pursuant to Provision E.6; and~~

~~(j) Resolution of problems noted and date problems fixed.~~

c. Existing Development Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried existing development identified by the Copermittee as having the reasonable potential to discharge pollutant loads from the MS4 within their jurisdiction, ~~as necessary, to achieve compliance with the requirements of this Order,~~ in accordance with its Enforcement Response Plan pursuant to Provision E.6.

6. Enforcement Response Plans

Each Copermittee must develop and implement an Enforcement Response Plan as part of its jurisdictional runoff management program document. The Enforcement Response Plan must ~~include the protocols for progressively stricter responses, including timeframes allowed for corrections of problems, and for~~

~~various field violation scenarios~~describe the applicable protocols and options for enforcing compliance with the provisions of this Order. The Enforcement Response Plan must include~~, at a minimum,~~ the following~~ requirements~~:

a. Enforcement Response Plan Components

The Enforcement Response Plans shall include the following individual components:

(1) The Illicit Discharge Detection and Elimination Enforcement Components provided in Provision E.2;

(2) The Development Planning Enforcement Component provided in Provision E.3;

(3) The Construction Management Enforcement Component provided in Provision E.4; and

(4) The Existing Development Management Enforcement Component provided in Provision E.5.

Existing enforcement plans or procedures may be used to partially or wholly satisfy the requirements of any Enforcement Response Plan component.

b. Enforcement Approaches and Options

Each Enforcement Response Plan component must describe the Copermittee's approach to correcting noncompliance with its permits, applicable local ordinances, and this Order. It must describe protocols for progressively stricter responses, including, as applicable, timeframes allowed to bring areas or facilities into compliance. The enforcement process must include appropriate sanctions to compel compliance, such as:

(1) Verbal and written notices of violation;

(2) Cleanup requirements;

(3) Fines

(4) Bonding requirements;

(5) Administrative and criminal (if intentional or criminally negligent) penalties;

(6) Liens;

(7) Stop work orders; and

(8) Permit and occupancy denials.

c. Correction of Violations

(1) Violations must be corrected in a timely manner with the goal of correcting them within 30 calendar days after the violations are discovered, and prior to the next predicted rain event, when possible.

(2) If more than 30 calendar days are required for compliance, then a rationale must be recorded in the applicable electronic database or tabular system used to track compliance.

d. ESCALATED ENFORCEMENT PRIORITIES

(1) Each Enforcement Response Plan must include a definition of "escalated enforcement priorities". Escalated enforcement priorities shall be defined to include any enforcement scenario where a violation or other non-compliance is determined to constitute a significant contribution to any of the highest water quality priorities identified in the Water Quality Improvement Plan. Escalated enforcement priorities may be defined differently for development planning; construction sites; commercial, industrial, and municipal sources; and residential management areas.

(2) Where a violation involving a pollutant or stressor that has been identified as a highest water quality priority is not determined to represent an escalated enforcement priority, a rationale must be recorded in the applicable electronic database or tabular system used to track compliance.

(3) Escalated enforcement actions must continue to increase in severity, as necessary, to compel compliance as soon as possible.

~~a. Illicit Discharge Detection and Elimination Enforcement Component~~

~~The Enforcement Response Plan must describe required enforcement actions to eliminate non-storm water discharges and illicit discharges or connections to the Copermittee's MS4.~~

~~(1) The Enforcement Response Plan must include a definition of "high level enforcement" for non-storm water discharges and illicit discharges or connections. "High level enforcement" for non-storm water discharges and illicit discharges or connections may be defined differently for construction sites, municipal, commercial, industrial, and residential areas of existing development.~~

~~(2) Non-storm water discharges and illicit discharges or connections must be addressed with an escalating series of enforcement actions as follows:~~

~~(a) If the non-storm water discharge and illicit discharge or connection is a source of pollutants contributing to the highest water quality priorities identified in the Water Quality Improvement Plan, then high level enforcement actions must be immediately issued, and subsequent high~~

~~level enforcement actions must continue to escalate, as necessary, to compel the elimination of the discharge or connection as soon as possible; or~~

~~(b) If the non-storm water discharge and illicit discharge or connection is not a source of pollutants contributing to the highest water quality priorities identified in the Water Quality Improvement Plan, then escalating enforcement actions must be issued, and enforcement actions must result in the elimination of the discharge or connection as quickly as the Copermittee's available resources allow.~~

~~(3) If the Copermittee identifies the source, and the source is a controllable non-storm water discharge (i.e. anthropogenically influenced) or a controllable illicit discharge or connection, then the Copermittee must implement the following:~~

~~(a) Immediately enforce its legal authority to eliminate controllable sources of non-storm water and illicit discharges or connections upon identifying the source; and~~

~~(b) For controllable sources of non-storm water discharges and illicit discharges or connections that cannot be eliminated immediately upon identification, the discharge or connection must be eliminated in a timely manner with the goal of eliminating the discharge or connection within 10 business days after the source is identified. If more than 10 business days are required to eliminate the discharge or connection, a rationale must be recorded in the electronic database or equivalent tabular system used to track the investigations of non-storm water and illicit discharges and connections.~~

~~(4) If the Copermittee identifies the source as a non-storm water discharge to or from the MS4 that is in exceedance of NALs developed pursuant to Provision C.1, and in violation or threatened violation of an existing separate NPDES permit (e.g. the groundwater dewatering NPDES permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.~~

~~**b.** Development Projects Enforcement Component~~

~~The Enforcement Response Plan must describe required enforcement actions to compel compliance with the Copermittee's BMP Design Manual requirements for development projects.~~

~~(1) The Enforcement Response Plan must include a definition of "high level enforcement" for development projects.~~

~~(2) The enforcement process must include appropriate sanctions to compel compliance with requirements of the Copermittee's BMP Design Manual or this Order. Sanctions must include, at a minimum, the following tools or their equivalent:~~

~~(a) Non-monetary penalties;~~

~~(b) Fines;~~

~~(c) Bonding requirements;~~

~~(d) Administrative and criminal penalties;~~

~~(e) Liens; and~~

~~(f) Permit or occupancy denials.~~

~~(3) Occupancy must be denied until a development project is in full compliance with the Copermittee's BMP Design Manual requirements. Documentation of full compliance with the Copermittee's BMP Design Manual requirements must be recorded in the electronic database or equivalent tabular system used to track development projects.~~

~~(4) Violations or other non-compliance that contribute or potentially contribute to the highest water quality priorities identified in the Water Quality Improvement Plan must be issued high level enforcement actions. High level enforcement actions must continue to escalate, as necessary, to compel compliance as soon as possible.~~

~~(5) For violations of permanent BMP maintenance requirements, all violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale must be recorded in the electronic database or equivalent tabular system used to track permanent BMP inspections.~~

~~**a.** Construction / Existing Development Enforcement Component~~

~~The Enforcement Response Plan must describe required enforcement actions to compel compliance with its permits and applicable local ordinances, and the requirements of this Order, at construction sites and areas of existing development.~~

~~(1) The Enforcement Response Plan must include a definition of "high level enforcement" for construction sites and areas of existing development. "High level enforcement" may be defined differently for construction sites, municipal,~~

~~commercial, industrial, and residential areas of existing development.~~

~~(2) The enforcement process must include, at a minimum, appropriate sanctions to compel compliance, such as:~~

~~(a) Verbal and written notices of violation;~~

~~(b) Cleanup requirements;~~

~~(c) Fines;~~

~~(d) Bonding requirements;~~

~~(e) Administrative and criminal penalties;~~

~~(f) Liens;~~

~~(g) Stop work orders; and~~

~~(h) Permit and occupancy denials.~~

~~(3) Violations or other non-compliance that contribute or potentially contribute to the highest water quality priorities identified in the Water Quality Improvement Plan must be issued high level enforcement actions. High level enforcement actions must continue to escalate, as necessary, to compel compliance as soon as possible.~~

~~(4) All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, then a rationale must be recorded in the electronic database or equivalent tabular system used to track construction site and existing development inspections.~~

e. REPORTING OF NON-COMPLIANT SITES

(1) Each Copermittee must notify the San Diego Water Board verbally within 24 hours and in writing within ~~48 hours~~ 5 calendar days of issuing ~~high level~~escalated enforcement (as defined in the Copermittee's Enforcement Response Plan) to a construction site that poses a significant threat to water quality as a result of violations or other non-compliance with its permits and applicable local ordinances, and the requirements of this Order. Written notification may be provided electronically in email form.

(2) Each Copermittee must notify the San Diego Water Board of non-filers under the Industrial General Permit and Construction General Permit by email to Nonfilers_R9@waterboards.ca.gov.

~~6.~~7. Public Education and Participation

a. Each Copermittee must implement a public education and participation program, as appropriate, to promote and encourage the development of programs, management practices, control techniques and systems, design and engineering methods, and behaviors that reduce the discharge of pollutants in storm water to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving waters. The public education program must include~~, at a minimum,~~ the following:

(1) Educational activities, public information activities, and other appropriate outreach activities intended to reduce pollutants ~~associated with the application of pesticides, herbicides and fertilizer in storm water discharges to and~~of concern from its MS4 to the MEP. Activities shall be determined and prioritized by Copermittees by jurisdiction and/or watershed (Section 5.c.(5) to address the highest threats to water quality (e.g. pesticides, herbicides and fertilizers, used oil, toxic waste, etc.);

~~(1) Educational activities, public information activities, and other appropriate outreach activities to facilitate the proper management and disposal of used oil and toxic materials; and~~

(2) Appropriate education and training measures for ~~construction site operators and other~~ specific target audiences, as determined and prioritized by the Copermittee(s) by jurisdiction and watershed, based on high risk behaviors and pollutants of concern, such as construction site operators, residents, underserved target audiences and school-aged children.

b. ~~.~~Each Copermittee shall incorporate a mechanism for evaluation and assessment of educational and other outreach activities, as needed, to identify progress and incorporate modifications necessary to increase the effectiveness of the public education program.

c. Each Copermittee may determine, where appropriate and effective, mechanisms for intergovernmental coordination on education and outreach activities.~~must incorporate a mechanism for public participation and where necessary intergovernmental coordination in updating, developing, and implementing its jurisdictional runoff management program.~~

~~7.~~8. Fiscal Analysis

a. Each Copermittee must secure the resources necessary to meet all the requirements of this Order.

b. Each Copermittee must conduct an annual fiscal analysis of their jurisdictional runoff management programs in their entirety. The fiscal analysis must include the following:

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(1) Identification of the various categories of expenditures necessary to implement the requirements of this Order, including a description of the specific items to be accounted for in each category of expenditures;
~~(1) The capital and operation and maintenance expenditures necessary to implement the requirements of this Order;~~

(2) The staff resources needed and allocated to meet the requirements of this Order, including any development, implementation, and enforcement activities required;

(3) The fiscal analysis must provide estimated expenditures for Provisions E.8.b.(1) and E.8.b.(2) for each Copermittee's jurisdictional runoff management program budget for the current reporting period.~~during the reporting period, the preceding reporting period, and the next reporting period; and~~

(4) The source(s) of funds that are proposed to meet the necessary expenditures described in Provisions E.8.b.(1) and E.8.b.(2), including legal restrictions on the use of such funds.

c. Each Copermittee must submit a summary of the annual fiscal analysis with each Annual Report required pursuant to Provision F.3.b.

d. Each Copermittee must provide the documentation used to develop the summary of the annual fiscal analysis upon request by the San Diego Water Board.

F. REPORTING

The purpose of this provision is to determine and document compliance with the requirements set forth in this Order. The goal of this provision is to communicate to the San Diego Water Board and the people of the State of California the implementation status of each jurisdictional runoff management program and compliance with the requirements of this Order. This goal is to be accomplished through the submittal of specific deliverables to the San Diego Water Board by the Copermittees.

1. Water Quality Improvement Plans

The Copermittees for each Watershed Management Area must develop and submit a complete Water Quality Improvement Plan in accordance with the requirements of Provision B, no later than ~~12~~ 18 months after the adoption of this Order for a 30 day public review and comment period. The San Diego Water Board will issue a public notice and solicit public comments on the Water Quality Improvement Plan for a minimum of 30 days. Based on the comments received, the San Diego Water Board will determine whether to hold a public hearing or to limit public input to submittal of written comments. If no hearing is held the San Diego Water Board will notify the Copermittees that the Water Quality Improvement Plan has been accepted as complete following its review and determination that the Water Quality Improvement Plan meets the requirements of this Order Water Quality Improvement Plans are deemed approved if no response is provided to the Copermittees within 2 months of the submittal date. Water Quality Improvement Plans must be made available on the Regional Clearinghouse required pursuant to Provision F.4.

a. WATER QUALITY IMPROVEMENT PLAN SUBMITTAL AND IMPLEMENTATION

Copermittees must submit requested modifications to the Water Quality Improvement Plan either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b. Once approved by the San Diego Water Board Executive Officer, the Copermittees must implement any modifications to the Water Quality Improvement Plan in accordance with the schedules developed pursuant to Provisions B.2 and B.3.b. Requests for modification are deemed approved if no response is provided to the requesting Copermittee(s) within 2 months of the request date.

b. CORRESPONDING MODIFICATIONS TO JURISDICTIONAL RUNOFF MANAGEMENT PROGRAMS AND MONITORING AND ASSESSMENT PROGRAMS

Copermittees must submit requested modifications to the jurisdictional runoff management programs and monitoring and assessment programs either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b. Once approved by the San Diego Water Board Executive Officer, the Copermittees must implement any modifications to the Water Quality Improvement Plan in

accordance with the schedules developed pursuant to Provisions B.3.b. Requests for modification are deemed approved if no response is provided to the requesting Copermittee(s) within 2 months of the request date.

2. Updates

a. Jurisdictional Runoff Management Program Document Updates

Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E. The update must be completed no later than ~~12~~18 months after the adoption of this Order. Updated jurisdictional runoff management program documents must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Subsequent updates may be submitted as part of the Annual Reports, and updated jurisdictional runoff management program documents must be made available on the Regional Clearinghouse.

Jurisdictional Runoff Management Program document updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

b. ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual Updates

Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provision E.3.d. The update must be completed no later than 18~~12~~ months after the adoption of this Order. Updated BMP Design Manuals must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Subsequent updates may be submitted as part of the Annual Reports. Updated BMP Design Manuals must be made available on the Regional Clearinghouse.

BMP Design Manual updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

c. Water Quality Improvement Plan Updates

The Copermittees for each Watershed Management Area must submit updates to the Water Quality Improvement Plan as part of the Annual Reports. Updated Water Quality Improvement Plans must be made available on the Regional Clearinghouse required pursuant to Provision F.4.

Water Quality Improvement Plan updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

~~5.~~3. Progress Reporting

a. PROGRESS REPORT PRESENTATIONS

The Copermittees for each Watershed Management Area must appear before the San Diego Water Board, as requested by the San Diego Water Board, to provide progress reports on the implementation of the Water Quality Improvement Plan and jurisdictional runoff management programs.

b. ANNUAL REPORTS

(1) The Copermittees for each Watershed Management Area must submit an Annual Report for each reporting period, which begins July 1 and ends June ~~-~~30 in the following year, no later than ~~October~~ January 31 of the following year~~the end of the reporting period~~. This is to accommodate the monitoring year from October 1, to September 30 of the subsequent year. The first Annual Report must be prepared for the reporting period beginning ~~from~~July 1 after adoption of the ~~date the~~permit, and upon San Diego Water Board ~~determines~~determination that the Water Quality Improvement Plan meets the requirements of this Order to June 30 in the following year. Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each Annual Report must include the following:

(a) The progress of implementing the Water Quality Improvement Plan including, but not limited to:

:

(i) The progress toward achieving the interim and final numeric ~~targets~~goals for the highest water quality priorities for the Watershed Management Area,

(ii) The water quality improvement strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods, and are planned to be implemented during the next reporting period,

(iii) Proposed modifications to water quality improvement or jurisdictional strategies with associated rationale for such modifications,

(iv) Previously proposed modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area,

[a] The monitoring data collected pursuant to Provision D,

summarized and presented in tabular and graphical form;

[b] Progress of the special studies required pursuant to Provision D, and the results or findings when a special study, or each phase of a special study, is completed;

[c] The findings from the assessments required pursuant to Provision D; and

~~[a] and~~

(v) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;

(b) A completed Jurisdictional Runoff Management Program Annual Report Form (Attachment D or approved revision) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative.

(2) Each Copermittee must complete and submit a Jurisdictional Runoff Management Program Annual Report Form (Attachment D or approved revision) no later than October 31 of each year until the first Annual Report is required to be submitted. Each Copermittee's Annual Report form must summarize the jurisdictional activities in the WMAs in which the Copermittee has jurisdiction.

(3) Each Copermittee must provide any data or documentation utilized in developing the Annual Report upon request by the San Diego Water Board. Any monitoring data utilized in developing the Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN).[19] Any monitoring and assessment data utilized in developing the Annual Report must be provided on the Regional Clearinghouse required pursuant to Provision F.4.

c. REGIONAL MONITORING AND ASSESSMENT REPORT

(1) The Copermittees must submit a Regional Monitoring and Assessment Report no later than 180 days in advance of the expiration date of this Order. The Regional Monitoring and Assessment Report may be submitted as part of the ROWD required pursuant to Provision F.5.b. The Copermittees must review the jurisdictional and watershed monitoring data, data analyses, and assessments required pursuant to Provision D.4, to assess the following:

[19] Data must be uploaded to CEDEN Southern California Regional Data Center (http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx) using the templates provided on the CEDEN website.

(a) The beneficial uses of the receiving waters within the San Diego Region that are protected or must be restored;

(b) The progress toward restoring impacted beneficial uses in the receiving waters within the San Diego Region; and

~~(c)~~ The Copermittees for each Watershed Management Area must submit an Annual ~~The jurisdictional and watershed monitoring data collected pursuant to Provisions D.1 and D.2, summarized and presented in tabular and graphical form;~~

~~(d)~~

~~(e) Progress of the special studies required pursuant to Provisions D.2 and D.3, and the results or findings when a special study, or each phase of a special study, is completed;~~

~~(f)~~

~~(g) The findings from the assessments required pursuant to Provision D.4;~~

~~(h)~~

~~(i)~~(c) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following

(d) Pollutants or conditions of emerging concern that may impact beneficial uses in the receiving waters within the San Diego Region.

(2) The Regional Monitoring and Assessment Report must include recommendations for improving the implementation and assessment of the Water Quality Improvement Plans and jurisdictional runoff management programs.

(3) Each Copermittee must provide any data or documentation utilized in developing the Regional Monitoring and Assessment Report upon request by the San Diego Water Board. Any monitoring and assessment data utilized in developing the Regional Monitoring and Assessment Report must be provided on the Regional Clearinghouse required pursuant to Provision F.4.

4. Regional Clearinghouse

The Copermittees[20][23] must develop, update, and maintain an internet-based Regional Clearinghouse that can be used to store, disseminate, and share the Copermittees' Water Quality Improvement Plans, Annual Reports, jurisdictional runoff management program documents, monitoring data, special studies, and any other data or information generated by the Copermittees during the implementation

[20] The Copermittee may elect to develop and maintain the clearinghouse(s) provided by other Copermittees or agencies.

of this Order. Monitoring data collected pursuant to Provision D must be uploaded to CEDEN,[21] with links to the uploaded data available on the Regional Clearinghouse. The Regional Clearinghouse may be linked to other internet-based data portals and databases where the original documents and data are stored. The Regional Clearinghouse must be available and accessible to members of the public. The Regional Clearinghouse must be developed and made available to the public no later than 18~~2~~ months after the adoption of this Order.

5. Report of Waste Discharge

a. The Orange County Copermittees and the Riverside County Copermittees, are required to submit a complete ROWD pursuant to the requirements of their current Orders and are enrolled under this Order upon expiration of their current Orders. Upon expiration of their current Orders, the Copermittees in each county must comply with the requirements of this Order by July 1 after enrollment under this Order, unless early enrollment is granted pursuant to Provision F.6 of this Order. The current Orders for the Orange County Copermittees and Riverside County Copermittees are rescinded upon their expiration date except for enforcement purposes.

b. The Copermittees must submit to the San Diego Water Board a complete ROWD as an application for the re-issuance of this NPDES permit. The ROWD must be submitted no later than 180 days in advance of the expiration date of this Order. The Copermittee may elect to develop and submit the in conjunction with or provided by another Copermittee. The ROWD must contain the following minimum information:

[21] Data must be uploaded to CEDEN Southern California Regional Data Center (http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx) using the templates provided on the CEDEN website.

(1) Names and addresses of the Copermittees;

(2) Names and titles of the primary contacts of the Copermittees;

(3) Proposed changes to the Copermittees' Water Quality Improvement Plans and the supporting justification;

(4) Proposed changes to the Copermittees' jurisdictional runoff management programs and the supporting justification;

(5) Any other information necessary for the re-issuance of this Order; and

(6) Any other information required by federal regulations for NPDES permit reissuance.

6. Application for Early Enrollment

a. The Orange County Copermittees, collectively, or Riverside County Copermittees, collectively, may apply for early enrollment under this Order by submitting a Report of Waste Discharge Form 200 for each individual Copermittee in the respective county, with a written request for early enrollment under this Order that certifies the following conditions have been met:

(1) A Water Quality Improvement Plan has been developed in accordance with the requirements of Provision B, which can and will be implemented immediately upon enrollment under this Order;

(2) Each Copermittee in the county has updated its jurisdictional runoff management program document to incorporate the requirements of Provision E, which can and will be implemented immediately upon enrollment under this Order; and

(3) Each Copermittee in the county has updated its BMP Design Manual to incorporate the requirements of Provision E.3.d, which can and will be implemented immediately upon enrollment under this Order.

b. The San Diego Water Board will review the application for early enrollment and associated documents for completeness. A Notice of Enrollment (NOE) under this Order will be issued to the Copermittees in the respective county by the San Diego Water Board upon completion of the early enrollment application requirements. The effective enrollment date will be specified in the NOE and the Copermittees in the respective county are authorized to have MS4 discharges pursuant to the requirements of this Order starting on the date specified in the NOE. The existing Order for that county is rescinded upon the effective enrollment date specified in the NOE except for enforcement purposes.

7. Reporting Provisions

Each Copermittee must comply with all the reporting and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

G. PRINCIPAL WATERSHED COPERMITTEE RESPONSIBILITIES

1. The Copermittees within each Watershed Management Area must designate a Principal Watershed Copermittee and notify the San Diego Water Board of the name of the Principal Watershed Copermittee. ~~An individual Copermittee should not be designated a Principal Watershed Copermittee for more than two Watershed Management Areas.~~ The notification may be submitted with the Water Quality Improvement Plan required pursuant to Provision F.1 of this Order.

2. The Principal Watershed Copermittee is responsible for, at a minimum, the following:

   a. Serving as liaison between the Copermittees in the Watershed Management Area and the San Diego Water Board on general permit issues, and when necessary and appropriate, representing the Copermittees in the Watershed Management Area before the San Diego Water Board.

   b. Facilitating the development of the Water Quality Improvement Plan in accordance with the requirements of Provision B of this Order

   c. Coordinating the submittal of the deliverables required by Provisions F.1, F.2, F.3.a, and F.3.b of this Order.

   d. Coordinating and developing, with the other ~~Principal Watershed~~ Copermittees, the requirements of Provisions F.3.c, F.4, and F.5,~~bbb~~ of this Order.

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H. MODIFICATION OF PROGRAMS

1. Modifications of the Order may be initiated by the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the San Diego Water Board.

2. Minor modifications to the Order may be made by the San Diego Water Board where the proposed modification complies with all the prohibitions and limitations, and other requirements of this Order.

3. Proposed modifications outside of the WQIP process that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

I. STANDARD PERMIT PROVISIONS AND GENERAL PROVISIONS

Each Copermittee must comply with all the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

ATTACHMENT A

DISCHARGE PROHIBITIONS

1. Basin Plan Waste Discharge Prohibitions

California Water Code Section 13243 provides that a Regional Water Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste or certain types of waste is not permitted. The following waste discharge prohibitions in the Water Quality Control Plan for the San Diego Basin (Basin Plan) are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by a National Pollutant Discharge Elimination System (NPDES) permit or a dredged or fill material permit (subject to the exemption described in California Water Code Section 13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this San Diego Water Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services (DHS) and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the San Diego Water Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the San Diego Water Board.

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7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the San Diego Water Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "*storm water*" is prohibited unless authorized by the San Diego Water Board. [The federal regulations, 40 CFR 122.26(b)(13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities.] [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the San Diego Water Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

16. The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

17. The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

18. The discharge of treated sewage from vessels, which do not have a properly functioning ~~US~~ U.S.Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at mean lower low water (MLLW) is prohibited.

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2. Attachment B to State Water Board Resolution 2012-0012~~X~~

Copermittees that discharge into Areas of Special Biological Significance must comply with State Water Board Resolution No. 2012-0012.

~~**Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges**~~

~~I. PROVISIONS FOR POINT SOURCE DISCHARGES OF STORM WATER AND NONPOINT SOURCE WASTE DISCHARGES~~

~~The following terms, prohibitions, and special conditions (hereafter collectively referred to as special conditions) are established as limitations on point source storm water and nonpoint source discharges. These special conditions provide Special Protections for marine aquatic life and natural water quality in Areas of Special Biological Significance (ASBS), as required for State Water Quality Protection Areas pursuant to California Public Resources Code Sections 36700(f) and 36710(f). These Special Protections are adopted by the State Water Board as part of the California Ocean Plan (Ocean Plan) General Exception.~~

~~The special conditions are organized by category of discharge. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) will determine categories and the means of regulation for those categories [e.g., Point Source Storm Water National Pollutant Discharge Elimination System (NPDES) or Nonpoint Source].~~

~~**A. PERMITTED POINT SOURCE DISCHARGES OF STORM WATER**~~

~~1. General Provisions for Permitted Point Source Discharges of Storm Water~~

~~a. Existing storm water discharges into an ASBS are allowed only under the following conditions:~~

~~(1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;~~

~~(2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in these Special Protections; and~~

~~(3) The discharges:~~

~~(i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;~~

~~(ii) Are designed to prevent soil erosion;~~

~~(iii) Occur only during wet weather;~~

~~(iv) Are composed of only storm water runoff.~~

~~b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.~~

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~~c. The discharge of trash is prohibited.~~

~~d. Only discharges from existing storm water outfalls are allowed. Any proposed or new storm water runoff discharge shall be routed to existing storm water discharge outfalls and shall not result in any new contribution of waste to an ASBS (i.e., no additional pollutant loading). "Existing storm water outfalls" are those that were constructed or under construction prior to January 1, 2005. "New contribution of waste" is defined as any addition of waste beyond what would have occurred as of January 1, 2005. A change to an existing storm water outfall, in terms of re-location or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.~~

~~e. Non-storm water discharges are prohibited except as provided below:~~

~~(1) The term "non-storm water discharges" means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.~~

~~(2) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:~~

~~(i) Discharges associated with emergency fire fighting operations.~~

~~(ii) Foundation and footing drains.~~

~~(iii) Water from crawl space or basement pumps.~~

~~(iv) Hillside dewatering.~~

~~(v) Naturally occurring groundwater seepage via a storm drain.~~

~~(vi) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.~~

~~(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.~~

~~2. Compliance Plans for Inclusion in Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP).~~

~~The discharger shall specifically address the prohibition of non-storm water runoff and the requirement to maintain natural water quality for storm water discharges to an ASBS in an ASBS Compliance Plan to be included in its SWMP or a SWPPP, as appropriate to permit type. If a statewide permit includes a SWMP, then the discharger shall prepare a stand-alone compliance plan for ASBS discharges . The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (for permits issued by Regional Water Boards).~~

~~a. The Compliance Plan shall include a map of surface drainage of storm water runoff, showing areas of sheet runoff, prioritize discharges, and describe any structural Best~~

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~~Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat and which are identified to require installation of structural BMPs. The map shall also show the storm water conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion, and waste and hazardous material storage areas, if applicable. The SWMP or SWPPP shall also include a procedure for updating the map and plan when changes are made to the storm water conveyance facilities.~~

~~b. The ASBS Compliance Plan shall describe the measures by which all non-authorized non-storm water runoff (e.g., dry weather flows) has been eliminated, how these measures will be maintained over time, and how these measures are monitored and documented.~~

~~c. For Municipal Separate Storm Sewer System (MS4s), the ASBS Compliance Plan shall require minimum inspection frequencies as follows:~~

~~(1) The minimum inspection frequency for construction sites shall be weekly during rainy season;~~

~~(2) The minimum inspection frequency for industrial facilities shall be monthly during the rainy season;~~

~~(3) The minimum inspection frequency for commercial facilities (e.g., restaurants) shall be twice during the rainy season; and~~

~~(4) Storm water outfall drains equal to or greater than 18 inches (457 mm) in diameter or width shall be inspected once prior to the beginning of the rainy season and once during the rainy season and maintained to remove trash and other anthropogenic debris.~~

~~d. The ASBS Compliance Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that such installation would pose a threat to health or safety. BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:~~

~~(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or~~

~~(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges. The baseline for the reduction is the effective date of the Exception. The baseline for these determinations is the effective date of the Exception, and the reductions must be achieved and documented within four (4) years of the effective date.~~

~~e. The ASBS Compliance Plan shall address erosion control and the prevention of anthropogenic sedimentation in ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.~~

~~f. The ASBS Compliance Plan shall describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule. The ASBS Compliance Plan shall include non-structural BMPs that address public education and outreach. Education and outreach efforts must adequately inform the public that direct discharges of pollutants from private property not entering an MS4 are prohibited. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development (LID) measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control storm water runoff discharges (at the end-of-pipe) during a design storm, permittees must first consider using LID practices to infiltrate, use, or evapotranspirate storm water runoff on-site.~~

~~g. The BMPs and implementation schedule shall be designed to ensure that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.~~

~~h. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results.~~

~~(1) The report shall identify the constituents in storm water runoff that alter natural ocean water quality and the sources of these constituents.~~

~~(2) The report shall describe BMPs that are currently being implemented, BMPs that are identified in the SWMP or SWPPP for future implementation, and any additional BMPs that may be added to the SWMP or SWPPP to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.~~

~~(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits), the discharger shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required.~~

~~(4) As long as the discharger has complied with the procedures described above and is implementing the revised SWMP or SWPPP, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent.~~

~~(5) Compliance with this section does not excuse violations of any term, prohibition, or condition contained in these Special Protections.~~

~~3. Compliance Schedule~~

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~~a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.~~

~~b. Within one year from the effective date of the Exception, the discharger shall submit a written ASBS Compliance Plan to the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that describes its strategy to comply with these special conditions, including the requirement to maintain natural water quality in the affected ASBS. The ASBS Compliance Plan shall include a time schedule to implement appropriate non-structural and structural controls (implementation schedule) to comply with these special conditions for inclusion in the discharger's SWMP or SWPPP, as appropriate to permit type.~~

~~c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these special conditions shall be implemented.~~

~~d. Within four (4) years of the effective date of the Exception, any structural controls identified in the ASBS Compliance Plan that are necessary to comply with these special conditions shall be operational.~~

~~e. Within four (4) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water, pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data, and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.~~

~~f. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.~~

~~If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.~~

~~The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:~~

~~(1) for municipalities, a demonstration of significant hardship to discharger ratepayers, by showing the relationship of storm water fees to annual household income for~~

~~residents within the discharger's jurisdictional area, and the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or~~

~~(2) for other governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process.~~

~~B. NONPOINT SOURCE DISCHARGES~~

~~*[NOT INCLUDED]*~~
~~*[PROVISIONS FOR NONPOINT SOURCE DISCHARGES NOT APPLICABLE]*~~

~~II. ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES~~

~~*[NOT INCLUDED]*~~
~~*[ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES NOT APPLICABLE]*~~

~~III. ADDITIONAL REQUIREMENTS – WATERFRONT AND MARINE OPERATIONS~~

~~*[NOT INCLUDED]*~~
~~*[ADDITIONAL REQUIREMENTS FOR WATERFRONT AND MARINE OPERATIONS NOT APPLICABLE]*~~

~~IV. MONITORING REQUIREMENTS~~

~~Monitoring is mandatory for all dischargers to assure compliance with the Ocean Plan. Monitoring requirements include both: (A) core discharge monitoring, and (B) ocean receiving water monitoring. The State and Regional Water Boards must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).~~

~~Safety concerns: Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notification to the State and Regional Water Boards if hazardous conditions prevail.~~

~~Analytical Chemistry Methods: All constituents must be analyzed using the lowest minimum detection limits comparable to the Ocean Plan water quality objectives. For metal analysis, all samples, including storm water effluent, reference samples, and ocean receiving water samples, must be analyzed by the approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the Ocean Plan.~~

~~A. CORE DISCHARGE MONITORING PROGRAM~~

~~1. General sampling requirements for timing and storm size:~~

~~Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected when post-storm receiving water is sampled, and analyzed for the same constituents as receiving water and reference site samples (see section IV B) as described below.~~

~~2. Runoff flow measurements~~

~~a. For municipal/industrial storm water outfalls in existence as of December 31, 2007, 18 inches (457mm) or greater in diameter/width (including multiple outfall pipes in combination having a width of 18 inches, runoff flows must be measured or calculated, using a method acceptable to and approved by the State and Regional Water Boards.~~
~~b. This will be reported annually for each precipitation season to the State and Regional Water Boards.~~

~~3. Runoff samples – storm events~~

~~a. For outfalls equal to or greater than 18 inches (0.46m) in diameter or width:~~

~~(1) samples of storm water runoff shall be analyzed during the same storm as receiving water samples for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination, ; and~~

~~(2) samples of storm water runoff shall be analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS~~

~~(3) If an applicant has no outfall greater than 36 inches, then storm water runoff from the applicant's largest outfall shall be further analyzed during the same storm as receiving water samples for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates).~~

~~b. For outfalls equal to or greater than 36 inches (0.91m) in diameter or width:~~

~~(1) samples of storm water runoff shall be analyzed during the same storm as receiving water samples for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and~~

~~(2) samples of storm water runoff shall be further analyzed during the same storm as receiving water samples for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates) and~~

~~(3) samples of storm water runoff shall be analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.~~

~~c. For an applicant not participating in a regional monitoring program [see below in Section IV (B)] in addition to (a.) and (b.) above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Ocean Plan Table A constituents, Table B constituents for marine aquatic life protection (except for toxicity, only chronic toxicity for three species shall be required), DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, and Ocean Plan indicator bacteria. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each Region.~~

~~4. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.~~

~~**B. OCEAN RECEIVING WATER AND REFERENCE AREA MONITORING PROGRAM**~~

~~In addition to performing the Core Discharge Monitoring Program in Section II.A above, all applicants having authorized discharges must perform ocean receiving water monitoring. In order to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS, dischargers may choose either (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program.~~

~~1. Individual Monitoring Program: The requirements listed below are for those dischargers who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met:~~

~~a. Three times annually, during wet weather (storm events), the receiving water at the point of discharge from the outfalls described in section (IV)(A)(3)(c) above shall be sampled and analyzed for Ocean Plan Table A constituents, Table B constituents for marine aquatic life, DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and Ocean Plan indicator bacteria.~~

~~The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where storm water runoff is sampled. Receiving water shall be sampled at approximately the same time prior to (pre-storm) and during (or immediately after) the same storm (post storm). Reference water quality shall also be sampled and analyzed for the same constituents pre-storm and post-storm, during the same storms when receiving water is sampled. Reference stations will be determined by the State Water Board's Division of Water Quality and the applicable Regional Water Board(s).~~

~~b. Sediment sampling shall occur at least three times during every five (5) year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Ocean Plan Table B constituents for marine aquatic life, DDT, PCBs, PAHs,~~

~~pyrethroids, and OP pesticides. For sediment toxicity testing, only an acute toxicity test using the amphipod Eohaustorius estuarius must be performed.~~

~~c. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and at a reference site. The survey shall be performed at least once every five (5) year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.~~

~~d. Once during each five (5) year period, a bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge sites and at representative reference sites. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (Mytilus californianus) and/or sand crabs (Emerita analoga or Blepharipoda occidentalis). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, or add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.~~

~~e. Marine Debris: Representative quantitative observations for trash by type and source shall be performed along the coast of the ASBS within the influence of the discharger's outfalls. The design, including locations and frequency, of the marine debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.~~

~~f. The monitoring requirements of the Individual Monitoring Program in this section are minimum requirements. After a minimum of one (1) year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board (statewide permits) or Executive officer of the Regional Water Board (Regional Water Board permits) may require additional monitoring, or adjust, reduce or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.~~

~~2. Regional Integrated Monitoring Program: Dischargers may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise prescribed individual monitoring approach (in Section IV.B.1) if approved by the State Water Board's Division of Water Quality and the Regional Water Boards.~~

~~a. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10% development), and shall not be located in CWA Section 303(d) listed waterbodies or have tributaries that are 303(d)~~

~~listed. Reference areas shall be free of wastewater discharges and anthropogenic non-storm water runoff. A minimum of low threat storm runoff discharges (e.g. stream highway overpasses and campgrounds) may be allowed on a case-by-case basis. Reference areas shall be located in the same region as the ASBS receiving water monitoring occurs. The reference areas for each Region are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.~~

~~b. ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e. at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e. co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.~~

~~c. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected when annual storm water runoff is sampled. Sampling shall occur in a minimum of two storm seasons. For those ASBS dischargers that have already participated in the Southern California Bight 2008 ASBS regional monitoring effort, sampling may be limited to only one storm season.~~

~~d. Receiving water and reference samples shall be analyzed for the same constituents as storm water runoff samples. At a minimum, constituents to be sampled and analyzed in reference and discharge receiving waters must include oil and grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, Ocean Plan PAHs, pyrethroids, OP pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed.~~

~~3. Waterfront and Marine Operations: In addition to the above requirements for ocean receiving water monitoring, additional monitoring must be performed for marinas and boat launch and pier facilities:~~

~~a. For all marina or mooring field operators, in mooring fields with 10 or more occupied moorings, the ocean receiving water must be sampled for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.~~

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~~(1) For mooring field operators opting for an individual monitoring program (Section IV.B.1 above), this sampling must occur weekly (on the weekend) from May through October.~~

~~(2) For mooring field operators opting to participate in a regional integrated monitoring program (Section IV.B.2 above), this sampling must occur monthly from May through October on a high use weekend in each month. The Water Boards may allow a reduction in the frequency of sampling, through the regional monitoring program, after the first year of monitoring.~~

~~b. For all mooring field operators, the subtidal sediment (sand or finer, if present) within mooring fields and below piers shall be sampled and analyzed for Ocean Plan Table B metals (for marine aquatic life beneficial use), acute toxicity, PAHs, and tributyltin. For sediment toxicity testing, only an acute toxicity test using the amphipod Eohaustorius estuarius must be performed. This sampling shall occur at least three times during a five (5) year period. For mooring field operators opting to participate in a regional integrated monitoring program, the Water Boards may allow a reduction in the frequency of sampling after the first sampling effort's results are assessed.~~

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ATTACHMENT B

STANDARD PERMIT PROVISIONS AND GENERAL PROVISIONS

1. Standard Permit Provisions

Code of Federal Regulations Title 40 Section 122.41 (40 CFR 122.41) includes conditions, or provisions, that apply to all National Pollutant Discharge Elimination System (NPDES) permits. Additional provisions applicable to NPDES permits are in 40 CFR 122.42. All applicable provisions in 40 CFR 122.41 and 40 CFR 122.42 must be incorporated into this Order and NPDES permit. The applicable 40 CFR 122.41 and 40 CFR 122.42 provisions are as follows:

a. Duty to Comply [40 CFR 122.41(a)]

The Copermittee must comply with all of the provisions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

(1) The Copermittee must comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement. [40 CFR 122.41(a)(1)]

(2) The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the CWA, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who *negligently* violates Section 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the CWA, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318 or 405 of the CWA, or any

permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.
[40 CFR 122.41(a)(2)]

(3) Any person may be assessed an administrative penalty by the San Diego Regional Water Quality Control Board (San Diego Water Board), State Water Resources Control Board (State Water Board), or United States Environmental Protection Agency (USEPA) for violating Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.
[40 CFR 122.41(a)(3)]

b. DUTY TO REAPPLY [40 CFR 122.41(B)]

If a Copermittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Copermittee must apply for and obtain a new permit.

c. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE [40 CFR 122.41(C)]

It shall not be a defense for a Copermittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

d. DUTY TO MITIGATE [40 CFR 122.41(D)]

The Copermittee must take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

e. PROPER OPERATION AND MAINTENANCE [40 CFR 122.41(E)]

The Copermittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Copermittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a Copermittee only when the operation is necessary to achieve compliance with the conditions of this permit.

f. PERMIT ACTIONS [40 CFR 122.41(F)]

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Copermittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

g. PROPERTY RIGHTS [40 CFR 122.41(G)]

This permit does not convey any property rights of any sort, or any exclusive privilege.

h. DUTY TO PROVIDE INFORMATION [40 CFR 122.41(H)]

The Copermittee must furnish to the San Diego Water Board, State Water Board, or USEPA within a reasonable time, any information which the San Diego Water Board, State Water Board, or USPEA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Copermittee must also furnish to the San Diego Water Board, State Water Board, or USPEA upon request, copies of records required to be kept by this permit.

i. INSPECTION AND ENTRY [40 CFR 122.41(I)]

The Copermittee must allow the San Diego Water Board, State Water Board, USEPA, and/or their authorized representative (including an authorized contractor acting as their representative), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the Copermittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit; [40 CFR 122.41(i)(1)]

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit; [40 CFR 122.41(i)(2)]

(3) Inspect and photograph at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; [40 CFR 122.41(i)(3)] and

(4) Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location. [40 CFR 122.41(i)(4)]

j. MONITORING AND RECORDS [40 CFR 122.41(J)]

(1) Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity. [40 CFR 122.41(j)(1)]

(2) Except for records of monitoring information required by this permit related to the Copermittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR Part 503), the Copermittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board at any time. [40 CFR 122.41(j)(2)]

(3) Records for monitoring information must include: [40 CFR 122.41(j)(3)]

(a) The date, exact place, and time of sampling or measurements; [40 CFR 122.41(j)(3)(i)]
(b) The individual(s) who performed the sampling or measurements; [40 CFR 122.41(j)(3)(ii)]
(c) The date(s) analyses were performed; [40 CFR 122.41(j)(3)(iii)]
(d) The individual(s) who performed the analyses; [40 CFR 122.41(j)(3)(iv)]
(e) The analytical techniques or methods used; [40 CFR 122.41(j)(3)(v)] and
(f) The results of such analyses. [40 CFR 122.41(j)(3)(vi)]

(4) Monitoring must be conducted according to test procedures under 40 CFR Part 136 unless another method is required under 40 CFR Subchapters N or O.
[40 CFR 122.41(j)(4)]

In the case of pollutants for which there are no approved methods under 40 CFR Part 136 or otherwise required under 40 CFR Subchapters N and O, monitoring must be conducted according to a test procedure specified in the permit for such pollutants. [40 CFR 122.44(i)(1)(iv)]

(5) The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. [40 CFR 122.41(j)(5)]

k. **SIGNATORY REQUIREMENT [40 CFR 122.41(K)]**

(1) All applications, reports, or information submitted to the San Diego Water Board, State Water Board, or USEPA must be signed and certified. (See 40 CFR 122.22) [40 CFR 122.41(k)(1)]

(a) *For a municipality, State, Federal, or other public agency.* [All applications must be signed] [b]y either a principal executive officer or ranking elected official. [40 CFR 122.22(a)(3)]

(b) All reports required by permits, and other information requested by the San Diego Water Board, State Water Board, or USEPA must be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if: [40 CFR 122.22(b)]

(i) The authorization is made in writing by a person described in paragraph (a) of this section; [40 CFR 122.22(b)(1)]
(ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company, (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)
[40 CFR 122.22(b)(2)] and,
(iii) The written authorization is submitted to the San Diego Water Board and State Water Board. [40 CFR 122.22(b)(3)]

(c) *Changes to authorization.* If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the San Diego Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative. [40 CFR 122.22(c)]

(d) *Certification.* Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." [40 CFR 122.22(d)]

(2) The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both. [40 CFR 122.41(k)(2)]

I. Reporting Requirements [40 CFR 122.41(l)]

(1) *Planned changes.* The Copermittee must give notice to the San Diego Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when: [40 CFR 122.41(l)(1)]

(a) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b);
[40 CFR 122.41(l)(1)(i)] or

(b) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).
[40 CFR 122.41(l)(1)(ii)]

(c) The alteration or addition results in a significant change in the Copermittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. [40 CFR 122.41(l)(1)(iii)]

(2) Anticipated noncompliance. The Copermittee must give advance notice to the San Diego Water Board or State Water Board of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
[40 CFR 122.41(l)(2)]

(3) *Transfers*. This permit is not transferable to any person except after notice to the San Diego Water Board. The San Diego Water Board may require modification or revocation and reissuance of the permit to change the name of the Copermittee and incorporate such other requirements as may be necessary under the CWA.
[40 CFR 122.41(l)(3)]

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(4) Monitoring reports. Monitoring results must be reported at the intervals specified elsewhere in this permit. [40 CFR 122.41(l)(4)]

(a) Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the San Diego Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. [40 CFR 122.41(l)(4)(i)]

(b) If the Copermittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or another method required for an industry-specific waste stream under 40 CFR Subchapters N or O, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the San Diego Water Board or State Water Board. [40 CFR 122.41(l)(4)(ii)]

(c) Calculations for all limitations which require averaging of measurements must utilize an arithmetic mean unless otherwise specified in the permit. [40 CFR 122.41(l)(4)(iii)]

(5) *Compliance schedules*. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date. [40 CFR 122.41(l)(5)]

(6) Twenty-four hour reporting.

(a) The Copermittee must report any noncompliance that may endanger health or the environment. Any information must be provided orally within 24 hours from the time the Copermittee becomes aware of the circumstances. A written submission must also be provided within five (5) days of the time the Copermittee becomes aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6)(i)]

(b) The following must be included as information which must be reported within 24 hours under this paragraph: [40 CFR 122.41(l)(6)(ii)]

(i) Any unanticipated bypass that exceeds any effluent limitation in the permit (See 40 CFR 122.41(g)). [40 CFR 122.41(l)(6)(ii)(A)]
(ii) Any upset which exceeds any effluent limitation in the permit. [40 CFR 122.41(l)(6)(ii)(B)] and,
(iii) Violation of a maximum daily discharge limitation for any of the pollutants listed by the San Diego Water Board in the permit to be reported within 24

hours. (See 40 CFR 122.44(g))
[40 CFR 122.41(l)(6)(ii)(C)]

(c) The San Diego Water Board may waive the above-required written report on a case-by-case basis if the oral report has been received within 24 hours. [40 CFR 122.41(l)(6)(iii)]

(7) *Other noncompliance.* The Copermittee must report all instances of noncompliance not reported in accordance with the standard provisions required under 40 CFR 122.41(l)(4), (5), and (6), at the time monitoring reports are submitted. The reports must contain the information listed in the standard provisions required under 40 CFR 122.41(l)(6). [40 CFR 122.41(l)(7))]

(8) *Other information.* When the Copermittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the San Diego Water Board, State Water Board, or USEPA, the Copermittee must promptly submit such facts or information.
[40 CFR 122.41(l)(8)]

~~**a. BYPASS** [40 CFR 122.41(m)]~~

~~(1) *Definitions.*~~

~~(a) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. [40 CFR 122.41(m)(1)(i)] or~~

~~(b) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. [40 CFR 122.41(m)(1)(ii)]~~

~~(2) *Bypass not exceeding limitations*. The Copermittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the standard provisions required under 40 CFR 122.41(m)(3) and (4). [40 CFR 122.41(m)(2)]~~

~~(3) *Notice.*~~

~~(a) *Anticipated bypass*. If the Copermittee knows in advance of the need for a bypass, it must submit a notice, if possible at least ten days before the date of the bypass. [40 CFR 122.41(m)(3)(i)] or~~

~~(b) *Unanticipated bypass*. The Copermittee must submit notice of an unanticipated bypass in accordance with the standard provisions required under 40 CFR 122.41(l)(6) (24-hour notice). [40 CFR 122.41(m)(3)(ii)]~~

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~~(4) *Prohibition of Bypass.*~~

~~(a) Bypass is prohibited, and the San Diego Water Board may take enforcement action against a Copermittee for bypass, unless: [40 CFR 122.41(m)(4)(i)]~~

~~(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; [40 CFR 122.41(m)(4)(i)(A)]~~

~~(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; [40 CFR 122.41(m)(4)(i)(B)] and,~~

~~(iii) The Copermittee submitted notice in accordance with the standard provisions required under 40 CFR 122.41(m)(3). [40 CFR 122.41(m)(4)(i)(C)]~~

~~(b) The San Diego Water Board may approve an anticipated bypass, after considering its adverse effects, if the San Diego Water Board determines that it will meet the three conditions listed above. [40 CFR 122.41(m)(4)(ii)]~~

m. UPSET [40 CFR 122.41(N)]

(1) *Definition.* "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Copermittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. [40 CFR 122.41(n)(1)]

(2) *Effect of an upset*. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the standard provisions required under 40 CFR 122.41(n)(3) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. [40 CFR 122.41(n)(2)]

(3) *Conditions necessary for a demonstration of upset*. A Copermittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
[40 CFR 122.41(n)(3)]

(a) An upset occurred and that the Copermittee can identify the cause(s) of the upset; [40 CFR 122.41(n)(3)(i)]
(b) The permitted facility was at the time being properly operated; [40 CFR 122.41(n)(3)(ii)] and
(c) The Copermittee submitted notice of the upset in accordance with the standard provisions required under 40 CFR 122.41(l)(6)(ii)(B) (24-hour notice).
[40 CFR 122.41(n)(3)(iii)]
(d) The Copermittee complied with any remedial measures pursuant to the standard provisions required under 40 CFR 122.41(d).
[40 CFR 122.41(n)(3)(iii)]

(4) *Burden of proof*. In any enforcement proceeding, the Copermittee seeking to establish the occurrence of an upset has the burden of proof.
[40 CFR 122.41(n)(4)]

n. STANDARD PERMIT PROVISIONS FOR MUNICIPAL SEPARATE STORM SEWER SYSTEMS [40 CFR 122.42(c)]

The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the San Diego Water Board or State Water Board under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report must include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions; [40 CFR 122.42(c)(1)]

(2) Proposed changes to the storm water management programs that are established as permit conditions. Such proposed changes must be consistent with 40 CFR 122.26(d)(2)(iii); [40 CFR 122.42(c)(2)] and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under 40 CFR 122.26(d)(2)(iv) and (v); [40 CFR 122.42(c)(3)]

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; [40 CFR 122.42(c)(4)]

(5) Annual expenditures and budget for year following each annual report; [40 CFR 122.42(c)(5)]

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; [40 CFR 122.42(c)(6)]

(7) Identification of water quality improvements or degradation.
[40 CFR 122.42(c)(7)]

o. **STANDARD PERMIT PROVISIONS FOR STORM WATER DISCHARGES [40 CFR 122.42(D)]**

The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) must require compliance with the conditions of the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

2. General Provisions

In addition to the standard provisions required to be incorporated into the Order and NPDES permit pursuant to 40 CFR 122.41 and 40 CFR 122.42, several other general provisions apply to this Order. The general provisions applicable to this Order and NPDES permit are as follows:

a. **DISCHARGE OF WASTE IS A PRIVILEGE**

No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights. [CWC Section 13263(g)]

b. **DURATION OF ORDER AND NPDES PERMIT**

(1) *Effective date*. This Order and NPDES permit becomes effective on the date of its adoption provided the USEPA has no objection. If the USEPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. R9-2007-0001 upon the effective date of this Order, and supercedes Order Nos. R9-2009-0002 and R9-2010-0016 upon their expiration.

(2) *Expiration*. This Order and NPDES permit expires five years after adoption. [40 CFR 122.46(a)]

(3) *Continuation of expired order*. After this Order and NPDES permit expires, the terms and conditions of this Order and NPDES permit are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

c. **AVAILABILITY**

A copy of this Order must be kept at a readily accessible location and must be available to on-site personnel at all times.

d. CONFIDENTIALITY OF INFORMATION

Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the San Diego Water Board office.

Claims of confidentiality for the following information will be denied: [40 CFR 122.7(b)]

(1) The name and address of any permit applicant or Copermittee; [40 CFR 122.7(b)(1)] and

(2) Permit applications and attachments, permits, and effluent data. [40 CFR 122.7(b)(2)]

e. EFFLUENT LIMITATIONS

(1) *Interim effluent limitations*. The Copermittee must comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by the San Diego Water Board.

(2) *Other effluent limitations and standards*. If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in the permit, the San Diego Water Board shall institute proceedings under these regulations to modify or revoke and reissue the permit to conform to the toxic effluent standard or prohibition. [40 CFR 122.44(b)(1)]

f. DUTY TO MINIMIZE OR CORRECT ADVERSE IMPACTS

The Copermittee must take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

g. PERMIT ACTIONS

The filing of a request by the Copermittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order. (See 40 CFR 122.41(f)) In addition, the following provisions apply to this Order:

(1) Upon application by any affected person, or on its own motion, the San Diego Water Board may review and revise the requirements in this Order. All requirements must be reviewed periodically. [CWC Section 13263(e)]

(2) This Order may be terminated or modified for cause, including, but not limited to, all of the following: [CWC Section 13381]

(a) Violation of any condition contained in the requirements of this Order. [CWC Section 13381(a)]

(b) Obtaining the requirements in this Order by misrepresentation, or failure to disclose fully all relevant facts. [CWC Section 13381(b)]

(c) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. [CWC Section 13381(c)]

(3) When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

h. NPDES Permitted Non-Storm Water Discharges

The San Diego Water Board has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The San Diego Water Board or State Water Board may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to an MS4.

i. Monitoring

In addition to the standard provisions required under 40 CFR 122.41(j) and (l)(4), the following general monitoring provisions apply to this Order:

(1) Where procedures are not otherwise specified in Order, sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's Surface Water Ambient Monitoring Program (SWAMP), adopted by the State Water Resources Control Board (State Water Board).

(2) Pursuant to 40 CFR 122.41(j)(2) and CWC Section 13383(a), each Copermittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least five (5) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board at any time.

(3) All chemical, bacteriological, and toxicity analyses must be conducted at a laboratory certified for such analyses by the California Department of Public Health or a laboratory approved by the San Diego Water Board.

(4) For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Copermittees must instruct their laboratories to establish

calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Copermittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR Part 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Copermittee must submit documentation from the laboratory to the San Diego Water Board for approval prior to raising the ML for any priority toxic pollutant.

j. ENFORCEMENT

(1) The San Diego Water Board is authorized to enforce the terms of this Order under several provisions of the CWC, including, but not limited to, CWC Sections 13385, 13386, and 13387.

(2) Nothing in this Order shall be construed to protect the Copermittee from its liabilities under federal, state, or local laws.

(3) The CWC provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

(4) Except as provided in the standard conditions required under 40 CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the Copermittee from civil or criminal penalties for noncompliance.

(5) Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties to which the Copermittee is or may be subject to under Section 311 of the CWA.

(6) Nothing in this Order shall be construed to preclude institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

k. SEVERABILITY

The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

l. APPLICATIONS

Any application submitted by a Copermittee for reissuance or modification of this Order must satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the California Code of Regulations.

m. IMPLEMENTATION

All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

n. REPORT SUBMITTALS

(1) All report submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

(2) Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal.

(3) The Principal Watershed Copermittee(s) must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

(4) Unless otherwise directed, the Copermittees must submit one hard copy and one electronic copy of each report required under this Order to the San Diego Water Board, and one electronic copy to the USEPA.

(5) The Copermittees must submit reports and provide notifications as required by this Order to the following:

EXECUTIVE OFFICER
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

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ATTACHMENT C

ACRONYMS AND ABBREVIATIONS

1. Acronyms and Abbreviations

AMAL	Average Monthly Action Level
ASBS	Area(s) of Special Biological Significance
BMP	Best Management Practice
~~BMP Design Manual~~	~~Permanent BMP Sizing Criteria Design Manual~~
Basin Plan	Water Quality Control Plan for the San Diego Basin
CEQA	California Environmental Quality Act
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
ERP	Enforcement Response Plan
ESAs	Environmentally Sensitive Areas
GIS	Geographic Information System
IBI	Index of Biotic Integrity
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
ML	Minimum Level
MS4	Municipal Separate Storm Sewer System
NAL	Non-Storm Water Action Level
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
ROWD	Report of Waste Discharge (application for NPDES reissuance)
SAL	Storm Water Action Level
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SIC	Standard Industrial Classification Code
State Water Board	State Water Resources Control Board
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
Waters of the U.S.	Waters of the United States
WDID	Waste Discharge Identification Number

WLA	Waste Load Allocation
WQBEL	Water Quality Based Effluent Limitation

DEFINITIONS

2. Definitions

Active/Passive Sediment Treatment - Using mechanical, electrical or chemical means to flocculate or coagulate suspended sediment for removal from runoff from construction sites prior to discharge.

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Average Monthly Action Level – The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month or the geometric mean for bacteria, as applicable.~~.~~

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote tangible and intangible economic, social, and environmental goals. "Beneficial Uses" of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. ~~-~~In the case of municipal ~~storm water~~discharge permits, BMPs may be used in place of numeric effluent limits.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biotic integrity) of a water body.

Biocriteria - Under the CWA, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The USEPA defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use… (that)…describe the characteristics of water body segments least impaired by human activities."

Biofiltration - Practices that use vegetation and amended soils to detain and treat runoff from impervious areas. Treatment is through filtration, infiltration, adsorption, ion exchange, and biological uptake of pollutants.

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. *Environmental Management* 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

BMP Design Manual – A plan developed to eliminate, reduce, or mitigate the impacts of runoff from development projects, including Priority Development Projects.

Channel Rehabilitation and Improvement –Remedial measures or activities for the purpose of improving or restoring the environmental health of streams, channels or river systems. Techniques may vary from in-stream restoration techniques to off-line stormwater management practices installed in the system corridor or upland areas. Rehabilitation techniques may include, but are not limited to the following: riparian zone restoration, constructed wetlands, bank stabilization, channel modifications, and daylighting of drainage systems. Effectiveness may be measured in various manners, including: assessments of habitat, reduced streambank erosion, and restoration of water and sediment transport balance.

Clean Water Act Section 303(d) Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Construction Site – Any project, including projects requiring coverage under the Construction General Permit, that involves soil disturbing activities greater than 10,000 square feet including, but not limited to, clearing, grading, disturbances to ground such as stockpiling, and excavation. This does not include minor construction activities such as interior remodeling, plumbing, electrical, or mechanical work.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

Copermittee – An incorporated city within the County of Orange, County of Riverside, or County of San Diego in the San Diego Region (Region 9), the County of Orange, the County of Riverside, the County of San Diego, the Orange County Flood Control District, the Riverside County Water Conservation and Flood Control District, the San Diego Regional Airport Authority, or the Unified Port District of San Diego.

Copermittees – All of the individual Copermittees, collectively.

Critical Channel Flow (Qc) – The channel flow that produces the critical shear stress that initiates bed movement or that erodes the toe of channel banks. When measuring Qc, it should be based on the weakest boundary material – either bed or bank.

Daily Discharge – Defined as either: (1) the total mass of the constituent discharged over the calendar day or any 24 hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g. concentration.)

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The Daily Discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day, or other 24 hour period other than a day), or by the arithmetic mean of analytical results from one or more grab samples taken over the course of a day.

Development Projects - Construction, rehabilitation, redevelopment, or reconstruction of any public or private projects involving land disturbance activities. ~~residential project, industrial, commercial, or any other projects.~~

Dry Season – ~~The period of time from~~ May 1 to September 30. ~~when rainfall is not expected to occur the San Diego.~~

Dry Weather – Weather is considered dry if the preceding 72 hours has been without measurable precipitation (>0.1 inch).

Enclosed Bays – Enclosed bays are indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost bay works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Environmentally Sensitive Areas (ESAs) - Areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Orange; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees.

Estuaries – Waters, including coastal lagoons, located at the mouth of streams that serve as areas of mixing fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and ocean water. Estuaries do not include inland surface waters or ocean waters.

Existing Development – Any area that has been developed and exists for municipal, commercial, industrial, or residential purposes, uses, or activities. May include areas that are not actively used for its originally developed purpose, but may be re-purposed or redeveloped for another use or activity.

Flow Duration – The long-term period of time that flows occur above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams (not a single storm event duration). The simplest way to visualize this is to consider a histogram of pre- and post-project flows using long-term records of hourly data. To maintain pre-

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development flow duration means that the total number of hours (counts) within each range of flows in a flow-duration histogram cannot increase between the pre- and post-development condition. Flow duration within the range of geomorphologically significant flows is important for managing erosion.

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical reactivity. These also include materials named by the USEPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code" [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Hydromodification – The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport. In addition, alteration of stream and river channels, such as stream channelization, concrete lining, installation of dams and water impoundments, and excessive streambank and shoreline erosion are also considered hydromodification, due to their disruption of natural watershed hydrologic processes.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Inactive Areas – Areas of construction activity that are not active and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

Infiltration – Water other than wastewater that enters a sewer system (including sewer service connections and foundation drains) from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow [40 CFR 35.2005(20)].

Inland Surface Waters – Includes all surface waters of the ~~State~~ U.S. that do not include the ocean, enclosed bays, or estuaries.

Jurisdictional Runoff Management Program Document – A written description of the specific jurisdictional runoff management measures and programs that each Copermittee will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

Low Impact Development (LID) – A storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions.

Low Impact Development Best Management Practices (LID BMPs) – LID BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States through storm water management and land development strategies that emphasize conservation ~~s~~and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. LID BMPs include retention practices that do not allow runoff, such as infiltration, rain water harvesting and reuse, and evapotranspiration. LID BMPs also include flow-through practices such as biofiltration that may have some discharge of storm water following pollutant reduction.

Major Outfall – As defined in the Code of Federal Regulations, a major outfall is a MS4 outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (i.e. discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres); or, for MS4s that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or equivalent), a MS4 outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (i.e. discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

Maximum Daily Action Level (MDAL) –The highest allowable daily discharge of a pollutant, over a calendar day (or 24 hour period). For pollutants with action levels expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with action levels expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Maximum Extent Practicable (MEP) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) for storm water that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their runoff management programs. Their total collective and individual activities conducted pursuant to the runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the San Diego Water Board, the San Diego Water Board defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> “*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective*

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BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
c. Public Acceptance: Does the BMP have public support?
d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc.?

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Monitoring Year – The monitoring year begins annually on October 1st and ends on September 30th.

Municipal Separate Storm Sewer System (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26. "Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.26(a)(3)(vi).

National Pollutant Discharge Elimination System (NPDES) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges and NPDES permitted discharges.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act, a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during~~,~~ or as a result of~~,~~ the treatment or disposal of wastes."

Ocean Waters – the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Board's California Ocean Plan.

Order – Unless otherwise specified, refers to this Order, Order No. R9-2012-0011 (NPDES No. CAS0109266).

~~**Permanent BMP Sizing Criteria Design Manual** – A plan developed to eliminate, reduce, or mitigate the impacts of runoff from development projects, including Priority Development Projects.~~

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act, pollution is "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Permanent BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, remove, or educate to prevent the release of pollutants to surface waters from development projects in perpetuity, after construction of a project is completed.

Pre-Development Runoff Conditions ~~**(Discharge Rates, Durations, Etc.)**~~ – "Runoff conditions that exist~~ed~~ onsite immediately before the ~~existing development was constructed, or exists onsite before~~ planned development activities occur. Pre-development is not intended to be interpreted as that period before any human-induced land disturbance activity has occurred." 64 FR 68761.~~This definition includes natural watershed hydrology before any human induced~~

~~land alterations.~~

Priority Development Projects - New development and redevelopment projects defined under Provision E.3.b of Order No. R9-2012-0011.

Properly Designed – Designed in accordance with the Copermittee's BMP Design Manual and/or any appropriate design requirements set forth by the Copermittee and based on widely accepted design criteria.

Public Education, Outreach and Participation – Programs to educate residents, businesses and visitors about the importance of water quality and water quality programs so that they will support local efforts and understand their role in protecting receiving waters. The Education and Outreach Program will increase knowledge and awareness, improve attitudes toward storm pollution prevention, and provide a foundation for changing behaviors that contribute to storm water pollution.

Rainy Season (aka Wet Season) – ~~The period of time from~~ October 1 to April 30. ~~when the San Diego Region experiences the most rainfall.~~

Receiving Waters – Waters of the ~~United States~~U.S.

Receiving Water Limitations - Waste discharge requirements issued by the San Diego Water Board typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; parking lots; resurfacing existing roadways; cutting and reconfiguring of surface parking lots; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair.

Retain –Keep or hold in a particular place, condition, or position without discharge to surface waters.

Retrofit – Retrofit is defined as a stormwater management practice (usually structural) put into place after development has occurred in watersheds where practices previously did not exist or are ineffective. The purpose of retrofits is to improve water quality, protect downstream channels, reduce flooding, or meet other specific objectives. Some examples of retrofits include, but are not limited to the following: green roofs, downspout and impervious cover disconnection, permeable pavement, bioretention, rain barrels, rain gardens, vacant lot stabilization, trash area enclosures, additional trash and waste disposal containers.

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Runoff - All flows in a storm water conveyance system that consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water including dry weather flows.

San Diego Water Board – As used in this document the term "San Diego Water Board" is synonymous with the term "Regional Board" as defined in Water Code section 13050(b) and is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment Control BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and runoff.

State Water Quality Protection Area – A nonterrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration in natural water quality, including, but not limited to, areas of special biological significance that have been designated by the State Water Board through its water quality control planning process. Areas of special biological significance are a subset of State Water Quality Protection Areas, and require special protection as determined by the State Water Resources Control Board pursuant to the California Ocean Plan adopted and reviewed pursuant to Article 4 (commencing with Section 13160) of Chapter 3 of Division 7 of the California Water Code and pursuant to the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (California Thermal Plan) adopted by the State Water Board.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage. ~~Surface runoff and drainage pertains to runoff and drainage resulting from precipitation events.~~

Structural BMP – Any structural control which detains, retains, or filters, to reduce the release of pollutants to surface waters from development projects (e.g. treatment control BMPs) which remains after construction.

Total Maximum Daily Load (TMDL) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Basin Plan, state in part…"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge".

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Unpaved Road – Any long, narrow stretch without pavement used for traveling by motor passenger vehicles between two or more points. Unpaved roads are generally constructed of dirt, gravel, aggregate or macadam and may be improved or unimproved.

Waste - As defined in CWC Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans. Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

Water Quality Standards - Water quality standards, as defined in Clean Water Act section 303(c) consist of the beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of a water body and criteria (referred to as water quality objectives in the California Water Code) necessary to protect those uses. Under the Water Code, the water boards establish beneficial uses and water quality objectives in water quality control or basin plans. Together with an anti-degradation policy, these beneficial uses and water quality objectives serve as water quality standards under the Clean Water Act. In Clean Water Act parlance, state beneficial uses are called “designated uses” and state water quality objectives are called “criteria.” Throughout this Order, the relevant term is used depending on the statutory scheme.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State ~~regardless of circumstances or condition.~~. Under this definition, portions of a MS4 ~~is always~~may be considered to be a Waters of the State. However, man-made portions of the MS4 constructed for the sole purpose of flow and/or pollutant reduction are not considered waters of the state.

Waters of the United States - As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: “(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate “wetlands;” (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, “wetlands,” sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) “Wetlands” adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area’s status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA.”

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Wet Season (aka Rainy Season) – The period of time from October 1 to April 30 when the San Diego Region experiences the most rainfall.

Wet Weather – Weather is considered wet if there is a storm event of 0.1 inches and greater and the following 72 hours, unless defined in another regulatory mechanism such as a TMDL.

ATTACHMENT D

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM

FY ________________

I. COPERMITTEE INFORMATION		
Copermittee Name:		
Copermittee Primary Contact Name:		
Copermittee Primary Contact Information: Address: City: County: State: Zip: Telephone: Fax: Email:		
II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☐ ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	☐ ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☐ ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Number of non-storm water discharges reported by the public		
Number of non-storm water discharges detected by Copermittee staff or contractors		
Number of non-storm water discharges investigated by the Copermittee		
Number of sources of non-storm water discharges identified		
Number of non-storm water discharges eliminated		
Number of sources of illicit discharges or connections identified		
Number of illicit discharges or connections eliminated		
Number of enforcement actions issued		
Number of high level enforcement actions issued		
V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Was an update to the ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual required or recommended by the San Diego Water Board?	YES NO	☐ ☐
If YES to the question above, did the Copermittee update its ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual and make it available on the Regional Clearinghouse?	YES NO	☐ ☐
Number of proposed development projects in review		
Number of Priority Development Projects in review		
Number of Priority Development Projects approved		
Number of approved Priority Development Projects exempt from any BMP requirements		
Number of approved Priority Development Projects requiring mitigation		
Number of Priority Development Projects granted occupancy		
Number of completed Priority Development Projects in inventory		
Number of high priority Priority Development Project ~~permanent~~ structural BMP inspections		
Number of Priority Development Project ~~permanent~~ structural BMP violations		
Number of enforcement actions issued		

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM

Number of high level enforcement actions issued	

FY ________________

VI. CONSTRUCTION MANAGEMENT PROGRAM		
Has the Copermittee implemented a construction management program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Number of construction sites in inventory		
Number of active construction sites in inventory		
Number of inactive construction sites in inventory		
Number of construction sites closed/completed during reporting period		
Number of construction site inspections		
Number of construction site violations		
Number of enforcement actions issued		
Number of high level enforcement actions issued		
VII EXISTING DEVELOPMENT MANAGEMENT PROGRAM		
Has the Copermittee implemented an existing development management program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

	Municipal	Commercial	Industrial	Residential
Number of existing developments in inventory				
Number of existing development inspections				
Number of follow-up inspections				
Number of existing development violations				
Number of enforcement actions issued				
Number of high level enforcement actions issued				

VIII PUBLIC EDUCATION AND PARTICIPATION		
Has the Copermittee implemented a public education program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Has the Copermittee implemented a mechanism for public participation and where necessary intergovernmental coordination that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
IX. FISCAL ANALYSIS		
Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☐ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

______________________	______________________
Signature	Date
______________________	______________________
Print Name	Title
______________________	______________________
Telephone Number	Email

**JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM**

ADMINISTRATIVE DRAFT

ATTACHMENT E

SPECIFIC PROVISIONS FOR TOTAL MAXIMUM DAILY LOADS APPLICABLE TO ORDER NO. R9-2012-0011

These provisions implement Total Maximum Daily Loads (TMDLs), adopted by the San Diego Water Board and approved by USEPA under Clean Water Act section 303(c), which are applicable to discharges regulated under this Order. The provisions and schedules for implementation of the TMDLs described below must be incorporated into the Water Quality Improvement Plans and monitoring requirements, required pursuant to Provisions B and D of this Order, respectively, for the specified Watershed Management Areas.

1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed~~Total Maximum Daily Load for Diazinon in Chollas Creek WatershedTotal Maximum Daily Load for Diazinon in Chollas Creek Watershed~~ Resolution No. R9-2002-0123
2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin Resolution No. R9-2005-0019
~~3. Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed~~
~~4.~~3. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek Resolution No. R9-2007-0043
~~5.~~4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Resolution No. R9-2008-0027
~~6.~~5. Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) Resolution No. R9-2010-0001

ADMINISTRATIVE DRAFT

1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed

a. Applicability

(1) TMDL Basin Plan Amendment: Resolution No. R9-2002-0123

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	August 14, 2002
State Water Board Approval Date:	July 16, 2003
Office of Administrative Law Approval Date:	September 11, 2003
US EPA Approval Date:	November 3, 2003

(3) TMDL Effective Date: September 11, 2003

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Chollas Creek

(6) Responsible Copermittees: City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, Unified Port District of San Diego

b. Water Quality Based Effluent Limitations

The WQBELs for Chollas Creek consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 1.~~II~~c:

Table 1.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Receiving Water Limitation	Averaging Period
Diazinon	Acute	0.08 µg/L	1 hour
	Chronic	0.05 µg/L	4 days

(2) Effluent Limitations

Discharges from the MS4s must not contain concentrations that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 1.~~II~~c:

Table 1.2
Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Constituent	Exposure Duration	Effluent Limitation	Averaging Period
Diazinon	Acute	0.072 µg/L	1 hour
	Chronic	0.045 µg/L	4 days

(3) Best Management Practices

~~The following~~ BMPs for Chollas Creek ~~must~~may be incorporated into the Water Quality Improvement Plan for the San Diego Bay Watershed Management Area and implemented by the Responsible Copermittees:

~~(a) The Responsible Copermittees must implement BMPs capable of achieving the WQBELs under Specific Provision 1. for Chollas Creek.~~
~~(b) Responsible Copermittees must implement the Diazinon Toxicity Control Plan and Diazinon Public Outreach/Education Program as described in the report titled, *Technical Report for Total Maximum Daily Load for Diazinon in Chollas Creek Watershed, San Diego County*, dated August 14, 2002, including subsequent modifications, in order to achieve the WQBELs under Specific Provision 1..~~

~~(c)~~(a) The Responsible Copermittees should coordinate ~~the~~any implemented BMPs to address this TMDL with Caltrans ~~wherever and whenever~~ , as possible.

c. COMPLIANCE SCHEDULE

The Responsible Copermittees were required to achieve their WLA by December 31, 2010. The Responsible Copermittees must be in compliance with the WQBELs under Specific Provision 1.b~~kk~~.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or

(2) Applicable effluent limitations are met, or

(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or

(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or

(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

ADMINISTRATIVE DRAFT

(1) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Investigation Order No. R9-2004-0277, *California Department of Transportation and San Diego Municipal Separate Storm Sewer System Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed*. The monitoring reports required under Investigation Order No. R9-2004-0277 must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

~~The Responsible Copermittees must monitor the effluent of the MS4 outfalls for diazinon within the Chollas Creek watershed, and calculate or estimate the monthly and annual diazinon loads, in accordance with the requirements of Provisions , , and of this Order. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision of this Order.~~

ADMINISTRATIVE DRAFT

2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2005-0019

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	February 9, 2005
State Water Board Approval Date:	September 22, 2005
Office of Administrative Law Approval Date:	December 2, 2005
US EPA Approval Date:	February 8, 2006

(3) TMDL Effective Date: December 2, 2005

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Shelter Island Yacht Basin

(6) Responsible Copermittees: City of San Diego, San Diego Unified Port District

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for Shelter Island Shoreline Park consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 2.c~~qq~~:

Table 2.1
Receiving Water Limitations as Concentrations in Shelter Island Yacht Basin

Constituent	Exposure Duration	Effluent Limitation	Averaging Period
Dissolved Copper	Acute	4.8 µg/L	1 hour
	Chronic	3.1 µg/L	4 days

(2) Effluent Limitations

Discharges from the MS4s must not contain pollutant loads that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 2.~~qq~~c:

Table 2.2
Effluent Limitations as Annual Loads in MS4 Discharges to Shelter Island Yacht Basin

Constituent	Effluent Limitation
Dissolved Copper	30 kg/yr

(3) Best Management Practices

The Responsible Copermittees ~~must~~may implement BMPs ~~capable of achieving~~to support the achievement of WQBELs under Specific Provision 2.~~pp~~ bfor Shelter Island Yacht Basin

c. Compliance Schedule

The Responsible Copermittees ~~was~~ are required to achieve ~~its~~ respective WLAs ~~upon the effective date of the TMDL,~~by December 2, ~~2005~~2022. The Responsible Copermittees must be in compliance with the WQBELs under Specific Provision 2.b~~pp~~.

d. Compliance Determination

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or

(2) Applicable effluent limitations are met, or

(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or

(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or

(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

~~d.~~e. Specific Monitoring and Assessment Requirements

(1) The Responsible Copermittees must ~~monitor~~implement the ~~effluent of its MS4 outfalls for dissolved copper, and calculate or estimate the monthly and annual dissolved copper loads, in accordance with the~~ monitoring and assessment requirements ~~of Provisions , , and of this~~ issued under Order~~.~~ No. R9-2005-0019. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

~~4. Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed~~

~~5.~~

~~6. Applicability~~

~~7.~~

~~8. TMDL Basin Plan Amendment: Resolution No. R9-2005-0036~~

~~9.~~

~~10. TMDL Adoption and Approval Dates:~~

~~11.~~

~~12. San Diego Water Board Adoption Date: February 9, 2005~~

~~13. State Water Board Approval Date: November 16, 2005~~

~~14. Office of Administrative Law Approval Date: February 1, 2006~~

~~15. US EPA Approval Date: March 22, 2006~~

~~16.~~

~~17. TMDL Effective Date: February 1, 2006~~

~~18.~~

~~19. Watershed Management Area: Santa Margarita River~~

~~20.~~

~~21. Water Body: Rainbow Creek~~

~~22.~~

~~23. Responsible Copermittee: County of San Diego~~

~~24.~~

~~25. Water Quality Based Effluent Limitations~~

~~26.~~

~~27. The WQBELs for Rainbow Creek consist of the following~~

~~28.~~

~~29. Receiving Water Limitations~~

~~30.~~

~~31. Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 3.c.(1):~~

~~32.~~

~~33. Table 3.1~~

~~34. Receiving Water Limitations as~~

~~35. Concentrations in Rainbow Creek~~

~~36. Constituent~~	~~37. Receiving Water 38. Limitation~~
~~39. Nitrate (as N)~~	~~40. 10 mg/L~~
~~41. Total Nitrogen~~	~~42. 1 mg/L~~
~~43. Total Phosphorus~~	~~44. 0.1 mg/L~~

~~45.~~

~~47.~~
~~48. Effluent Limitations~~
~~49.~~
~~50. Discharges from the MS4s must not contain concentrations that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 3.c.(1):~~
~~51.~~
~~52. Table 3.2~~
~~53. Effluent Limitations as Concentrations in~~
~~54. MS4 Discharges to Rainbow Creek~~

~~55. Constituent~~	~~56. Effluent 57. Limitation~~
~~58. Nitrate (as N)~~	~~59. 10 mg/L~~
~~60. Total Nitrogen~~	~~61. 1 mg/L~~
~~62. Total Phosphorus~~	~~63. 0.1 mg/L~~

~~64.~~
~~65. Pollutant loads from given land uses discharging to and from the MS4s must not exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 3.c.(1):~~
~~66.~~
~~67. Table 3.3~~
~~68. Effluent Limitations as Annual Loads in~~
~~69. MS4 Discharges to Rainbow Creek~~

~~70. Land Use~~	~~71. Total N~~	~~72. Total P~~
~~73. Commercial nurseries~~	~~74. 116 kg/yr~~	~~75. 3 kg/yr~~
~~76. Park~~	~~77. 3 kg/yr~~	~~78. 0.1 kg/yr~~
~~79. Residential areas~~	~~80. 149 kg/yr~~	~~81. 12 kg/yr~~
~~82. Urban areas~~	~~83. 27 kg/yr~~	~~84. 6 kg/yr~~

~~85.~~
~~86. Interim effluent limitations expressed as pollutant loads are given in the compliance schedule under Specific Provision 3.0.~~
~~87.~~
~~88. Best Management Practices~~
~~89.~~
~~90. The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 3.b for Rainbow Creek.~~
~~91.~~

ADMINISTRATIVE DRAFT

~~92. The Responsible Copermittee should coordinate the BMPs to address this TMDL with Caltrans and other sources wherever and whenever possible.~~

~~93.~~

ADMINISTRATIVE DRAFT

~~95. Compliance Schedule~~

~~96.~~

~~97. WLA Compliance Date~~

~~98.~~

~~99. The Responsible Copermittee is required to achieve its WLAs, thus must be in compliance with the WQBELs under Specific Provision 3.b, by December 31, 2021.~~

~~100.~~

~~101. Interim Compliance Requirements~~

~~102.~~

~~103. Table 3.4~~

~~104. Interim Effluent Limitations as Annual Loads in~~

~~105. MS4 Discharges from Specific Land Uses to Rainbow Creek~~

~~106.~~	~~107. Total N~~ ~~108. Interim Effluent Limitations~~ ~~109. (kg/yr)~~			~~110. Total P~~ ~~111. Interim Effluent Limitations~~ ~~112. (kg/yr)~~		
~~113.~~	~~114. Interim Compliance Date~~			~~115. Interim Compliance Date~~		
~~116. Land Use~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~
~~123. Commercial nurseries~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~
~~130. Park~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~
~~137. Residential areas~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~
~~144. Urban areas~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~

~~Specific Monitoring and Assessment Requirements~~

~~The Responsible Copermittee must implement the Sampling and Analysis Plan for Rainbow Creek Nutrient Reduction TMDL Implementation Water Quality Monitoring, dated January 2010. The results of any monitoring conducted during the reporting period, and assessment of whether the interim and final WQBELs have been achieved must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.~~

3. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek

a. Applicability

(1) TMDL Basin Plan Amendment: Resolution No. R9-2007-0043

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	June 13, 2007
State Water Board Approval Date:	July 15, 2008
Office of Administrative Law Approval Date:	October 22, 2008
US EPA Approval Date:	December 18, 2008

(3) TMDL Effective Date: October 22, 2008

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Chollas Creek

(6) Responsible Copermittees: City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, San Diego Unified Port District ~~of San Diego~~

b. Water Quality Based Effluent Limitations

The WQBELs for Chollas Creek consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 4.c.(1):

Table 3.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
Dissolved Copper	Acute	$(0.96) \times e^{[0.9422 \times \ln(\text{hardness}) - 1.700]} \times WER^*$	1 hour
	Chronic	$(0.96) \times e^{[0.8545 \times \ln(\text{hardness}) - 1.702]} \times WER^*$	4 days
Dissolved Lead	Acute	$[1.46203 - 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 1.460]} \times WER^*$	1 hour
	Chronic	$[1.46203 - 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 4.705]} \times WER^*$	4 days
Dissolved Zinc	Acute	$(0.978) \times e^{[0.8473 \times \ln(\text{hardness}) + 0.884]} \times WER^*$	1 hour
	Chronic	$(0.986) \times e^{[0.8473 \times \ln(\text{hardness}) + 0.884]} \times WER^*$	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

(2) Effluent Limitations

Discharges from the MS4s must not contain pollutant loads that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 4.c.(1):

Table 3.2
Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
Dissolved Copper	Acute	$90\% \times (0.96) \times e^{[0.9422 \times \ln(hardness) - 1.700]} \times WER^*$	1 hour
	Chronic	$90\% \times (0.96) \times e^{[0.8545 \times \ln(hardness) - 1.702]} \times WER^*$	4 days
Dissolved Lead	Acute	$90\% \times [1.46203 - 0.145712 \times \ln(hardness)] \times e^{[1.273 \times \ln(hardness) - 1.460]} \times WER^*$	1 hour
	Chronic	$90\% \times [1.46203 - 0.145712 \times \ln(hardness)] \times e^{[1.273 \times \ln(hardness) - 4.705]} \times WER^*$	4 days
Dissolved Zinc	Acute	$90\% \times (0.978) \times e^{[0.8473 \times \ln(hardness) + 0.884]} \times WER^*$	1 hour
	Chronic	$90\% \times (0.986) \times e^{[0.8473 \times \ln(hardness) + 0.884]} \times WER^*$	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

(3) Best Management Practices

(a) The Responsible Copermittee ~~must~~may implement BMPs ~~capable of achieving~~to support the achievement of WQBELs under Specific Provision 4.c~~uu~~ for Chollas Creek.

(b) The Responsible Copermittees should coordinate the BMPs to address this TMDL with Caltrans and the U.S. Navy ~~wherever and whenever~~, as possible.

c. Compliance Schedule

(1) WLA Compliance Date

The Responsible Copermittee is required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 4.b~~uu~~, by October 22, 2028.

(2) Interim Compliance Requirements

The Responsible Copermittee must comply with the following interim WQBELs by the interim compliance date:

Table 3.1
Interim Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Interim Compliance Date	Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
October 22, 2018	Dissolved Copper	Acute	1.2 x 90% x (0.96) x $e^{[0.9422 \times \ln(\text{hardness}) - 1.700]}$ x WER*	1 hour
		Chronic	1.2 x 90% x (0.96) x $e^{[0.8545 \times \ln(\text{hardness}) - 1.702]}$ x WER*	4 days
	Dissolved Lead	Acute	1.2 x 90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(\text{hardness}) - 1.460]}$ x WER*	1 hour
		Chronic	1.2 x 90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(\text{hardness}) - 4.705]}$ x WER*	4 days
	Dissolved Zinc	Acute	1.2 x 90% x (0.978) x $e^{[0.8473 \times \ln(\text{hardness}) + 0.884]}$ x WER*	1 hour
		Chronic	1.2 x 90% x (0.986) x $e^{[0.8473 \times \ln(\text{hardness}) + 0.884]}$ x WER*	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

d. Compliance Determination

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or

(2) Applicable effluent limitations are met, or

(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or

(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or

(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

e. Specific Monitoring and Assessment Requirements

(1) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Investigation Order No. R9-2004-0277, *California Department of Transportation and San Diego Municipal Separate Storm Sewer System Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed*, when it is amended to include monitoring requirements for the Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek. The monitoring reports required under Investigation Order No. R9-2004-0277 must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

(2) The Responsible Copermittees must ~~monitor~~implement the ~~effluent of the MS4 outfalls discharging to Chollas Creek for dissolved copper, lead, and zinc, and calculate or estimate the monthly and annual dissolved copper, lead, and zinc loads, in accordance with the~~ monitoring and assessment requirements ~~of Provisions , , and of~~ issued under Order No. R9-2007-0043, as consistent with this Order~~.~~.. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

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4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2008-0027

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date: June 11, 2008
State Water Board Approval Date: June 16, 2009
Office of Administrative Law Approval Date: September 15, 2009
US EPA Approval Date: October 26, 2009

(3) TMDL Effective Date: September 15, 2009

(4) Watershed Management Areas: See Table 5.0

(5) Water Bodies: See Table 5.0

(6) Responsible Copermittees: See Table 5.0

Table 4.0
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County	Dana Point Harbor	Baby Beach	-City of Dana Point -County of Orange
San Diego Bay	San Diego Bay	Shelter Island Shoreline Park	-Unified Port of San Diego

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for segments or areas of the water bodies listed in Table 5.0 consist of the following:

(1) Receiving Water Limitations

(a) Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedules under Specific Provisions 5.c.(1)(a) and 5.c.(2):

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Table 4.1
Receiving Water Limitations as Bacteria Densities in the Water Body

Constituent	Receiving Water Limitations: Single Sample Maximum[1,2]	Receiving Water Limitations: 30-Day Geometric Mean[2]
Total Coliform	10,000 MPN/100mL	1,000 MPN/100mL
Fecal Coliform	400 MPN/100mL	200 MPN/100mL
Enterococcus	104 MPN/100mL	35 MPN/100mL

Notes:
1. During wet weather days, only the single sample maximum receiving water limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved.

(b) If the above receiving water limitations are not met in the receiving water, the Responsible Copermittees must demonstrate that the discharges from the MS4s are not causing or contributing to the violation of receiving water limitations. The Copermittee must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 5.b.(2).

(2) Effluent Limitations

Discharges from the MS4s must not contain densities that exceed the following effluent limitations by the end of the compliance schedules under Specific Provisions 5.c.(1)(a) and 5.c.(2) to demonstrate the discharge is not causing or contributing to a violation of receiving water quality standards:

Table 4.2
Effluent Limitations as Bacteria Densities in MS4 Discharges to the Water Body

Constituent	Effluent Limitations: Single Sample Maximum[1,2]	Effluent Limitations: 30-Day Geometric Mean[2]
Total Coliform	10,000 MPN/100mL	1,000 MPN/100mL
Fecal Coliform	400 MPN/100mL	200 MPN/100mL
Enterococcus	104 MPN/100mL	35 MPN/100mL

Notes:
1. During wet weather days, only the single sample maximum effluent limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean effluent limitations are required to be achieved.

Interim effluent limitations expressed as pollutant loads are given in the compliance schedule under Specific Provision 5.c.

(3) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 5.0 fulfill the Bacteria Load Reduction Plan (BLRP) requirements in Resolution No. R9-2008-0027.

(b) The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 5.0 for the segments or areas of the water bodies listed in Table 5.0

c. COMPLIANCE SCHEDULE

(1) Baby Beach in Dana Point Harbor

(a) WLA Compliance Dates

The Responsible Copermittees for MS4 discharges to Baby Beach are required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 5.0, according to the following compliance schedule:

Table 4.3
Compliance Schedule Dates to Achieve Baby Beach WLAs

Constituent	Dry Weather WLA Compliance Date	Wet Weather WLA Compliance Date
Total Coliform	September 15, 2014	September 15, 2009
Fecal Coliform		September 15, 2009
Enterococcus		September 15, 2019

(b) Interim Compliance Requirements

The Responsible Copermittees for MS4 discharges to Baby Beach must comply with the following interim WQBELs by the interim compliance date:

Table 4.4
Interim Effluent Limitations as Loads in MS4 Discharges to Baby Beach

Constituent	Interim Compliance Date	Dry Weather Interim Effluent Limitation	Wet Weather Interim Effluent Limitation
Total Coliform	September 15, 2012	$5.32x10^9$ MPN/day	NA*
Fecal Coliform	September 15, 2012	$0.59x10^9$ MPN/day	NA*
Enterococcus	September 15, 2012	$0.42x10^9$ MPN/day	NA**
	September 15, 2016	NA*	$207x10^9$ MPN/30days

Notes:
* The WQBELs under Specific Provision 5.b must already be achieved by the given interim compliance date.
** There is no corresponding interim WQBEL for the given interim compliance date.

(2) Shelter Island Shoreline Park in San Diego Bay

The Responsible Copermittee for MS4 discharges to Shelter Island Shoreline Park is required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 5.0, by December 31, 2012.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or

(2) Applicable effluent limitations are met, or

(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or

(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or

(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

~~d.~~e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

(1) Monitoring Stations and Procedures

The Responsible Copermittees must implement the monitoring requirements issued under Order No. R9-2008-0027.

~~(a) designate the MS4 outfalls within their jurisdiction discharging to the segments or areas of the water bodies listed in Table 5.0 as high priority non-storm water MS4 monitoring stations, in accordance with the requirements of Provision D.1.~~

~~(b)~~

~~(c) The Responsible Copermittees must establish at least one monitoring station within the receiving water body.~~

~~(2) Monitoring Procedures~~

~~(a) The Responsible Copermittees must monitor the effluent of the designated MS4 outfalls within their jurisdiction discharging during dry weather conditions to the segments or areas of the water bodies listed in Table 5.0 in accordance with the dry weather jurisdictional monitoring requirements of Provision D.1.a.(1)(b). Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(b) The Responsible Copermittees must monitor, within the first 24 hours of each storm event,[25] the effluent of the designated MS4 outfalls within their~~

~~[25] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].~~

~~jurisdiction discharging to the segments or areas of the water bodies listed in Table 5.0 in accordance with the wet weather jurisdictional monitoring requirements of Provision D.1.b.(1)(b) of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(c) The Responsible Copermittees must collect samples from the monitoring stations within the receiving water body for each dry weather and wet weather MS4 outfall monitoring event. Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(3)~~(2) Assessment and Reporting Requirements

(a) The Responsible Copermittees must analyze the dry weather and wet weather monitoring data to assess whether the interim and final WQBELs have been achieved.

(b) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

5. Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2010-0001

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date: ___February 10, 2010
State Water Board Approval Date: ___December 14, 2010
Office of Administrative Law Approval Date: ___April 4, 2011
US EPA Approval Date: ___June 22, 2011

(3) TMDL Effective Date: April 4, 2011

(4) Watershed Management Areas: See Table 6.0

(5) Water Bodies: See Table 6.0

The water bodies identified in Table 6.0 are subject to the requirements of this Attachment E, except those water bodies listed in Table 6.0 that have been delisted from the 303(d) list for REC-1 bacteria impairments. These delisted water bodies are not subject to the requirements of this Attachment E so long as monitoring data continues to support compliance with water quality standards.

(6) Responsible Copermittees: See Table 6.0

Table 5.0
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

<table>
<tr><th>Watershed Management Area</th><th>Water Body</th><th>Segment or Area</th><th>Responsible Copermittees</th></tr>
<tr><td rowspan="7">South Orange County</td><td rowspan="2">Pacific Ocean Shoreline</td><td>Cameo Cove at Irvine Cove Drive – Riviera Way</td><td rowspan="2">-City of Laguna Beach
-County of Orange
-Orange County Flood Control District</td></tr>
<tr><td>at Heisler Park - North</td></tr>
<tr><td rowspan="5">Pacific Ocean Shoreline</td><td>at Main Laguna Beach</td><td rowspan="5">-City of Aliso Viejo
-City of Laguna Beach
-City of Laguna Woods
-County of Orange
-Orange County Flood Control District</td></tr>
<tr><td>Laguna Beach at Ocean Avenue</td></tr>
<tr><td>Laguna Beach at Cleo Street</td></tr>
<tr><td>Arch Cove at Bluebird Canyon Road</td></tr>
<tr><td>Laguna Beach at Dumond Drive</td></tr>
</table>

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Table 5.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County (cont'd)	Pacific Ocean Shoreline	Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach	-City of Aliso Viejo -City of Laguna Beach -City of Laguna Hills -City of Laguna Niguel -City of Laguna Woods -City of Lake Forest -City of Mission Viejo -County of Orange -Orange County Flood Control District
	Aliso Creek	Entire reach (7.2 miles) and associated tributaries: - Aliso Hills Channel - English Canyon Creek - Dairy Fork Creek - Sulfur Creek - Wood Canyon Creek	
	Aliso Creek Mouth	at mouth	
	Pacific Ocean Shoreline	Aliso Beach at West Street	-City of Dana Point -City of Laguna Beach -City of Laguna Niguel -County of Orange -Orange County Flood Control District
		Aliso Beach at Table Rock Drive	
		100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)	
		at Salt Creek (large outlet)	
		Salt Creek Beach at Salt Creek service road	
		Salt Creek Beach at Strand Road	
	Pacific Ocean Shoreline	at San Juan Creek	-City of Dana Point -City of Laguna Hills -City of Laguna Niguel -City of Mission Viejo -City of Rancho Santa Margarita -City of San Juan Capistrano -County of Orange -Orange County Flood Control District
	San Juan Creek	lower 1 mile	
	San Juan Creek Mouth	at mouth	

Table 5.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I- Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County (cont'd)	Pacific Ocean Shoreline	at Poche Beach Ole Hanson Beach Club Beach at Pico Drain San Clemente City Beach at El Portal Street Stairs San Clemente City Beach at Mariposa Street San Clemente City Beach at Linda Lane San Clemente City Beach at South Linda Lane San Clemente City Beach at Lifeguard Headquarters under San Clemente Municipal Pier San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane) San Clemente State Beach at Riviera Beach Can Clemente State Beach at Cypress Shores	- City of Dana Point -City of San Clemente -County of Orange -Orange County Flood Control District
San Luis Rey River	Pacific Ocean Shoreline	at San Luis Rey River mouth	-City of Oceanside -City of Vista -County of San Diego
Carlsbad	Pacific Ocean Shoreline	at Moonlight State Beach	-City of Carlsbad -City of Encinitas -City of Escondido -City of Oceanside -City of San Marcos -City of Solana Beach -City of Vista -County of San Diego
San Dieguito River	Pacific Ocean Shoreline	at San Dieguito Lagoon mouth	-City of Del Mar -City of Escondido -City of Poway -City of San Diego -City of Solana Beach -County of San Diego
Penasquitos (Miramar Reservior HA)	Pacific Ocean Shoreline	Torrey Pines State Beach at Del Mar (Anderson Canyon)	-City of Del Mar -City of Poway -City of San Diego -County of San Diego
Mission Bay	Pacific Ocean Shoreline	La Jolla Shores Beach at El Paseo Grande La Jolla Shores Beach at Caminito del Oro	-City of San Diego

Table 5.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I- Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
		La Jolla Shores Beach at Vallecitos	
Mission Bay (cont'd)	Pacific Ocean Shoreline	La Jolla Shores Beach at Avenida de la Playa	-City of San Diego
		at Casa Beach, Children's Pool	
		South Casa Beach at Coast Boulevard	
		Whispering Sands Beach at Ravina Street	
		Windansea Beach at Vista de la Playa	
		Windansea Beach at Bonair Street	
		Windansea Beach at Playa del Norte	
		Windansea Beach at Palomar Avenue	
		at Tourmaline Surf Park	
		Pacific Beach at Grand Avenue	
	Tecolote Creek	Entire reach and tributaries	-City of San Diego
San Diego River	Forrester Creek	lower 1 mile	City of El Cajon ~~-City of La Mesa~~ -City of Santee -County of San Diego
	San Diego River	lower 6 miles	-City of El Cajon -City of La Mesa -City of San Diego -City of Santee -County of San Diego
	Pacific Ocean Shoreline	at San Diego River mouth at Dog Beach	
San Diego Bay	Chollas Creek	lower 1.2 miles	-City of La Mesa -City of Lemon Grove -City of San Diego -County of San Diego -San Diego Unified Port District

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for segments or areas of the water bodies listed in Table 6.0 consist of the following:

~~(1) Receiving Water Limitations~~

~~(a) Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedules under Specific Provision 6.c.(1):~~

~~**Table 6.1**~~
~~*Receiving Water Limitations as Bacteria Densities and Allowable Exceedance Frequencies in the Water Body*~~

		~~Receiving Water Limitations~~		
~~Constituent~~	~~Single Sample Maximum[1,2] (MPN/100mL)~~	~~Single Sample Maximum Allowable Exceedance Frequency[3]~~	~~30-Day Geometric Mean[2] (MPN/100mL)~~	~~30-Day Geometric Mean Allowable Exceedance Frequency~~
~~Total Coliform~~	~~10,000~~	~~22% / 0%~~	~~1,000~~	~~0%~~
~~Fecal Coliform~~	~~400~~	~~22% / 0%~~	~~200~~	~~0%~~
~~*Enterococcus*~~	~~104[4] / 61[5]~~	~~22% / 0%~~	~~35[4] / 33[5]~~	~~0%~~

~~Notes:~~
~~1. During wet weather days, only the single sample maximum receiving water limitations are required to be achieved.~~
~~2. During dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved.~~
~~3. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days. The 0% single sample maximum allowable exceedance frequency applies to dry weather days.~~
~~4. This *Enterococcus* receiving water limitation applies to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.~~
~~5. This *Enterococcus* receiving water limitations applies to segments or areas of creeks or creek mouths listed in Table 6.0.~~

~~Interim receiving water limitations expressed as allowable exceedance frequencies are given in the compliance schedule under Specific Provision 6.fff.~~

~~(b) If the above receiving water limitations are not met in the receiving water, the Responsible Copermittees must demonstrate that the discharges from the MS4s are not causing or contributing to the violation of receiving water limitations. The Copermittee must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 6.b..~~

~~(2)~~(1) Effluent Limitations

Discharges from the MS4s must not ~~contain densities that exceed the following effluent limitations by the end of the compliance schedules under Specific Provision 6.c. to demonstrate the discharge is not causing~~cause or ~~contributing~~contribute to a violation of receiving water ~~quality standards~~limitations. The mass-based waste load allocations presented in Resolution No. R9-2010-0001 can be used to demonstrate that loading from the MS4 is such that it does not cause water quality objective exceedances, as described in bullet (4) under Specific Provision 6.d. ~~:~~

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~~**Table 6.2**~~
~~*Effluent Limitations as Bacteria Densities and Allowable Exceedance Frequencies in MS4 Discharges to the Water Body*~~

	~~Effluent Limitations~~			
~~Constituent~~	~~Single Sample Maximum[1,2] (MPN/100mL)~~	~~Single Sample Maximum Allowable Exceedance Frequency[3]~~	~~30-Day Geometric Mean[2] (MPN/100mL)~~	~~30-Day Geometric Mean Allowable Exceedance Frequency~~
~~Total Coliform~~	~~10,000~~	~~22% / 0%~~	~~1,000~~	~~0%~~
~~Fecal Coliform~~	~~400~~	~~22% / 0%~~	~~200~~	~~0%~~
~~*Enterococcus*~~	~~104[4] / 61[5]~~	~~22% / 0%~~	~~35[4] / 33[5]~~	~~0%~~

~~Notes:~~
~~1. During wet weather days, only the single sample maximum effluent limitations are required to be achieved.~~
~~2. During dry weather days, the single sample maximum and 30-day geometric mean effluent limitations are required to be achieved.~~
~~3. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days. The 0% single sample maximum allowable exceedance frequency applies to dry weather days~~
~~4. This *Enterococcus* effluent limitation applies to MS4 discharges to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.~~
~~5. This *Enterococcus* effluent limitation applies to MS4 discharges to segments or areas of creeks or creek mouths listed in Table 6.0.~~

~~Interim effluent limitations expressed as allowable exceedance frequencies are given in the compliance schedule under Specific Provision 6.c.~~

~~(3)~~(2) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 6.0 ~~fulfill~~will incorporate the Comprehensive Load Reduction ~~Plan~~Plans (CLRP) ~~requirements in~~drafted pursuant to Resolution No. R9-2010-0001.

(b) The Responsible Copermittee ~~must~~may implement BMPs ~~capable of achieving~~to support the achievement of WQBELs under Specific Provision 6.~~eee~~ b for the segments or areas of the water bodies listed in Table 6.0.

(c) The Responsible Copermittees ~~should coordinate~~may implement BMPs to support the ~~BMPs~~achievement of ~~to address~~ this TMDL with Caltrans and owners/operators of small MS4s ~~wherever and whenever~~, as possible.

c. COMPLIANCE SCHEDULE

(1) WLA Compliance Dates

The Responsible Copermittees for MS4 discharges to a segment or area of the water bodies listed in Table 6.0 are required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 6.0, according to the following compliance schedule:

Table 5.2
Compliance Schedule Dates to Achieve Indicator Bacteria WLAs

Constituent	Dry Weather WLA Compliance Date	Wet Weather WLA Compliance Date
Total Coliform[1]	April 4, 2021	April 4, 2031
Fecal Coliform		
Enterococcus		

1 - Total coliform receiving water limitations apply only to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.

(2) Interim Compliance Requirements

The Responsible Copermittees must comply with the ~~following~~ interim WQBELs by the interim compliance dates~~:~~ provided as part of the CLRP and supported by Order No. R9-2010-0001.

(a) Interim Dry Weather WQBELs

Interim dry weather WQBELS are expressed as receiving water limitations. The Responsible Copermittee must calculate the "existing" exceedance frequencies of the 30-day geometric mean water quality objectives for each of the indicator bacteria by analyzing the monitoring data collected between January 1, 2002 and April 4, 2011. "Existing" exceedance frequencies may be calculated by segment or area of a water body, or by water body, and/or by Watershed Management Area listed in Table 6.0. Separate "existing" exceedance frequencies must be calculated for beaches and creeks/creek mouths.

The Responsible Copermittees must achieve a 50 percent reduction in the "existing" exceedance frequency of the 30-day geometric mean WQBELs for the segments or areas of the water bodies listed in Table 6.0 ~~by the interim compliance dates for achieving the interim dry weather WQBELs given in Table 6.5~~. A 50 percent reduction in the "existing" exceedance frequency is equivalent to half of the "existing" exceedance frequency of the 30-day geometric mean WQBELs.

(3) Submittals to Support TMDL Basin Plan Amendment

The Responsible Copermittees are encouraged to submit data to support the TMDL reopener scheduled for April 2016 including but not limited to data related to reference watershed monitoring and beneficial use usage frequency.

~~The "existing" exceedance frequencies and the interim dry weather allowable exceedance frequencies (i.e. interim dry weather WQBELs) calculated by the Responsible Copermittees must be included in the Water Quality Improvement Plans for the applicable Watershed Management Areas.~~

~~Interim Wet Weather WQBELs~~

~~The Responsible Copermittees must achieve the interim wet weather WQBELs in Table~~

~~6.4, expressed as interim allowable exceedance frequencies, by the interim compliance dates for achieving the interim wet weather WQBELs given in Table 6.5.~~

~~Table 6.4~~
~~Interim Wet Weather WQBELs Expressed as~~
~~Interim Wet Weather Allowable Exceedance Frequencies~~

~~Watershed Management Area~~	~~Water Body~~	~~Segment or Area~~	~~Interim Wet Weather Allowable Exceedance Frequencies~~		
			~~Total Coliform~~	~~Fecal Coliform~~	~~Enterococcus~~
~~South Orange County~~	~~Pacific Ocean Shoreline~~	~~Cameo Cove at Irvine Cove Drive – Riviera Way~~	~~38%~~	~~37%~~	~~39%~~
		~~at Heisler Park - North~~			
	~~Pacific Ocean Shoreline~~	~~at Main Laguna Beach~~			
		~~Laguna Beach at Ocean Avenue~~			
		~~Laguna Beach at Cleo Street~~			
		~~Arch Cove at Bluebird Canyon Road~~			
		~~Laguna Beach at Dumond Drive~~			
	~~Pacific Ocean Shoreline~~	~~Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach~~	~~41%~~	~~41%~~	~~42%~~
	~~Aliso Creek~~	~~Entire reach (7.2 miles) and associated tributaries: - Aliso Hills Channel - English Canyon Creek - Dairy Fork Creek - Sulfur Creek - Wood Canyon Creek~~	~~41%~~	~~41%~~	~~42%~~
	~~Aliso Creek Mouth~~	~~at mouth~~	~~41%~~	~~41%~~	~~42%~~

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	~~Pacific Ocean Shoreline~~	~~Aliso Beach at West Street~~	~~36%~~	~~36%~~	~~36%~~
		~~Aliso Beach at Table Rock Drive~~			
		~~100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)~~			
		~~at Salt Creek (large outlet)~~			
		~~Salt Creek Beach at Salt Creek service road~~			
		~~Salt Creek Beach at Strand Road~~			

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~~Table 6.4 (Cont'd)~~
~~Interim Wet Weather WQBELs Expressed as~~
~~Interim Wet Weather Allowable Exceedance Frequencies~~

~~Watershed Management Area~~	~~Water Body~~	~~Segment or Area~~	~~Interim Wet Weather Allowable Exceedance Frequencies~~		
			~~Total Coliform~~	~~Fecal Coliform~~	~~Entero-coccus~~
~~South Orange County (cont'd)~~	~~Pacific Ocean Shoreline~~	~~at San Juan Creek~~	~~44%~~	~~44%~~	~~48%~~
	~~San Juan Creek~~	~~lower 1 mile~~	~~44%~~	~~44%~~	~~47%~~
	~~San Juan Creek Mouth~~	~~at mouth~~	~~44%~~	~~44%~~	~~47%~~
	~~Pacific Ocean Shoreline~~	~~at Poche Beach~~	~~35%~~	~~35%~~	~~36%~~
		~~Ole Hanson Beach Club Beach at Pico Drain~~			
		~~San Clemente City Beach at El Portal Street Stairs~~			
		~~San Clemente City Beach at Mariposa Street~~			
		~~San Clemente City Beach at Linda Lane~~			
		~~San Clemente City Beach at South Linda Lane~~			
		~~San Clemente City Beach at Lifeguard Headquarters~~			
		~~under San Clemente Municipal Pier~~			
		~~San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane)~~			

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		~~San Clemente State Beach at Riviera Beach~~			
		~~Can Clemente State Beach at Cypress Shores~~			
~~San Luis Rey River~~	~~Pacific Ocean Shoreline~~	~~at San Luis Rey River mouth~~	~~45%~~	~~44%~~	~~47%~~
~~Carlsbad~~	~~Pacific Ocean Shoreline~~	~~at Moonlight State Beach~~	~~40%~~	~~40%~~	~~41%~~
~~San Dieguito River~~	~~Pacific Ocean Shoreline~~	~~at San Dieguito Lagoon mouth~~	~~33%~~	~~33%~~	~~36%~~

ADMINISTRATIVE DRAFT

~~Table 6.4 (Cont'd)~~
~~Interim Wet Weather WQBELs Expressed as~~
~~Interim Wet Weather Allowable Exceedance Frequencies~~

~~Watershed Management Area~~	~~Water Body~~	~~Segment or Area~~	~~Interim Wet Weather Allowable Exceedance Frequencies~~ ~~Total Coliform~~	~~Fecal Coliform~~	~~Entero-coccus~~
~~Penasquitos~~	~~Pacific Ocean Shoreline~~	~~Torrey Pines State Beach at Del Mar (Anderson Canyon)~~	~~26%~~	~~26%~~	~~26%~~
	~~Pacific Ocean Shoreline~~	~~La Jolla Shores Beach at El Paseo Grande~~	~~37%~~	~~37%~~	~~37%~~
		~~La Jolla Shores Beach at Caminito del Oro~~			
		~~La Jolla Shores Beach at Vallecitos~~			
		~~La Jolla Shores Beach at Avenida de la Playa~~			
		~~at Casa Beach, Children's Pool~~			
		~~South Casa Beach at Coast Boulevard~~			
		~~Whispering Sands Beach at Ravina Street~~			
		~~Windansea Beach at Vista de la Playa~~			
		~~Windansea Beach at Bonair Street~~			
		~~Windansea Beach at Playa del Norte~~			
		~~Windansea Beach at Palomar Avenue~~			
		~~at Tourmaline Surf Park~~			
		~~Pacific Beach at Grand Avenue~~			

	~~Tecolote Creek~~	~~Entire reach and tributaries~~	~~49%~~	~~49%~~	~~51%~~
~~San Diego River~~	~~Forrester Creek~~	~~lower 1 mile~~	~~46%~~	~~43%~~	~~49%~~
	~~San Diego River~~	~~lower 6 miles~~	~~46%~~	~~43%~~	~~49%~~
	~~Pacific Ocean Shoreline~~	~~at San Diego River mouth at Dog Beach~~	~~46%~~	~~43%~~	~~51%~~
~~San Diego Bay~~	~~Chollas Creek~~	~~lower 1.2 miles~~	~~41%~~	~~41%~~	~~43%~~

~~Interim WQBEL Compliance Dates~~

~~The Responsible Copermittees must achieve the interim WQBELs under Specific Provisions 6.c.(2) and 6.c.(2) by the interim compliance dates given in Table 6.5.~~

~~Table 6.5~~
~~Interim Compliance Dates to Achieve Interim WQBELs~~

			~~Interim Compliance Dates~~	
~~Watershed Management Area~~	~~Water Body~~	~~Segment or Area~~	~~Interim Dry Weather WQBELs~~	~~Interim Wet Weather WQBELs~~
~~South Orange County~~	~~Pacific Ocean Shoreline~~	~~Cameo Cove at Irvine Cove Drive – Riviera Way~~	~~April 4, 2016~~	~~April 4, 2021~~
		~~at Heisler Park - North~~		
	~~Pacific Ocean Shoreline~~	~~at Main Laguna Beach~~	~~April 4, 2016~~	~~April 4, 2021~~
		~~Laguna Beach at Ocean Avenue~~		
		~~Laguna Beach at Cleo Street~~		
		~~Arch Cove at Bluebird Canyon Road~~		
		~~Laguna Beach at Dumond Drive~~		
	~~Pacific Ocean Shoreline~~	~~Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach~~	~~April 4, 2016~~	~~April 4, 2021~~
	~~Aliso Creek~~	~~Entire reach (7.2 miles) and associated tributaries:~~ ~~- Aliso Hills Channel~~ ~~- English Canyon Creek~~ ~~- Dairy Fork Creek~~ ~~- Sulfur Creek~~ ~~- Wood~~	~~April 4, 2018~~	~~April 4, 2021~~

		~~Canyon Creek~~		
	~~Aliso Creek Mouth~~	~~at mouth~~	~~April 4, 2018~~	~~April 4, 2021~~
	~~Pacific Ocean Shoreline~~	~~Aliso Beach at West Street~~	~~April 4, 2016~~	~~April 4, 2021~~
		~~Aliso Beach at Table Rock Drive~~		
		~~100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)~~		
		~~at Salt Creek (large outlet)~~		
		~~Salt Creek Beach at Salt Creek service road~~	~~April 4, 2017~~	~~April 4, 2021~~
		~~Salt Creek Beach at Strand Road~~	~~April 4, 2017~~	~~April 4, 2021~~

~~Table 6.5 (Cont'd)~~
~~Interim Compliance Dates to Achieve Interim WQBELs~~

			~~Interim Compliance Dates~~	
~~Watershed Management Area~~	~~Water Body~~	~~Segment or Area~~	~~Interim Dry Weather WQBELs~~	~~Interim Wet Weather WQBELs~~
~~South Orange County (cont'd)~~	~~Pacific Ocean Shoreline~~	~~at San Juan Creek~~	~~April 4, 2016~~	~~April 4, 2021~~
	~~San Juan Creek~~	~~lower 1 mile~~	~~April 4, 2018~~	~~April 4, 2021~~
	~~San Juan Creek Mouth~~	~~at mouth~~	~~April 4, 2016~~	~~April 4, 2021~~
	~~Pacific Ocean Shoreline~~	~~at Poche Beach~~	~~April 4, 2016~~	~~April 4, 2021~~
		~~Ole Hanson Beach Club Beach at Pico Drain~~	~~April 4, 2016~~	~~April 4, 2021~~
		~~San Clemente City Beach at El Portal Street Stairs~~	~~April 4, 2017~~	~~April 4, 2021~~
		~~San Clemente City Beach at Mariposa Street~~		
		~~San Clemente City Beach at Linda Lane~~	~~April 4, 2016~~	~~April 4, 2021~~
		~~San Clemente City Beach at South Linda Lane~~	~~April 4, 2018~~	~~April 4, 2021~~
		~~San Clemente City Beach at Lifeguard Headquarters~~	~~April 4, 2017~~	~~April 4, 2021~~
		~~under San Clemente Municipal Pier~~		
		~~San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane)~~	~~April 4, 2018~~	~~April 4, 2021~~

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		~~San Clemente State Beach at Riviera Beach~~	~~April 4, 2016~~	~~April 4, 2021~~
		~~Can Clemente State Beach at Cypress Shores~~	~~April 4, 2017~~	~~April 4, 2021~~
~~San Luis Rey River~~	~~Pacific Ocean Shoreline~~	~~at San Luis Rey River mouth~~	~~April 4, 2017~~	~~April 4, 2021~~
~~Carlsbad~~	~~Pacific Ocean Shoreline~~	~~at Moonlight State Beach~~	~~April 4, 2016~~	~~April 4, 2021~~
~~San Dieguito River~~	~~Pacific Ocean Shoreline~~	~~at San Dieguito Lagoon mouth~~	~~April 4, 2016~~	~~April 4, 2021~~

ADMINISTRATIVE DRAFT

~~Table 6.5 (Cont'd)~~
~~Interim Compliance Dates to Achieve Interim WQBELs~~

			~~Interim Compliance Dates~~	
~~Watershed Management Area~~	~~Water Body~~	~~Segment or Area~~	~~Interim Dry Weather WQBELs~~	~~Interim Wet Weather WQBELs~~
~~Penasquitos~~	~~Pacific Ocean Shoreline~~	~~Torrey Pines State Beach at Del Mar (Anderson Canyon)~~	~~April 4, 2016~~	~~April 4, 2021~~
	~~Pacific Ocean Shoreline~~	~~La Jolla Shores Beach at El Paseo Grande~~		
		~~La Jolla Shores Beach at Caminito del Oro~~		
		~~La Jolla Shores Beach at Vallecitos~~		
		~~La Jolla Shores Beach at Avenida de la Playa~~		
		~~at Casa Beach, Children's Pool~~		
		~~South Casa Beach at Coast Boulevard~~		
		~~Whispering Sands Beach at Ravina Street~~		
		~~Windansea Beach at Vista de la Playa~~		
		~~Windansea Beach at Bonair Street~~		
		~~Windansea Beach at Playa del Norte~~		
		~~Windansea Beach at Palomar Avenue~~		
		~~at Tourmaline Surf Park~~		
		~~Pacific Beach at Grand Avenue~~		
	~~Tecolote Creek~~	~~Entire reach and tributaries~~		

~~San Diego River~~	~~Forrester Creek~~	~~lower 1 mile~~	~~April 4, 2018~~	~~April 4, 2021~~
	~~San Diego River~~	~~lower 6 miles~~		
	~~Pacific Ocean Shoreline~~	~~at San Diego River mouth at Dog Beach~~		
~~San Diego Bay~~	~~Chollas Creek~~	~~lower 1.2 miles~~	~~April 4, 2018~~	~~April 4, 2021~~

a. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or

(2) Applicable effluent limitations are met, or

(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or

(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or

(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

The Phase I MS4s may demonstrate that their discharges are not causing the exceedances in the receiving waters by providing data from their discharge points to the receiving waters, by providing data collected at jurisdictional boundaries, and/or by using other methods accepted by the San Diego Water Board. Otherwise, at the end of the dry weather TMDL compliance schedule, the municipal Phase I MS4s will be held responsible and considered out of compliance unless other information or evidence indicates another controllable or uncontrollable source is responsible for the exceedances in the receiving waters. If controllable sources other than discharges from the municipal Phase I MS4s are identified before or after the end of the dry weather TMDL Compliance Schedule as causing the exceedances, those controllable sources will be responsible for reducing their bacteria loads and/or demonstrating that discharges from those sources are not causing the exceedances. The San Diego Water Board shall implement additional actions (e.g., issue enforcement actions, amend existing NPDES requirements or conditional waivers), as needed, to bring all controllable sources into compliance with the dry weather TMDLs.

e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

The Bacteria Load Reduction Plans (BLRPs) and CLRPs to be submitted by the Copermittees and approved by the Regional Board Executive Officer contain monitoring programs. Implementation of those Regional Board-approved monitoring programs constitutes compliance with the Monitoring Station and Monitoring Procedure requirements, described below.

(1) Monitoring and Assessment Requirements for Beaches

(a) Monitoring Stations

~~(i) The Responsible Copermittees must designate the MS4 outfalls within their jurisdiction discharging to the Pacific Ocean Shoreline segments or areas listed in Table 6.0 as high priority non-storm water MS4 monitoring stations, in accordance with the requirements of Provision of this Order.~~

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~~(ii) For the Pacific Ocean Shoreline segments or areas listed in Table 6.0 with MS4 outfalls, the Responsible Copermittees must establish at least one monitoring station within the receiving water.~~

For beaches addressed by these TMDLs, monitoring locations should consist of, at a minimum, the same locations used to collect data required under MS4 NPDES monitoring requirements and beach monitoring for Health and Safety Code section 115880.[75] If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters.

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(b) Monitoring Procedures

(i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly.

(ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations at least once within the first 24 hours of the end of a storm event[26] that occurs during the rainy season (i.e., October 1 through April 30).

~~(i) The Responsible Copermittees must monitor, within the first 24 hours of each storm event,[27] the effluent of the designated MS4 outfalls within their jurisdiction discharging to the Pacific Ocean Shoreline segments or areas listed in Table 6.0 in accordance with the wet weather jurisdictional monitoring requirements of Provision of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(ii)~~(iii) ~~The Responsible Copermittees must collect samples from the monitoring stations within the receiving water body for each dry weather and wet weather MS4 outfall monitoring event.~~ Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(c) Assessment and Reporting Requirements

(i) The Responsible Copermittees must analyze the dry weather and wet weather monitoring data to assess whether the interim and final WQBELs for the Pacific Ocean Shoreline segments or areas listed in Table 6.0 have been achieved.

[28] Commonly referred to as AB 411 monitoring

~~(i)~~(ii) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

[26] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

~~[27] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].~~

(2) Monitoring and Assessment Requirements for Creeks and Creek Mouths

(a) Monitoring Stations

~~(i) The Responsible Copermittees must establish at least one receiving water monitoring station at or near the mouth of the creeks listed in Table 6.0.~~

~~(ii)~~

~~(iii) The Responsible Copermittees must establish at least one receiving water monitoring station upstream of the station established for Specific Provision 6.d.(2)(a). At least one monitoring station must be established for each Responsible Copermittee at the most downstream location within its jurisdiction, and one monitoring station at the most upstream location within its jurisdiction.~~

~~(iv) The Responsible Copermittees must identify the MS4 outfalls discharging to the segments or areas of the creeks and creek mouths listed in Table 6.0. The Responsible Copermittees must identify the MS4 outfalls that are monitored in accordance with the dry weather jurisdictional monitoring requirements of Provision of this Order and the wet weather jurisdictional monitoring requirements of Provision of this Order.~~

For creeks addressed by these TMDLs, monitoring locations should consist of, at a minimum, a location at or near the mouth of the creek (e.g., Mass Loading Station or Mass Emission Station) and one or more locations upstream of the mouth (e.g., Watershed Assessment Stations). If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters.

(b) Monitoring Procedures

(i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations ~~at least monthly.~~ according to the WQIP.

(ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations within the first 24 hours of the end of a storm event[28] that occurs during the rainy season (i.e., October 1 through April 30).

(iii) Samples collected from receiving water monitoring stations must be analyzed for ~~total coliform,~~ fecal coliform~~,~~ and *Enterococcus* indicator bacteria.

(c) Assessment and Reporting Requirements

(i) The Responsible Copermittees must analyze the receiving water monitoring data to assess whether the interim and final receiving water WQBELs for the creeks and creek mouths listed in Table 6.0 have been achieved.

~~(ii) If the receiving water WQBELs for the creeks and creek mouths listed in Table 6.0 have not been achieved, the Responsible Copermittees must review the MS4 outfall monitoring data to assess whether the interim and final effluent WQBELs have been achieved.~~

~~(iii) The Responsible Copermittee must identify and incorporate additional MS4 outfall and receiving water monitoring stations and/or adjust monitoring frequencies to identify sources causing exceedances of the receiving water WQBELs.~~

(ii) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

[28] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

Walsh, Laurie@Waterboards

From: Helen Davies <HDavies@ci.santee.ca.us>
Sent: Friday, September 14, 2012 3:32 PM
To: Walsh, Laurie@Waterboards; Gibson, David@Waterboards
Subject: City of Santee Comment on Draft Regional Municipal Permit R9-2012-0011
Attachments: Scanned from a Xerox multifunction device001.pdf

Dave and Laurie,

Please see attached a comment letter from our Deputy City Manager Pedro Orso Delgado.

Regards,

Helen

CITY OF SANTEE

September 14, 2012

Mr. David Gibson
Executive Officer
Regional Water Quality Control Board San Diego Region
9174 Sky Park Court, Suite 100
San Diego, Ca 92123

SUBJECT: DRAFT REGIONAL MUNICIPAL PERMIT

Dear ~~Mr. Gibson~~, Dave

I am writing to express the City of Santee's general support for the revised comments being submitted on behalf of the San Diego County Copermittees. We have been actively participating in the development of these comments; the focused meetings; and associated discussions with RWQCB staff and stakeholders.

We appreciate the opportunity to constructively participate in the development of this permit and hope that the RWQCB will continue the discussion with us as the administrative draft is developed.

We commend your leadership in enabling this process to occur.

Pedro Orso Delgado

Pedro Orso Delgado, P.E.
Deputy City Manager/Director of Development Services

10601 Magnolia Avenue • Santee, California 92071 • (619) 258-4100 • www.ci.santee.ca.us

Walsh, Laurie@Waterboards

From: Paul Hartman <phartman@ci.vista.ca.us>
Sent: Friday, September 14, 2012 4:21 PM
To: Walsh, Laurie@Waterboards
Subject: City of Vista comments
Attachments: City of Vista Comment Letter ADTO R9-2012-0011.pdf

Hi Laurie,

Attached please find the City of Vista's comment letter addressing the Administrative Draft Tentative Order. Please confirm your receipt.

Thank you! Have a great weekend!

Paul Hartman
Stormwater Program Manager
200 Civic Center Drive
Vista, CA 92084
(760) 726-1340 x1373

CITY OF VISTA
Water Quality Protection Program

CITY OF VISTA
CALIFORNIA

September 14, 2012

Regional Water Quality Control Board
Attention: Ms. Laurie Walsh
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Subject: **City of Vista Comments regarding the Administrative Draft of the Tentative Order No. R9-2012-0011, the NPDES Permit for Municipal Separate Storm Sewer Systems (MS4) Draining the Watersheds within the San Diego Region**

Dear Ms. Walsh:

The City of Vista appreciates the efforts that the Regional Water Board staff has undertaken to involve the stakeholders in the development of the new permit. The release of the administrative draft to the stakeholders is a positive step that fosters early and collaborative input and will provide for an improved Tentative Order when released. The focused meetings were successful in bringing together the various stakeholders and provided for fruitful discussions of the permit requirements that allowed for the expression of many points of view. Thank you for these efforts.

The City of Vista participated in the development of the comments submitted by the County of San Diego on behalf of the 21 Copermittees in San Diego County. We support the comments and look forward to their inclusion in the revised Tentative Order. Additionally, we respectfully submit the following comments for your consideration. Due to staffing limitations and time constraints, these comments were unable to be put forward for consideration in the Copermittee comments.

1. E.4.b.(2) - Construction Site Inventory and Tracking: This section addresses minimums in determining construction sites that are a high threat to water quality. The requirement to "identify all construction sites within its jurisdiction that represent a high threat to downstream surface water quality" is acceptable practice. However, the following requirements to include all sites within areas of the watershed that have water bodies that are impacted by sediment does not allow for prioritization of construction sites. **The statement "At a minimum, high threat to water quality sites must include:" should be changed to read "At a minimum, prioritization of construction sites must consider:"**

   Through many discussions with Regional Board Staff, the City understands that the concept of prioritization and adaptation is supported and will be incorporated throughout the permit. The City would appreciate the latitude to prioritize construction sites appropriately. In the past, prioritization has been accomplished taking many factors into account including site size, erosion potential, location related to an Environmentally Sensitive Area, sediment impaired waterbodies, etc. When

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200 Civic Center Drive, Vista, California 92084-6275

determining the threat to water quality of a construction site, the overall potential for the discharge of sediment is the critical consideration with respect to determining priority. The watershed and receiving water problems should be a factor in this determination, but should not automatically deem construction sites a high priority, regardless of other factors.

As written, it is likely that small sites, with limited ground disturbance and a low threat to water quality, will be deemed high priority due to their location within the jurisdiction. This may result in a misdirection of resources to provide frequent inspections at these sites with relatively little benefit to water quality.

2. Attachment C: **The definition of Monitoring Year should be changed to October 1 through September 30** to align with hydrologic patterns. This modification will allow for reporting of a full wet season followed by the subsequent dry season. This definition is consistent with the proposed Provision D submitted by the San Diego County Copermittees. Defining the monitoring year as written (July 1 – June 30) breaks up the dry season which will present challenges and inconsistencies in data interpretation and reporting.

We understand the need to balance the collaborative process in the development of the permit with the regulatory oversight incumbent on the Regional Water Quality Control Board. Thank you for the opportunities provided thus far for the Copermittees to add their experience and insights to the process. We look forward to further discussions on the concepts put forward as we all work towards a permit that will efficiently and effectively lead to improvements in water quality in the San Diego Region.

Sincerely,

Paul Hartman
Water Quality Protection Program Manager

Walsh, Laurie@Waterboards

From:	Suppes, Christy <Christy.Suppes@ocpw.ocgov.com>
Sent:	Friday, September 14, 2012 3:58 PM
To:	Walsh, Laurie@Waterboards
Cc:	Gibson, David@Waterboards; Felix, Tony@Waterboards; Crompton, Chris; Skorpanich, Mary Anne; Boon, Richard; Onuma, Kevin; 'jon.vanrhyn@sdcounty.ca.gov'; 'Padres, Claudio'; 'syhasenin@sandiego.gov'; Ruano, Betty; bfowler@danapoint.org; Crompton, Chris; Chris Macon - Laguna Woods; Suppes, Christy; Devin Slaven - Lake Forest; E. (Max) Maximous - Rancho Santa Margarita; Fortuna, James; Gin, Vincent; Sharp, Grant; Humza Javed - Laguna Hills; Jean Jambon - Laguna Niguel; Voss, Jenna; Shook, Jennifer; Joe Ames - Mission Viejo; jwhitman@cityofalisoviejo.com; Jonathan Orduna - Laguna Niguel; krosenfield@ci.laguna-hills.ca.us; Leslie Keane - Laguna Woods; Lisa Zawaski - Dana Point; Luis Estevez - Lake Forest; Skorpanich, Mary Anne; Mary Vondrak - San Clemente; Mike Phillips - Laguna Beach; Moy Yahya - Aliso Viejo; Nancy Palmer - Laguna Niguel; Nasser Abbaszadeh - San Juan Capistrano; Nguyen, Duc; Peter Meier - Lake Forest; Rae Beimer - Rancho Santa Margarita; Boon, Richard; Richard Schlesinger - Mission Viejo; Tom Bonigut - San Clemente; Tracy Ingebrigtsen - Laguna Beach; Yi, Greg; Ziad Mazboudi - San Juan Capistrano
Subject:	County of Orange Comments on Administrative Draft Order No. R9-2012-0111
Attachments:	OC Comment Letter - Draft Administrative Order R9-2012-011.pdf; OC Attachment A - Summary Table of Comments.pdf; OC Attachment B.1 - Draft Tentative Order Redline Comments.docx; OC Attachment B.2 - Enforcement Response Plan Alternative.docx; OC Attachment B.3 - Existing Development Management Alternative.docx; OC Attachment C - Monitoring Principles.pdf; OC Attachment D - Proposed Regional Permit Structure.pdf

Good afternoon,

Please find attached comments from the County of Orange on the *Administrative Draft Order No. R9-2012-0011 NPDES No. CAS0109266 National Pollutant Discharge Eliminations System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region.*

Thank you,

Christy Suppes
OC Watershed Program - Stormwater External
2301 N. Glassell St., Orange, CA 92865
(714) 955-0673 tel / (714) 955-0639 fax
christy.suppes@ocpw.ocgov.com
www.ocwatersheds.com

Please note my working hours are 7:30 AM - 5:00 PM, Monday - Thursday, and 7:30 AM - 4:00 PM every other Friday.
For the month of September, I will be in the office on the following Friday(s): 14th and 28th.

ORANGE COUNTY
OC PublicWorks
Our Community. Our Commitment.

Ignacio G. Ochoa, P.E., Interim Director
300 N. Flower Street
Santa Ana, CA

P.O. Box 4048
Santa Ana, CA 92702-4048

Telephone: (714) 834-2300
Fax: (714) 967-0896

September 14, 2012

By E-Mail and U.S. Mail

Laurie Walsh
California Regional Water Quality Control Board, San Diego region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4353

Subject: County of Orange Comments on the Administrative Draft of Tentative Order No. R9-2012-0011, NPDES No. CAS0109266

Dear Ms. Walsh:

We are in receipt of April 9, 2012, *Administrative Draft Order No. R9-2012-0011 NPDES No. CAS0109266 National Pollutant Discharge Eliminations System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds Within the San Diego Region*. The County of Orange, as Principal Permittee of the Orange County Stormwater Program, welcomes the opportunity to provide comments on the Draft Administrative Order that has been prepared, distributed, and discussed by your staff. The south Orange County Permittees (Permittees) were involved in the development of these comments and the cities of Aliso Viejo, Dana Point and Mission Viejo have directed that they be recognized as concurring entities on this letter. We also support the comments of the Permittees in Riverside and San Diego Counties (except where noted in the attachments), who have identified many of the same issues with the Administrative Draft Order.

Since April 9, the Permittees have participated with Board staff in an initial public workshop (April 25), four "focused meetings" (June 27, July 11, July 25 and August 22), a hydromodification workshop (August 30), and a final public workshop (September 5). There have also been two separate Orange County-specific meetings. We recognize the significant efforts of your staff to engage the Permittees and key stakeholders in the initial development of this regional permit in a collaborative manner. While you are already aware of our concerns regarding the scheduling and appropriateness of this effort (see prior correspondence dated May 10, 2012, May 17, 2012 and July 3, 2012, which are incorporated by reference), this approach nonetheless represents a notable departure from prior permit renewal processes. It is hoped that this initial consultative effort is a harbinger for meaningful compromise on issues of concern to the Permittees.

In starting to conceive of a fifth term permit, the Permittees share an understanding that MS4 permitting needs to be informed by the following guiding principles:

1. The ability of the Permittees to direct resources toward specific water quality priorities in a given watershed, rather than all potential problems simultaneously, is more likely to result in actual / meaningful improvements in water quality.

2. The Permittees must be able to truly and fully adaptively manage their programs to focus their resources on those BMP strategies and monitoring efforts that are identified in the approved Water Quality Improvement Plan (WQIP) as being most effective, consistent with the MEP standard, to address each watershed's priorities.

3. The regional permit through the Water Quality Improvement plan (WQIP) should enable the Permittees to specify the jurisdictional and regional BMP strategies and the monitoring efforts that will be implemented to address the watershed's highest priorities, monitor and measure progress, identify and control pollutant sources, etc.

4. Once the WQIP is approved by the Regional Board, each Permittee's implementation of their respective responsibilities as laid out and scheduled within the WQIP, should alone constitute compliance with the regional permit.

5. The Jurisdictional Runoff Management Program (JRMP) is a procedural document that describes how each Permittee will accomplish their WQIP responsibilities.

6. The WQIP (and the BMP strategies and Monitoring and Assessment Plans (MAP) therein), should be updated at least every five years based upon the Report of Waste Discharge (ROWD), and as needed in between. Attachment D shows a conceptual representation of how we see the elements of the Draft Administrative Order working together cohesively, which would suggest structural change is needed to the organization of the Order.

7. The JRMP and monitoring program requirements should be written in the regional permit as a "default menu of options," recognizing that the WQIP - which will be publically vetted and approved by the Regional Board - will specify those jurisdictional and regional activities that will be implemented to address the watershed's priorities, the appropriate frequencies, performance standards, and other compliance elements.

We look forward to continuing to meet with Regional Board staff to discuss the development of the Permittees' next permit based upon these principles. In the meantime, we have summarized our overarching concerns with the Draft Administrative Order as general comments in this letter and provide additional comments and concerns in the following attachments:

- Attachment A presents a tabulation on our technical concerns.
- Attachment B presents a redline/strikeout version of the Draft Order.
- Attachment C presents a set of principles regarding monitoring.

- Attachment D presents a conceptual representation of how we see the elements of the Draft Administrative Order working together cohesively.

General Comments

I. MS4 Permitting

In 2009, your staff committed in the last permit renewal to look at consistency with the State's other MS4 permits, notably those being promulgated by the Santa Ana and Los Angeles Regional Boards. This commitment represented recognition of the Little Hoover Commission's highlighting of the lack of consistency in MS4 permits as a critical area of concern and consideration of the regulated communities and USEPA's interest in seeing greater permitting consistency. Nonetheless, while Regional Board staff has stated that the Draft Administrative Order is meant to be a modest incremental update of the current south Orange County permit, it nevertheless escalates the regulatory requirements in many key areas, creates greater variance with the north Orange County permit, and appears to represent a singular rather than statewide vision of the future of MS4 permitting.

To the extent that the Draft Administrative Order may ease the regulatory burden for your staff, there will be a commensurate increase in burden for the local governments that are dealing with multiple Regional Board jurisdictions if permitting in California continues to be defined by divergent rather than convergent approaches. It is therefore necessary for us to seek revisions to the Draft Administrative Order and an enrollment schedule supportive of a more cogent alignment of our countywide program. This consistency is important to the credibility of our respective efforts to manage urban runoff and is vital to sustaining the obvious cost effectiveness of a coordinated countywide program in Orange County with promising synergies in other regions at a time of widespread economic distress for many communities.

It should also be noted that the Draft Administrative Order provides no consideration at all for the five Permittees whose jurisdictional area is regulated under separate permits from the Santa Ana and San Diego Regional Boards.

II. Planning

Since 1993, the Drainage Area Management Plan (DAMP) has provided policy and programmatic guidance to each Permittee in the development of its DAMP/Local Implementation Plan that describes how stormwater management actions will be implemented on a jurisdictional basis (equivalent to the JRMP). It also includes Watershed Workplans (previously Watershed Action Plans) for each of the south Orange County watersheds. Concurrently, the annual progress report has developed into a systematic assessment of program effectiveness at jurisdictional, watershed, and countywide levels of resolution, using California Stormwater Quality Association program effectiveness assessment guidance and a comprehensive environmental quality dataset.

In 2009, it appeared that the DAMP was in danger of being dismissed as inconsequential "procedural correspondence." Consequently, the renewed importance of effective adaptive management to be described in a policy and program guidance document, i.e., the Water Quality Improvement Plan (WQIP), is welcomed by the Permittees. The attached redline/strikeout version of the Draft Administrative Order provides a number of suggested revisions related to this provision intended to more fully develop this planning process both as a robust basis for compliance and as a basis for ensuring meaningful water quality outcomes. However, the revisions do not address the separation of the planning and reporting processes that is a consequence of the current structure of the Draft Administrative Order. The Permittees believe that such structural adjustments need to be made in Draft Administrative Order to realize the full potential of the WQIP-JRMP alignment and planning and reporting process. See again attached Attachment D.

III. New Requirements for Land Development

The history of MS4 permitting has largely been defined by a focus on land development. In 2009, MS4 programs on a statewide basis started to transition requirements for land development from "treat and release" runoff management to onsite retention, a new emphasis on Low Impact Development (LID), and hydromodification. In 2012, while there is perhaps recognition of an emerging paradigm that the future management of urban landscapes should be based upon the principal of seeking to restore of natural hydrologic processes, there is absolutely no clear consensus on how and where this approach should be effected.

The attached comments are intended to shift the land development program toward an approach based upon nationally accepted LID principles, recognize the uncertainties and need for greater flexibility in hydromodification requirements, and offer a mitigative approach to urban land development that will produce meaningful environmental outcomes. Our revisions would recognize biofiltration as a LID BMP; ensure that the significantly more challenging requirements related to hydromodification are not imposed for discharges to channels that are engineered, concrete lined, significantly hardened, and/or are regularly maintained as part of a regional flood control program; and incorporate USEPA green street guidance to provide greater flexibility for land-constrained street, road, and highway projects consistent with other adopted MS4 permits in the State.

IV. Monitoring

The Permittees consider it axiomatic that the purpose of environmental monitoring is to inform and support decisions regarding the management, protection, and improvement of Orange County's surface water resources. During the focused meetings your staff explicitly encouraged submittal of alternate monitoring proposals that might better support the WQIP management approach. We have been party to the San Diego Permittees' efforts to define an alternative monitoring approach in response to this request and, indeed, concur with many elements of their proposal. However, we do not believe that this proposal represents a model for the permit that would be appropriate for Orange County. Instead, we believe that the WQIP management approach would be best served by permit requirements for monitoring that establish the principles and review criteria for a monitoring program that is reviewed and approved as an integral component of the WQIP. These principles should substitute for the Draft

Administrative Order's prescription in this area. Our recommendation regarding these principles is provided in Attachment C.

V. Technical Justification

To the extent that the Draft Administrative Order seeks to prescribe any requirements that escalate the future compliance obligations beyond the Permittees' current MS4 Permit, such requirements need to be supported by a rigorous technical justification. The Permittees are concerned that the Fact Sheet, which is the document for establishing the technical rationale for the regulations, has not been made available and appears to be on a schedule to follow rather precede the Tentative Order. At the same time the Report of Waste Discharge (ROWD), which represents the opportunity of the Permittees to consider and apply experiential knowledge is being made largely irrelevant by the regional permit approach. The Permittees believe that the integrity and credibility of the MS4 permitting process risks being compromised by the sidelining of the Fact Sheet and ROWD documents. These potentially significant shortcomings would be addressed by your staff releasing a Fact Sheet for review and comment in advance of the release of the Tentative Order and a re-crafting of the enrollment process to re-establish the role of the ROWD.

VI. Compliance

In responding to your staff's requests for comments on the Draft Administrative Order, the focus has been on providing technical comments intended to assist development of a MS4 permit that will support the Orange County Stormwater Program's continued progress toward our mutual goals based upon a robust and achievable basis for maintaining compliance centered on the WQIP. However, establishing the WQIP as the fundamental basis of compliance has tremendous legal significance. The Permittees believe that the Ninth Circuit Court of Appeals decision in the case of Natural Resources Defense Council vs. Los Angeles County Flood Control District will create an unavoidable situation of non-compliance unless the Receiving Water Limitations language is revised. The importance of making the revisions as shown in Attachment B cannot be overstated and its focus as a State Board workshop in November highlights this.

Thank you for your attention to our comments. Please contact me directly if you have any questions. For technical questions, please contact Chris Crompton at (714) 955-0630 or Richard Boon at (714) 955-0670.

Sincerely,

MAskorpanich

Mary Anne Skorpanich, Manager
OC Watersheds

Attachments: A – Technical Concerns
B – Redline Version of the Draft Administrative Order

C – Monitoring Principles
D – Proposed Regional Permit Structure

Cc: David Gibson, San Diego Regional Board
Tony Felix, San Diego Regional Board
South Orange County Permittees
Orange County Technical Advisory Committee
Kevin Onuma, Orange County Flood Control District
County of San Diego
Riverside County Flood Control and Water Conservation District
City of San Diego

ORANGE COUNTY PERMITTEES

ATTACHMENT A

SUMMARY TABLE OF COMMENTS

	COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Comment #	**Permit Section**	**Permit Page[1]**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
1	General Comments	N/A	Throughout	The term "prohibit" is broader than the Clean Water Act requirements, and should be changed to "effectively prohibit." CWA section 402(p) (3) (B) (ii) reads as follows: (B) Municipal Discharge – Permits for discharges from municipal storm sewers – (ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewer; (Emphasis added) The permit shall "effectively prohibit non-stormwater discharges" but may exempt certain discharges that are not significant sources of pollutants from the prohibition. The section does not require a full prohibition but rather an effective prohibition. The operative word is "effective", which recognizes the constraints of owning and operating a stormwater drainage system, which includes hundreds of miles of open channel. The finding/provision should note that non-stormwater discharges are effectively prohibited (per 402(p)(3)(B)(ii)). In addition, discharges that are not significant sources of pollutants are exempted from the prohibition. In a practical sense, the use of word "effective" also provides flexibility to assess the impacts of relatively benign discharges such as landscape irrigation, air condition condensate, individual car washing, and non-emergency fire-fighting flows or non-anthropogenic sources before instituting a prohibition.	**Revise language throughout the Permit to read as follows:** Change "prohibit" to "effectively prohibit."
2	General	N/A	Throughout	Language similar to that which is deleted in the	**Revise language throughout the Permit to read**

[1] Refers to the page numbers of the original Administrative Draft issued by the Regional Board on April 9, 2012

	COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Comment #	**Permit Section**	**Permit Page[1]**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
	Comments			proposed changes is in several sections of the Admin Draft. This language provides an overly broad interpretation of the stormwater regulations.	**as follows:** "The goal of this provision is to address the impacts of MS4 discharges so that such discharges do not impair~~protect, preserve, enhance, and restore the~~ water quality and designated beneficial uses of waters of the state."
3	General Comments	1-2	Cover Pages	The Copermittees request clarification that waste discharge requirements are for their respective jurisdictions, in order to limit the entire permit to within each Copermittee's jurisdictional boundaries and preempt any such clauses that would extend requirements beyond the Copermittee's jurisdiction.	**As shown in the attached revised Permit, revise the cover page as follows:** "The San Diego County Copermittees in Table 1a are subject to waste discharge requirements within their respective jurisdictions as set forth in this Order" This change is also requested for other sections of the Permit, including Provision A. Add the same language for Orange and Riverside County Copermittees.
4	General Comments	N/A	Throughout	Jurisdictional boundaries only partially define the geographic extent of areas where Copermittees can control, reduce, or prohibit stormwater pollutants. The other component that must be incorporated into the Permit language is ownership/operation. There can be multiple MS4s within a municipal boundary (e.g., Phase 2 MS4s), and some MS4 areas are neither owned nor operated by Copermittees, preventing them from controlling pollutants or flows. The Permit should clarify that Permit requirements apply to MS4s owned and operated by the Copermittees. Other MS4 permits in California, including the Los Angeles County MS4 permit, include the "owned and operated" distinction.	**Clarify/Make distinction between different MS4 classifications:** Throughout the Permit replace "MS4s" with "MS4s owned and operated by the Copermittee".

	COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Comment #	**Permit Section**	**Permit Page**[1]	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
I. FINDINGS					
5		1	Finding 4	Minor edit change	**As shown in the attached revised Permit, revise the language as follows:** Delete space from "in to" to "into".
6		2	Finding 7	The interpretation of the Federal regulations is overly broad. The suggested deletion narrows the applicability of this Finding.	**As shown in the attached revised Permit, revise the language as follows:** The federal regulations [40 CFR 122.26(d)(2)(iv)(B)] require the Copermittees to have a program to effectively prohibit~~preventall types of non-stormwater discharges, or~~ illicit discharges, from entering the MS4.
7		2	Finding 9	Discharges may contain waste or pollutants, but it should not be presumed that they necessarily always contain waste or pollutants.	**As shown in the attached revised Permit, revise the language as follows:** "Discharges from the MS4s may contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the state. A discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. Storm water and non-storm water discharges from the MS4s may contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Basin Plan."
8		4	Finding 16	Although the Permittees do not agree with the Regional Board's Finding that the MEP technology-based standard does not apply to non-stormwater discharges, the Permittees are, at a minimum, recommending the proposed change to the existing language.	**As shown in the attached revised Permit, revise the language as follows:** "Non-storm water discharges ~~from~~into the MS4s are not considered storm water discharges and therefore are not subject to the MEP…"

	COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Comment #	**Permit Section**	**Permit Page**[1]	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
9		8	Finding 33	The Copermittees reserve the right to submit additional comments on the Fact Sheet and/or on Provisions of the Tentative Order based on the information that is provided in the Fact Sheet when it is made available for review. To date the Fact Sheet has not been provided to the Copermittees for review.	N/A
II. PROVISIONS					
A. Prohibitions and Limitations					
10	A	9	Prohibitions and Limitations	The proposed Prohibitions and Limitation provisions may be construed as standalone provisions that could expose the Copermittees to state and federal enforcement actions, as well as to third party actions under the federal Clean Water Act's citizen suit provisions. Consistent with the recent 9th Circuit Court of Appeal decision, each provision of the permit could be read separately so if provision A.2.a states that "the MS4 must not cause or contribute to a violations of a water quality standard" then that is the stand-alone provision, and the accompanying language found in A.4 (Compliance with Discharge Prohibitions) regarding compliance may be considered irrelevant. As such, a clear linkage between the compliance provisions and the prohibitions, receiving water limitations, and effluent limitations must be established.	**As shown in the attached revised Permit, insert the following sentence at the end of the introductory paragraph of Provision A:** "The process for determining compliance with the Discharge Prohibitions (A.1), Receiving Water Limitations (A.2), and Effluent Limitations (A.3, including effluent limitations derived from the TMDL requirements – Attachment E) is defined in Provision A.4." In this manner, Provisions A.1, A.2, and A.3 are clearly linked to A.4, as opposed to being standalone provisions.
11	A.1.a	9	Discharge Prohibitions	The Discharge Prohibitions do not establish a sufficient linkage with approved compliance schedules for TMDLs that have been incorporated into the Basin Plan. TMDLs adopted within the region include a schedule to provide MS4 Permittees the time necessary to develop and implement a plan to achieve water quality standards in impaired waters. The compliance schedules for effective TMDLs have been incorporated into Attachment E and language is included in the RWLs provisions (A.2.c.) and the Effluent Limitations	**As shown in the attached revised Permit:** **Revise 1.a. as follows:** "Except as otherwise permitted herein, ~~D~~ discharges ~~into and~~ fromMS4s, owned and operated by a Copermittee, in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance in ~~receiving~~ waters of the state are prohibited."

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				provisions (A.3.b.) pointing to the TMDL compliance schedules.	
12	A.1.d	9	Discharge Prohibitions	The first sentence seems to conflict with the remainder of the paragraph and may create a conflict with the State Water Board's policy if not clarified. The revised language clarifies authorized and unauthorized discharges to the ASBS and limits the jurisdiction.	**As shown in the attached revised Permit, revise the language as follows:** "~~Discharges from MS4s to ASBS are prohibited unless specifically authorized.~~ Stormwater dischargesfrom the City of San Diego's MS4 to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's MS4 to the Heisler Park ASBS are authorized under this Order subject to the Special Protections contained in Attachment B to State Water Board Resolution No. 2012-0012applicable to these discharges, included in Attachment A to this Order. <u>All other discharges from MS4s to ASBS are prohibited, unless authorized by a subsequent order.</u>"
13	A.2.a, A.2.c	9-10	Receiving Water Limitations	Without modification to the RWLs, they conflict with TMDL compliance schedules. Language should be included to clarify that in instances where a TMDL iseffective, the Copermittees shall achieve compliance with these provisions as outlined in Attachment E (Specific Provisions for Total Maximum Daily Loads). Without the requested change, the RWLs put the municipalities in immediate and ongoing non-compliance with the permit, as opposed to incorporating TMDL implementation schedules.	**To provide a more direct tie in between Provision A.2.a, TMDL compliance schedules, and A.4 the following language is proposed, as shown in the attached revised Permit**. **Revise A.2.a by adding the following onto the end of the provision:** "…the list below to the extent they remain in effect and are operative, unless such discharges are being addressed by the Copermittee(s) through the processes set forth in this Order (including Provision A.4 below and Attachment E, the TMDL Provisions):." **As shown in the attached revised Permit, delete 2.c.**

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14	A.2.a.3.b	10	Receiving Water Limitations	The Sediment Quality Control Plan applies specifically to bays and estuaries and only subtidal surficial sediments that have been deposited or emplaced seaward of the intertidal zone. Many Copermittees do not discharge to the intertidal zone. Text should be revised to clarify that this does not apply to inland MS4 discharges.	**As shown in the attached revised Permit, revise A.2.a.3.b as follows**: "Sediment Quality Control Plan which includes the following narrative objectives <u>for bays and estuaries:</u>"
15	A.2.a.4.b. Footnote 3	10	Receiving Water Limitations	Footnote to A.2.a.4.b requires Copermittees to not cause or contribute to the more stringent of a water quality objective or a CTR criterion. Instances may exist where it has been determined that one or the other is more appropriate given site specific conditions or analysis (i.e., a TMDL has been established).	**As shown in the attached revised Permit, attach the following to the end of footnote 3**: "unless a previous regulatory action (i.e., TMDL) has specified otherwise."
16	A.3	10	Effluent Limitations	Two types of effluent limitations, technology-based and water quality-based, are described in A.3, which should be reflected in the Permit.	**As shown in the attached revised Permit, revise subsections (a) and (b) for Technology-based and Water Quality-based Effluent Limitations, respectively.** **a.** Technology and Water Quality Based Effluent Limitations (including Effluent Limitations based on TMDLs). Each Copermittee shall reduce pollutants in discharges from the MS4 to the maximum extent practicable (MEP[2]). **b.** It is understood that compliance with this requirement will be achieved through the use of MEP-compliance best management practices (BMPs) or other controls that are

[2] This does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer).Runoff treatment must occur prior to the discharge of runoff into receiving waters per Finding **Error! Reference source not found.**.

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					consistent with the MEP standard.
17	A.3	10	Effluent Limitations	The water quality-based effluent limitations and compliance with the limitations should be linked to Attachment E; currently the language reads in a manner that is standalone from Attachment E. Instead, the language should reference Attachment E and the compliance determination language the Copermittees propose for inclusion therein.	**As shown in the attached revised Permit, revised the WQBEL language in A.3 as follows to better reflect the role of Attachment E:** "This Order establishes WQBELs consistent with the assumptions and requirements of all available TMDL waste load allocations assigned to discharges from the respective MS4s. Each Copermittee shall comply with applicable WQBELs as set forth in Attachment E to this Order, pursuant to the applicable TMDL compliance schedules."
18	A.4	11	Compliance with Discharge Prohibitions and Receiving Water Limitations	Language in Provision A.4 should be consistent with the CASQA proposed receiving water limitation language (also attached).	**As shown in the attached revised Permit, please modify A.4**.
19	A.4	12	Compliance with Discharge Prohibition and Receiving Water Limitations Compliance with Discharge Prohibitions, Receiving Water Limitations, and Effluent Limitations (Title Revision)	The Copermittees envision WQIPs as the foundation for a BMP-based compliance approach for the Discharge Prohibitions and RWLs. However, the language in the Provision A.4 describes the WQIPs as a document trail rather than a compliance mechanism. In essence, the language suggests that Copermittees shall expend significant resources to develop and implement WQIPs, but taking the actions in the WQIPs has no effect on the Regional Board's compliance determination. The iterative process is a fundamental aspect of MS4 programs, as envisioned by State Water Board Order 99-05 and later reconfirmed in Order WQ 2001-15 (BIA Order), and is the mechanism by which MS4 Permittees should <u>demonstrate</u> compliance. The WQIPs	**As shown in the attached revised Permit, modify the opening paragraph to A.4 to reflect the 99-05 order, using the WQIP in place of the SWMP, as follows:** 1. Change the title of the section and first sentence in A.4 to also include effluent limitations (A.3) 2. Add the following language to the end of the paragraph: "The Water Quality Improvement Plans described in Provision B shall be designed to achieve compliance to the MEP standard with the discharge prohibitions, receiving water limitations, and all effluent limitations. If the Executive Officer

	COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
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				now provide a mechanism to provide the detail and quantitative analyses used to identify pollutant sources and implement BMPs to address those sources.	approves a Water Quality Improvement Plan and subsequent updates as described in Provision B and F.1, and the plan is being implemented in a timely and good faith manner, such implementation of the plan shall constitute compliance with Provisions A.1, A.2, and A.3."
20	A.4	11	Compliance with Discharge Prohibition and Receiving Water Limitations	The WQIPs are intended to focus on water quality priorities. Pollutants addressed by existing TMDLs or are exceeding frequently such that a TMDL may be warranted are clearly high priority. However, pollutants that intermittently exceed a WQO or exceed once during a permit term appear to result in violations of the RWL provisions and will require Copermittees to expend resources in line with pollutants that have been identified as a priority. Provision A.4 describes the iterative process for MS4s to respond to exceedances of water quality standards that persist. However, the language in A.4 appears too broad and suggests the Copermittees should revise their WQIPs even in cases when (1) TMDL pollutant WLAs are exceeded but the TMDL compliance date has not yet occurred and (2) non-TMDL pollutant RWLs are exceeded and the pollutant is a WQIP priority but the BMP implementation schedule described in the WQIP has not yet been exhausted. In these two cases, the water quality standards exceedances are "expected" and no WQIP update is needed; instead the Copermittees should simply complete the implementation of actions identified in the WQIP.	**As shown in the attached revised Permit, revise the language as follows:** Revise the approach to determining compliance with the RWL provisions such that the primary focus of WQIPs is on priorities rather than random and infrequent exceedances of WQO. See also the language added to the introduction to Provision B. "The Water Quality Improvement Plans described in Provision B shall be designed to achieve compliance to the MEP standard with the discharge prohibitions, receiving water limitations, and all effluent limitations.“
B. Water Quality Improvement Plans					
21	B	13	Water Quality Improvement	Although Board staff have indicated that the WQIPs, once developed and approved, will functionally replace the CLRPs and BLRPs, the permit does not formally	**As shown in the attached revised Permit, revise the language as follows and add footnote 5:**

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			Plans	recognize this. This footnote would clarify that this is the case.	"Once developed and approved, the Water Quality Improvement Plan and corresponding Jurisdictional Runoff Management Plans will functionally replace the Load Reduction Plans."
22	B	13	Water Quality Improvement Plans	The Copermittes request a revision to the WQIP goal statement. A concise goal statement that is more central to MS4 permitting is requested. This goal statement provides context to several requested revisions to subsequent provisions.	**As shown in the attached revised Permit, revise the second sentence of the first paragraph of Provision B as follows:** "The goal of the Water Quality Improvement Plan is to <u>1) effectively prohibit non-storm water discharges into the MS4s, 2) reduce pollutants in storm water discharges from the MS4s to the MEP, and 3)</u> attain the reasonable protection, ~~preservation, andenhancement and restoration~~ of water quality and designated beneficial uses of waters of the state."
23	B	13	Water Quality Improvement Plans	The County envisions the WQIPs as the foundation for a BMP-based compliance approach for the Discharge Prohibitions and RWLs. However, language is needs to be added to Provision B to provide a clear linkage between Provision A and B.	**As shown in the attached revised Permit, insert the following in the first paragraph of Provision B, after the second sentence:** "<u>Therefore, implementation of the WQIPs also provides the basis for complying with Provisions II.A.1, II.A.2, and II.A.3, as described in Provision II.A.4.</u>"
24	B	13	Water Quality Improvement Plans	Additional language should be added to clarify that Provision E requirements may be modified for consistency with Water Quality Improvements Plans.	**As shown in the attached revised Permit, insert the following at the end of the first paragraph of Provision B:** <u>"As such, the requirements outlined in Provision E may be modified for consistency with the Water Quality Improvement Plan for the applicable Watershed Management Area, if appropriate justification is provided."</u>

	COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Comment #	**Permit Section**	**Permit Page[1]**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
					Insert the following language at the beginning of the second paragraph: "Development of the Water Quality Improvement Plans allows permittees to customize the requirements in Provision E to address the highest watershed priorities."
25	B	13	Water Quality Improvement Plans	Similarly, the Copermittees request revisions to the required/critical elements of the WQIPs. These elements reflect several requested revisions to the WQIP process (e.g., B.2), described below.	**As shown in the attached revised Permit, revise the second paragraph of Provision B as follows:** The Copermittees must develop Water Quality Improvement Plans for each Watershed Management Area that 1) prioritize water quality ~~issues~~ conditions resulting from the Copermittee's MS4 discharges ~~to and from the MS4s with~~in each Watershed Management Area, 2) identify MS4 pollutant sources ~~and other stressors~~ associated with ~~those~~the water quality priorities, 3) define numeric ~~targets~~goals and schedules to ~~achieve improvement of~~address water quality priorities, 4) describe water quality improvement strategies to achieve numeric ~~targets~~goals, and 5) develop and execute a coordinated monitoring and assessment program to facilitate adaptive management of the Water Quality Improvement Plansand determine progress towards achieving ~~improved water quality~~those goals.
26	B	13	Water Quality Improvement Plans	It is unclear whether the 12-month timeline identified in the third paragraph of Provision B applies to the development of the WQIP or the implementation of the BMPs identified in the WQIP. It would appear that the	**As shown in the attached revised Permit, revise the last introductory paragraph of Provision B, as follows:** "The Copermittees must submit Water Quality

	COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Comment #	**Permit Section**	**Permit Page[1]**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
				provision requires that the MS4s must *implement* all the requirements (including BMPs) of Provision B within 12 months of permit adoption.	Improvement Plans for public review and Regional Board Executive Officer review and approval per the schedule outline in Provision II.B.0. "
27	B	13	Water Quality Improvement Plans	The development of a WQIP will require at a minimum of 18 months and BMP implementation will likely be staggered over a certain time frame. Once the permit is adopted, Copermittees will begin the planning process. However, Copermittees must have at least one full fiscal year budgeting cycle within which to seek additional funding to implement the WQIP from our governing bodies (i.e., City councils and County supervisors). Thus the more reasonable time schedule is to require the development of the WQIP within 18 months and the implementations of the BMPs to occur consistent with the final approved WQIP.	**See the proposed changes to the last paragraph of the opening section of Provision B in the attached revised Permit.** A staggered approach to WQIP development is proposed, as detailed in a proposed section B.6. This staggered approach ensures rapid progress on WQIP development while providing a feasible WQIP submittal and initiation schedule: 1. The WQIP priorities and numeric goals are presented to the Regional Board within 6 months of the adopted Order. (B.6.a) 2. The complete WQIPs and corresponding jurisdiction measures are submitted 12 months later. (B.6.b) 3. WQIP implementation is initiated at the beginning of the next fiscal year. (B.6.b)
28	B.1	13-14	Watershed Management Areas	Several changes to Table B-1 are requested. The Copermittees request addition of a tenth WMA, for Mission Bay which is entirely in the jurisdiction of the City of San Diego. Furthermore, the City of Poway is not a responsible Copermittee for San Diego River. City of Escondido is not a responsible Copermittee for San Luis Rey River. Finally, the waterbody Loma Alta Slough should be listed under the Carlsbad WMA. Penasquitos WMA includes Miramar Reservoir HA and Poway HA.	**Make the following changes to Table B-1, per the attached revised Permit:** 1. Add a WMA for Mission Bay which includes Scripps HA, Miramar HA, and Tecolote HA. 2. Remove Penasquitos HA and Mission Bay HA from Penasquitos WMA and insert Miramar Reservoir HA and Poway HA. 3. Remove City of Poway from San Diego River 4. Remove City of Escondido from San Luis Rey River.

COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011					
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					5. Add the waterbody "Loma Alta Slough" to the Carlsbad WMA.
29	B.2	15-18	Identification of Water Quality Priorities	The Copermittees have fully embraced the concept of WQIPs and appreciate the Regional Board's approach to identifying priorities, setting goals, and developing a strategy and schedule to meet those goals. The Copermittees have identified an alternative to Provision B.2, which follows the general approach proposed by the Regional Board but increases focus on addressing MS4 impacts.	The following changes are requested, as detailed in the attached revised Permit section B and further described in subsequent comments: 1. Revisions are proposed to section B.2.a to refine the purpose and add considerations for assessing receiving water conditions. 2. A new section B.2.b is proposed to provide a linkage between receiving water conditions and corresponding impacts from the MS4s (versus other sources). 3. Section B.2.c is expanded to describe the considerations when identifying priority receiving water conditions. 4. Section B.2.d is refined to focus on MS4 impacts and pollutant generating activities. 5. Section B.2.e is refined to elucidate the meaning of numeric goals and their implication for MS4 compliance. 6. The schedule component of B.2.e is moved to a new section B.6 to improve organization of WQIP concepts.
30	B.2.a	15-16	Assessment of Receiving Water Conditions	The assessment of receiving water conditions is a critical first step to WQIP development. Changes to purpose of this step are proposed, to focus on water quality issues related to MS4s. Further, data quality and relevance are critical to this assessment, and requirement to consider "all available data" should be refined to address accessibility and quality control issues. Finally, whether a receiving water condition can be achieved and maintained should be assessed.	**As shown in the attached revised Permit, the following changes/revisions were made in Permit section B.2.a:** **Revise the opening paragraph**: "The Copermittees must consider the following, at a minimum, to support the identification of water quality priorities based on the impacts of MS4 discharges on receiving water beneficial uses:"

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					Under part (7): replace "All available data" with "Available, relevant, and appropriately collected…data meeting appropriate QA/QC standards" **Insert a new part (10):** "The potential for long-term achievement and maintenance of beneficial use attainment in the Watershed Management Area."
31	*Language Addition* B.2.b	Not in original (Add at: 17-18)	Assessment of MS4 Discharge Quality and Impacts	For WQIP development, it is critical to differentiate between receiving water conditions and MS4 discharges and impacts. Many receiving water conditions are not driven by MS4 impacts, and Copermittees can have the greatest effect on receiving water quality by focusing on reduction of pollutants discharged by their MS4s.	**As shown in the attached revised Permit, add a new section B.2.b titled "Assessment of MS4 Discharge Quality and Impacts", as follows:** "To support the identification of priorities based on the impacts of MS4 discharges on receiving water beneficial uses, the Copermittees must review appropriately collected MS4 discharge quality data and consider the extent to which MS4s cause or contribute to the adverse impacts to receiving water beneficial uses identified in II.B.2.a. Considerations include: (1) Locations of the Copermittees' MS4 discharges with respect to receiving waters; (2) MS4 discharge quality results relevant to impacts in receiving waters and action levels, including the temporal and geographic variation of the results: (3) The requirements of Provisions II.A.1 and II.A.3.; and (4) Whether MS4 discharge quality is sufficiently well known or other information is available to assess whether MS4 discharges are causing or contributing to specific receiving water

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					conditions, or whether additional data need to be collected through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan."
32	B.2.b	16	Identify Priority Pollutants and Receiving Water Conditions Identification of Priority Receiving Water Conditions (Title Revision)	We appreciate the Regional Board's approach to identifying priorities for receiving water conditions. Our proposed revisions to the Permit add several elements that should be included by Copermittees when identifying priority receiving water conditions. Following the Regional Board's approach, "priorities" are also differentiated from "highest priorities" (see new sub-bullet 6). Note the proposed revision to the title of the section, which better reflects the envisioned effort/outcome.	**As shown in the attached revised Permit, rename section to "Identification of Priority Receiving Water Conditions" and add the following to the end of the Section B.2., as follows:** "The Water Quality Improvement Plans shall describe the following for each priority receiving water condition: (1) The beneficial use(s) and pollutant(s) associated with the priority receiving water condition(s); (2) The geographic extent of the priority receiving water condition(s)within the WMA, if known; (3) The Copermittees with MS4s that contribute discharges to the priority water receiving condition(s); (4) The temporal extent of the priority receiving condition(s) (i.e., dry weather and/or wet weather); (5) Whether receiving waters have been monitored sufficiently to adequately characterize the priority receiving condition(s), including a consideration of spatial and temporal variation; and (6) The reasoning for selecting specific receiving water conditions as a priority and a subset of priorities as the highest priorities."
33	B.2.c	16-	Pollutant Source	The success of WQIPs will hinge on the ability of	

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		17	and/or Stressor Identification MS4 Pollutant Source Identification (Title Revision)	MS4s to identify and abate sources of pollutants within the MS4s. The pollutant source identification process proposed by the Regional Board is too broad and inhibits the Copermittees from focusing on the sources they are most able to control. In addition, some pollutants are poorly understood and need to be further investigated to allow for design of pollutant control strategies [new sub-bullet d.(4).(5)]. The proposed revisions to the Source ID section are intended to effectively focus the WQIP prioritization process.	**As shown in the attached revised Permit, rename section to "MS4 Pollutant Source Identification" and revise the section, as follows:** See the changes proposed in the attached revised Permit, which focuses the Source ID section on MS4 sources and impacts. **The new section B.2.d follows:** "The Copermittees must identify <u>and prioritize</u> known and suspected storm water and non-storm water pollutant sources within the MS4 associated with the highest priority receiving water conditions identified under II.B.2.c. The identification of known and suspected sources of the highest water quality priorities as identified for Provision B.2.c shall consider the following : (1) Land uses and their potential contribution to the highest priority receiving water conditions; (2) Pollutant generating facilities, areas, and/or activities within the Watershed Management Area;: (3) Locations of the Copermittees' MS4s outfalls. (4) Review of available data, including: (a) Findings from the Copermittees' illicit discharge detection and elimination programs, (b) Findings from the Copermittees' MS4 outfall monitoring,

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					(c) Other available, relevant, and appropriately-collected data, information, or studies related to pollutant sources and pollutant-generating activities that contribute to the highest priority receiving water conditions identified in Provision II.B.2. (5) Whether MS4 sources are sufficiently well known to design an effective, directed control strategy, or whether additional source/stressor identification needs to be conducted through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan to identify and prioritize sources/stressors within the watershed."
34	B.2.d	17-18	Numeric Targets and Schedules Numeric Goals (Title Revision)	We appreciate the Board staff efforts to allow the MS4s to prioritize their water quality issues and to develop a plan to address these issues. However, the terminology in Provision B.2.d regarding interim and final targets are terms used in TMDL program and their use here confuses the issue. In fact, Provision 2.d (3)(e) clearly ties the numeric "targets" with a TMDL. The WQIP should identify interim and final numeric "goals" to keep the distinction clear between a TMDL and a WQIP. It is entirely possible that the interim goal may in fact be the same as an interim TMDL target but not necessarily.	**Replace "numeric target" with "numeric goal" throughout Provision B.**
35	B.2.d	17-18	Numeric Targets and Schedules	It will be critical to quantify the expected outcomes of WQIP implementation efforts, and numeric goals serve	**As shown in attached revised Permit, revise section B.2.d, as follows:**

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			Numeric Goals (Title Revision)	to elucidate those expected outcomes. Based on the proposed revisions to the WQIP goals and elements, revisions to the description of the purpose of numeric goals are also proposed. Furthermore the notation of "target" implies a compliance effluent limit and thereby subject to enforcement action, versus goals set by the Copermittees that do not trigger any enforcement action by themselves.	The Copermittees must develop and incorporate interim and final numeric[6] goals goals[7] into the Water Quality Improvement Plans. Numeric goals and schedules are intended to support Water Quality Improvement Plan development and to measure progress towards addressing the highest priority receiving water conditions identified under II.B.2.**Error! Reference source not found.**. Numeric goals themselves are not enforceable compliance standards, effluent limitations, or receiving water limitations. When establishing numeric goals and corresponding schedules, the Copermittees must consider the following: (1) Final numeric goals must be based on measureable criteria or indicators, to be achieved in the receiving waters and/or MS4 discharges for the highest priority receiving water conditions which will be capable of demonstrating progress toward the achievement of the restoration and/or protection of water quality standards in receiving waters; and (2) Interim numeric goals must be based on measureable criteria or indicators that can demonstrate incremental progress toward achieving the final numeric goals in the receiving waters and/or MS4 discharges. **Footnote 7:** "Interim and final numeric goals may take a variety of forms such as TMDL targets, TMDL wasteload allocations, TMDL based

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					WQBELs incorporated in Attachment E of this Order, action levels, pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric goals are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators. To the extent that a goal is not based on an enforceable regulatory mechanism (i.e., TMDL, WLA), WQIP goals and schedules may be revised through the iterative process. Numeric goals are not subject to enforcement or non-compliance actions under this Order."
36	B.2.d.3	17-18	Numeric Targets and Schedules Implementation Schedules (Title Revision)	The schedule for achieving a numeric goal is tied to *implementation* not the goals itself. Therefore, it is recommended that part B.2.3 be moved to the section that describes WQIP implementation schedule requirements.	**As shown in the revised Permit, sub-bullet (3), which is the schedule component of B.2.e, should be moved to section B.3.b to improve organization of WQIP concepts.**
37	B.3	18-19	Water Quality Improvement Strategies and Schedules	The current version of B.3 requires that the MS4s have all of the following water quality improvement strategies in their WQIP (sub-bullets B.3.a.1 through B.3.a.4): structural and non-structural BMPs, retrofit projects, stream and/or habitat rehabilitation, and other water quality improvements associated with eliminating non-stormwater discharges to the MS4s. This may be an appropriate menu of actions to choose from, but pending the water quality issues and the watershed, the WQIP strategies may include all or only one of the strategies listed.	**As shown in the revised Permit, revise section B.3, as follows:** See the changes proposed in the attached revised Permit section B.3. Sub-bullets B.3.a.1 through a.4 are revised and condensed into two sub-bullets, one for JRMP activities and one for other structural and non-structural BMPs. These two sub-bullets compose the universe of BMPs that would be implemented by the Copermittees to meet the WQIP numeric goals:

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					(1) Copermittee-selected activities identified in Provision E ,either as described in the jurisdictional runoff management programs or as modified with justification, that will address the highest priority receiving water conditions; and (2) Additional Copermittee-selected structural and/or non-structural BMPs that are designed to achieve the interim and final numeric goals. **a. WATER QUALITY IMPROVEMENT STRATEGIES** The water quality improvement strategies must prioritize, based on their likely effectiveness and efficiency, and implement measures, as appropriate, to effectively prohibit non-storm water discharges into its MS4, reduce pollutants in storm water discharges from its MS4 to the MEP, and achieve the interim and final numeric goals in accordance with the schedules in Provision II.B.2.e. Measures shall include: (1) Activities identified in Provision E either as described or as modified, with justification, at the discretion of each Copermittee[3]; and (2) Structural and/or non-structural BMPs that are designed to achieve the interim

[3] Activities considered for modification shall include those required in Provisions II.D and II.E with the exception of II.E.3.c.(2)(b), II.E.3.c.(2)(d) and II.E.3.c.(3).

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					and final numeric goals identified in Provision II.B.2.e.
38	B.3.b	19	Implementation Schedules	Implementation of the WQIPs should form the basis of Permit compliance. As commented above, the schedule bullets from the Numeric Targets section should be moved to the Implementation Schedule section. Furthermore, the requirement that "Final dates for achieving final numeric targets must not extend more than 10 years..." is one of the most disconcerting requirements in the Permit. Based on conversations with Regional Board staff, it is understood that goals can take a number of forms and the "10 year" requirement is not intended as a requirement to attain all Basin Plan water quality standards within 10 years. However, to ensure this requirement is not mis-interpreted by third parties, language should be added to make this clarification.	**As shown in the attached revised Permit, add a footnote to sub-bullet (5), as follows:** "Achievement of final numeric goals within 10 years represents progress towards attainment of water quality standards, but is not a requirement to fully attain all applicable water quality standards or all priority receiving water conditions within 10 years."
39	B.4	19-20	Water Quality Improvement Monitoring and Assessment	Monitoring and assessment will be a critical component of the WQIP process. The vision for WQIP monitoring and assessment is reflected in the proposed revised language for Permit section B.4. A major aspect of this vision is that monitoring requirements in Provision D will be fully integrated into the WQIPs and modified as the WQIPs evolve. The proposed language clarifies the Copermittee's vision for purpose and components of WQIP monitoring and assessment. The requested linkage with Provision D is highlighted through the proposed revision.	As shown in the attached revised Permit revise section B.4, as follows: The Copermittees in each Watershed Management Area must develop an integrated Water Quality Improvement Plan Monitoring and Assessment Program that assesses: 1) progress toward achieving the numeric goals and schedules, 2) progress toward addressing the highest priority receiving water conditions for each Watershed Management Area, and 3) each Copermittee's overall efforts implementing the requirements of Provision B. The water quality improvement monitoring and assessment program must include the monitoring and assessment requirements of

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					Provision D, which may be modified for consistency with the priority receiving water conditions of each Watershed Management Area and associated Copermittees. For Watershed Management Areas with applicable TMDLs, the water quality monitoring and assessment program must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-001**2** (see Attachment A).
40	B.5	20-21	Adaptive Management Process	The WQIPs provide an opportunity to integrate water quality improvement strategies (e.g, TMDL implementation) and jurisdictional runoff management programs. The Copermittees have embraced the concept of WQIPs and propose to revise the Permit to fully integrate JRMPs into the WQIP process. The Adaptive Management section B.5 proposed by the Regional Board has two components: WQIP adaptive management and JRMP adaptive management. With the proposed expanded scope of the WQIPs proposed by the Copermittees, the two components of the adaptive management process are not WQIP and JRMP, instead the components are (1) Priority Receiving Water Conditions and Numeric Goals and (2) Water Quality Improvement Strategies and Schedules. The proposed revisions to section B.5 reflect the Copermittee's vision for WQIP implementation.	**As shown in the attached revised Permit revise section B.5, as follows:** The Copermittees in each Watershed Management Area must implement the iterative process, adapting the Water Quality Improvement Plan to become more effective and meet the requirements of Provisions II.A, and shall consider the following: **a. PRIORITY RECEIVING WATER CONDITIONS AND NUMERIC GOALS** The priority receiving water conditions and numeric goals, developed pursuant to II.B.2.c. and II.B.2.e respectively, shall guide jurisdictional implementation efforts for the duration of this Order. Recommendations for changes to priority receiving water conditions and numeric goals shall be provided in the Report of Waste Discharge and shall consider the following:

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				Most of the components of the adaptive management process proposed by the Regional Board (sub-bullets B.5.a.1.a thru h and B.5.b.1.a thru e) are included. The proposed language adds clarification on the purpose of the adaptive management process and re-organizes into two alternative management categories: (1) Priority Receiving Water Conditions and Numeric Goals and (2) Water Quality Improvement Strategies and Schedules. Note that these two management categories are adapted on different timelines: • Priority Receiving Water Conditions and Numeric Goals would be adapted, at a minimum, on a frequency that corresponds to Permit cycles (every 5 years). In this manner the ROWD for future permits is supported by the WQIP process. It is not expected that priority receiving water conditions and numeric goals would vary on a shorter frequency, and thus resources for adaptive management should be focused on the strategies/BMPs used to *achieve* the numeric goals. • Water Quality Improvement Strategies and Schedules would be adapted annually, allowing modification to the JRMP elements, structural BMPs, and non-structural BMPs for achieving numeric goals. Finally, to improve organization, it is proposed that the requirements regarding WQIP and JRMP modification and submittals (sub-bullets B.5.a.2 thru 3 and B.5.b.2 thru 3) be moved to a new section B.6.	(1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan; (2) Progress toward achieving interim and final numeric goals in receiving waters and/or MS4 discharges for the highest water quality priorities in the Watershed Management Area (3) New scientific information or new or updated policies or regulations that affect identified numeric goals including revised water quality objectives or TMDLs; (4) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality problems and implementation measures to address the highest priority receiving water conditions; (5) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that

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					informs the effectiveness of the actions implemented by the Copermittees; (6) The factors listed in Provision II.B.2.a.(1)-(10); (7) San Diego Water Board recommendations; and Recommendations for modifications solicited through a public participation process. **b. WATER QUALITY IMPROVEMENT STRATEGIES AND SCHEDULES** The water quality improvement strategies and schedules required pursuant to II.B.3 shall be adapted as new information becomes available to inform more effective and efficient means of achieving the numeric goals established in II.B.2.e. Copermittees shall consider adaptation to ~~b. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ADAPTIVE MANAGEMENT PROCESS~~ jurisdictional programs and monitoring and assessment strategies and schedules at least annually considering the following: (1) Changes to priority receiving water conditions and numeric goals based on recommendations from II.B.5.a.;

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					(2) Measurable or demonstrable reductions of non-storm water discharges to each Copermittee's MS4; (3) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP; (4) Information on the MS4 sources and/or pollutant-generating activities determined to be most significantly contributing to priority receiving water conditions; (5) Efficiency in implementing the Water Quality Improvement Plan; (6) San Diego Water Board recommendations; and (7) Recommendations for modifications solicited through a public participation process.
41	B.6	21	Water Quality Improvement Plan Implementation	The WQIP development and implementation process has several components and requirements for submittals to the Regional Board. As described in the first comments for Provision B, a staggered WQIP submittal schedule is proposed to extend the timeline to 18 months while still ensuring rapid progress on WQIP development. This proposal is described in the	**6. Water Quality Improvement Plan Submittal, Implementation, and Modifications** **a. PRIORITY RECEIVING WATER CONDITIONS, MS4 SOURCES, AND NUMERIC GOALS**

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				proposed language for the new Section B.6. Furthermore, requirements for submittals to the Regional Board following modifications due to adaptive management would also fall under section B.6. A staggered approach to WQIP development is proposed, as detailed in a proposed section B.6. This staggered approach ensures rapid progress on WQIP development while providing a feasible WQIP submittal and initiation schedule: 1. The WQIP priorities and numeric goals are presented to the Regional Board within 6 months of the adopted Order. (B.6.a) 2. The complete WQIPs and corresponding jurisdiction measures are submitted 12 months later. (B.6.b) 3. WQIP implementation is initiated at the beginning of the next fiscal year. (B.6.b) Furthermore, adaptive management submittals (i.e., WQIP modifications) are combined and described under Section B.6.c and B.6.d (these requirements were previously described under section B.5.a.2 thru 3 and section B.5.b.2 thru 3.	The Copermittees in each Watershed Management Area must submit the proposed priority receiving water conditions, MS4 sources, and numeric goals required in Provisions II.B.2.c-e. for San Diego Water Board Executive Officer review and approval no later than 6 months following adoption of this Order. Priority receiving water conditions, MS4 sources, and numeric goals are deemed approved if no response is provided to the Copermittees within 2 months of the submittal date. **a. WATER QUALITY IMPROVEMENT PLANS** Copermittees shall commence development of the remaining portions of the Water Quality Improvement Plans upon approval of the priority receiving water conditions, MS4 sources, and numeric goals by the San Diego Water Board Executive Officer in II.B.6.a. Copermittees must submit complete Water Quality Improvement Plans for San Diego Water Board review and approval no later than 18 months following adoption of this Order. Copermittees must commence with implementation of the Water Quality Improvement Plan no later than the fiscal year (July 1) following San Diego Water Board approval. Water Quality

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					Improvement Plans are deemed approved if no response is provided to the Copermittees within 6 months of the submittal date. **b. WATER QUALITY IMPROVEMENT PLAN MODIFICATIONS** Copermittees must submit requested modifications to the Water Quality Improvement Plan either in the Annual Report required pursuant to Provision II.F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision II.F.5 .b. Once approved by the San Diego Water Board Executive Officer, the Copermittees must implement any modifications to the Water Quality Improvement Plan in accordance with the schedules developed pursuant to Provisions II.B.2 and II.B.3.b. Requests for modification are deemed approved if no response is provided to the requesting Copermittee(s) within 3 months of the request date.
C. Action Levels					
42	C. (Intro)	22	Action Levels	The Draft Order in Provision B states that the goal of the WQIP is to identify the highest water quality priorities within a watershed and implement strategies to achieve improvements in the quality of discharge and receiving waters. Furthermore in Provision B.2.d the Permittees are required to develop and use *interim and final numeric targets/goals* to measure progress towards the protection/enhancement of the receiving	**As shown in the attached revised Permit, revise introductory paragraphs of section C, as follows:** "The purpose of this provision is for the Copermittees to incorporate numeric non-storm water and storm water action levels in the Water Quality Improvement Plans and numeric non-

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				waters and beneficial uses. The choice of the target/goals of the watershed may be biological, chemical, or physical based and may include multiple criteria and/or indicators. The permit should provide a clear linkage between Provision B and Provision C and state that the WQIP should guide the customization of the NALs/SALs to meet the highest water quality priorities in a given watershed and that NALs/SALs will be used to assist Copermittees in reaching the goals specified in the WQIP. The introduction to Provision C indicates that the *action levels* (NALs and/or SALs) will be incorporated into the WQIPs (B.2.d) and used to: a) Measure progress towards the protection/ enhancement of the receiving waters and beneficial uses (B.4) ; b) Direct and focus the JRMP implementation efforts for addressing MS4 discharges (D.4.a); and c) Detect and eliminate non-stormwater and illicit discharges to the MS4 (E.2) Although action levels will be used for several different purposes, the action levels defined in Provision C.1 and C. 2 are chemically based and may be in conflict with the selected watershed metrics. As an example, if the watershed metric is improved IBI scores for a water body, then NALs and SALs associated with water chemistry are unlikely to be the best metric to evaluate progress towards improving IBI scores or for assessing our implementation efforts. Thus, the chemically based NALs/SALs may direct resources away from the watershed priorities. Since Provision C indicates that there are three different	stormwater action levels into the IDDE Program. The action levels shall be used to guide the following program planning efforts and measure progress towards attaining the reasonable protection, preservation, and enhancement of water quality and designated beneficial uses of waters of the state: 1) Support development and prioritization of water quality improvement strategies through the Water Quality Improvement Plans. Discharge data above action levels can be evaluated using a statistical approach considering the frequency, magnitude, and loading of discharges to the receiving waters to support development of actions and prioritization of their implementation. 2) Assist in the effective prohibition of non-stormwater discharges from the MS4 pursuant to Provision E.2. 3) Support the detection and elimination of illicit discharges to the MS4 pursuant to Provision E.2. These goals will be accomplished through monitoring and assessing the quality of the MS4 discharges prior to and during the implementation of the Water Quality Improvement Plans and as a part of the IDDE Program. Exceedances of action levels are not subject to enforcement or non-compliance actions under this Order. ”

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				purposes for the action levels, the permit should recognize that the action levels for each permit provision (B.4, D.4.a, and/or E.2) may be based on different constituents, metrics, and/or may be different values. As a result, the permit should establish the purposes of the action levels and then allow the Copermittees to establish the numeric action levels. For our purpose we would submit that the action levels should be developed to support program planning and measure progress towards attaining the protection of the beneficial uses.	
43	C. (Intro)	22	Action Levels	The development of action levels, including the timeline should be clearly linked to the Water Quality Improvement Plans. A timeline that is separate and different from the development of the Water Quality Improvement Plans is not necessary. Previously developed action levels should serve as interim action levels until the Water Quality Improvement Plans are completed.	**As shown in the attached revised Permit, revise concluding paragraph of section C, as follows:** Action levels will be developed and incorporated into the Water Quality Improvement Plans (Provision B) including the Illicit Discharge Detection and Elimination (IDDE) Program (Provision E.2). Depending upon the goals/objectives for the use of the action levels and the priority receiving water conditions, the constituents and values at which they are set may differ between watersheds. Copermittees may develop Watershed Management Area specific numeric action levels for non-storm water and storm water MS4 discharges using an approach approved by the Regional Board or use the default non-stormwater and stormwater action levels prescribed within C.1 and C.2 below, respectively. The Copermittees will submit action levels as part of their Water Quality Improvement Plan(s). The action levels currently established will serve as the interim action levels until revised action levels are

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					completed and approved.
44	C. (Intro)	22	Action Levels	The introduction to Provision C indicates that numeric action levels must be *developed* for non-stormwater and stormwater MS4 discharges….. Although the permit states that NALs/SALs must be *developed*, the permit then mandates which constituents must have NALs/SALs and what the values of the action levels are. As stated above, the Permit should include an approach that allows the Permittees the opportunity to *develop* the NALs/SALs.	**As shown in the attached revised Permit, add the following to the introduction to C.1, as follows:** The following non-storm water action levels (NALs) must be incorporated in the Water Quality Improvement Plan and IDDE program if the Permittees have not developed their own NALs using an approach approved by the Regional Board EO:
45	C.1		Non-Stormwater Action Levels	Referencingthe CTR as a "source" is misleading. It is unclear why the Board is excluding the conversion factor from the CMC and CCC Metals Criteria equations from the CTR to generate total recoverable metals criteria. Table notes need to be updated to explain how NALs were derived. It should be made clear that the MDALs and AMALs were calculated using State Implementation Standard (SIP) procedures.	Add appropriate references to the State Implementation Standard procedures and provide a narrative explanation for reasoning and application in the fact sheet, when provided.
46	C.1	22-24	Non-Stormwater Action Levels	Provision C.1.b of the permit requires that additional NALs must be incorporated into the Permit for any constituents causing or contributing to conditions associated with the highest non-stormwater related water quality priorities. In Provision C.1.a the Permit mandates the NALs that must be incorporated into the WQIP. This provision results in the potential for NALs to be incorporated into the WQIP that may have no direct	The permit should provide a clear linkage between Provision B and Provision C and state allow the WQIP to guide the customization of the NALs based on the watershed needs. As a result, the Permit should provide two approaches for the NALs: 1. Permittees develop the NALs based on the highest water quality priorities; or 2. Permittees use the default NALs and

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				linkage to the highest water quality priorities. Flexibility should be added to the permit language to allow Copermittees to implement NALs based on the watershed's highest priorities and for those NALs to be included, as appropriate, in the WQIP. Otherwise Copermittees may be required to expend time and resources on numeric metrics not associated with the highest priorities in a given watershed instead of addressing the highest priorities.	approach identified in Provision C (both provision C.1.a and C.1.b) **The following is recommended language to support this approach.** C.1.c. Dry weather monitoring and assessment data from MS4 outfalls collected in accordance with Provision D.1.a may be used to develop or revise NALs based upon watershed-specific data. Revision of NALs is subject to Regional Board approval.
47	C.2	25	Storm Water Action Levels	Provision C.2.b requires that additional SALs must be incorporated into the Permit for any constituents causing or contributing to conditions associated with the highest non-stormwater related water quality priorities. The development of SALs may be based on one of 3 options: 1) water quality standards; 2) site specific conditions; and 3) numeric WQBELs. As noted previously the Copermittees believe that it is critical that flexibility be provided in the development and implementation of the SALs to allow the Copermittees to address their highest water quality issue(s). Consequently the Copermittees support other options for developing SALs.	Other options that should be included for the development of the SALs in the Permit are the approaches identified in the California Storm Water Panel in its report, "The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities" (June 2006). As previously noted, if the Copermittees do not establish action levels to support the WQIP then the Copermittees must use the SALs identified in Provision C.
D. Monitoring and Assessment Requirements [See attached Monitoring Principles**]**					
E. Jurisdictional Runoff Management Programs					
48	E	53	Jurisdictional Runoff Management Programs	Modifications/clarifications to the first sentence.	**As shown in the attached revised Permit, revise the language, as follows:** "The purpose of this provision is for each Copermittee to implement a program to control the discharge~~contribution~~ of pollutants into and ~~the discharges~~ from theirrespective MS4sto receiving

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					waterswithin its jurisdiction and to focus and prioritize those implementation actions based on the highest water quality priorities identified within the associated Water Quality Improvement Plan."
49	E	53	Jurisdictional Runoff Management Programs	As stated in the second introductory paragraph in Provision E "The jurisdictional runoff management programs implemented by each Copermittee must be consistent with the Water Quality Improvement Plan for the applicable Watershed Management Area required by Provision B." Additionally, as stated in the introduction to the WQIP (Section B) "The purpose of this provision is to develop Water Quality Improvement Plans that guide the Copermittees' jurisdictional runoff management program implementation efforts…" However, the provisions do not clearly allow for the appropriate modification of the JRMP requirements contained in the permit. Given this, it is unclear that the Copermittees would be able to implement a JRMP consistent with the WQIP unless the WQIP was designed to implement the JRMP in the exact manner as required by the current provisions in Provision E.	Include language into the introductory paragraph that clearly indicates that the JRMP requirements contained in Provision E may be modified to allow for implementation of the JRMP consistent with the WQIP if appropriate justification is provided. **Add the following language:** "As such, the requirements of the jurisdictional runoff management programs as outlined below may be modified and prioritized as appropriate for consistency with the highest water quality priorities identified in the Water Quality Improvement Plan for the applicable Watershed Management Area if appropriate justification is provided."
50	E & Attachment C	Throughout	Jurisdictional Runoff Management Programs	Clarification.	Refer to Permanent BMPs as Structural BMPs and add a definition for structural BMPs into Attachment C.
51	E	Throughout	Jurisdictional Runoff Management Programs	Clarification for consistency.	Change "~~Permanent BMP Sizing Criteria Design Manual"~~ to"BMP Design Manual" and make reference to the current design requirements under R9-2007-0001.
52	E.1.a.2	53	Legal Authority Establishment and Enforcement	Sites regulated under the Construction and Industrial General Permits are regulated elsewhere and through alternative means. Clarification is necessary for sites that are not regulated under the respective General Permits.	**As shown in the attached revised Permit, revise the language, as follows:** "Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity into its MS4 and control the

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					quality of runoff from industrial and construction sites ~~including industrial and construction sites whichhave coverage under the statewide General Permit for Discharges of Storm Water Associated with Industrial Activities (Industrial General Permit) or General Permit for Discharges of Storm Water Associated with Construction Activities (Construction General Permit), as well as to those sites which do not~~;" **And add the footnote:** "The Permittees will only be responsible for administering and enforcing the codes and ordinances applicable to their jurisdictions (i.e.; a municipality is not responsible for administering and/or enforcing a permit issued by the State of California)."
53	E.1.a.4 and E.1.a.5	53-54	Legal Authority Establishment and Enforcement	The Copermittees do not have jurisdiction to control MS4 discharges outside of their respective MS4s and the Regional Board does not have the authority to require interagency agreements to grant such jurisdiction, particularly for those agencies not subject to the Order (Caltrans, Native American Tribes, Military installations, etc.)	**As shown in the attached revised Permit, revise the language, as follows:** "~~Control through interagency agreements among Copermittees the contribution of pollutants from one portion MS4 to another portion of the MS4;~~" and "~~Control through interagency agreements with other owners of the MS4 such as Caltrans, the U.S. federal government, or sovereign Native American Tribes, where possible, the contribution of pollutants from one portion of the MS4 to another portion of the MS4;~~" (4) The permittees are encouraged to enter into interagency agreements with owners of other MS4 systems, such as Caltrans, school and college districts, universities, Department of Defense, Native American Tribes, etc., to control the

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					contribution of pollutants from one portion of the MS4s to another portion.
54	E.1.a.7&8	54	Legal Authority Establishment and Enforcement	Copermittees must have the legal authority to control contribution of pollutants in discharges of runoff to its MS4 – mandating the legal authority to require BMPs is not necessary. Additionally, it is not realistic to require homeowners or other private responsible parties to ensure effectiveness of structural BMPs.	Delete E.1.a.7 and E.1.a.8
55	E.1.a.10	54	Legal Authority Establishment And Enforcement	Incorporate language from existing Orange County permit that acknowledges that legal authority will be included in ordinances to the extent permitted by the constitution.	**As shown in the attached revised Permit, revise the language, as follows:** "The Copermittee's ordinance must include adequate legal authority, to the extent permitted by California and Federal Law and subject to the limitations on municipal action under the constitutions of California and the United States,"
56	E.2.a	54	Illicit Discharge Detection and Elimination	Some non-storm water discharges are authorized under the permit unless the Copermittee or San Diego Water Board determines they are a source of pollutants in receiving waters. Language should be provided to account for subsection E.2.a.(3).	**As shown in the attached revised Permit, revise the language, as follows:** "Each Copermittee must address all non-storm water discharges as illicit discharges, where the likelihood exists that they are a source of pollutants to waters of the state."
57	E.2.a.2	55	Illicit Discharge Detection and Elimination	There is no basis for addressing potable water as an illicit discharge to the MS4 unless pollutants are discharged as a result of the water line flushing or a water main break.	**As shown in the attached revised Permit, revise the language, as follows:** "Discharges of non-storm water from water line flushing and water main breaks to the MS4 must be addressed as illicit discharges unless the discharge has coverage under a valid NPDES Permit,. This includes water line flushing and water main break discharges from water purveyors under the Copermittee's jurisdiction that has been issued a water supply permit by the California Department of Public Health or federal military installations. Discharges from recycled or reclaimed water lines to the MS4 must be addressed as illicit discharges, unless the discharges have coverage under a

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					separate NPDES permit.
58	E.2.a.1	55	Illicit Discharge Detection and Elimination	There is no technical basis or water quality concern that justifies the classification of uncontaminated pumped ground water, discharges from foundation drains, water from crawl space pumps, water from footing drains, water line flushing and water main breaks as illicit discharges. These discharges have little to no contribution to water quality pollution. Addressing these non-stormwater discharges as illicit discharges is not a good use of Copermittee resources and they should be added back to the list of allowable non-stormwater discharges.	Add the following back to the list of allowable non-stormwater discharges: • Uncontaminated pumped ground water • Discharges from foundation drains • Water from crawl space pumps • Water line flushing • Water main breaks
59	E.2.a.2	55	Illicit Discharge Detection and Elimination	The provision states: "Discharges from recycled or reclaimed water lines to the MS4 must be addressed as illicit discharges, unless the discharges have coverage under a separate NPDES permit." What does this mean for Cities where a separate Water District has a separate Permit for recycled water lines? Are cities primarily responsible for "addressing the illicit discharge," or is the Water District responsible for enforcing its permit? Does this discussion apply to on-site irrigation lines?	Please clarify.
60	E.2.a.4	56	Illicit Discharge Detection and Elimination	See comment E.2.a.	**As shown in the attached revised Permit, revise the language, as follows:** "or similar means<u>where there is evidence that those discharges are a source of pollutants to waters of the state</u>"
61	E.2.a.4.a	56	Illicit Discharge Detection and Elimination	Individual buildings may require substantial structural modifications to redirect air conditioning condensation to landscaped areas. Redirection should be encouraged instead of required.	**As shown in the attached revised Permit, revise the language, as follows:** "The discharge of air conditioning condensation ~~must~~ <u>should</u> be directed to landscaped areas or other pervious surfaces where feasible;"

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62	E.2.a.4.b	56	Illicit Discharge Detection and Elimination	Complete removal of residential car washing activities is unrealistic and resources would be better used to educate the public. Public outreach has proven to be also effective in minimizing water and detergent use and encouraging the use of commercial facilities.	**As shown in the attached revised Permit, revise the language, as follows:** "(b) Individual residential vehicle washing – <u>Residents should be encouraged, through public outreach and education, to implement the following when washing their vehicles</u>: <u>(i)</u> <u>Direct</u> the discharge of wash ~~water must be directed~~ to landscaped areas or other pervious surfaces where feasible, and <u>(ii)</u> Minimize the use of water for vehicle washing, use as little washing detergent and other vehicle wash products as possible, wash vehicles at commercial wash facilities, and implement other practices or behaviors that will prevent the discharge of pollutants associated with individual residential vehicle washing from entering the MS4; and"
63	E.2.a.4.c.ii	56	Illicit Discharge Detection and Elimination	Clarify. Discharges of saline water to the MS4 cannot be directed out of the MS4 once the discharge has occurred. Allow saline discharges to salt water receiving waters.	**As shown in the attached revised Permit, revise the language, as follows:** "The discharge of saline swimming pool water ~~to the MS4~~ must be directed to the sanitary sewer (with approval from the sanitary sewer agency), landscaped areas, or other pervious surfaces that can accommodate the volume of water<u> or to the MS4 if the MS4 discharges to a saltwater receiving water</u>."
64	E.2.a.5.b	56-57	Illicit Discharge Detection and Elimination	Priorities for emergency procedures such as firefighting are public health and safety. The paragraph on Emergency Fire Fighting discharges should reflect the language included in the County's current permit. In addition, the language for the non-emergency fire fighting activities should be streamlined.	**As shown in the attached revised Permit, revise the language, as follows:** (1) "Firefighting discharges to the MS4 must be addressed by the Copermittees ~~as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a significant source of pollutants to receiving~~

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					~~waters. Firefighting discharges to the MS4 not identified as a significant source of pollutants to receiving waters, must be addressed, at a minimum,~~ as follows:" **Delete language in E.2.a.5.b and replace with:** (a) "<u>Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Runoff Management Plan (JRMP), each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.</u>"
65	E.2.b.1.e	58	Illicit Discharge Detection and Elimination	Clause is redundant and confusing.	**As shown in the attached revised Permit, revise the language, as follows:** ~~(i.e., receiving water segments that are both a receiving water and part of the MS4),~~
66	E.2.b.2	58	Illicit Discharge Detection and Elimination	Clarification is necessary to limit employee responsibilities to within the terms of their employment.	**As shown in the attached revised Permit, revise the language, as follows:** "~~Each Copermittee must use~~ Copermittee personnel and contractors <u>should</u>~~to~~ assist in identifying and reporting illicit discharges and connections<u>, if observed</u> during <u>the course of</u> their daily <u>employment</u> activities;"
67	E.2.b.4	58	Illicit Discharge Detection and Elimination	The addition of language is necessary to limit Copermittees responsibility to standards that may reasonably be met.	**As shown in the attached revised Permit, revise the language, as follows:** "Each Copermittee must implement practices and procedures (including a notification mechanism) to prevent, respond to, contain, and clean up any spills

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					that may discharge into the MS4 <u>within their jurisdiction</u> from any source. The Copermittee must coordinate with spill response teams to prevent <u>to the extent possible</u> entry of spills into the MS4, and prevent contamination of surface water, ground water, and soil."
68	E.2.c	58	Illicit Discharge Detection and Elimination: Field Screening and Monitoring	Visual observations should be acknowledged as a way to detect non-storm water and illicit discharges and connections.	Add "<u>Visual Observations</u>" to the provision header and acknowledge within the text.
69	E.2.d.2 & E.2.d.3	59 – 61	Illicit Discharge Detection and Elimination: Investigate and Eliminate	Sections 2 and 3 outline the procedures that Copermittees must have in place. Not all language under these headers speak to procedures. Additionally, some overlap exists between these two sections.	Edit were made to ensure that requirements addressed the development of procedures. Additional edits made for clarity and to reduce overlap between sections. See the strikeout document of the admin draft for specifics.
70	E.2.d.2	59	Illicit Discharge Detection and Elimination	Language should be added for discharges to receiving waters <u>within</u> the jurisdiction of the Copermittee.	**As shown in the attached revised Permit, revise the language, as follows:** "Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on reports or notifications, <u>visual observations</u>, field screening and monitoring, or other appropriate information, indicate a reasonable potential of ~~receiving, containing, or~~ discharging pollutants <u>to receiving waters within the Copermittees jurisdiction</u> due to illicit discharges <u>or</u> illicit connections, ~~or other sources of non-storm water~~."
71	E.2.d.2.b & c	60	Illicit Discharge Detection and Elimination	Provision E.2.d.2 states that the Copermittee must implement procedures and develop criteria for responding to and addressing incidents. Providing additional specificity in (b) and (c) is unnecessary and contradicts previous statements that Copermittees develop their own criteria. Delete b and c.	**Delete the following:** ~~(b) Each Copermittee must immediately investigate and seek to identify the source(s) of discharges of non-storm water where flows are observed in and from the MS4 during the field screening and monitoring required pursuant to Provision D.1.a.(1). The investigation must include field~~

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					~~investigations to identify sources or potential sources for the discharge, unless the source or potential source has already been identified during previous investigations;~~ ~~(c) Each Copermittee must investigate and seek to identify the source(s) of non-storm water discharges from the MS4 where there is evidence of non-storm water having been discharged into or from the MS4 (e.g., pooled water). The investigation may include field investigations, reviewing Copermittee inventories, and other land use data to identify potential sources of the discharge; and~~
72	E.2.d.4	61	Illicit Discharge Detection and Elimination	Language used in the current Orange County Permit (Provision R9-2009-0002) provides clearer language regarding follow through.	**Use Orange County permit language instead:** If the Copermittee suspects the source of the non-storm water discharge as natural in origin (i.e. non-anthropogenically influenced) and in conveyance into the MS4, then the Copermittee must ~~collect the data and evidence necessary to demonstrate to the San Diego Water Board that it is natural in origin; and~~document the rationale for why the discharge does not need further investigation. This documentation shall be included in the Annual Report.
73	E.3	61	Permanent BMP Requirements for All Development Projects	No jurisdictional limitations are provided in this section. As a result, language in the subsections may be interpreted as expanding Copermittee requirements outside their MS4 jurisdiction. In addition how the Copermittees implement their program should be a decision left to the Copermittees.	**As shown in the attached revised Permit, revise the language, as follows:** "Each Copermittee, within their respective jurisdictions, must ~~use their land use/planning authorities to~~ implement a development planning program…"
74	E.3.	61-74	Development Planning	Permanent BMPs. This nomenclature can be confusing. "Treatment controls and structural LID BMPs" is more apt language than "permanent" to the type of BMPs in these provisions.	**As shown in the attached revised Permit, revise the language, as follows:** Change "permanent" to "Treatment controls and

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					structural LID BMPs" throuought the section.
75	E.3.a	61	Permanent BMP Requirements for All Development Projects	Requiring specific types of BMPs (i.e. LID) does not allow for Copermittees to implement adaptive management practices based on the best available technology for the soil and climate types of specific developments. This is an increase in BMP requirements to all development (including redevelopment) projects as compared to the prior permit and will require additional TCBMP inspections and maintenance. It will also impact the Copermittee's ability to maintain their infrastructure due to additional requirements, costs, and time associated with implementation. An exception should also be added for the protection of persons and property, particularly as it applies to BMPs not being implemented in waters of the U.S. or state. This language is consistent with Cal. Water Code §13269(c)(1-2). Flood control projects are intended for the protection of public safety and property and are mandated by the Orange County Flood Control Act of 1927. Requiring flood control projects to implement BMPs which are intended for traditional types of development projects is inappropriate and in most cases infeasible. Furthermore requiring flood control projects to implement BMPs may cause flood control projects to be infeasible which in many cases will increase the risk of flooding. If flooding does occur in these areas it would increase the risk of pollutants discharging into receiving waters from the flooded areas.	**As shown in the attached revised Permit, revise the language, as follows:** "Each Copermittee, as practical and feasible, must prescribe the following BMP requirements during the planning process (i.e. prior to project approval and issuance of grading or building permits) for all development projects (regardless of project type or size), where local permits are issued, including unpaved roads, ~~and flood management projects~~, except emergency projects implemented for the protection of persons and property:"
76	E.3.a.3	62	Permanent BMP Requirements for All Development Projects	Specified LID BMPs should be implemented consistent with technical guidance developed by the Copermittees.	**As shown in the attached revised Permit, revise the language, as follows:** Add the following foot note to this section: "Implementation of LID BMPs shall be consistent with technical guidance developed by the Copermittees."

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77	E.3.a.5	63	Infiltration and Groundwater Protection	Infiltration BMPs must not have a reasonable potential to cause an exceedance of an applicable groundwater quality objective as identifying that it has caused an exceedance would be difficult.	**As shown in the attached revised Permit, revise the language, as follows:** "Infiltration and treatment control BMPs designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins) must not <u>have reasonable potential</u> to cause or contribute to an exceedance of an applicable groundwater quality objective."
78	E.3.b.1.a	64	Definition of Priority Development Project	The entire project footprint should not be required to adhere to the new development requirements as only project features that qualify as PDP projects should be subject to the PDP requirements. Other non-PDP land uses have not been identified as PDPs for a reason as they are not a significant source of pollutants. If they were a source of pollutants then they would be categorized as a PDP. Identification of PDP types has focused in the past on those land uses that are a significant source of pollutants, and so requiring non-PDP land uses to meet PDP requirements has no technical basis since they are not a significant source of pollutants there will be no significant reduction in pollutants through the implementation of PDP requirements. Furthermore this non-PDP land uses also do not represent an increase in the volume of runoff as they do not contain large amounts of impervious surfaces as if they did then they we trigger the impervious area thresholds of the PDP categories. Therefore requiring non-PDP land uses to meet PDP requirements has no technical basis since they are also not a significant source of increases of volume of runoff and therefore there will be no significant reduction in the volume of runoff through the implementation of PDP requirements.	Delete the section from the permit.

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79	E.3.b.1.b	64	Definition of Priority Development Project	Limit to requirements not subject to prior PDP requirements as these projects already have water quality treatment and the new requirements should not apply to areas that already have water quality treatment.	**As shown in the attached revised Permit, revise the language, as follows:** "Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development and was not subject to previous Priority Project Development requirements, the performance and sizing requirements apply to the entire development."
80	E.3.b.1.c	64-65	Definition of Priority Development Project	Clarify that regardless of the 50% threshold, portions of the site that were subject to and meet previous Priority Development Project requirements are not subject to the new requirements. Proposed language has been modified from Ventura County NPDES MS4 Permit (Order No. 00-108).	**As shown in the attached revised Permit, revise the language, as follows:** Add the following: "(c) Projects where redevelopment results in an increase of more than fifty percent of impervious surfaces of a previously existing development, and the existing development *was* subject to previous Priority Project Development Requirements, only the altered portion is subject to the new Priority Development Project requirements. "
81	E.3.b.2	65	Priority Development Project Categories	This provision establishes the scope of development projects subject to the post-construction controls. Sometimes the criterion is based on impervious area and other times it is based on surface area. Also, this is an increase in requirements from the prior permit, which was limited to much larger development projects.	In the interest of consistency, revise the criterion so that impervious area is the mechanism for determining applicability as it is an accurate surrogate for establishing project eligibility.
82	E.3.b.2.g	66	Priority Development Project Categories	This requires PDP requirements for development and redevelopment of streets, roads, highways, freeways, and residential driveways over 5,000 square feet. This requirement was present in the prior permit; however, the residential driveways requirement was added under the proposed permit and will require additional Copermittee effort for treatment control and structural LID BMP inventory, inspections, and maintenance	**As shown in the attached revised Permit, revise the language, as follows:** "Streets, roads, highways, and freeways~~, and residential driveways~~. This category is defined as any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other internal

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				verification and may have potential enforcement issues. Residential driveways should be removed from this Provision unless the Regional Board can provide a sound scientific basis for inclusion. Additionally vehicles should be defined as internal combustion vehicles as internal combustion vehicles are the source of pollutants this section is developed for.	combustionvehicles."
83	E.3.b.2.i	66	Priority Development Project Categories	The term pollutant-generating is ambiguous and needs to be defined.	**As shown in the attached revised Permit, revise the language, as follows:** Include footnote with a definition of "pollutant generating"
84	E.3.b.3.d	66	Priority Development Project Categories	An exemption for Priority Development Projects should be provided for driveways and parking lots constructed with permeable surfaces.	**As shown in the attached revised Permit, revise the language, as follows:** "Sidewalks, bicycle lanes, driveways, parking lots, or trails constructed with permeable surfaces."
85	E.3.b.3.e	66	Priority Development Project Categories	Single family residential projects should not be subject to PDP requirements as the PDP requirements would put an undue burden on single family residences where it has not been shown that they are significant source of pollutants.	**As shown in the attached revised Permit, revise the language, as follows:** Single-family residential projects that are not part of a larger development or proposed subdivision
86	E.3.b.3.f	66	Priority Development Project Categories	The Ventura County NPDES MS4 Permit, the Santa Ana Region permits for Orange County, San Bernardino County, and Riverside County, and the Greater Los Angeles MS4 Permit Staff Working Proposal provide that streets, roads, and highways, and freeways follow USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets to the maximum extent practicable.	**As shown in the attached revised Permit, revise the language, as follows:** "(e) Any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles that follows the USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets[1] to the MEP." 1:http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm

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87	E.3.b.3.g	66	Definition of Priority Development Project	This provision establishes an exemption for emergency public safety projects where a delay due to a SSMP would compromise public safety, public health and/or the environment. Permittees need an exemption where if public health or safety or environmental protection is threatened the project can proceed without a SSMP.	**As shown in the attached revised Permit, revise the language, as follows:** "(d) Emergency public safety projects in any of the Priority Development Categories may be excluded if the delay caused due to the requirement for a SSMP compromises public safety, public health and/or environmental protection."
88	E.3.c.2	66 – 68	Priority Development Project Permanent BMP Performance and Sizing Criteria	The permit should allow offsite regional groundwater replenishment as an option that is coequal with onsite retention. This promotes groundwater infiltration at a regional scale where it can have watershed-wide benefits. As currently written in the Administrative Draft, a project applicant must prove technical infeasibility before pursuing alternative compliance. This will limit the need for alternative compliance. Copermittees may not be willing to take on the risk of investing in regional groundwater replenishment projects if the permit requirements do not foster a need for such projects. Allowing onsite retention and offsite regional groundwater replenishment as coequal options provides for a higher number of project applicants paying into a fund to construct regional facilities.	**As shown in the attached revised Permit, revise the language, as follows:** Allow offsite regional groundwater replenishment as an option coequal with onsite retention. Suggest adding the following language: "(a) Each Priority Development Project must be required to implement LID BMPs as described in Provision E.3.a.(3) or offsite regional groundwater replenishment if the following conditions apply:; (i) The volume of stormwater runoff used to replenish groundwater must be equal to or greater than the design capture volume; (ii) Pollutant reduction is provided through treatment of the design capture volume at the project site."
89	E.3.c.2.b	67	Priority Development Project BMP Implementation and Oversight	Retention should not be limited to requiring retention for the 85th percentile storm but also allow, as an option, the matching of the volumes between the pre and post-project conditions. The former will result in lesser flows necessary for downstream habitats and may be less desirable in some circumstances.	**As shown in the attached revised Permit, revise the language, as follows:** "Each Priority Development Project must be required to implement LID BMPs that are sized and designed to retain the volume equivalent to runoff produced from a 24-hour 85th percentile storm event or to retain the difference in the volume

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					between the runoff volume produced in the post-project condition as compared to the pre-project condition resulting from a 24-hour 85th percentile storm event ("design capture volume").
90	E.3.c.2.c	67	Priority Development Project BMP Implementation and Oversight	This provision removes the BMP hierarchy recently adopted in both the South Orange County Permit (R9-2009-0002) and the Santa Margarita Region Permit (R9-2010-0016): retention, then biofiltration, and then conventional BMPs including offsite mitigation with no technical justification. Biofiltration provided an option for those sites where in their natural condition soils are not suitable for infiltration, and where harvesting and use is not feasible. By removing the biofiltration step from the hierarchy the existing soils of the site are no longer considered in the implementation of BMPs for the site. In the above mentioned permits, soils of a site can be factored into BMP implementation as when infiltration is not feasible due to poor soilsbiofiltration is a viable option. This provision in the Administrative Draft removes the biofiltration option and additionally requires offsite mitigation for those siteswith natural site conditions that prevent full retention from occurring onsite. This in effect punishes sites that have poor soils, which is a factor beyond the control of the site. Furthermore this provision as currently written will result in development being implemented in areas of well draining soils so that the retention standard can be met through infiltration. This result is antithetical to one of the primary LID site design techniques, which is to concentrate development and impervious surfaces on poor draining soils to help maintain the natural hydrology. The result of this provision will be that development will be located on well draining	**As shown in the attached revised Permit, revise the language, as follows:** "(c) If onsite retention of the design capture volume using LID BMPs is technically infeasible per Provision E.3.c.(4)flow-thru LID ~~and/or conventional treatment control~~ BMPs must be implemented to treat the portion of the design capture volume that is not retained onsite. Flow-thru LID treatment control BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. (d) If retention and/or equivalent pollutant removal of the design capture volume to meet E.3.c.(2)(a) or E.3.c.(2)(b) are infeasible onsite~~Additionally~~ project applicants must perform mitigation for the portion of the pollutant load in the design capture volume that is not retained onsite, as described in Provision E.3.c.(4)**Error! Reference source not found.**."

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				soilswhere meeting retention through infiltration is feasible, which could have a disastrous impact on the overall health of a watershed as land with good draining soils will be targeted for development vs being preserved in the watershed.	
91	E.3.c.(3)	68	Hydromodification Management BMP Requirements	The Regional Board adopted the San Diego Hydromodification Management Plan (HMP) in July 2010. Significant work, technical analysis and input have gone into the development of the HMP and these requirements have been in effect for only 16 months. Rather than providing separate criteria, the permit should acknowledge implementation of the Regional Board approved HMP as a sufficient mechanism for meeting hydromodification requirements. The Orange County MS4 permit states only guidelines/criteria regarding hydromodification and refer to the HMP for detailed requirements. Similarly significant work and technical analysis and input have gone into the development of the South Orange County HMP, which would essentially become obsolete shortly after approval and beginning of implementation. The Regional Board has provided no technical justification for the new hydromodification provisions. The HMPs for San Diego and South Orange County are based on sound science and should be allowed time to understand if they are adequate for mitigating hydromodification impacts. The administrative draft proposes to lower project applicability thresholds substantially in some categories. For example, commercial and industrial projects will be lowered from one acre to 10,000 sqftor	**As shown in the attached revised Permit, revise the language, as follows:** "Each Copermittee must require each Priority Development Projects greater than one acre to implement hydromodification management BMPs as described in the Copermittees' current HMP, as applicable ~~so that~~." Delete sections E.3.c.3(a)(i) and (ii).

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				more of impervious surfaces. Imposing hydromodification requirements on these lower thresholds will be unduly burdensome to smaller projects.	
92	E.3.c.(3)(c)	68	Hydromodification Management BMP Requirements	Per the Hydromodification Management Workshop provided by the Copermittees on August 30, 2012 the expert panel identified that onsite controls are not one size fits all and in some cases it maybe more beneficial to provide stream restoration instead of onsite controls. Regional Board Staff acknowledged at the September 5, 2012 workshop that onsite controls may not be applicable in all cases. Changes to the language in this section provide an opportunity for PDPs to implement stream restoration projects or offsite mitigation or contribute to an established mitigation fund if it is identified that stream restoration or offsite mitigation would be more beneficial to watershed health	**As shown in the attached revised Permit, revise the language, as follows:** "If hydromodification management BMPs are technically infeasible per Provision E.3.c.(4)orit is identified that stream rehabilitation projects or regional mitigation projects are preferable for restoration of watershed functions, project applicants must perform mitigation for the portion of the runoff volume that is not controlled and has a reasonable potential to cause or contribute to increased potential for erosion of receiving waters downstream of the Priority Development Project, as described in Provision E.3.c.(4)**Error! Reference source not found.**or contribute to an established mitigation fund per Provision (3)(d)(v)."
93	E.3.c.(3)(d) New Section	69	Hydromodification Management BMP Requirements	This section provides an option for Copermittees to develop an Offsite Hydromodification Mitigation program to implement a watershed based approach to hydormodification. This language provides the basis and key elements to the development of this program.	**As shown in the attached revised Permit, revise the language, as follows:** Add the following text: (d) Offsite Hydromodification Mitigation Program Each Copermittee, in collaboration with the other Copermittees may develop and implement a watershed based approach to hydromodification management that may include the following: (i) Analysis to identify current

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					land uses and proposed future development and changes in land use. (ii) Development of watershed hydromodification management objectives. (iii) Development of criteria to identify when stream rehabilitation or regional mitigation projects are preferable to onsite hydromodification controls for PDPs, in order to restore watershed functions and processes,. (iv) Identification of opportunities for stream rehabilitation and mitigation projects to restore watershed functions and processes (v) Development of a mitigation fund and program for implementation of stream rehabilitation and mitigation projects
94	E.3.c.3.d.ii	69	Hydromodification Management BMP Requirements – Exemptions	Section F.1.h.(3) provides discretion to the Copermittees to identify hydromodification requirements that are not required. Hydromodification requirements are not appropriate for channels that are designed to accept increased flows from upstream	**As shown in the attached revised Permit, revise the language, as follows:** "(ii) Discharges storm water runoff into conveyance channels <u>that are engineered for the</u>

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				development, as the potential for erosion, if any, is minimal. A waiver for projects that discharge to concrete-lined or engineered channels should be included. Studies have shown that hydromodification is caused by the smaller storms up to the 10 year event. Based on these studies those engineered channels designed to convey the 10-year ultimate build out condition will therefore not experience hydromodification impacts. These channels were installed for the purpose of flood control and protection of public safety and property as historically flooding occurred where there is now development. These channels cannot be removed as they serve the important and mandated service of flood control. It is also unrealistic to think that development can be removed from the floodplain so that these flood control channels could be removed and returned to a natural state. Since removal of these channels is infeasible restoration of these channels to a natural state is also infeasible. Since there is no potential for restoration to a natural state and because these channels are designed to be flood control channels they should be allowed to convey the storm events they are designed for. Since there is no potential for removal of these channels there is no environmental benefit to requiring onsite mitigation of hydromodification when these channels are designed and engineered to accept these flows.	capacity to convey the 10-year ultimate build out condition flow and are regularly maintained to ensure flow capacity ~~whose bed and bank are concrete lined~~ all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean;"
95	E.3.c.3.d.iii	69	Hydromodification Management BMP Requirements – Exemptions	Studies have shown that cumulative watershed impacts are minimal in stream reaches of large depositional rivers. Analysis in the San Diego HMP demonstrated that the effects of cumulative watershed impacts are minimal in those reaches which the drainage area exceeds 100 square miles and with a 100-year design flow in excess of 20,000 cfs. An exemption for those reaches that meet these criteria should be included in	**As shown in the attached revised Permit, revise the language, as follows:** " (iv) Discharges to large rivers where large rivers are defined as reaches for which the contributing drainage area exceeds 100 square miles and with a 100-year design flow in excess of 20,000 cfs;"

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				the exemption provisions of the permit.	
96	E.3.c.3.d.iv	69	Hydromodification Management BMP Requirements – Exemptions	Infill redevelopment projects offer an opportunity for improvement in water quality. Due to the usual tight constraints and limited footprint of infill development projects implementing onsite hydromodification controls is often infeasible. In many cases projects will not be able to meet the hydromodification criteria and so will choose "greenfield" developments where meeting hydromodification criteria are more feasible. To encourage infill development over "urban sprawl" and "greenfield" development, a hydromodification exemption should be provided for infill development projects. This will also provide the benefit of improving water quality as the water quality/LID requirements will still be required to be met. Overtime infill redevelopment projects will address the significant issue of improving water quality from existing development. Without this exemption redevelopment for infill projects will likely not occur as implementing onsite hydromodification will just be too expensive for these types of projects and so the benefits meeting the water quality/LID requirements will not be realized at these sites. Criteria for what projects qualify for the infill development exemption shall be developed by each of the Permittees as part of updates to their HMPs.	**As shown in the attached revised Permit, revise the language, as follows:** " (v) Discharges from infill redevelopment projects that meet criteria to be established in the Permittees' HMPs; or"
97	E.3.c.3.d.v	69	Hydromodification Management BMP Requirements – Exemptions	Flood control projects are intended for the protection of public safety and property and are mandated by the Orange County Flood Control Act of 1927. Requiring flood control projects to implement hydromodification controls intended for traditional types of development projects is inappropriate and in most cases infeasible. Furthermore requiring flood control projects to implement hydromodification controls may cause flood control projects to be infeasible which may increase the risk of flooding. If flooding does occur in these areas it	**As shown in the attached revised Permit, revise the language, as follows:** "(vi) In-stream flood control and restoration projects."

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				would increase the risk of pollutants discharging into receiving waters from the flooded areas. In-stream restoration projects are designed to restore beneficial use of streams and channels. These projects also serve as a potential option for restoring impacts from hydromodification. It is counterproductive to require mitigation of a restoration project.	
98	E.3.c.4.a.iv	69	Alternative Compliance for Technical Infeasibility	Add additional language to encourage strategically important regional BMP projects	**As shown in the attached revised Permit, revise the language, as follows:** <u>"(iv) The project applicant is required to perform mitigation described in Provision E.3.c.(4)(c) and has the option or ability to contribute to a regionally important mitigation project/program as defined in the Water Quality Improvement Plan that would address strategic high-priority water quality protection and/or more-direct restoration of beneficial uses in receiving waters than if achieved if the Priority Development Project had fully implemented the retention LID and hydromodification management BMP requirements under Provisions E.3.c.(2) and E.3.c.(3) onsite."</u>
99	E.3.c.4.b.i.	70	Alternative Compliance for Technical Infeasibility: Criteria	Contaminated groundwater at a project development site should also be included as reason for technical infeasibility.	**As shown in the attached revised Permit, revise the language, as follows:** "(i) Locations that cannot meet the infiltration and groundwater protection requirements in Provision E.3.a.(5)due to the presence of shallow bedrock, contaminated soils, <u>contaminated groundwater</u>, near surface groundwater, underground facilities, or utilities;"
100	E.3.c.4.c	70	Alternative Compliance for	The permit should clearly provide Copermittees' with the option to develop an alternative compliance	**As shown in the attached revised Permit, revise the language, as follows:**

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			Technical Infeasibility: Mitigation	program that fits their specific program needs.	"Priority Development Projects that meet the Copermittee's technical infeasibility criteria developed pursuant to Provision E.3.c.(4)**Error! Reference source not found.** must be required to mitigate for the increased flow rates, increased flow durations, and/or increased pollutant loads expected to be discharged from the site. ~~Forpollutant load in the volume of storm water~~Copermittees may establish an offsite mitigation program that requires the developer to mitigate for the water quality equivalencenot retained onsite with retention LID BMPs, or increased potential erosion of downstream receiving waters not fully controlled onsite with hydromodification management BMPs, the Copermittee must require the project applicant to either 1) implement an offsite mitigation project, and/or 2) provide sufficient funding for a public or private offsite mitigation project via a mitigation fund."
101	E.3.c.4.c.ii	71	Mitigation Project Types	Groundwater recharge projects are a viable offsite mitigation project as they promote and integrated water resources approach and should be listed as an option for offsite mitigation. In-stream rehabilitation projects need the flexibility to incorporate a variety of materials to be effective at restoring beneficial uses and stream function. Limiting the types of materials that can be used will prevent many project from being implemented. Regional Board staff will have an opportunity to review the materials used in all stream restoration projects through the 401 certification.	**As shown in the attached revised Permit, revise the language, as follows:** "Offsite mitigation projects ~~must~~may include, where applicable and feasible, retrofitting opportunities and stream and/or habitat rehabilitation or restoration opportunities identified in the Water Quality Improvement Plans, identified pursuant to Provision B.3.a. Other offsite mitigation projects may include green streets or infrastructure projects, groundwater recharge projects, or regional BMPs upstream of receiving waters. ~~In stream rehabilitation or restoration measures to protect~~

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					~~or prevent adverse physical changes to creek bed and banks must not include the use of nonnaturally occurring hardscape material such as concrete, riprap, or gabions.~~ Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of Provision E.3.c.(4)**Error! Reference source not found.**.
102	E.3.c.4.c.iii	71	Mitigation Project Timing	Offsite mitigation projects being implemented by a PDP should be completed upon completion of the PDP project, however the Copermitees should be provided the opportunity to develop a timing scheme if they choose to develop a Copermittee offsite mitigation program.	**As shown in the attached revised Permit, revise the language, as follows:** "The Copermittee and/or project applicant must develop a schedule for the completion of offsite mitigation projects, including milestone dates to identify, fund, design, and construct the projects. PDP implemented~~O~~offsite mitigation projects must be completed upon ~~the granting of occupancy for the first project that contributed funds~~completion of thePDP, unless a longer period is authorized by the San Diego Water Board. The timing of mitigation projects associated with a Copermittee offsite mitigation program will be developed by the Copermittees as part of developing their offsite mitigation program."
103	E.3.e.2.a	73	Priority Development Project BMP Implementation and Oversight	Removal of the term "continuously" is suggested so ensure Copermittees do not have to allocate resources for incessant updates to the database. Language should also be added to clarify that, although the database will be watershed-based, each Copermittee is responsible only for inventory under their jurisdiction.	**As shown in the attached revised Permit, revise the language, as follows:** "Each Copermittee must develop and ~~continuously~~regularly maintain a watershed-based

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					database to track and inventory all Priority Development Projects and associated ~~permanent~~ treatment control and structural LIDBMPs within their jurisdiction…"
104	E.4	75	Construction Management	The current language does not provide clarity on when the construction management program is applicable or what the Copermittees responsibilities are under the program.	Revise section to clarify Copermittees responsibilities and applicability of the program.
105	E.4.a.	75	Construction Management	Include the word "sediment" in this section as construction stormwater management requires an effective combination of erosion and sediment controls. Remove the word "equivalent" as this term is ambiguous as there is no set standard for SWPPPs and so equivalency is undefined.	Revise the section include the word "sediment" in the sections that identify erosion control plans and remove the word "equivalent" related to erosion and sediment control plans.
106	E.4.a.4	75	Project Approval Process	Copermittees are required to verify that the project applicant has obtained coverage under applicable permits. The US ACOE requires all other permits to be in place prior to issuing the 404 permit. It is not possible to have the 404 permit prior to issuing a grading or building permit. The requirement from the 4th Term permit was to verify coverage under the Construction General Permit.	**As shown in the attached revised Permit, revise the language, as follows:** "Verify that the project applicant has obtained coverage under ~~applicable permits, including, but not limited to~~ the Construction General Permit.~~, Clean Water Act Section 401 Water Qaulity Certification and Section 404 Permit, and California Department of Fish and Game Streambed Alteration Agreement.~~
107	E.4.b.(1)	75	Construction Management	The current language requires monthly update of construction sites. Quarterly update of the inventory is more appropriate to track construction sites as this is a significant burden on the Copermittees. These sites are tracked through SMARTS already and more frequent tracking is not necessary.	**As shown in the attached revised Permit, revise the language, as follows:** "(1) Each Copermittee must maintain, and update at least ~~monthly~~quarterly, a watershed-based inventory of all construction sites requiring construction, grading, or building permits within its jurisdiction."
108	E.5	79	Existing Development	After years of implementation of existing development programs, the Copermittees have the knowledge and	Replace the current provision E.5 with the proposed Provison E.5 provided in the attachment.

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			Management	experience to implement programs consistent with the goals of the Order and the adaptive management process required under the Order. In order to accomplish this goal, the Copermittees have reorganized and provided a concise existing development section as an alternative to the current provision E.	
109	E.5	79	Existing Development Management	Provision E.5.a mixes types of facilities, areas, and activities that should be included in the inventory and the information that should be included within the database regarding each type of facility, area, and activity.	If the current provision E.5 is not replaced with the proposed provision E.5, then the reorganization of this provision is recommended. Specific edits for this section are provided below.
110	E.5.a	79	Existing Development Management	Regulation of residential sites, while not entirely new, will increase cost, responsibility, and liability as currently presented due to the magnitude of increased regulatory requirements. There will be significant enforcement issues, particularly with the residential portion. Adding the term "reasonable potential to discharge" allows flexibility for the Copermittees to determine priorities. Practically all existing properties have the potential to generate pollutant loads and the inspection program will be ineffective and impractical to implement as written. The focus needs to be on significant pollutant load discharges so inspections and enforcement can actually succeed in receiving water pollutant load reductions versus spending an exhaustive amount of time and money inspecting sites that discharge no pollutant loads, but have the potential to generate minimal loads.	**If the current Provision E.5 is not replaced, modify as follows**: "Each Copermittee must maintain an updated watershed-based inventory and/or map of its existing development that has the reasonable potential to ~~may potentiallygenerate~~discharge a pollutant load into ~~and from~~ the MS4."
111	E.5.a.4, E.5.a.7	79	Existing Development Management	Minor grammatical corrections.	**If the current Provision E.5 is not replaced, modify as follows**: "(4) Identification ~~if a business is a~~ of mobile businesses;

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					(7) ~~Identification if an area is a~~ Common Interest Areas (CIAs) / Home Owner Associations (HOAs), ~~or~~and mobile home parks;”
112	E.5.a.13	80	Existing Development Management	The continual requirement for map updating is excessive. Regularly updated maps should be sufficient for up-to-date information without requiring Copermittees to expend excessive resources. Expand to highlight what has already been accomplished by permittees.	**If the current Provision E.5 is not replaced, modify as follows**: “A ~~continually~~regularly updated map showing the location of inventoried existing development, watershed boundaries, water bodies, and retrofits implemented~~and pollutants generated~~ at the inventoried existing development and/or rehabilitations implemented at channels and/or receiving waters.”
113	E.5.b	80	Retrofitting and Channel Rehabilitation in Areas of Existing Development	This is a new requirement, as compared to the prior permit, which only requires an evaluation of channels that may be retrofitted. Requiring Municipalities to take responsibility for entire stream channels and rehabilitate them to restore impaired beneficial uses of streams is beyond the responsibility that MS4 operators have over MS4 discharges. MS4 operators are not the sole discharger to/cause of impaired channels. Additionally in many instances the channels are flood control facilities which may be required to sustain the existing surrounding development. In many instances, channel rehabilitation of channels may not be feasible and other options for improving discharge water quality would need to be considered.	Remove this Provision entirely or include it as an option for compliance as stated below: “…and rehabilitatechannels and/or receiving waters to restore impaired beneficial uses of streams, as feasible.”
114	E.5.b.1	80	Retrofitting and Channel Rehabilitation in Areas of Existing Development	Minor modifications to language to better encompass creek restoration projects.	**As shown in the attached revised Permit, revise the language, as follows:** “Each Copermittee must identify areas of existing development as candidates for retrofitting, and channels and/or receiving waters ~~in areas of~~

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					~~existing development~~ as candidates for rehabilitationwithin its jurisdiction<u>, as feasible</u>. Areas of existing development must be selected based on a likelihood that retrofitting and channel rehabilitation will address the highest water quality priorities identified in the Water Quality Improvement Plan prepared pursuant to Provision B."
115	E.5.b.2	80	Retrofitting and Channel Rehabilitation in Areas of Existing Development	Minor modifications to language to acknowledge that benefits of creek restoration may occur immediately downstream.	**As shown in the attached revised Permit, revise the language, as follows:** "The evaluation must also include an assessment of the channels <u>and/or receiving waters</u> within its jurisdiction where ~~channel~~ rehabilitation will improve beneficial uses of streams within <u>or immediately downstream of</u> the Copermittee's jurisdiction."
116	E.5.b.3	80	Retrofitting and Channel Rehabilitation in Areas of Existing Development	The proposed permit requires the Copermittees to "encourage" landowner retrofit to private property through the "Copermittee's use of subsidies, penalties, or other incentives." Copermittees will face serious enforcement (and possibly legal) issues if they attempt to penalize private landowners for failing to expend their own time, effort, and money retrofitting properties that landowners had no intention of altering in the first place. As this is a first time requirement to implement channel restoration projects, the logical first step in retrofitting is to identify projects and prioritize them for implementation based on the highest benefit to water quality and beneficial uses.	**As shown in the attached revised Permit, revise the language, as follows:** "Each Copermittee must ~~implement~~<u>prioritize for implementation</u> retrofit and channel rehabilitation projects<u>, as feasible,</u> that address the highest water quality priorities identified in the Water Quality Improvement Plan pursuant to Provision B.3.a. <u>Ranking may also take into account project feasibility and cost effectiveness.</u> The Copermittee ~~must~~ <u>should</u> encourage private landowners to implement retrofit <u>designs, at minimum, through the use of public education and outreach.</u> ~~and channel rehabilitation projects whenever practical. Private landowners should be encouraged through the Copermittee's use of subsidies, penalties, or other incentives.~~"

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117	E.5.b.4	81	Retrofitting and Channel Rehabilitation in Areas of Existing Development	Evaluation of flood control facilities for retrofit for water quality should occur as a part of maintenance for these facilities.	**As shown in the attached revised Permit, revise the language, as follows:** "Each Copermittee must evaluate the flood management and flood control devices and structures in its inventory to determine if it is feasible to retrofit the device or structure, to provide additional pollutant removal from storm water. A Copermittee must consider the highest water quality priorities identified in their Water Quality Improvement Plan as part of each assessment. <u>Evaluation of facilities may occur as a part of routine maintenance of these facilities.</u>"
118	E.5.b.5	81	Retrofitting and Channel Rehabilitation in Areas of Existing Development	See comments for Provision E.5.b. and E.5.b.3.	**As shown in the attached revised Permit, revise the language, as follows:** "Where retrofitting and channel rehabilitation within specific areas of existing development <u>under the Copermittees jurisdiction</u> are determined to be infeasible to restore and protect receiving waters from the highest water quality priorities identified in the Water Quality Improvement Plan, each Copermittee ~~must~~<u>may</u> identify, develop, and ~~implement~~<u>prioritize for implementation</u> regional retrofitting and channel rehabilitation…"
119	E.5.b.6	81	Existing Development Management	This provision gives the Copermittees flexibility in reallocating resources with the approval of the Regional Board Executive Officer to implement retrofit or rehabilitation projects.	**As shown in the attached revised Permit, revise the language, as follows:** Add the following: "Upon Regional Board Executive Officer approval the Copermittees may reallocate resources in the WQIPs for retrofit and rehabilitation project(s).
120	E.5.c.1	81	Existing Development	Required use of pollution prevention methods will be extremely difficult to enforce, particularly if residential	**If the current Provision E.5 is not replaced, modify as follows**:

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			Management	land uses are included.	"Each Copermittee must ~~require~~ promote the use of pollution prevention methods by the inventoried existing development through public outreach."
121	E.5.c.2	81	Existing Development Management	See comment E.5.a.	**If the current Provision E.5 is not replaced, modify as follows**: "Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development with the reasonable potential to discharge pollutant loads to their MS4, including special event venues~~, that have the potential to generate pollutants~~."
122	E.5.c.3	81	Existing Development Management	See comment E.5.a.	**If the current Provision E.5 is not replaced, modify as follows**: "Each Copermittee must implement, or require the implementation of, designated BMPs at inventoried existing development that have the reasonable potential to ~~generate~~discharge pollutant~~s~~ loadsfrom their MS4."
123	E.5.c.4	82	Existing Development Management	See comment E.5.a.	**If the current Provision E.5 is not replaced, modify as follows**: "Each Copermittee must operate and maintain, or require the operation and maintenance of designated BMPs at all inventoried existing development that have been identified by the Copermittee as having the reasonable potential to discharge pollutant loads to their MS4."
124	E.5.c.4.b	82	Existing Development Management	Clarification is necessary that Copermittees are only responsible for the work conducted within their jurisdiction and under their authority.	**If the current Provision E.5 is not replaced, modify as follows**: "Each Copermittee must implement procedures during the operation and maintenance of public streets, unpaved roads, paved roads, and paved highways and freeways, conducted under their authority and within their jurisdiction, that will reduce the contribution of storm water pollutants to

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					the MEP and effectively prohibit <u>the discharge of</u> non-storm water pollutants from the MS4 to receiving water bodies...”
125	E.5.c.5	82	Existing Development Management	See comment E.5.a.	**If the current Provision E.5 is not replaced, modify as follows**: “…associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from inventoried existing development ~~into and from the MS4s.~~ <u>identified by the Copermittee as having the reasonable potential to discharge pollutant loads into or from their MS4</u>.”
126	E.5.d	83	Existing Development Management	See comment E.5.a. In addition to the comment under E.5.a, the proposed language will also limit the number of inspections required.	**If the current Provision E.5 is not replaced, modify as follows**: “Each Copermittee must conduct inspections of inventoried existing development <u>that have been identified by the Copermittee as having the reasonable potential to discharge pollutant loads from their MS4</u> to ensure compliance with applicable local ordinances and permits, and the requirements of this Order.”
127	E.5.d.1	83	Existing Development Management	See comment E.5.a. Proposed language will also limit the number of inspections required and allow effective self-certifications and third party inspections to be utilized. Additional language added to clarify expectation of land use change. Inspections due to changes in property ownership are not realistic as it is not possible for a municipality to track and be aware of all property ownership changes.	**If the current Provision E.5 is not replaced, modify as follows**: “…At a minimum, inventoried existing <u>municipal, industrial, commercial, and residential-association</u> development ~~that has been~~ <u>identified by the Copermittee as having the reasonable potential to discharge pollutant loads to and from their MS4</u> must be inspected once ~~every five years~~<u>during the permit term. Effective self-certification or third-party inspection programs may be utilized for this purpose</u>. Inventoried existing development must also be inspected within <u>12</u>~~six~~ months ~~of any change in property ownership~~ <u>after any redevelopment or land use</u>~~or change~~<u>change associated with a potential increase</u> in pollutant

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					generating activity…"
128	E.5.d.2.d through E.5.d.2.f	83-84	Existing Development Management	The addition of "if present" is necessary for clarification.	**If the current Provision E.5 is not replaced, modify as follows**: "(d)Visual observations of actual non-storm water discharges, if present; (e)Visual observations of actual or potential discharge of pollutants, if present; (f)Visual observations of actual or potential illicit connections, if present; and…"
129	E.5d.3.f	84	Existing Development Inspection Records	Photo documentation should not include a requirement to obtain and keep photographic records of active compliance. Photo documentation should be limited to cases of non-compliance in the interest of file space, size, and information management.	**If the current Provision E.5 is not replaced, modify as follows**: Delete the following: "~~Photo documentation of observed actions or BMPs to reduce pollutants in stormwater runoff to the MEP and actions to effectively prohibit non-storm discharges into the storm drain.~~"
130	E.5.d.3.e and g	84	Existing Development Inspection Records	It is unnecessary to formally describe all of the activities and actions being conducted at each site that assist in reducing pollutants and non-stormwater discharges. It is more efficient and effective to focus on those items that need to be improved or added in order to ensure that the site is being managed correctly. This is standard protocol for inspection programs. Per the language within Provision B and the intro to Provision E, the JRMPs will already be focused on those sources and activities that have a reasonable potential to contribute the pollutants of concern that are of the highest priority within the WQIPs. Therefore this paragraph is unnecessary. Combine these three paragraphs to simplify and better convey requirement.	**If the current Provision E.5 is not replaced, modify as follows**: Delete the following ~~Description of actions to reduce pollutants in storm water runoff to the MEP and actions to effectively prohibit non-storm discharges into the MS4 at the inventoried existing development~~ ~~If the facility, area, and/or activity has been designated or identified as a contributor to the highest water quality priorities identified in the Water Quality Improvement Plan, then the inspection report must include a description of any specific or additional actions taken to reduce or eliminate the contribution of the facility, area, and/or activity to the highest water quality priorities;~~

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					and replace with the following: “Verification of compliance with designated BMPs, as applicable.”
131	E.5.e	85	Existing Development Management	Limiting language should be included for the Copermittee’s jurisdiction. The existing development inventory and enforcement should be limited to development with the reasonable potential to discharge pollutants, avoiding inventory, inspection, and enforcement of every developed property within their jurisdiction. Time and money will be better spent focusing on development that may actually contribute to pollutant loads in the MS4.	**If the current Provision E.5 is not replaced, modify as follows**: “Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried existing development identified by the Copermittee as having the reasonable potential to discharge pollutant loads from the MS4 within their jurisdiction, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.”
132	E.6	87	Enforcement Response Plans	Enforcement response plans are already codified in Copermittees’ municipal codes. This section increases requirements for enforcement response and should be made more concise.	Recommend replacement of Enforcement Response Plan Provision with Copermittee streamlined provision, contained in the attachment provided.
133	E.6	85	Existing Development Management	Acknowledge and allow existing and equivalent enforcement plans such as Orange County’s Enforcement Consistency Guide to meet intent of provision.	**If the current Provision E.6 is not replaced, modify as follows**: “The Enforcement Response Plan must include the protocols for progressively stricter responses, including timeframes allowed for corrections of problems, and for various field violation scenarios. Copermittees may continue to utilize and implement established, equivalent guidelines and procedures for enforcement .”
134	E.6.a.2.a	85	Existing Development Management	Enforcement may not be feasible “immediately.”	**If the current Provision E.6 is not replaced, modify as follows**: “…the Water Quality Improvement Plan, then ~~high level~~ enforcement actions must beginat a high level ~~immediately issued,~~ and subsequent high level…”
135	E.6.b.3.a	86	Existing	Permit should acknowledge the responsibilities of other	**If the current Provision E.6 is not replaced,**

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			Development Management	entities and encourage coordination (e.g., Caltrans, water districts).	**modify as follows**: "(a) Immediately enforce its legal authority, or notify the entity with applicable legal authority, to eliminate controllable sources of non-storm water and illicit discharges or connections upon identifying the source; and"
136	E.6.b.5	87	Enforcement Response Plans	Two weeks compliance is an extremely short time period for maintenance of BMPs and reasonable only if the next rain event is within that two week period. One month is much more reasonable and realistic for confirmation of BMP maintenance.	**If the current Provision E.6 is not replaced, modify as follows**: "For violations of permanent BMP maintenance requirements, all violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 30 ~~10~~calendar~~business~~ days after the violations are discovered. If more than ~~10~~30calendar~~business~~ days are required for compliance, a rationale must be recorded in the electronic database or equivalent tabular system used to track permanent BMP inspections."
137	E.6.c.2	87-88	Enforcement Response Plans	Criminal penalties should be limited to intentional or negligent acts.	**If the current Provision E.6 is not replaced, modify as follows**: The enforcement process must include, at a minimum, appropriate sanctions to compel compliance, such as: (a) Verbal and written notices of violation; (b) Cleanup requirements; (c) Fines; (d) Bonding requirements; (e) Administrative and criminal (if intentional or negligent) penalties; (f) Liens;

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					(g) Stop work orders; and (h) Permit and occupancy denials.
138	E.6.c.4	88	Enforcement Response Plans	See comment E.6.b.5.	Change 10 business days to 30 calendar days.
139	E.6.d.1	88	Enforcement Response Plans	Use consistent terminology	**If the current Provision E.6 is not replaced, modify as follows**: "…(as defined in the Copermittee's Enforcement Response Plan) to a construction site that significantly impacts~~poses a significant threat to~~ water quality as a result of violations or other…"
140	E.7	88	Public Education and Participation	Language was provided in this section to identify that the Permittees will develop the public education program based on the highest water quality issues of concern identified within the WQIPs.	See corresponding edits within Provision E.7
141	E.8	89	Fiscal Analysis	Unclear why the fiscal analysis has expanded beyond what is required in Orange County's current permit.	See corresponding edits within Provision E.8
F. Reporting					
142	F.1 & F.2	90	Reporting	Changes for consistency with Provision II.B.6.	**As shown in the attached revised Permit, revise the language, as follows:** Change timeframe from 12 to 18 months.
143	F.1	90	Reporting	Minor changes incorporated for consistency with Provision II.B.	**As shown in the attached revised Permit, revise the language, as follows:** Incorporate timeline consistent with Provision B.
144	F.1	90	Reporting	All references to "Regional Clearinghouse" deleted and replaced with reference to Provision F.4. See comment re: F.4 below.	**As shown in the attached revised Permit, revise the language, as follows:** "Water Quality Improvement Plans must be made available as~~on the Regional Clearinghouse~~ required pursuant to Provision F.4."
145	F.2.a	90	Reporting	Additional language is necessary to clarify that modification of program elements of the jurisdictional runoff management program will include rationale for any changes to program elements prescribed in Provision E.	**As shown in the attached revised Permit, revise the language, as follows:** Add "Jurisdictional Runoff Management Program document updates that modify program elements from the requirements of Provision E must provide

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					rationale for the modifications within the update documents." Add similar language for the BMP design manual and the Water Quality Improvement updates.
146	F.2.b	90	Reporting	See F.2.a.	See F.2.a.
147	F.2.c	90	Reporting	See F.2.a.	See F.2.a.
148	F.3.b	91	Reporting	Clarification as to a date when the annual reporting period will begin under the permit is necessary.	**As shown in the attached revised Permit, revise the language, as follows:** "…The first Annual Report must be prepared for the reporting period beginning July 1 after adoption of the permit, and upon San Diego Water Board Determination that~~the date the San Diego Water Board determines that~~…"
149	F.3.b.1.e and F.3.b.2	92	Reporting	Unclear how form will improve upon existing reporting processes. Form seems to restrict reporting and require the compilation of cumbersome and uninformative numbers such as "number of existing developments in residential inventory." Permittees should be allowed to continue current reporting formats. Either delete the form or make optional.	Delete the following language: "~~(a) A completed Jurisdictional Runoff Management Program Annual Report Form (Attachment D) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative.~~" "~~(2) Each Copermittee must complete and submit a Jurisdictional Runoff Management Program Annual Report Form (Attachment D) no later than October 31 of each year until the first Annual Report is required to be submitted.~~"
150	F.4	93	Reporting	The Copermittees require language clarification that the regional clearinghouse may be maintained by another agency.	**As shown in the attached revised Permit, revise the language, as follows:** Add a footnote: "The Copermittee may elect to develop and maintain the clearinghouse(s) provided by other Copermittees or agencies."
151	F.4	93	Reporting	Delete all references to a Regional Clearinghouse. Copermittees have been and will continue to make key	**As shown in the attached revised Permit, revise the language, as follows:**

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				documents and information related to permit compliance available to the public. Copermittees should not be required to invest time and resources into a potentially expensive and time consuming clearinghouse that would require coordination amongst all permittees. The benefit of a clearinghouse does not appear to outweigh the resources necessary to make it possible.	Delete all references throughout permit to "Regional Clearinghouse" and replace with reference to comply with Provision F4. Additionally, modify language as follows: "4.~~**Regional Clearinghouse**~~**Mechanism for Data and Information Sharing** The Copermittees must identify and implement a mechanism to ~~develop, update, and maintain an internet-based Regional Clearinghouse that can be used to~~ store, disseminate, and share the Copermittees' Water Quality Improvement Plans, Annual Reports, jurisdictional runoff management program documents, monitoring data, special studies, and ~~any~~ other pertinent data or information generated by the Copermittees during the implementation of this Order. Monitoring data collected pursuant to Provision D must be uploaded to CEDEN, ~~with links to the uploaded data available on the Regional Clearinghouse. The Regional Clearinghouse may be linked to other internet-based data portals and databases where the original documents and data are stored. The Regional Clearinghouse~~Copermittees must make this information ~~be~~ available and accessible to members of the public. The ~~Regional Clearinghouse~~ mechanism for sharing Copermittee data and information must be developed and made available to the public no later than 12 months after the adoption of this Order."
152	F.5	93	Reporting	See F.4.	Add similar language from F.4.
G. Principal Watershed Copermittee Responsibilities					
153	G	96	Principal Watershed	Coordinating and developing, with the other Copermittees, the requirements of Provisions F.3.c, F.4,	Remove requirement that Principal Copermittee can only be Principal Copermittee for 2 watersheds.

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			Copermittee Responsibilities	and F.5.b of this Order.	Clarify that all Copermittees have some level of commitment, not just the Principal Watershed Copermittee.
H. Modification of Programs					
154	H	97	Modification of Programs	Modifications of programs are allowed under the WQIP as part of the iterative process and adaptive management. Language should be added to that effect or there may be annual amendments to the Order.	"Proposed modifications <u>outside of the WQIP process</u> that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures."
I. Standard Permit Provisions and General Provisions					
				N/A	None.
Attachment A. Discharge Prohibitions					
155	Attachment A, 2	A-2	Attachment B to State Water Board Resolution 2012-001X	The Resolution has been adopted as 2012-0012 and should be updated accordingly throughout the document. Order should be incorporated by reference instead duplication.	Reference adopted SWRCB Resolution 2012-0012.
Attachment B. Standard Permit Provisions and General Provisions					
156	Attachment B	B1-B5	Standard Permit Provisions and General Provisions	This attachment incorporates the standard NPDES permit provisions as identified in 40 CFR 122.41. Although correctly transposed from the regulations the provisions are obviously developed for a traditional point source permit (i.e. wastewater permit). As such there are a number of standard provision that pose challenges to the Copermittees to comply with. Clarification is requested on a number of the provisions.	See specific changes noted below.
157	Attachment B, 1.m	B-7	Bypass	This provision requires the Copermittees to notify the Regional Board whenever an anticipated or unanticipated bypass will occur. Given the nature of storm events and the fact that stormwater treatment BMPs include bypass provisions to protect the BMP integrity it would appear that the Copermittees should notify the Regional Board anytime a storm is predicted	Delete this provision.

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				to ensure compliance with the provision (whether anticipated or unanticipated). This provision was crafted for typical wastewater discharges and has little relevance to stormwater.	
Attachment C. Acronyms, Abbreviations and Definitions					
158	Attachment C	C1-C10	Definitions	Definitions need to be added for: properly designed, rehabilitation, and retrofit. As currently written, the permit authorizes subjective broad authority and deference to the Regional Board in interpretation of the definitions, if not included. Minor clarifications and grammatical corrections are also included.	Suggested definitions are provided in the strikeout.
159	Attachment C	C-4	Definitions - Infiltration	The current definition only makes reference to infiltration of water into the sewer system. This definition should also include a traditional definition of infiltration.	**As shown in the attached revised Permit, revise the language, as follows:** Add: In the context of low impact development, infiltration may also be defined as the percolation of water into the ground. Infiltration is often expressed as a rate (inches per hour), which is determined through an infiltration test.
160	Attachment C	C-6	Definitions – MS4	The addition of CWA language to the definition of MS4 limits Copermittees' responsibilities to within their jurisdiction and strengthens support that Copermittees are not responsible for discharges in MS4s that they do not operate.	**As shown in the attached revised Permit, revise the language, as follows:** Add: "Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.21(a)(vi).
161	Attachment C	C-10	Definitions – Waters of the state	Current permit language, citing the California Water Code, presupposes that all portions of the MS4 are considered waters covered by the definition of waters of the state, "Any water, surface or underground, including saline waters within the boundaries of the State [CWC Provision 13050 (e)]." This language	**"Waters of the State -** Any water, surface or underground, including saline waters within the boundaries of the State [CWC Provision 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to

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				should be limited based on the intent of the definition (natural water sources) and should not include dry man-made structures that collect runoff for the sole purpose of flow volume/velocity and/or pollutant reduction.	be a Waters of the State~~ regardless of circumstance or condition~~. Under this definition, portions of a MS4 may be~~is always~~ considered to be a Waters of the State. However, man-made portions of the MS4 constructed for the sole purpose of flow and/or pollutant reduction will not be considered Waters of the State.”
162	Attachment C	C-11	Definitions – Wet Weather	Grammatical edits –words appear to be missing from the definition	Edit as follows: **“Wet Weather –** Weather is considered wet if there is a storm event of 0.1 inches and greater and ~~the following~~preceded by 72 hours of dry weather.”
Attachment D. Jurisdictional Runoff Management Program Annual Report Form					
163	Attachment D			See previous comments in F.3.b	Delete form or make optional.
Attachment E. Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011					
164	Attachment E	E-1 to E-30	Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	Most requirements are outlined already in the TMDLs and the redundancy of this Attachment is unnecessary. In fact, Attachment E *adds* many TMDL requirements not provided in the TMDL Resolutions, circumventing the TMDL public process. Implementation will be inconsistent with previously adopted resolutions and CLRPs and MPs already drafted, submitted, approved, and/or implemented.	On page E-1, reword to clarify that TMDL implementation must be incorporated into the WQIP and Monitoring sections by the Copermittees and reference the Resolution Numbers in the TMDL list and add recommended compliance language per comments below.
165	Attachment E	E-1	Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	The Rainbow Creek TMDL for Total Nitrogen and Phosphorous does not include Wasteload Allocations for the County of San Diego Copermittees. The TMDL only contains Load Allocations. Load allocations should not be implemented through an NPDES permit. It is in appropriate to simply “re-name” the Load Allocations as Wasteload Allocations.	Strike the following TMDL from Attachment E in its entirety: Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed
166	Attachment	E-1	Specific		

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	E	to E-30	Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	State and federal law do not require the use of numeric effluent limitations for MS4 permittees, but rather encourage flexible implementation of best management practices through an iterative process. Specifically, the choice to include either management practices or numeric limitations in MS4 permits is within the regulatory agency's discretion, and on the question of whether MS4 permits must contain numeric effluent limitations, the court upheld EPA's use of iterative BMPs in place of numeric effluent limitations for storm water discharges. (See *Defenders of Wildlife v. Browner*, 191 F.3d 1159, 1166-1167 (9th Cir. 1999)[4] Given the challenges with meeting the numeric WQBELs (even with the implementation of a comprehensive suite of BMPs) and the flexibility allowed by State and federal regulations and guidance, a BMP-based WQBEL approach should be allowed for complying with TMDLs. Removing the numeric WQBELs is not proposed. Rather, inclusion of a WQIP-based "compliance path" is recommended. The WQIPs can and should be used as the basis for establishing WQBELs expressed as BMPs. The WQIPs can satisfy the necessary elements of BMP-based WQBELs. For example, the WQIPs would meet the requirements described in the 2010 EPA memo (which updated key aspects of the 2002 memorandum) regarding federal expectations for incorporation of TMDLs WLAs into NPDES stormwater permits as BMP-based WQBELs.	See recommended changes in the attached revised Permit to the following: • Provision A.4.c • Provision A.4.d • Provision B (first paragraph) • Provision B.3 Additionally, within the requirements for each individual TMDL in Attachment E, include language similar to the following: Compliance may be demonstrated via any one of the following methods: 1. There is no discharge from the MS4, or 2. Applicable effluent limitations are met, or 3. Receiving waters meet the applicable receiving water limitations or water quality objective, or 4. Loading from the MS4 is such that it does not cause water quality objective exceedances, or 5. For Permittee(s) that are implementing a Regional Board-approved WQIP, WQBELs will be implemented as BMPs and compliance will be based upon implementing all provisions of the WQIP in accordance with the approved milestones and schedule.

[4] See also California Regional Water Quality Control Board San Diego Region - Fact Sheet / Technical Report For Order No. R9-2010-0016 / NPDES NO. CAS0108766.

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167	Attachment E	E-1 to E-30	Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	The findings of California's Stormwater Blue Ribbon Panel, which was convened specifically to examine the feasibility of incorporating numeric effluent limits in stormwater permits, ultimately concluded that numeric limits were generally infeasible across all three stormwater activities (municipal, industrial, and construction), with a few exceptions (*The Feasibility of Numeric Effluent Limits Applicable to Discharges of Stormwater Associated with Municipal, Industrial and Construction Activities, June 19, 2006*). Additionally, state law and policy does not require the use of numeric effluent limitations in MS4 permits. In 2009, the State Water Board affirmed this approach in a precedential order, stating: [i]t is our intent that federally mandated TMDLs be given substantive effect. Doing so can improve the efficacy of California's NPDES storm water permits. This is not to say that a wasteload allocation will result in numeric effluent limitations for municipal storm water dischargers. Whether a future municipal storm water permit requirement appropriately implements a storm water wasteload allocation will need to be decided on the regional water quality control board's findings *supporting either the numeric or non-numeric* effluent limitations contained in the permit. (Order WQ 2009-0008, In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District, at p. 10 (emphasis added).)	See recommended changes in the attached revised Permit to the following: • Provision A.4.c • Provision A.4.d • Provision B (first paragraph) • Provision B.3 Additionally, within the requirements for each individual TMDL in Attachment E, include language similar to the following,: Compliance may be demonstrated via any one of the following methods: 1. There is no discharge from the MS4, or 2. Applicable effluent limitations are met, or 3. Receiving waters meet the applicable receiving water limitations or water quality objective, or 4. Loading from the MS4 is such that it does not cause water quality objective exceedances, or 5. For Permittee(s) that are implementing a Regional Board-approved WQIP, WQBELs will be implemented as BMPs and compliance will be based upon implementing all provisions of the WQIP in accordance with the approved milestones and schedule.

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168	Attachment E. Part 1.b, 2.b, 3.b, 4.b, 5.b, and 6.b	E-2, E-4, E-6, E-9, E-13, and E-19	Water Quality Based Effluent Limitations	Federal regulations (40 CFR 122.44(d)(1)(vii)(B)) require inclusion of effluent limits that are "consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA." Attachment E outlines the requirements of effective TMDLs and appears to incorporate numeric receiving water limitations (RWL) <u>and</u> effluent limitations, where the effluent limitations are set equal to the TMDL Waste Load Allocations (WLAs) and the RWLs are set equal to the TMDL numeric targets. This approach results in a situation where the Copermittees are in double jeopardy. Copermittees should not be put in double jeopardy by being required to meet both RWLs and effluent limitations. Rather, attainment of either RWLs <u>**or**</u> effluent limitations should represent compliance with the permit and the requirements of the TMDL.	See recommended changes in the attached revised Permit. Additional language should be added to the WQBELs sections for all TMDLs in Attachment E to clearly define compliance with WQBELs via any of the following methods: - There is no discharge from the MS4, **OR** - Applicable effluent limitations are met, **OR** - Receiving waters meet the applicable receiving water limitations or water quality objective, **OR** - Loading from the MS4 is such that it does not cause water quality objective exceedances, **OR** - For Permittee(s) that are implementing a Regional Board-approved WQIP, WQBELs will be implemented as BMPs and compliance will be based upon implementing all provisions of the WQIP in accordance with the approved milestones and schedule.
169	Attachment E	E-1 to E-30	Multiple	Attachment E specifies outfall monitoring requirements for several TMDLs, "in accordance with the requirements of Provisions D.1, D.4.a.(1)(b), and D.4.a.(3)(b) of this Order." Adding outfall monitoring to the TMDL provisions is inappropriate and unnecessary. Attachment E should focus on integrating the monitoring requirements *specified in the TMDL Basin Plan Amendments.* The monitoring requirements for TMDLs were developed through a public comment	Modify the Specific Monitoring and Assessment Requirements for the following TMDLs: 1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed 2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin 3. Total Maximum Daily Loads for Dissolved

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				process and adopted by the Regional Board, and are the only monitoring requirements that should be specified in Attachment E. Furthermore, there is no reason to re-state the requirements from Provision D, which makes it likely that Attachment E and Provision D will have inconsistencies. Provision D requirements should only be listed in Provision D.	Copper, Lead, and Zinc in Chollas Creek 4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Specifically, for each of these TMDLs, the sub-bullet under section (d) regarding effluent monitoring should be stricken and replaced with the following: "The Responsible Copermittees must implement the monitoring and assessment requirements issued under Order No. XXXX. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.", where "XXXX" reflects the order numbers for each TMDL, shown in the attached revised Permit on Page E-1. For the Chollas Creek Metals and Diazinon TMDLs, the XXX refers to the order number for the issued Investigation Orders. For the Project I Bacteria TMDL, specific changes to the monitoring requirements are requested to reflect those specified in the TMDL Basin Plan Amendment, as described below.
170	Attachment E. Part 4.b.	E-10	Water Quality Based Effluent Limitations	The TMDL for Dissolved Copper, Lead, and Zinc in Chollas Creek states that "If all copper, lead, and zinc concentrations in urban runoff to Chollas Creek meet their respective TMDL concentrations, the loading capacity of the creek should not be exceeded" (Section	If WQBELs are to be expressed as numeric effluent limits consistent with the WLAs, then mass-based WQBELs should be included as a mechanism for demonstrating compliance to allow for options to demonstrate load-based pollutant reductions. As described above, the mass-based WQBELs

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				8). The TMDL further states that "because this WLA is concentration-based it will apply to each land use and each sub-watershed at all times and will not be specific to any land use or sub-watershed (Section 8.1). Requiring all land uses and sub-watersheds to meet effluent limits consistent with RWLs is not a cost-effective or practicable approach to BMP strategy development. Volume reduction strategies such as Low Impact Development and Green Infrastructure should be a viable compliance path for the San Diego region. The WQBELs should include the mass-load based WLAs to consider the pollutant loads reduced, which will be impacted by both pollutant concentration reductions *and* stormwater volume reductions. Alternatives for load-based approaches should be included as effluent limitations, which will correspond to targets for meaningful CLRP and WQIP development.	should only be included with an "or" statement (not an "and" statement). The recommended Compliance Determination language in the attached revised Permit addresses this issue.
171	Attachment E. Part 5.b (1) and (2)		Effluent Limits	The effluent limits listed within the permit apply the water quality objectives end of pipe for the MS4 dischargers. The permit language should be consistent with the TMDL and state what the load allocations are that are assigned to the dischargers.	**As shown in the attached revised Permit, revise the language, as follows:** Delete the following from 5.b (1)(b): "The Copermittee must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 5.b.**Error! Reference source not found.**" Delete section 5.b.(2) "Effluent Limits" and replace with the following: "For both (a) and (b) above, if the REC-1 water quality objectives cannot be met in the receiving waters, and if the natural and

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					background sources appear to be the sole source of the continued impairment, the natural sources exclusion approach (NSEA) may be applied. The Municipal Dischargers are responsible for collection of the data to support the application of the NSEA to recalculate the TMDL." www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/docs/update082812/Chpt_7_2012.pdf, Page 7-56
172	Attachment E. Part 5.c		Compliance Schedule	The waste load reduction milestones should be consistent with the milestones included in the current Order R9-2009-0002 (page 78).	**As shown in the attached revised Permit, revise the language, as follows:** Revise 5.c.(1) to include the waste load reduction compliance dates.
173	Attachment E. Part 6.a	E-19	Applicability	Since adoption of the Project I Bacteria TMDL, the Copermittees have submitted data to the Regional Board to demonstrate that 303(d) listings for San Marcos HA, San Dieguito River HA, and Los Penasquitos HA were incorrectly applied to REC beneficial uses. The Regional Board has responded and agreed, indicating "that Los Penasquitos has posted data to the Regional Board to demonstrate that 303(d) listings for San Marcos HA, Pacific Ocean Shoreline at Los Penasquitos River Mouth is not subject to further action under Resolution No. R9-2010-0001." Similar responses are expected for the other HAs.	In Table 6.0, the San Dieguito River WMA and Carlsbad WMAs should be deleted. The Los Penasquitos WMA should be re-named to the Mission Bay WMA and Torrey Pines State Beach at Del Mar should be removed. The recommended language in the attached revised Permit addresses this issue by also adding the following to Specific Provision 6.a.(5): "Subsequent to TMDL adoption, it has been established by the Regional Board that the following water bodies are not

<table>
<tr><th></th><th colspan="5">COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011</th></tr>
<tr><th>Comment #</th><th>Permit Section</th><th>Permit Page[1]</th><th>Section Title</th><th>Reason for Proposed Changes/Comments</th><th>Proposed Changes</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>subject to further action under Resolution No. R9-2010-001, and therefore are not subject to Bacteria TMDL requirements described herein and are not included in Table 6.0:

<table>
<tr><th>Watershed Management Area</th><th>Water Body</th><th>Segment or Area</th></tr>
<tr><td>Carlsbad</td><td>Pacific Ocean Shoreline</td><td>at Moonlight State Beach</td></tr>
<tr><td>San Dieguito River</td><td>Pacific Ocean Shoreline</td><td>at San Dieguito Lagoon mouth</td></tr>
<tr><td>Penasquitos</td><td>Pacific Ocean Shoreline</td><td>Torrey Pines State Beach at Del Mar (Anderson Canyon)</td></tr>
</table></td></tr>
<tr><td>174</td><td>Attachment E. Part 6.a</td><td>E-19</td><td>Applicability</td><td>Since adoption of the Project I Bacteria TMDL, the Copermittees have submitted data to the Regional Board to demonstrate that 303(d) listings were incorrectly applied to REC beneficial uses. The permit should include language to recognize that additional water body areas or segment may not be subject to further action under Resolution No. R9-2010-001.</td><td>As shown in the attached revised Permit, revise the language, as follows:

Add the following language:
"The TMDLs that have been developed for the Pacific Ocean shorelines are applicable to all the beaches located on the shorelines of the hydrologic subareas (HSAs), hydrologic areas (HAs), and hydrologic units (HUs) listed above. Beginning with the 2008 303(d) List, specific beach segments of the Pacific Ocean shoreline are listed individually. Specific beach segments from some of the Pacific Ocean shorelines listed in the above table have been delisted from the 2008 303(d) list that was approved by the San Diego Board on December 16, 2009, and therefore are not subject to</td></tr>
</table>

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					any further action as long as monitoring data continues to support compliance with water quality standards." www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/docs/update082812/Chpt_7_2012.pdf, Page 7-60
175	Attachment E. Part 6.b	E-19	Receiving Water Limitations	The Basin Plan Amendment for the Project I Bacteria TMDL contains Receiving Water Limitations. These Receiving Water Limitations should be incorporated directly into the Permit. However, Attachment E contains Receiving Water Limitations that do not match those from the TMDL. The Regional Board should not revise or translate the RWLs from the TMDL, they should be incorporated directly. The RWLs incorporated into Attachment E have several discrepancies with the RWLs in the TMDL, including application of single sample targets to the dry weather RWLs and application of total coliform RWLs for inland waters.	Replace entirely the RWLs in the Permit with those from the TMDL. The attached revised Permit incorporates RWLs for beaches (Table 6.1) and RWLs for Creeks (Table 6.2). Note these RWLs were *pasted directly* from the Basin Plan Amendment (Attachment A, page 52).
176	Attachment E. Part 6.b	E-19 and E-20	Water Quality Based Effluent Limitations	Attachment E specifies WQBELs for dry weather flows as both receiving water and effluent limitations for the Project I Bacteria TMDL, in terms of zero allowable exceedances of the single sample maximum and the 30-day geometric mean. However, the dry weather component of the TMDL only considered the 30-day geometric mean, and did not consider the single sample maximum within its calculation. Incorporating single sample effluent limitations into the Permit goes beyond the TMDL requirements. In addition, if the TMDL had included single sample limits, there would have been a corresponding allowable exceedance frequency, just as	It is recommended that the single sample maximum not be used for dry weather WQBELs. At a minimum, an acceptable dry weather exceedance frequency should be assumed and applied. Specific Provision 6.b.(2) of the attached revised Permit addresses this issue by (1) incorporating the RWLs directly from the TMDL, and (2) linking the receiving water limitations and effluent limitations.

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				for wet weather. The 22% allowable exceedance rate for wet weather was based on a reference beach within the Los Angeles Region, and although not used in the technical approach for the San Diego Beaches and Creeks TMDL, the reference beach also exhibits exceedances during dry weather, which is incorporated into beach TMDLs in the Los Angeles region.	
177	Attachment E. Part 6.b	E-20	Water Quality Based Effluent Limitations	The Project I Bacteria TMDL applies mass-load based TMDLs to point sources. Many of the BMPs used for achieving pollutant reductions, such as structural BMPs and green infrastructure, emphasize infiltration and associated volume reduction as the primary mechanism for reducing urban runoff. A significant investment could be made to implement structural BMPs to reduce urban runoff to meet the mass-load based WLAs assigned in the TMDL. These reductions could result in meeting the mass-based WLA and have a positive impact on receiving waters by significantly reducing urban loads to receiving waters. However, even the small amount of flows remaining could exceed the numeric effluent limitations currently in the Permit, but <u>not</u> cause or contribute to WQO exceedances. In this manner, a violation of the numeric WQBELs would result in zero credit for the millions invested and penalty for discharges that did <u>not</u> negatively impact attainment of WQ standards. Volume reduction strategies such as Low Impact Development and Green Infrastructure should be a viable compliance path for the San Diego region. The WQBELs should include the mass-load based WLAs to consider the pollutant loads reduced, which will be impacted by both pollutant concentration reductions *and* stormwater volume reductions.	If WQBELs are to be expressed as numeric effluent limits consistent with the WLAs, the mass based WLAs for both dry and wet weather presented in the TMDL should be included as a mechanism for demonstrating compliance to 1) be consistent with the assumptions of the WLAs and 2) allow for options to demonstrate load based pollutant reductions. The attached revised Permit addresses this issue by incorporating the mass-based wasteload allocations into Section 6.b.(2).

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178	Attachment E. Part 6.b	E-20	Water Quality Based Effluent Limitations	The reference conditions and associated allowable exceedance frequencies for WQBELs addressing Project I Bacteria TMDL were based on a marine reference beach within Los Angeles, and are not necessarily applicable to fresh water flows in the San Diego Region. The Los Angeles reference beach was influenced by salt water (increasing bacterial die-off) and mixing/dilution from wave action that likely resulted in lower exceedances of REC-1 objectives than would be found in a freshwater stream. Freshwater TMDLs in the Los Angeles region now incorporate freshwater reference systems (instead of a marine reference system), and the marine beach exceedance rates have been updated through a recent TMDL reopener for Santa Monica Bay. In addition, a reference study is currently underway for the San Diego Region.	The permit should include language that allows for update of the allowable exceedance frequencies as these results become available. The attached revised Permit addresses this issue by added the following paragraph to Specific Provision 6.b.(1).(a): "The allowable exceedance frequencies in Table 6.1 and Table 6.2 can be updated by the Regional Board Executive Officer if sufficient data is provided regarding reference systems in the San Diego Region."
179	Attachment E. Part 6.c	E-20	Compliance Schedule	Total coliform WQOs do not apply to inland waters.	As shown in the attached revised Permit, add a footnote to Table 6.3 as follows: "Total coliform receiving water limitations apply only to segments of areas of Pacific Ocean Shoreline listed in Table 6.0."
180	Attachment E. Part 6.c	E-27	Compliance Schedule	The CLRPs to be submitted by Copermitees will propose interim compliance dates, as allowed by the Project I Bacteria TMDL, generally 7 and 10 years, respectively, to meet the 50% reduction milestone for dry and wet weather. The CLRPs submitted by Copermittees may not all propose the same interim compliance dates and the Permit should acknowledge the flexibility allowed by the TMDL (see page 68 of Attachment A of the Basin Plan Amendment). In fact, this scheduling flexibility was a primary "incentive" for Copermitees to develop CLRPs instead of BLRPs.	The interim compliance dates should not be specified in the Permit. Instead, the Permit should reference the submitted and Regional Board-approved CLRPs. This approach will avoid conflict between the TMDL, Permit, and CLRPs. The attached revised Permit addresses this issue by revising the opening of Section 6.c.(2): "The Responsible Copermittees must comply with

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					the following interim WQBELs by the interim compliance dates submitted in the Regional Board-approved CLRPs and supported by Order No. R9-2010-0001:" Table 6.5 should be deleted from Attachment E to allow the CLRPs the scheduling flexibility provided in the TMDL adopted by the Regional Board.
181	Attachment E. Part 6.c	E-21 thru E-27	Compliance Schedule	Similar to the flexibility allowed for scheduling, the TMDL allows CLRPs flexibility in expressing and achieving TMDL milestones/interim requirements. Furthermore, the wet weather interim compliance dates are well-beyond the term of this Permit, and should be not included in Attachment E.	Delete Table 6.4 because (1) the CLRPs have flexibility to express interim milestones and (2) the wet weather interim requirements do not apply until 2022, well beyond the term of this Permit.
182	Attachment E. Part 6.c	E-27	Compliance Schedule	The Copermittees request an acknowledgement of the TMDL reopener scheduled for April 2016 which falls within the term of this Permit.	Add a part (3) to Specific Provision 6.c: "(3) Submittals to Support TMDL Basin Plan Amendment The Responsible Copermittees are encouraged to submit data to support the TMDL reopener scheduled for April 2016 including but not limited to data related to reference watershed monitoring and beneficial use usage frequency."
183	Attachment E. Part 6.d (new section added to revised)	E-27	Compliance Determination	The BPA for the Project I Bacteria TMDL contains specific language regarding MS4 compliance determination in the case that receiving water limitations are not attained. This language should be added directly to the Permit.	As shown in the attached revised Permit, add the following language to Section 6 of Attachment E, which is *pasted directly* from the BPA: "The municipal MS4s may demonstrate that their discharges are not causing the exceedances in the receiving waters by providing data from their discharge points to the receiving waters, by providing data collected at jurisdictional

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					boundaries, and/or by using other methods accepted by the San Diego Water Board. Otherwise, at the end of the wet weather TMDL compliance schedule, the municipal Phase I MS4s will be held responsible and considered out of compliance unless other information or evidence indicates another controllable or uncontrollable source is responsible for the exceedances in the receiving waters. If controllable sources other than discharges from the municipal Phase I MS4s are identified before or after the end of the wet weather TMDL Compliance Schedules as causing the exceedances, those controllable sources will be responsible for reducing their bacteria loads and/or demonstrating that discharges from those sources are not causing the exceedances. If controllable sources other than the Phase I MS4s are identified as causing the exceedances, and the Phase I MS4s have demonstrated they are not causing or contributing to the exceedances, the Phase I MS4s will not be considered out of compliance. The San Diego Water Board shall implement additional actions (e.g., issue enforcement actions, amend existing NPDES requirements or conditional waivers), as needed, to bring all those controllable sources into compliance with the wet weather TMDLs.”
184	Attachment E. Part 6.d	E-27	Specific Monitoring and Assessment Requirements	As described above, the CLRPs envisioned in the Project I Bacteria TMDL include flexibility to develop certain components based on watershed-specific issues and conditions. Each CLRP submitted by the Copermittees will include a monitoring and assessment component. It is important to allow the CLRP process to drive the monitoring programs.	As shown in the attached revised Permit, include the following at the beginning of the Monitoring and Assessment section: “The BLRPs and CLRPs to be submitted by the Copermittees and approved by the Regional Board

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					Executive Officer contain monitoring programs. Implementation of those Regional Board-approved monitoring programs constitutes compliance with the Monitoring Station and Monitoring Procedure requirements, described below."
185	Attachment E. Part 6.d	E-27	Specific Monitoring and Assessment Requirements	The Project I Bacteria TMDL included specific beach monitoring requirements, which were subject to a public comment process and adopted by the Regional Board. Attachment E adds many additional components to these requirements, which undermines the TMDL adoption and public commenting process. Instead of re-interpreting and adding onto the TMDL monitoring requirements in the Basin Plan Amendment, the Permit should adopt those requirements directly (BPA Attachment A, page 50-51).	As shown in the attached revised Permit, the beach monitoring requirement should be incorporated directly from the TMDL. The following language/requirement for beaches is *pasted directly* from the TMDL: "(1) Monitoring and Assessment Requirements for Beaches (a) Monitoring Stations For beaches addressed by these TMDLs, monitoring locations should consist of, at a minimum, the same locations used to collect data required under MS4 NPDES monitoring requirements and beach monitoring for Health and Safety Code section 115880.75 If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters. (b) Monitoring Procedures

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					(i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly. (ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations at least once within the first 24 hours of the end of a storm event that occurs during the rainy season (i.e., October 1 through April 30). (iii) Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria."
186	Attachment E. Part 6.d	E-27	Specific Monitoring and Assessment Requirements	Similarly, the creek monitoring requirements should reflect the TMDL that was approved and subject to public comment (BPA Attachment A, page 50-51). Note that total coliform should not be a requirement for creek monitoring, as creeks are not subject to total coliform WQOs, RWLs, or WLAs.	As shown in the attached revised Permit, the creek monitoring requirement should be incorporated directly from the TMDL. The following language/requirement for creeks is *pasted directly* from the TMDL: "Monitoring and Assessment Requirements for Creeks and Creek Mouths (a) Monitoring Stations For creeks addressed by these TMDLs, monitoring locations should consist of, at a minimum, a location at or near the mouth of the creek (e.g., Mass Loading Station or Mass Emission Station) and one or more locations upstream of the mouth (e.g., Watershed Assessment Stations). If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source

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					identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters. (b) Monitoring Procedures (i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly. (ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations within the first 24 hours of the end of a storm event that occurs during the rainy season (i.e., October 1 through April 30) (iii) Samples collected from receiving water monitoring stations must be analyzed for fecal coliform and *Enterococcus* indicator bacteria.”

ADMINISTRATIVE DRAFT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE
ORDER NO. R9-2012-0011
NPDES NO. CAS0109266

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHEDS WITHIN THE SAN DIEGO REGION

The San Diego County Copermittees in Table 1a are subject to waste discharge requirements within their respective jurisdictions as set forth in this Order.

Table 1a. San Diego County Copermittees

City of Carlsbad	City of Oceanside
City of Chula Vista	City of Poway
City of Coronado	City of San Diego
City of Del Mar	City of San Marcos
City of El Cajon	City of Santee
City of Encinitas	City of Solana Beach
City of Escondido	City of Vista
City of Imperial Beach	County of San Diego
City of La Mesa	San Diego County Regional Airport Authority
City of Lemon Grove	Unified Port District of San Diego
City of National City	

The Orange County Copermittees in Table 1b are subject to waste discharge requirements within their respective jurisdictions as set forth in this Order upon expiration of Order No. R9-2009-0002, NPDES No. CAS0108740 on December 16, 2014.

Table 1b. Orange County Copermittees

City of Aliso Viejo	City of Ranch Santa Margarita
City of Dana Point	City of San Clemente
City of Laguna Beach	City of San Juan Capistrano
City of Laguna Hills	City of Laguna Woods
City of Laguna Niguel	County of Orange
City of Lake Forest	Orange County Flood Control District
City of Mission Viejo	

ADMINISTRATIVE DRAFT

The Riverside County Copermittees in Table 1c are subject to waste discharge requirements within their respective jurisdictions as set forth in this Order upon expiration of Order No. R9-2010-0016, NPDES No. CAS0108766 on November 10, 2015.

Table 1c. Riverside County Copermittees

City of Murrieta	County of Riverside
City of Temecula	Riverside County Flood Control and Water Conservation District
City of Wildomar	

The Orange County Copermittees and Riverside County Copermittees may enroll under this Order at a date earlier than the expiration date of their current Orders subject to the conditions described in Provision F.6 of this Order and the Copermittees in the respective county receive a Notice of Enrollment (NOE) from the San Diego Water Board.

The term Copermittee in this Order refers to any San Diego County, Orange County, or Riverside County Copermittee enrolled under this Order, unless specified otherwise.

This Order provides permit coverage for the Copermittee discharges described in Table 2.

Table 2. Discharge Locations and Receiving Waters

Discharge Points	Locations throughout San Diego Region
Discharge Description	Municipal Separate Storm Sewer System (MS4) Discharges
Receiving Waters	Inland Surface Waters, Enclosed Bays and Estuaries, and Coastal Ocean Waters of the San Diego Region

Table 3. Administrative Information

This Order was adopted by the San Diego Water Board on:	**Month Day, 2012**
This Order will become effective on:	**Month Day, 2012**
This Order will expire on:	**Month Day, 2017**
The Copermittees must file a Report of Waste Discharge (ROWD) in accordance with Title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than 180 days in advance of the Order expiration date.	

I, David W. Gibson, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on Month Day, 2012.

TENTATIVE

David W. Gibson
Executive Officer

ADMINISTRATIVE DRAFT

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I. FINDINGS

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board), finds that:

JURISDICTION

1. **MS4 Ownership or Operation.** Each of the Copermittees owns or operates an MS4, through which it discharges storm water and non-storm water into waters of the U.S. within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

2. **Legal and Regulatory Authority.** This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations (Code of Federal Regulations [CFR] Title 40, Part 122 [40 CFR 122]) adopted by the United States Environmental Protection Agency (USEPA), and chapter 5.5, division 7 of the California Water Code (CWC) (commencing with section 13370). This Order serves as an NPDES permit for discharges from MS4s to surface waters. This Order also serves as waste discharge requirements (WDRs) pursuant to article 4, chapter 4, division 7 of the CWC (commencing with section 13260).

3. **CWA Technology Based Standards and Prohibitions.** Pursuant to CWA section 402(p)(3)(B), NPDES permits for storm water discharges from MS4s must include requirements to effectively prohibit non-storm water discharges into MS4s, and require controls to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP).

4. **CWA NPDES Permit Conditions.** Pursuant to CWA section 402(a)(2), NPDES permits must prescribe conditions to assure compliance with CWA section 402(p)(3)(B) and 40 CFR 122.26(d)(2)(iv)(B). This Order prescribes conditions to assure compliance with the CWA requirements for owners and operators of MS4s to effectively prohibit non-storm water discharges in~~-~~to the MS4s, and require controls to reduce the discharge of pollutants in storm water from the MS4s to the MEP.

5. **CWA and CWC Monitoring Requirements.** Pursuant to 40 CFR 122.48, NPDES permits must specify requirements for recording and reporting monitoring results. In addition, CWC sections 13267 and 13383 authorize the San Diego Water Board to require technical and monitoring reports. This Order establishes monitoring and reporting requirements to implement federal and State requirements.

ADMINISTRATIVE DRAFT

6. **Total Maximum Daily Loads.** CWA section 303(d)(1)(A) requires that "[e]ach state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Clean Water Act Section 303(d) List of Water Quality Limited Segments, commonly referred to as the 303(d) List. The CWA requires the 303(d) List to be updated every two years. Requirements of this Order implement the TMDLs adopted by the San Diego Water Board and approved by USEPA.

7. **Non-Storm Water Discharges.** Pursuant to CWA section 402(p)(3)(B)(ii), this Order requires each Copermittee to effectively prohibit discharges of non-storm water into its MS4. Nevertheless, non-storm water discharges into and from the MS4s continue to be reported to the San Diego Water Board by the Copermittees and other persons. Monitoring conducted by the Copermittees, as well as the 303(d) List, have identified dry weather, non-storm water discharges from the MS4s as a source of pollutants causing or contributing to receiving water quality impairments in the San Diego Region. The federal regulations [40 CFR 122.26(d)(2)(iv)(B)] require the Copermittees to have a program to ~~prevent~~ effectively prohibit ~~all types of non-storm water discharges, or~~ illicit discharges, from entering the MS4. The federal regulations, however, allow for specific categories of non-storm water discharges ~~or flows~~ to be addressed as illicit discharges only where such discharges are identified as sources of pollutants to waters of the U.S.

8. **In-Stream Treatment Systems.** Pursuant to federal regulations [40 CFR 131.10(a)], in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of a runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Runoff treatment must occur prior to the discharge of runoff into receiving waters. Treatment control best management practices (BMPs) must not be constructed in waters of the U.S. or state. Construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body.

DISCHARGE CHARACTERISTICS AND RUNOFF MANAGEMENT

9. **Point Source Discharges of Pollutants.** Discharges from the MS4s may contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the state. A discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. Storm water and non-storm water discharges from the MS4s may contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4s are subject to the conditions and requirements established in the Basin Plan for point source

discharges.

10. **Potential Beneficial Use Impairment.** The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution, contamination, or nuisance.

11. **Pollutants Generated by Land Development.** Land development has created and continues to create new sources of non-storm water discharges and pollutants in storm water discharges as human population density increases. This brings higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, and trash. Pollutants from these sources are dumped or washed off the surface by non-storm water or storm water flows into and from the MS4s. When development converts natural vegetated pervious ground cover to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area contains greater pollutant loads and is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area.

12. **Runoff Discharges to Receiving Waters.** The MS4s discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within the eleven hydrologic units comprising the San Diego Region. Numerous receiving water bodies and water body segments have been designated as impaired by the San Diego Water Board pursuant to CWA section 303(d).

13. **Pollutants in Runoff.** The most common pollutants in runoff discharged from the MS4s include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., cadmium, copper, lead, and zinc), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

14. **Human Health and Aquatic Life Impairment.** Pollutants in runoff discharges from the MS4s can threaten and adversely affect human health and aquatic organisms. Adverse responses of organisms to chemicals or physical agents in runoff range from physiological responses such as impaired reproduction or growth anomalies to mortality. Increased volume, velocity, rate, and duration of storm water runoff greatly accelerate the erosion of downstream natural channels. This alters stream channels and habitats and can adversely affect aquatic and terrestrial organisms.

15. **Water Quality Effects.** The Copermittees' water quality monitoring data submitted to date documents persistent exceedances of Basin Plan water quality objectives for runoff-related pollutants at various watershed monitoring stations. Persistent toxicity has also been observed at several watershed monitoring stations. In addition,

bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity (IBI) ratings. These findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in the San Diego Region. Non-storm water discharges from the MS4s have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds, and contribute significantly to exceedances of applicable receiving water quality objectives.

16. **Non-Storm Water Discharges.** Non-storm water discharges ~~from~~ into the MS4s are not considered storm water discharges and therefore are not subject to the MEP standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4s. Pursuant to CWA 402(p)(3)(B)(ii), non-storm water discharges into the MS4s must be effectively prohibited.

17. **Best Management Practices.** Pollutants can be effectively reduced in runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and runoff, therefore keeping pollutants onsite and out of receiving waters. Treatment control BMPs remove pollutants that have been mobilized by storm water or non-storm water flows.

18. **BMP Implementation.** Runoff needs to be addressed during the three major phases of development (planning, construction, and use) in order to reduce the discharge of storm water pollutants to the MEP, effectively prohibit non-storm water discharges, and protect receiving waters. Development which is not guided by water quality planning policies and principles can result in increased pollutant load discharges, flow rates, and flow durations which can negatively affect receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development can generate substantial pollutant loads which are discharged in runoff to receiving waters.

19. **Long Term Planning and Implementation.** Federal regulations require municipal storm water permits to expire 5 years from adoption, after which the permit must be renewed and reissued. The San Diego Water Board recognizes that the degradation of water quality and impacts to beneficial uses of the waters in the San Diego Region occurred over several decades. The San Diego Water Board further recognizes that a decade or more may be necessary to realize demonstrable improvement to the quality of waters in the Region. This Order includes a long term planning and implementation approach that will require more than a single permit term to complete.

WATER QUALITY STANDARDS

20. **Basin Plan.** The San Diego Water Board adopted a Water Quality Control Plan for the San Diego Basin (Basin Plan) on September 8, 1994 that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for receiving waters addressed through the plan. The Basin Plan was subsequently approved by the State Water Resources Control Board (State Water Board) on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and approved by the State Water Board. Requirements of this Order implement the Basin Plan.

    The Basin Plan identifies the following existing and potential beneficial uses for inland surface waters in the San Diego Region: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Freshwater Replenishment (FRSH), Hydropower Generation (POW), and Preservation of Biological Habitats of Special Significance (BIOL). The following additional existing and potential beneficial uses are identified for coastal waters of the San Diego Region: Navigation (NAV), Commercial and Sport Fishing (COMM), Estuarine Habitat (EST), Marine Habitat (MAR), Aquaculture (AQUA), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction, and/or Early Development (SPWN), and Shellfish Harvesting (SHELL).

21. **Ocean Plan.** The State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, and 2005. The State Water Board adopted the latest amendment on April 21, 2005 and it became effective on February 14, 2006. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean. Requirements of this Order implement the Ocean Plan.

    The Ocean Plan identifies the following beneficial uses of ocean waters of the state to be protected: Industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture; preservation and enhancement of designated Areas of Special Biological Significance; rare and endangered species; marine habitat; fish spawning and shellfish harvesting

22. **Sediment Quality Control Plan**. On September 16, 2008, the State Water Board adopted the Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality (Sediment Quality Control Plan). The Sediment Quality Control Plan became effective on August 25, 2009. The Sediment Quality Control Plan establishes 1) narrative sediment quality objectives for benthic community protection from exposure to contaminants in sediment and to protect human health, and 2) a program of implementation using a multiple lines of evidence approach to interpret

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the narrative sediment quality objectives. Requirements of this Order implement the Sediment Quality Control Plan.

23. **National Toxics Rule and California Toxics Rule.** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the National toxics Rule (NTR) applied in California. On May 18, 2000, USEPA adopted the California Toxics Rule (CTR). The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants

24. **Antidegradation Policy.** This Order is in conformance with the federal Antidegradation Policy described in 40 CFR 131.12, and State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*. Federal regulations at 40 CFR 131.12 require that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The San Diego Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies.

CONSIDERATIONS UNDER FEDERAL LAW

25. **Coastal Zone Act Reauthorization Amendments.** Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This Order addresses the management measures required for the urban category, with the exception of septic systems. The runoff management programs developed pursuant to this Order fulfill the need for coastal cities to develop a runoff non-point source plan identified in the Non-Point Source Program Strategy and Implementation Plan. The San Diego Water Board addresses septic systems through the administration of other programs.

26. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 USCA sections 1531 to 1544). This Order requires compliance with receiving water limits, and other requirements to protect the beneficial uses of waters of the State. The Copermittees are responsible for meeting all requirements of the applicable Endangered Species Act.

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CONSIDERATIONS UNDER STATE LAW

27. **Unfunded Mandates.** This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following:

   a. This Order implements federally mandated requirements under CWA section 402. (33 USC 1342(p)(3)(B).)

   b. The local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges.

   c. The local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order.

   d. The Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301(a) (33 USC 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations).

   e. The local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

   f. The provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 USC 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions and requirements of any applicable wasteload allocation. (40 CFR 122.44(d)(1)(vii)(B).)

28. **California Environmental Quality Act.** The issuance of WDRs and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with CWC section 13389.

STATE WATER BOARD DECISIONS

29. **Compliance with Prohibitions and Limitations.** The receiving water limitation language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The receiving water limitation language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the

implementation of improved and better-tailored BMPs over time. Implementation of the iterative approach to comply with receiving water limitations based on applicable water quality standards is necessary to ensure that storm water discharges from the MS4 ultimately will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

30. Special Conditions for Areas of Special Biological Significance. On March 20, 2012, the State Water Board approved Resolution No. 2012-~~001X~~ 0012 approving an exception to the Ocean Plan prohibition against discharges to Areas of Special Biological Significance (ASBS) for certain nonpoint source discharges and NPDES permitted municipal storm water discharges. The Resolution requires monitoring and testing of marine aquatic life and water quality in several ASBS to protect California's coastline during storms when rain water overflows into coastal waters. Specific terms, prohibitions, and special conditions were adopted to provide special protections for marine aquatic life and natural water quality in ASBSs. The City of San Diego's municipal storm water discharges to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's municipal storm water discharges to the Heisler Park ASBS are subject terms and conditions of the Resolution. The Special Protections contained in Attachment B to the Resolution applicable to these discharges are hereby incorporated in this Order as if fully set forth herein.

ADMINISTRATIVE FINDINGS

31. Executive Officer Delegation of Authority. The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC section 13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC section 13223 or this Order explicitly states otherwise.

32. Standard Provisions. Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment B to this Order.

33. Fact Sheet. The Fact Sheet for this Order contains background information, regulatory and legal citations, references and additional explanatory information and data in support of the requirements of this Order. The Fact Sheet is hereby incorporated into this Order and constitutes part of the Findings of this Order.

34. Public Notice. The San Diego Water Board notified the Copermittees, and interested agencies and persons of its intent to prescribe WDRs for MS4 discharges of pollutants to waters of the U.S. and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet.

35. Public Hearing. The San Diego Water Board held a public hearing on Month Day, 2012 and heard and considered all comments pertaining to the terms and conditions of this Order. Details of the public hearing are provided in the Fact Sheet.

II. PROVISIONS

THEREFORE, IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND LIMITATIONS

The purpose of this provision is to describe the conditions under which ~~storm water and~~ non-storm water discharges into ~~and from~~ the MS4s are to be effectively prohibited or limited, and to describe how pollutants in discharges from the MS4, whether from stormwater or non-stormwater, are to be reduced to the maximum extent practicable (MEP). The goal of this provision is to address the impacts of MS4 discharges so that such discharges do not impair~~protect, preserve, enhance, and restore the~~ water quality and designated beneficial uses of waters of the state. This goal will be accomplished through implementation of control measures that effectively prohibit non-storm water discharges into ~~and from~~ the Copermittees' MS4s, and reduce pollutants in ~~storm water~~all discharges from the Copermittees' MS4s to the MEP. The process for determining compliance with the Discharge Prohibitions (A.1), Receiving Water Limitations (A.2), and Effluent Limitations (A.3, including effluent limitations derived from the TMDL requirements – Attachment E) is defined in Provision A.4.

1. Discharge Prohibitions

a. Except as otherwise permitted herein, ~~Discharges~~ discharges ~~into and~~ from MS4s~~s~~ owned and operated by a Copermittee, in a manner causing~~, or threatening to cause,~~ a condition of pollution, contamination, or nuisance in ~~receiving~~ waters of the state are prohibited.

b. Non-storm water discharges into ~~and from~~ MS4s are effectively prohibited, unless such discharges are either authorized by a separate NPDES permit, or the discharge is a category of non-storm water discharges or flows that must be addressed pursuant to Provisions E.2.a.(1)-(5) of this Order.

c. Discharges from MS4s are subject to all waste discharge prohibitions in the Basin Plan, included in Attachment A to this Order.

d. ~~Discharges from MS4s to ASBS are prohibited.~~ Storm water discharges from the City of San Diego's MS4 to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's MS4 to the Heisler Park ASBS are authorized under this Order subject to the Special Protections contained in Attachment B to State Water Board Resolution No. 2012-~~001X~~ 0012 applicable to these discharges, included in Attachment A to this Order. All other discharges from MS4s to ASBS are prohibited, unless authorized by a separate Order.

2. Receiving Water Limitations

a. Discharges from MS4s owned and operated by a Copermittee must not cause or contribute to the violation of water quality standards in any receiving waters, including but not limited to all applicable provisions contained in the list below to the extent they remain in effect and are operative, unless such discharges are being addressed by the Copermittee(s) through the processes set forth in this Order (including Provision A.4 below and Attachment E, the TMDL Provisions):

(1) The San Diego Water Board's Basin Plan, including beneficial uses, water quality objectives, and implementation plans;

(2) State Water Board plans for water quality control including the following:

(a) Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries (Thermal Plan), and

(b) The Ocean Plan, including beneficial uses, water quality objectives, and implementation plans;

(3) State Water Board policies for water and sediment quality control including the following:

(a) Water Quality Control Policy for the Enclosed Bays and Estuaries of California,

(b) Sediment Quality Control Plan which includes the following narrative objectives for bays and estuaries:

(i) Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities, and

(ii) Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health,

(c) The Statement of Policy with Respect to Maintaining High Quality of Waters in California (State Water Board Resolution No. 68-16).

(4) Priority pollutant criteria promulgated by the USEPA through the following:

(a) National Toxics Rule (NTR)[1] (promulgated on December 22, 1992 and amended on May 4, 1995), and

[1] 40 CFR 131.36

(b) California Toxics Rule (CTR)[2,3]

~~Discharges from MS4s composed of storm water runoff must not alter natural ocean water quality in an ASBS.~~

~~Discharges from MS4s must not cause or contribute to the violation of any receiving water limitations expressed as water quality based effluent limitations (WQBELs) required to meet the WLAs established for the TMDLs in Attachment E to this Order, pursuant to the applicable TMDL compliance schedules.~~

3. Effluent Limitations

a. Technology and Water Quality Based Effluent Limitations (including Effluent Limitations based on TMDLs).
Each Copermittee shall reduce pollutants in discharges from the MS4 to the maximum extent practicable (~~Pollutants in storm water discharges from MS4s must be reduced to the~~ MEP[4]).

~~a.~~ It is understood that compliance with this requirement will be achieved through the use of MEP-compliance best management practices (BMPs) or other controls that are consistent with the MEP standard.

b. ~~Pollutants in discharges from MS4s must be reduced to comply with any effluent limitations expressed as WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order, pursuant to the applicable TMDL compliance schedules.~~

4. Compliance with Discharge Prohibitions, ~~and~~ Receiving Water Limitations, and Effluent Limitations

Comment [A1]: It is recommended that this section be replaced with the language similar to what CASQA provided to the State Board. Although this language has been slightly modified, it is consistent with the CASQA language.

a. Each Copermittee must comply with the discharge prohibitions (A.1), ~~and~~ receiving water limitations (A.2), and effluent limitations (A.3, including effluent limitations developed based on TMDLs) of this Order through timely implementation of ~~control~~ strategies, control measures and other actions as specified in Provisions B, ~~and~~ E, and Attachment E (TMDLs) of this Order. The Water Quality Improvement Plans described in Provision B shall be designed to achieve compliance to the MEP standard with the discharge prohibitions, receiving water limitations, and all effluent limitations. If the Executive Officer approves a Water Quality Improvement Plan and subsequent updates as described in Provision B and F.1, and the plan is being implemented in a timely and good faith manner, such

2 65 Federal Register 31682-31719 (May 18, 2000), adding Section 131.38 to 40 CFR
3 If a water quality objective and a CTR criterion are in effect for the same priority pollutant, the more stringent of the two applies, unless a previous regulatory action (i.e., TMDL) has specified otherwise.
4 This requirement does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in ~~storm water~~ discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment must occur prior to the discharge of runoff into receiving waters per Finding 8.

implementation of the plan shall constitute compliance with Provisions A.1, A.2, and A.3.

b. In instances where discharges from the MS4 for which the permittee is responsible, causes or contributes to an exceedance of any applicable water quality standard or effluent limitation, or causes a condition of nuisance in the receiving water; and the pollutant(s) associated with the discharge is otherwise not specifically addressed by a provision of this Order (such as specific scheduled actions in a Water Quality Improvement Plan), the Permittee shall comply with the following iterative procedure:

1. Submit a report to the Executive Officer that:
    i. Summarizes and evaluates water quality data associated with the pollutant of concern in the context of the applicable water quality objective, discharge prohibition, or effluent limitation including the magnitude and frequency of the exceedances.
    ii. Includes a work plan to identify the sources of the constituents of concern (including those not associated with the MS4 such that non-MS4s sources can be pursued).
    iii. Describes the strategy and schedule for implementing MEP-compliant BMPs and other MEP-compliant controls (including those that are currently being implemented) that will address the Permittee's sources of constituents that are causing or contributing to the exceedances of any applicable water quality standard, discharge prohibition, or effluent limitation, or causing a condition of nuisance, and are reflective of the severity of the exceedances. The strategy shall demonstrate that the selection of BMPs will address the Permittee's sources of constituents and include a mechanism for tracking BMP implementation. The strategy shall provide for future refinement pending the results of the source identification work plan noted above.
    iv. Outlines, if necessary, additional monitoring to evaluate improvement in water quality and, if appropriate, special studies that will be undertaken to support future management decisions.
    v. Includes a methodology(ies) that will assess the effectiveness of the BMPs to address the exceedances.
    vi. This report may be submitted in conjunction with the Annual Report unless the Executive Officer directs an earlier submittal.

2. Submit any modifications to the report that are required by the Executive Officer and that are consistent with the MEP standard within 60 days of notification from the Executive Officer. The report is deemed approved within 60 days of its submission if no response is received from the Executive Officer.

3. Implement the actions specified in the report in accordance with the acceptance or approval of the Executive Officer, including the implementation schedule.

c. Compliance with the procedure set forth above for the subject pollutant or pollutants shall constitute compliance with the applicable discharge prohibition, receiving water limitation or effluent limitation (including the applicable TMDL) in issue, and the Permittee does not have to repeat the same procedure for continuing or recurring exceedances.

The information developed pursuant to A.4.b must be incorporated into the Water Quality Improvement Plans and/or the jurisdictional runoff management programs, as needed.

~~**a.** If exceedance(s) of water quality standards persist in receiving waters notwithstanding implementation of this Order, the Copermittees must comply with the following procedures:~~

~~(1) Upon a determination by either the Copermittees or the San Diego Water Board that discharges from the MS4 are causing or contributing to an exceedance of an applicable water quality standard, the Copermittees must submit the following updates to the Water Quality Improvement Plan required under Provision B as part of the Annual Report required under Provision F.3.b, unless the San Diego Water Board directs an earlier submittal:~~

~~(a) The water quality improvement strategies being implemented that are effective and will continue to be implemented;~~

~~(b) Additional water quality improvement strategies (i.e. BMPs, retrofitting projects, stream and/or habitat rehabilitation or restoration projects) that will be implemented to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards;~~

~~(c) Updates to the schedule for implementation of the existing and additional water quality improvement strategies; and~~

~~(d) Updates, when necessary, to the schedule for achieving compliance with the discharge prohibitions and receiving water limitations of this Order;~~

~~(2) The San Diego Water Board may require the incorporation of additional modifications to the Water Quality Improvement Plan required under Provision B. The applicable Copermittees must submit any modifications to the update to the Water Quality Improvement Plan within 30 days of~~

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~~notification that additional modifications are required by the San Diego Water Board, or as otherwise directed;~~

~~(3) Within 30 days of the San Diego Water Board determination that the update to the Water Quality Improvement Plan meets the requirements of this Order, the Copermittees must revise the jurisdictional runoff management program documents to incorporate the updated water quality improvement strategies that have been and will be implemented, the implementation schedule, and any additional monitoring required; and~~

~~(4) The Copermittees must implement the revised jurisdictional runoff management programs and updated jurisdictional monitoring and assessment component of the Water Quality Improvement Plan.~~

B. WATER QUALITY IMPROVEMENT PLANS[5]

The purpose of this provision is to develop Water Quality Improvement Plans that guide the Copermittees' jurisdictional ~~runoff management program~~ implementation efforts (Provision E) towards achieving the outcome of improved water quality in MS4 discharges and receiving waters. The goal of the Water Quality Improvement Plan is to 1) effectively prohibit non-stormwater discharges into the MS4s, 2) reduce pollutants in stormwater discharges from the MS4s to the MEP, and 3) attain the reasonable protection~~, preservation, enhancement, and restoration~~ of water quality and designated beneficial uses of waters of the state. Therefore, implementation of the WQIPs also provides the basis for complying with Provisions II.A.1, II.A.2, II.A.3, as described in Provision II.A.4. This goal will be accomplished through an adaptive planning and management process that identifies the highest water quality priorities within a watershed and implements customized strategies, control measures, and BMPs to achieve improvements in the quality of discharges from the MS4s and receiving waters. As such, the requirements outlined in Provision E may be modified for consistency with the Water Quality Improvement Plan for the applicable Watershed Management Area, if appropriate justification is provided.

Development of the Water Quality Improvement Plans allows permittees to customize the requirements in Provision E to address the highest watershed priorities. The Copermittees must develop Water Quality Improvement Plans for each Watershed Management Area that 1) prioritize water quality ~~issues~~ conditions resulting from the Copermittee's MS4 discharges ~~to and from the MS4s with~~in each Watershed Management Area, 2) identify MS4 pollutant sources ~~and other stressors~~ associated with th~~os~~e water quality priorities, 3) define numeric ~~targets~~goals and schedules to ~~achieve~~ address ~~improvement of~~ water quality priorities, 4) describe water quality improvement strategies to achieve numeric ~~targets~~goals, and 5) develop and execute a coordinated monitoring and assessment program to facilitate adaptive management of the WQIPs and determine progress towards achieving ~~improved water quality~~those goals.

The Copermittees must submit WQIPs for public review and Regional Board Executive Officer review and approval per the schedule outline in Provision II.B.6.~~implement all the requirements of Provisions B.1 through B.4 no later than 12 18 months after the adoption of this Order, or in accordance with Provision F.5.a~~ of this Order.

1. Watershed Management Areas

The Copermittees must develop Water Quality Improvement Plans for each of the Watershed Management Areas in Table B-1. A total of ~~nine~~ ten Water Quality Improvement Plans must be developed for the San Diego Region.

Table B-1. Watershed Management Areas

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[5] Once developed and approved, the Water Quality Improvement Plan and corresponding Jurisdictional Runoff Management Plans will functionally replace Load Reduction Plans.

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Watershed Management Area	Hydrologic Unit(s)	Major Surface Water Bodies	Responsible Copermittees
South Orange County	San Juan (901.00)	Aliso Creek San Juan Creek San Mateo Creek Pacific Ocean	- City of Aliso Viejo[1] - City of Dana Point[1] - City of Laguna Beach[1] - City of Laguna Hills[1] - City of Laguna Niguel[1] - City of Laguna Woods[1] - City of Lake Forest[1] - City of Mission Viejo[1] - City of Rancho Santa Margarita[1] - City of San Clemente[1] - City of San Juan Capistrano[1] - County of Orange[1] - Orange County Flood Control District[1]
Santa Margarita River	Santa Margarita (902.00)	Murrieta Creek Temecula Creek Santa Margarita River Santa Margarita Lagoon Pacific Ocean	- City of Murrieta[2] - City of Temecula[2] - City of Wildomar[2] - County of Riverside[2] - County of San Diego[3] - Riverside County Flood Control and Water Conservation District[2]
San Luis Rey River	San Luis Rey (903.00)	San Luis Rey River San Luis Rey Estuary Pacific Ocean	- ~~City of Escondido~~ ~~-~~City of Oceanside - City of Vista - County of San Diego
Carlsbad	Carlsbad (904.00)	Loma Alta Slough Buena Vista Lagoon Agua Hedionda Lagoon Batiquitos Lagoon San Elijo Lagoon Pacific Ocean	- City of Carlsbad - City of Encinitas - City of Escondido - City of Oceanside - City of San Marcos - City of Solana Beach - City of Vista - County of San Diego
San Dieguito River	San Dieguito (905.00)	San Dieguito River San Dieguito Lagoon Pacific Ocean	- City of Del Mar - City of Escondido - City of Poway - City of San Diego - City of Solana Beach - County of San Diego
Penasquitos	~~Penasquitos (906.00)~~Reservoir HA (906.10) Poway HA (906.20) Miramar HA (906.40)	Los Penasquitos Lagoon ~~Mission Bay~~ Pacific Ocean	- City of Del Mar - City of Poway - City of San Diego - County of San Diego
Mission Bay	Scripps HA (906.30) Miramar HA (906.40) Tecolote HA (906.50)	Mission Bay Pacific Ocean	- City of San Diego
San Diego River	San Diego (907.00)	San Diego River Pacific Ocean	- City of El Cajon - City of La Mesa ~~- City of Poway~~ - City of San Diego - City of Santee - County of San Diego

Table B-1. Watershed Management Areas

Watershed Management Area	Hydrologic Unit(s)	Major Surface Water Bodies	Responsible Copermittees
San Diego Bay	Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)	Sweetwater River Otay River San Diego Bay Pacific Ocean	- City of Chula Vista - City of Coronado - City of Imperial Beach - City of La Mesa - City of Lemon Grove - City of National City - City of San Diego - County of San Diego - San Diego County Regional Airport Authority - Unified Port of San Diego
Tijuana River	Tijuana (911.00)	Tijuana River Tijuana Estuary Pacific Ocean	- City of Imperial Beach - City of San Diego - County of San Diego

Notes:
1. The Orange County Copermittees will be enrolled under this Order upon expiration of Order No. R9-2009-0002, or earlier if the Orange County Copermittees meet the conditions in Provision F.6.
2. The Riverside County Copermittees will be enrolled under this Order upon expiration of Order No. R9-2010-0016, or earlier if the Riverside County Copermittees meet the conditions in Provision F.6.
3. The County of San Diego will not be required to implement the requirements of Provision B for the Santa Margarita River Watershed Management Area until the Riverside County Copermittees are enrolled under this Order. Until then, the County of San Diego is responsible for implementing and complying with the requirements of Provisions D.1, D.4.a.(1)&(3), E, F.2.a-b, F.3.b, and F.4 for the areas of the Santa Margarita River Watershed Management Area within its jurisdiction.

2. Identification of Water Quality Priorities

The Copermittees must identify the water quality priorities within each Watershed Management Area that will be addressed by the Water Quality Improvement Plan. Where appropriate, Watershed Management Areas may be separated into subwatersheds to focus water quality prioritization and jurisdictional ~~runoff management program~~ implementation efforts by receiving water.

a. Assessment of Receiving Water Conditions

The Copermittees must consider ~~review pollutant sources, discharges, and receiving water conditions and assess~~ the following, at a minimum, to support ~~determine~~ the identification ~~degree~~ of water quality priorities based on the ~~adverse~~ impacts of MS4 discharges on ~~to~~ receiving water beneficial uses:

(1) Receiving waters listed as impaired on the CWA Section 303(d) List of Water Quality Limited Segments (303(d) List);

(2) TMDLs adopted and under development by the San Diego Water Board;

~~(2)~~(3) The requirements of Provision II.A.2;

~~(3)~~(4) Receiving waters recognized as sensitive or highly valued by the Copermittees, including estuaries designated under the National Estuary Program under CWA section 320, wetlands defined by the State or U.S. Fish and Wildlife Service's National Wetlands Inventory as wetlands, and receiving waters identified as ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-~~001X~~ 0012 (Attachment A);

~~(4)~~(5) Water quality standards established in the Basin Plan;

~~(5)~~(6) Known historical versus current physical, chemical, and biological water quality conditions;

~~(6)~~(7) A~~All a~~vailable, relevant, and appropriately collected physical, chemical, and biological receiving water monitoring data meeting appropriate QA/QC standards~~,~~ including ~~, but not limited to,~~ data describing:

(a) Chemical constituents;

(b) Water quality parameters (i.e. pH, temperature, conductivity, etc.);

(c) Toxicity Identification Evaluations for both receiving water column and sediment;

(d) Trash impacts;

(e) Bioassessments; and

(f) Physical habitat.

~~(7)~~(8) Available evidence of erosional impacts in receiving waters due to accelerated flows (i.e. hydromodification); ~~and~~

(9) Available evidence of adverse impacts to the chemical, physical, and biological integrity of receiving waters~~.~~; and

~~(8)~~(10) The potential for long-term achievement and maintenance of beneficial use attainment in the Watershed Management Area.

b. Assessment of MS4 Discharge Quality and Impacts

To support the identification of priorities based on the impacts of MS4 discharges on receiving water beneficial uses, the Copermittees must review appropriately collected MS4 discharge quality data and consider the extent to which MS4s cause or contribute to the adverse impacts to receiving water beneficial uses identified in II.B.2.a. Considerations include:

(1) Locations of the Copermittees' MS4 discharges with respect to receiving waters;

(2) MS4 discharge quality results relevant to impacts in receiving waters and action levels, including the temporal and geographic variation of the results:

(3) The requirements of Provisions II.A.1 and II.A.3.; and

(4) Whether MS4 discharge quality is sufficiently well known or other information is available to assess whether MS4 discharges are causing or contributing to specific receiving water conditions, or whether additional data need to be collected through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan.

~~b.~~c. IDENTIFICATION OF ~~Y~~ PRIORITY ~~POLLUTANTS AND~~ RECEIVING WATER CONDITIONS

The Copermittees must use the information gathered in Provision B.2.a. and B.2.b to develop a list of water quality priorities as pollutants and/or receiving water conditions that are the highest threat to water quality or that most adversely affect the physical, chemical, and biological integrity of receiving waters. The Copermittees must identify the highest water quality priorities to be addressed by the Water Quality Improvement Plan. The WQIPs shall describe the following for each priority receiving water condition:

(1) The beneficial use(s) and pollutant(s) associated with the priority receiving water condition(s);

(2) The geographic extent of the priority receiving water condition(s)within the WMA, if known;

(3) The Copermittees with MS4s that contribute discharges to the priority water receiving condition(s);

(4) The temporal extent of the priority receiving condition(s) (i.e., dry weather and/or wet weather);

(5) Whether receiving waters have been monitored sufficiently to adequately characterize the priority receiving condition(s), including a consideration of spatial and temporal variation; and

(6) The reasoning for selecting specific receiving water conditions as a priority and a subset of priorities as the highest priorities.

~~c.~~d. MS4 POLLUTANT SOURCE ~~AND/OR STRESSOR~~ IDENTIFICATION

The Copermittees must identify and prioritize known and suspected storm water and non-storm water pollutant sources within the MS4 associated with ~~and any other stressors causing or contributing to~~ the highest priority receiving water conditions identified under II.B.2.c. ~~quality priorities.~~ The identification of known and suspected sources of the highest water quality priorities as identified for

Provision B.2.c~~b~~ shall~~must~~ consider the following:

(1) Land uses and their potential contribution to the highest priority receiving water conditions;

~~(1)~~(2) Pollutant generating facilities ~~or~~, areas, and/or activities within the Watershed Management Area~~, including:~~;

~~(2) Each Copermittee's inventory of construction, municipal, commercial, industrial, and residential facilities, areas, and/or activities,~~
~~(3)~~
~~(4) Publicly owned parks and/or recreational areas,~~
~~(5)~~
~~(6) Open space areas,~~
~~(7)~~
~~(8) All currently operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, and~~
~~(9)~~
~~(10) Areas not within the Copermittees' jurisdictions (e.g., tribal lands, state lands, federal lands) that may be pollutant sources related to the highest water quality priorities within the Watershed Management Area;~~
~~(11)~~
~~(12)~~ Locations of the Copermittees' MS4s~~, including the following:~~
~~(13)~~
~~(14)~~(3) ~~All MS4~~ outfalls ~~that discharge to receiving waters, and~~ .

~~(15) Locations of major structural controls for storm water and non-storm water (e.g., retention basins, detention basins, major infiltration devices, etc.);~~
~~(16)~~
~~(17) Other known and suspected sources of non-storm water or pollutants in storm water discharges to receiving waters within the Watershed Management Area, including the following:~~
~~(18)~~
~~(19) Other MS4 outfalls (e.g., Phase II Municipal and Caltrans),~~
~~(20)~~
~~(21) Other NPDES permitted discharges,~~
~~(22)~~
~~(23) Any other discharges that may be considered point sources (e.g., private outfalls), and~~
~~(24)~~
~~(25) Any other discharges that may be considered non-point sources (e.g., agriculture, wildlife or other natural sources);~~
~~(26)~~
~~(27)~~(4) Review of available data, including ~~but not limited to~~:

(a) Findings from the Copermittees' illicit discharge detection and elimination programs,

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(b) Findings from the Copermittees' MS4 outfall monitoring,

~~(c) Findings from the Copermittees' receiving water monitoring,~~
~~(d)~~
~~(e) Findings from the Copermittees' MS4 discharges and receiving water assessments, and~~
~~(f)~~
~~(g)~~(c) ~~Any other~~Other available, relevant, and appropriately-collected data, information, or studies related to pollutant sources and ~~conditions~~ pollutant-generating activities that contribute to the highest priority receiving water ~~quality priorities as~~conditions identified ~~for~~ in Provision II.B.2.b.

~~(28)~~(5) Whether MS4 sources are sufficiently well known to design an effective, directed control strategy, or whether additional source/stressor identification needs to be conducted through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan to identify and prioritize sources/stressors within the watershed.

~~d.~~e. NUMERIC ~~TARGETS~~ GOALS ~~AND SCHEDULES~~

The Copermittees must develop and incorporate interim and final numeric ~~targets[6] and schedules~~ goals[7] into the Water Quality Improvement Plans. Numeric ~~targets~~goals and schedules ~~must be used~~are intended to support Water Quality Improvement Plan development and to measure progress towards addressing the highest priority receiving water conditions identified under II.B.2.b~~water quality priorities and an ultimate outcome of protections, preservation, enhancement, and restoration of~~. Numeric goals themselves are not enforceable compliance standards, effluent limitations, or receiving water ~~beneficial uses.~~ limitations. When ~~developing~~establishing numeric ~~targets~~goals and corresponding schedules, the Copermittees must consider the following:

~~[6] Interim and final numeric targets may take a variety of forms such as pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric targets are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators.~~

[7] Interim and final numeric goals may take a variety of forms such as TMDL targets, TMDL wasteload allocations, TMDL based WQBELs incorporated in Attachment E of this Order, action levels, pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric goals are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators. To the extent that a goal is not based on an enforceable regulatory mechanism (i.e., TMDL, WLA), WQIP goals and schedules may be revised through the iterative process. Numeric goals are not subject to enforcement or non-compliance actions under this Order.

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(1) Final numeric ~~targets~~goals must be based on measureable criteria or indicators, to be achieved in the receiving waters and/or MS4 discharges for the highest priority receiving water ~~quality priorities~~conditions which will ~~result in~~be capable of demonstrating progress toward the achievement of the restoration and/or protection of water quality standards in receiving waters; and

(2) Interim numeric ~~targets~~goals must be based on measureable criteria or indicators that can demonstrate incremental progress toward achieving the final numeric ~~targets~~goals in the receiving waters and/or MS4 discharges~~;~~. ~~and~~

~~(3) Schedules must be adequate for measuring progress toward achieving the interim and final numeric targets required for Provisions B.2.d. and B.2.d.. Schedules must incorporate the following:~~

3. Water Quality Improvement Strategies and Schedules

The Copermittees must develop specific water quality improvement strategies to address the highest ~~water quality~~ priorit~~yies~~ receiving water conditions identified within a Watershed Management Area. The water quality improvement strategies must address the highest water quality priorities by preventing or eliminating non-storm water discharges to and from the MS4, reducing pollutants in storm water discharges from the MS4 to the MEP, and restoring and/or protecting the water quality standards of receiving waters.

a. Water Quality Improvement Strategies

The water quality improvement strategies must prioritize, based on their likely effectiveness and efficiency, and implement ~~the following~~ measures, as appropriate, to effectively prohibit non-storm water discharges into its MS4, reduce pollutants in storm water discharges from its MS4 to the MEP, and achieve the interim and final numeric ~~targets~~goals in accordance with the schedules ~~required for~~in Provision II.B.2~~.:~~.e. Measures include:

(1) Activities identified in Provision E ,either as described in the jurisdictional runoff management programs or as modified with justification, that will address priority receiving water conditions; and

~~(1)~~ Additional ~~S~~structural and/or non-structural BMPs that are designed to achieve the interim and final numeric goals identified in Provision II.B.2.e.~~targets in the receiving waters and/or MS4 discharges;~~
~~(2)~~

~~(3) Retrofitting projects for areas of existing development known or suspected to contribute to the highest water quality priorities, and where retrofitting will contribute to reducing or eliminating non-storm water discharges to the MS4 and/or reducing pollutants in storm water discharges from the MS4 to the MEP;~~

~~(4)~~

~~(5)~~(2) ~~Stream and/or habitat rehabilitation or restoration projects where stream and/or habitat rehabilitation or restoration are necessary for, or will contribute to demonstrable improvements in the physical, chemical, and biological receiving water conditions and restoration and/or protection of water quality standards in receiving waters; and~~

~~Other water quality improvement strategies that will result in preventing or eliminating non-storm water discharges to and from the MS4, reducing pollutants in storm water discharges from the MS4 to the MEP, and restoring and/or protecting the water quality standards of receiving waters.~~

b. IMPLEMENTATION SCHEDULES

The Copermittees must develop schedules for implementing the water quality improvement strategies identified under Provision II.B.3.a to achieve the interim and final numeric ~~targets~~goals identified in ~~the receiving waters and/or MS4 discharges for the highest water quality priorities~~B.2.e in the Watershed Management Area. Schedules must be developed for both the water quality improvement strategies implemented by each Copermittee within its jurisdiction and for strategies that ~~will be implemented by multiple Copermittees~~ Copermittees' choose to implement on a collaborative basis. Schedules must incorporate the following:

(a) Interim dates for achieving the interim numeric ~~targets~~goals;

(b) Compliance schedules for any applicable TMDLs in Attachment E to this Order;

(c) Compliance schedules for any ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-0012~~X~~ (see Attachment A);

(d) Achievement of the final numeric goals~~targets~~ in the receiving waters and/or MS4 discharges for the highest water quality priorities must be as soon as possible, and

(e) Final dates for achieving the final numeric ~~targets~~ goals must not extend more than 10 years beyond the date this Order is adopted, unless the schedule includes an applicable TMDL in Attachment E to this Order[8]

[8] Achievement of final numeric goals within 10 years represents progress towards attainment of water quality standards, but is not a requirement to fully attain all applicable water quality standards or all priority receiving water conditions within 10 years.

4. Water Quality Improvement Monitoring and Assessment

The Copermittees in each Watershed Management Area must develop an integrated ~~program to assess the~~Water Quality Improvement Plan Monitoring and Assessment Program that assesses: 1) progress toward achieving the numeric ~~targets~~goals and schedules, ~~and~~2) ~~the~~ progress toward addressing the highest priority receiving water ~~quality priorities~~conditions for each Watershed Management Area, and 3) each Copermittee's overall efforts implementing the requirements of Provision B. The water quality improvement monitoring and assessment program must include the monitoring and assessment requirements of Provision D~~.~~, which may be modified for consistency with the priority receiving water conditions of each Watershed Management Area and associated Copermittees. For Watershed Management Areas with applicable TMDLs, the water quality monitoring and assessment program must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-0012~~X~~ (see Attachment A).

5. Adaptive Management Process

~~1. WATER QUALITY IMPROVEMENT PLAN ADAPTIVE MANAGEMENT PROCESS~~

The Copermittees in each Watershed Management Area must implement the iterative process, ~~at least once every 3 years,~~ adapting the Water Quality Improvement Plan to become more effective~~, based on, but not limited to~~ and meet the requirements of Provisions II.A, and shall consider the following ~~considerations~~:

a. **PRIORITY RECEIVING WATER CONDITIONS AND NUMERIC GOALS**

The priority receiving water conditions and numeric goals, developed pursuant to II.B.2.c. and II.B.2.e respectively, shall guide jurisdictional implementation efforts for the duration of this Order. Recommendations for changes to priority receiving water conditions and numeric goals shall be provided in the Report of Waste Discharge and shall consider the following:

(1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan;

(2) Progress toward achieving interim and final numeric ~~targets~~goals in receiving waters and/or MS4 discharges for the highest water quality priorities in the Watershed Management Area~~,~~

~~(3) Appropriateness of the highest water quality priorities identified for the Watershed Management Area;~~
~~(4)~~
~~(5) Progress toward achieving outcomes according to established schedules;~~

~~(6)~~
(3) New scientific information or new or updated policies or regulations that affect identified numeric goals including revised water quality objectives or TMDLs;

~~(7)~~(4) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality problems and implementation measures to address the highest priority receiving water ~~quality problems~~conditions;

~~(8)~~(5) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees;

(6) The factors listed in Provision II.B.2.a.(1)-(10);

~~(9)~~(7) San Diego Water Board recommendations; and

~~(10)~~(8) Recommendations for modifications ~~to the Water Quality Improvement Plan~~ solicited through a public participation process.

b. ~~Based on the results of the iterative process~~ **WATER QUALITY IMPROVEMENT STRATEGIES AND SCHEDULES**
~~(11)~~ The water quality improvement strategies and schedules required pursuant to ~~Provision B.5.a., the~~II.B.3 shall be adapted as new information becomes available to inform more effective and efficient means of achieving the numeric goals established in II.B.2.e. Copermittees ~~must report any modifications necessary~~shall consider adaptation to ~~improve the effectiveness of the Water Quality Improvement Plan in the Annual Report required pursuant to Provision , or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5..~~

~~(12) The Copermittees must implement any modifications to the Water Quality Improvement Plan in accordance with the schedules developed pursuant to Provisions B.2. and B.3., unless directed otherwise by the San Diego Water Board.~~

~~2. **JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ADAPTIVE MANAGEMENT PROCESS**~~

~~Each Copermittee in the Watershed Management Area must implement the iterative process,~~jurisdictional runoff management programs and monitoring and assessment strategies and schedules at least annually~~, adapting its jurisdictional runoff management program to become more effective, based on, but not limited to~~ considering the following:

<ins>(1) Changes to priority receiving water conditions and numeric goals based on recommendations from II.B.5.a.;</ins>

~~(1)~~(2) Measurable or demonstrable reductions of non-storm water discharges to ~~and from~~ each Copermittee's MS4;

~~(2)~~(3) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;

(4) Information on the MS4 sources and/or pollutant-generating activities determined to be most significantly contributing to priority receiving water conditions;

~~(3)~~(5) Efficiency in implementing the Water Quality Improvement Plan;

~~(4)~~(6) San Diego Water Board recommendations; and

~~(5)~~(7) Recommendations for modifications ~~to each Copermittee's jurisdictional runoff management program~~ solicited through a public participation process~~.~~.

6. Water Quality Improvement Plan Submittal, Implementation, and Modifications

a. PRIORITY RECEIVING WATER CONDITIONS, MS4 SOURCES, AND NUMERIC GOALS

The ~~Based on~~Copermittees in each Watershed Management Area must submit the ~~results of the iterative process~~proposed priority receiving water conditions, MS4 sources, and numeric goals required ~~pursuant~~in Provisions II.B.2.c-e. for San Diego Water Board Executive Officer review and approval no later than 6 months following adoption of this Order. Priority receiving water conditions, MS4 sources, and numeric goals are deemed approved if no response is provided to the Copermittees within 2 months of the submittal date.

b. WATER QUALITY IMPROVEMENT PLANS

Copermittees shall commence development of the remaining portions of the Water Quality Improvement Plans upon approval of the priority receiving water conditions, MS4 sources, and numeric goals by the San Diego Water Board Executive Officer in II.B.6.a, and must submit complete Water Quality Improvement Plans for San Diego Water Board review and approval no later than 12 months thereafter. Water Quality Improvement Plans are deemed approved if no response is provided to the Copermittees within 2 months of the submittal date. Copermittees must commence with implementation of the Water Quality Improvement Plan no later than ~~180 days after submission, unless otherwise directed in writing by the San Diego Water Board.~~ the fiscal year (July 1) following San Diego Water Board approval of the Water Quality

Improvement Plan.

c. WATER QUALITY IMPROVEMENT PLAN MODIFICATIONS

~~(a)~~ Copermittees must submit requested modifications ~~necessary~~ to ~~improve the effectiveness its jurisdictional runoff management program document~~the Water Quality Improvement Plan either in the Annual Report required pursuant to Provision II.F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision II.F.5~~.~~.

~~Each Copermittee~~.b. Once approved by the San Diego Water Board Executive Officer, the Copermittees must implement any modifications to ~~its jurisdictional runoff management program~~the Water Quality Improvement Plan in accordance with the schedules developed pursuant to Provisions ~~B.2. and B.3., unless directed otherwise by the San Diego Water Board~~II.B.2 and II.B.3.b. Requests for modification are deemed approved if no response is provided to the requesting Copermittee(s) within 2 months of the request date.

d. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM MODIFICATIONS

Copermittees must submit requested modifications to the jurisdictional runoff management programs either in the Annual Report required pursuant to Provision II.F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision II.F.5.b. Once approved by the San Diego Water Board Executive Officer, the Copermittees must implement any modifications to the Water Quality Improvement Plan in accordance with the schedules developed pursuant to Provisions II.B.3.b. Requests for modification are deemed approved if no response is provided to the requesting Copermittee(s) within 2 months of the request date.

~~**6. Water Quality Improvement Plan Implementation**~~

~~Copermittees must commence with implementation of the Water Quality Improvement Plan no later than 180 days after submission, unless otherwise directed in writing by the San Diego Water Board.~~

C. ACTION LEVELS

The purpose of this provision is for the Copermittees to incorporate numeric non-storm water and storm water action levels in the Water Quality Improvement Plans and numeric non-storm water action levels in the IDDE Program. The action levels ~~will~~shall be used to guide the following program planning efforts and measure progress towards ~~attaining~~ the reasonable protection~~, preservation, and enhancement, and restoration~~ of water quality and designated beneficial uses of waters of the state~~. This goal will be accomplished through monitoring and assessing the quality of the MS4 discharges during the implementation of the Water Quality Improvement Plans.~~:

1) ~~The Copermittees must incorporate numeric action levels in the~~ Support development and prioritization of water quality improvement strategies through the Water Quality Improvement Plans ~~to direct and focus~~. Discharge data above action levels can be evaluated using a statistical approach considering the ~~Copermittees' jurisdictional runoff management program implementation efforts for addressing MS4~~ frequency, magnitude, and loading of discharges to the receiving waters~~. The numeric action levels will be used as part of the MS4~~ to support development of actions and prioritization of their implementation.
2) Assist in the effective prohibition of non-stormwater discharges ~~assessments required under~~ from the MS4 pursuant to Provision ~~, and each Copermittee's program to detect and eliminate non-storm water~~ E.2.
3) Support the detection and elimination of illicit discharges to the MS4 ~~required under~~pursuant to Provision ~~. Numeric~~E.2.

These goals will be accomplished through monitoring and assessing the quality of the MS4 discharges prior to and during the implementation of the Water Quality Improvement Plans and as a part of the IDDE program. Exceedances of action levels are not subject to enforcement or non-compliance actions under this Order.

Action levels will be developed and incorporated into the Water Quality Improvement Plans (Provision B) and~~including~~ the Illicit Discharge Detection and Elimination (IDDE) Program (Provision E.2). Depending upon the goals/objectives for the use of the action levels ~~must be developed~~ and the priority receiving water conditions, the constituents and values at which they are set may differ between watersheds. Copermittees may develop Watershed Management Area specific numeric action levels for non-storm water and storm water MS4 discharges using an approach approved by the Regional Board or use the default non-stormwater and stormwater action levels prescribed within C.1 and C.2 below, respectively. The Copermittees will submit action levels as part of their Water Quality Improvement Plan(s). The action levels currently established ~~as follows:part of R9-2007-0001~~ will serve as the interim action levels until ~~the Water Quality Improvement Plans~~revised action levels are completed and approved.

PROVISION C: ACTION LEVELS
C.1. Non-Storm Water Action Levels

1. Non-Storm Water Action Levels

The following non-storm water action levels (NALs) must be incorporated in the Water Quality Improvement Plan and IDDE program if the Permittees have not developed their own NALs using an approach approved by the Regional Board EO:

a. The following non-storm water action levels (NALs) must be incorporated ~~in the Water Quality Improvement Plan~~:

(1) Non-Storm Water Discharges from MS4s to Ocean Surf Zone

Table C-1. Non-Storm Water Action Levels for Discharges from MS4s to Ocean Surf Zone

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Total Coliform	MPN/100 ml	1,000	-	10,000/1,000[1]	OP
Fecal Coliform	MPN/100 ml	200[2]	-	400	OP
Enterococci	MPN/100 ml	35	-	104[3]	OP

Abbreviations/Acronyms
AMAL – average monthly action level
MDAL – maximum daily action level
OP – Ocean Plan water quality objective
MPN/100 ml – most probable number per 100 milliliters

Notes:
1. Total coliform density ~~shall not exceed~~NAL is 1,000 MPN/100 ml when the fecal/total coliform ratio exceeds 0.1
2. Fecal coliform density ~~may not exceed~~NAL is 200 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas"

(2) Non-Storm Water Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Table C-2. Non-Storm Water Action Levels for Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Turbidity	NTU	75	-	225	OP
pH	Units	Within limit of 6.0 to 9.0 at all times			OP
Fecal Coliform	MPN/100 ml	200[1]	-	400[2]	BP
Enterococci	MPN/100 ml	35	-	104[3]	BP
Priority Pollutants	ug/L	See Table C-3			

Abbreviations/Acronyms:
AMAL – average monthly action level
MDAL – maximum daily action level
OP – Ocean Plan water quality objective
BP – Basin Plan water quality objective
NTU – Nephelometric Turbidity Units
MPN/100 ml – most probable number per 100 milliliters
ug/L – micrograms per liter

Notes:
1. Based on a minimum of not less than five samples for any 30-day period
2. NAL is reached if n~~N~~o more than 10 percent of total samples may exceed 400 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas" and is not applicable to waterbodies that are not designated REC-1

Table C-3. Non-Storm Water Action Levels for Priority Pollutants

Parameter	Units	Freshwater (CTR)		Saltwater (CTR)	
		MDAL	AMAL	MDAL	AMAL
Cadmium	ug/L	**	**	16	8
Copper	ug/L	*	*	5.8	2.9
Chromium III	ug/L	**	**	-	-
Chromium VI	ug/L	16	8.1	83	41
Lead	ug/L	*	*	14	2.9
Nickel	ug/L	**	**	14	6.8
Silver	ug/L	*	*	2.2	1.1
Zinc	ug/L	*	*	95	47

Abbreviations/Acronyms:
CTR – California Toxic Rule
ug/L – micrograms per liter
AMAL – average monthly action level
MDAL – maximum daily action level

Notes:
* Action levels developed on a case-by-case basis (see below)
** Action levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels (MCLs) under the California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431

The Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc NALs for MS4 discharges to freshwater receiving waters will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable)	= exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable)	= exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable)	= exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable)	= exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable)	= exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable)	= exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable)	= exp(0.8473[ln(hardness)] + 0.884)

(3) Non-Storm Water Discharges from MS4s to Inland Surface Waters

Table C-4. Non-Storm Water Action Levels for Discharges from MS4s to Inland Surface Waters

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BP
Turbidity	NTU	-	20	See MDAL	BP
pH	Units	Within limit of 6.5 to 8.5 at all times			BP
Fecal Coliform	MPN/100 ml	200[1]	-	400[2]	BP
Enterococci	MPN/100 ml	33	-	61[3]	BP
Total Nitrogen	mg/L	-	1.0	See MDAL	BP
Total Phosphorus	mg/L	-	0.1	See MDAL	BP
MBAS	mg/L	-	0.5	See MDAL	BP
Iron	mg/L	-	0.3	See MDAL	BP
Manganese	mg/L	-	0.05	See MDAL	BP
Priority Pollutants	ug/L	See Table C-3			

Abbreviations/Acronyms:
- AMAL – average monthly action level
- BP – Basin Plan water quality objective
- COLD – cold freshwater habitat beneficial use
- NTU – Nephelometric Turbidity Units
- mg/L – milligrams per liter
- MDAL – maximum daily action level
- WARM – warm freshwater habitat beneficial use
- MBAS – Methylene Blue Active Substances
- MPN/100 ml – most probable number per 100 milliliters
- ug/L – micrograms per liter

Notes:
1. Based on a minimum of not less than five samples for any 30-day period
2. NAL is reached if n~~N~~o more than 10 percent of total samples may exceed 400 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for freshwater "designated beach areas" and is not applicable to waterbodies that are nor designated REC-1.

b. If not identified in Provision C.1.a, NALs must be identified and incorporated in the Water Quality Improvement ~~Plan~~ Plan and/or IDDE program for any pollutants or waste constituents that cause~~ing~~ or contribute~~ing~~, or are threatening to cause or contribute to a condition of pollution or nuisance in waters of the state associated with the highest water quality priorities related to non-storm water discharges from the MS4s. NALs must be based on:

(1) Applicable water quality standards which may be dependent upon site-specific or receiving water-specific conditions or assumptions to be identified by the Copermittees; or

(2) Applicable numeric WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order.

c. Dry weather monitoring and assessment data from MS4 outfalls collected in accordance with Provision D.1.a may be used to develop or revise NALs based upon watershed-specific data. Revision of NALs is subject to Regional Board EO approval.

2. Storm Water Action Levels

The following storm water action levels (SALs) must be incorporated in the Water Quality Improvement Plan if the Permittees have not developed their own SALs using an approach approved by the Regional Board EO:

a. The following storm water action levels (SALs) for discharges of storm water from the MS4 must be incorporated ~~in the Water Quality Improvement Plan~~:

Table C-5. Storm Water Action Levels for Discharges from MS4s to Receiving Waters

Parameter	Units	Action Level
Turbidity	NTU	126
Nitrate & Nitrite (Total)	mg/L	2.6
Phosphorus (Total P)	mg/L	1.46
Cadmium (Total Cd)*	µg/L	3.0
Copper (Total Cu)*	µg/L	127
Lead (Total Pb)*	µg/L	250
Zinc (Total Zn)*	µg/L	976

Abbreviations/Acronyms:
NTU – Nephelometric Turbidity Units
mg/L – milligrams per liter
ug/L – micrograms per liter

Notes:
* The sampling must include a measure of receiving water hardness at each MS4 outfall. If a total metal concentration exceeds the corresponding metals SAL in Table C-5, that concentration must be compared to the California Toxics Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific metal exceeds that SAL, but does not exceed the applicable USEPA 1-hour maximum concentration criterion for the measured level of hardness, then the sample result will not be considered ~~as an excursion~~ above the SAL for that measurement.

b. If not identified in Provision C.2.a, SALs must be identified and incorporated in the Water Quality Improvement Plan for pollutants or waste constituents that caus~~eing~~ or contribut~~eing~~, or are threatening to cause or contribute to a condition of pollution or nuisance in waters of the state associated with the highest water quality priorities related to storm water discharges from the MS4s. SALs must be based on:

(1) Federal and State water quality guidance and/or water quality standards; ~~and~~or

(2) Site-specific or receiving water-specific conditions; or

~~(2)~~(3) One of the approaches recommended by the California Water Board's Storm Water Panel in its report, "The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities" (June 2006); or

~~(3)~~(4) Applicable numeric WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order.

c. Wet weather monitoring and assessment data from MS4 outfalls collected in accordance with Provision D.1.b may be used to develop or revise SALs based upon watershed-specific data. Revision of SALs is subject to ~~San Diego Water~~Regional Board EO approval.

D. MONITORING AND ASSESSMENT REQUIREMENTS

Comment [A2]: The Orange County Copermittees are working on revised monitoring language with the San Diego County Copermittees. While the OC Copermittees do not have specific language that can be offered at this time, the Monitoring Principles that we would like to see incorporated as a part of the monitoring program are included as an attachment.

The purpose of this provision is for the Copermittees to monitor and assess the chemical, physical, and biological impact on receiving waters caused by discharges from the Copermittees' MS4s under wet weather and dry weather conditions. The goal of this provision is to inform the Copermittees about the nexus between the health of receiving waters and the water quality condition of the discharges from their MS4s. This goal will be accomplished through implementing and complying with the monitoring and assessment requirements of this Order.

The Copermittees must implement the following minimum monitoring and assessment requirements:

1. Jurisdictional Monitoring Requirements

~~b.~~a. DRY WEATHER JURISDICTIONAL MONITORING [D.1.a]

For dry weather days,[9] each Copermittee must implement the following minimum monitoring requirements within its jurisdiction:

(1) Non-Storm Water MS4 Monitoring Program [D.1.a.(1)]

Each Copermittee must develop and conduct a program to monitor and characterize non-storm water flows and pollutant loads during dry weather conditions within its jurisdiction. The non-storm water MS4 monitoring program must be utilized to detect and eliminate non-storm water discharges and illicit discharges and connections to the Copermittee's MS4. Any available monitoring data not collected specifically to meet these requirements may be utilized by the Copermittee. The non-storm water MS4 monitoring program must meet the following minimum requirements:

(a) Non-Storm Water MS4 Monitoring Stations [D.1.a.(1)(a)]

Each Copermittee must identify the non-storm water MS4 monitoring stations within its jurisdiction that will be screened and monitored during dry weather days to identify non-storm water discharges and illicit discharges and connections to the MS4. Non-storm water MS4 monitoring stations must be selected in accordance with the following guidelines and criteria:

(i) A grid system consisting of perpendicular north-south and east-west lines spaced ¼ mile apart must be overlayed on a map of the Copermittee's MS4. All cells that contain a segment of the Copermittee's MS4 must be identified;

[9] Dry weather day is defined as any day with less than 0.1 inches of rain observed on each of the previous 3 days.

(ii) At least one non-storm water MS4 monitoring station must be selected in each cell containing a segment of the Copermittee's MS4, which must consist of one of the following:

[a] A major outfall,
[b] Other outfall point, or
[c] Other point of access (e.g., manhole);

(iii) Each non-storm water MS4 monitoring station should be located downstream of any areas that are known or suspected to be sources of non-storm water discharges and/or illicit discharges or connections to the MS4;

(iv) Each non-storm water MS4 monitoring station must be located to the degree practicable at the farthest outfall, manhole, or other accessible location downstream in the MS4, within each cell;

(v) In addition to the non-storm water MS4 monitoring stations identified in accordance with Provisions D.1.a.(1)(a)(i)-(iv) above, each Copermittee must identify stations that will be screened and monitored during dry weather days to identify non-storm water discharges from sources not directly under the jurisdiction of the Copermittee.[10] These stations must be selected in accordance with the following guidelines and criteria:

[a] Stations should be located at or prior to the point of discharge into the Copermittee's MS4, but may be located downstream of the source as long as the station remains appropriate for characterizing the discharge from the source not within the authority of the Copermittee to control,
[b] Any non-storm water MS4 monitoring station identified in accordance with Provisions D.1.a.(1)(a)(i)-(iv) and located at the point of discharge or directly downstream of a known or suspected source of non-storm water discharges not within the authority of the Copermittee to control may also be utilized as a station to monitor the source not within the authority of the Copermittee to control;

(vi) The following factors should be considered in determining the location of each non-storm water MS4 monitoring station:

[a] Safety of personnel and accessibility of the location,
[b] Total area draining to the location,
[c] Population density of the area draining to the location,
[d] Traffic density,
[e] Age of the structures or buildings in the area,

[10] Sources not directly under the jurisdiction of and subject to regulation by the Copermittee may include lands or areas under the jurisdiction of other Copermittees, owners or operators of federal and state lands or facilities, tribal lands, special districts, etc.

[f] History of the area,
[g] Land use types draining to the location,
[h] Hydrological conditions, and
[i] Recommendations from the San Diego Water Board; and

(vii) No more than 500 non-storm water MS4 monitoring stations need to be selected by each Copermittee within its jurisdiction for any given year.

(b) Non-Storm Water MS4 Station Prioritization [D.1.a.(1)(b)]

Based on the first year of non-storm water field observations collected consistent with the Provision D.1.a.(1)(c)(i), each Copermittee must identify the high priority non-storm water MS4 monitoring stations. The non-storm water MS4 monitoring stations that meet the following criteria must be identified as high priority:

(i) The Copermittee has not identified and eliminated the source of the non-storm water discharges; or

(ii) The Copermittee has not been able to eliminate the source of an identified illicit discharge, and

(iii) The non-storm water discharges and/or illicit discharges are known or suspected to contribute and/or contain pollutants that cause or contribute, or threaten to cause or contribute to a condition of pollution or nuisance associated with the highest water quality priorities related to discharges from the MS4s.

(iv) The Copermittee may also designate any non-storm water MS4 monitoring stations that do not meet the criteria above as high priority.

(c) Non-Storm Water Monitoring Procedures [D.1.a.(1)(c)]

Each Copermittee must monitor the non-storm water MS4 monitoring stations within its jurisdiction as follows:

(i) *Non-Storm Water Field Observations* [D.1.a.(1)(c)(i)]

[a] Monitoring events for each non-storm water MS4 monitoring station must be scheduled as follows:
[1] During the first year of enrollment under this Order, the Copermittee must record field observations consistent with Table D-1 at each non-storm water MS4 monitoring station within its jurisdiction at least one time per month;

Table D-1. Field Observations for Non-Storm Water MS4 Monitoring Stations

Field Observations
• Station identification and location. • Presence of flow, or pooled or ponded water. • If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate), - Flow characteristics (i.e. presence of floatables, surface scum, or sheens, odor, color), - Flow source(s) suspected or identified from non-storm water source investigation, and - Flow source(s) eliminated during non-storm water source identification. • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, or sheens, odor, color), and - Known or suspected source(s) of pooled or ponded water. • Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology). • Presence and assessment of trash in and around station. • Evidence or signs of illicit connections or illegal dumping.

[2] For any stations monitoring sources not within the authority of the Copermittee to control where flows are observed during the first year of enrollment under this Order, the Copermittee must develop a field screening and monitoring schedule that can characterize the monthly non-storm water discharges and pollutant loads from the sources in or discharging to the Copermittee's MS4;

[3] High priority non-storm water MS4 monitoring stations must be monitored in accordance with the following:

A. Each Copermittee must designate at least 5 high priority non-storm water MS4 monitoring stations that are representative of non-storm water discharges from areas consisting primarily of residential, commercial, and industrial land uses present within and directly under the Copermittee's jurisdiction. Where there are less than 5 non-storm water MS4 monitoring stations within a Copermittee's jurisdiction, all stations must be designated as high priority, and

B. Each Copermittee must develop a monitoring schedule that can characterize the monthly non-storm water discharges and pollutant loads in or discharging from the high priority non-storm water MS4 monitoring stations;

[4] At least 10 percent of the non-storm water MS4 monitoring stations not identified as high priority must be screened and monitored each month. In addition, each non-storm water MS4 monitoring station must be screened and monitored at least once per year. If non-storm water flows are observed at

any non-storm water MS4 monitoring stations not identified as high priority, then they must become high priority pursuant to Provision D.1.a.(1)(b).

[b] For each monitoring events required above, the narrative descriptions and observations in Table D-1 must be recorded at each non-storm water MS4 monitoring station.

(ii) *Non-Storm Water Field Monitoring* [D.1.a.(1)(c)(ii)]

If flows, or pooled or ponded water are present during the field observations required under Provision D.1.a.(1)(c)(i), the Copermittee must monitor and record the parameters in Table D-2:

Table D-2. Field Monitoring Parameters for Non-Storm Water MS4 Monitoring Stations

Parameters
• pH • Temperature • Specific conductivity • Dissolved oxygen • Turbidity • Total chlorine • Total copper* • Total phenol • Detergents (or surfactants)* • Total hardness* • Reactive phosphorus* • Nitrate* • Ammonia as nitrogen*

* Field measurement not required if flow is observed and collection of a sample for analysis is required.

(iii) *Non-Storm Water Analytical Monitoring* [D.1.a.(1)(c)(iii)]

If flows are present during the field observations required under Provision D.1.a.(1)(c)(i), samples must be collected and analyzed as follows:

[a] If the Copermittee identifies and eliminates the source of non-storm water discharge, analysis of the sample is not required, but encouraged;

[b] During the first year of enrollment under this Order, samples must be collected if flows are observed at non-storm water MS4 monitoring stations. Samples must be analyzed for the following constituents, unless the Copermittee has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary:

[1] Any pollutants identified as the highest priority for the Watershed Management Area in the Water Quality Improvement Plan,

[2] Any pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection,

[3] Constituents listed in Table D-3;

Table D-3. Analytical Monitoring Constituents for Non-Storm Water MS4 Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Total Phosphorus • Dissolved Phosphorus • Nitrite[1] • Nitrate[1] • Total Kjeldhal Nitrogen • Ammonia • Oil and Grease	• Diazinon • Chlorpyrifos • Pyrethroids	• Cadmium • Copper • Lead • Zinc	• Total Coliform • Fecal Coliform[2] • *Enterococcus*

Notes:
1. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
2. *E. Coli* may be substituted for Fecal Coliform.

[c] **After** the first year of enrollment under this Order, samples must be collected from all high priority non-storm water MS4 monitoring stations for analysis at least two times per year. Samples must be collected at least once during the dry season (May-September) and at least once after the first storm event of the wet season (October-April). Samples must be analyzed for the following constituents:
[1] Any pollutants identified as the highest priority for the Watershed Management Area in the Water Quality Improvement Plan,
[2] Any pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and
[3] Constituents listed in Table D-3 must be analyzed at least once per year;

[d] Samples must be collected from all non-storm water MS4 monitoring stations not identified as high priority for analysis if flows are observed during required field screening and monitoring events. Samples must be analyzed for the following constituents, unless the Copermittee has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary:
[1] Any pollutants identified as the highest priority for the Watershed Management Area in the Water Quality Improvement Plan,
[2] Any pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and
[3] Constituents listed in Table D-3.

(2) Dry Weather Ambient Receiving Water Monitoring Program [D.1.a.(2)]

Each Copermittee must develop and conduct a program to monitor and characterize the ambient conditions of the receiving waters utilized for conveying non-storm water within and through its jurisdiction. Any available monitoring data not collected specifically to meet these requirements may be utilized by the Copermittee. The dry weather ambient receiving water monitoring program must meet the following minimum requirements:

(a) Dry Weather Ambient Receiving Water Monitoring Stations [D.1.a.(2)(a)]

Each Copermittee must identify the dry weather ambient receiving water monitoring stations that will be screened and monitored. Any location in a receiving water that is already monitored by the Copermittee or another entity may also be utilized as a dry weather ambient receiving water monitoring station. The monitoring stations must be selected in accordance with the following criteria:

(i) The following factors should be considered in determining the location of each dry weather ambient receiving water monitoring station:

[a] Permission to cross private property and public land,
[b] Safety of personnel and accessibility of the location,
[c] Location can complement or supplement historical ambient receiving water data,
[d] Location should not be in close proximity to any MS4 outfalls or other point source discharges to the receiving water,
[e] Natural or relatively unaltered areas in receiving waters are preferred, and
[f] Recommendations from the San Diego Water Board;

(ii) Locate at least one monitoring station in the lowest part of the Watershed Management Area near the boundary of its jurisdiction;

(iii) Locate at least one monitoring station located in the uppermost part of the Watershed Management Area near the boundary of its jurisdiction; and

(iv) The monitoring stations identified in Provisions D.1.a.(2)(a)(ii) and D.1.a.(2)(a)(iii) must be hydraulically connected.

(b) Dry Weather Ambient Receiving Water Monitoring Procedures [D.1.a.(2)(b)]

Each Copermittee must monitor the dry weather ambient receiving water monitoring stations as follows:

(i) *Dry Weather Ambient Receiving Water Field Observations* [D.1.a.(2)(b)(i)]

Monitoring events for each monitoring station must be scheduled as follows:

[a] During the first year of enrollment under this Order, the Copermittee must record field observations consistent with Table D-4 at each dry weather ambient receiving water monitoring station at least one time per month; and

Table D-4. Field Observations for Dry Weather Ambient Receiving Water Monitoring Stations

Field Observations
• Station identification and location. • Presence of flow, or pooled or ponded water. • If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate), - Flow characteristics (i.e. presence of floatables, surface scum, or sheens, odor, color), • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, or sheens, odor, color),. • Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology). • Presence and assessment of trash in and around station.

[b] For any monitoring stations where flows are observed during the first year of enrollment under this Order, the Copermittee must develop a field screening and monitoring schedule that can characterize the monthly flows and pollutant loads in the receiving water.

(ii) *Dry Weather Ambient Receiving Water Field Monitoring* [D.1.a.(2)(b)(ii)]

If flow, or pooled or ponded water is present during the field observations required under Provision D.1.a.(2)(b)(i), the Copermittee must monitor and record the parameters in Table D-2.

(iii) *Dry Weather Ambient Receiving Water Analytical Monitoring* [D.1.a.(2)(b)(iii)]

If flows are present during the field observations required under Provision D.1.a.(2)(b)(i), samples of the ambient receiving water flows must be collected and analyzed as follows:

[a] During the first year of enrollment under this Order, samples must be collected for each observation of flow in the ambient receiving water monitoring stations for analysis. Samples must be analyzed for the following constituents:

[1] Any pollutants identified as the highest priority for the Watershed Management Area in the Water Quality Improvement Plan,

[2] Any non-storm water pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and
[3] Constituents listed in Table D-3; and

[b] **After** the first year of enrollment under this Order, samples of flows observed at ambient receiving water monitoring stations must be collected for analysis at least two times during the remaining term of this Order. Samples must be collected at least once during the dry season (May-September) and at least once after the first storm event of the wet season (October-April). Samples must be analyzed for the following constituents:
[1] Any pollutants identified as the highest priority for the Watershed Management Area in the Water Quality Improvement Plan,
[2] Any pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection,
[3] Constituents listed in Table D-3 must be analyzed at least once per year.

~~c.~~b. **WET WEATHER JURISDICTIONAL MONITORING** [D.1.b]

For wet weather days,[11] each Copermittee must implement the following minimum monitoring requirements within its jurisdiction:

(1) Storm Water MS4 Outfall Monitoring Program [D.1.b.(1)]

Each Copermittee must develop and conduct a program to monitor and characterize the storm water flows and pollutant loads from the MS4 outfalls within its jurisdiction during wet weather days. Any available monitoring data not collected specifically to meet these requirements may be utilized by the Copermittee. The monitoring program must meet the following minimum requirements:

(a) Storm Water MS4 Outfall Monitoring Stations [D.1.b.(1)(a)]

Each Copermittee must identify the wet weather MS4 outfall monitoring stations within its jurisdiction that will be monitored and sampled during wet weather days. Any non-storm water MS4 monitoring station identified under Provision D.1.a.(1)(a) may also be utilized as a storm water MS4 outfall monitoring station. Monitoring stations must be selected in accordance with the following guidelines and criteria:

(i) The following factors should be considered in determining the location of each wet weather MS4 outfall monitoring station:

[11] Wet weather day defined as any day with 0.1 inches of rain or greater and the following 3 days.

[a] Safety of personnel and accessibility of the location,
[b] Total area draining to the location,
[c] Population density of the area draining to the location,
[d] Traffic density,
[e] Age of the structures or buildings in the area,
[f] History of the area,
[g] Land use types draining to the location,
[h] Hydrological conditions, and
[i] Recommendations from the San Diego Water Board.

(ii) Each wet weather MS4 outfall monitoring station must consist of one of the following:

[a] A major outfall, or
[b] Other outfall point, or
[c] Other point of access (e.g., manhole), only as an alternate location if safety during wet weather discharge sampling at available outfall locations discharging to receiving waters is a significant concern and limits accessibility;

(iii) Each Copermittee must designate at least 5 monitoring stations that are representative of storm water flows from areas consisting primarily of residential, commercial, and industrial land uses present within the Copermittee's jurisdiction. Where there are less than 5 MS4 outfalls within a Copermittee's jurisdiction, all MS4 outfalls must be designated as wet weather MS4 outfall monitoring stations.

(iv) Any monitoring station that does not have any SAL exceedances for 3 successive years may be replaced with a different monitoring station.

(b) Storm Water MS4 Outfall Monitoring Procedures [D.1.b.(1)(b)]

Each Copermittee must develop monitoring procedures to be consistent with the following criteria:

(i) A narrative description must be provided of the station identification and location, date and duration of the storm event(s) sampled, rainfall estimates of the storm event which generated the sampled discharge and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(ii) Flow rates and volumes for each monitoring station must be measured or estimated during each monitoring event in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), sections 3.2.1 or 3.2.2, or other method proposed by the Copermittees that is acceptable to the San Diego Water Board;

(iii) Each Copermittee must develop and implement a monitoring frequency during the wet season to characterize pollutant discharges from the MS4 outfalls within its jurisdiction. At a minimum, storm water samples must be collected from two storm events occurring at least one month apart for each monitoring station. Samples must be collected as follows:

[a] Grab samples may be collected only for pH, temperature, specific conductivity, dissolved oxygen, hardness, oil and grease, and indicator bacteria,
[b] For all other constituents, one of the following methods must be used to collect the samples:
[1] A 24-hour composite sample, using a minimum of 4 grab samples, collected during the first 24 hours of the storm water discharge, or for the entire storm water discharge if the storm event is less than 24 hours. Results of the analyses of individual grab samples may be averaged to obtain the daily average,
[2] A flow-weighted composite sample for either the entire discharge or for the first 3 hours of the discharge. The flow-weighted composite sample for the storm water discharge may be taken with a continuous sampler or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire discharge or for the first three hours of the discharge, with each aliquot being separated by a minimum period of fifteen minutes. Only one analysis of the composite of aliquots is required, or
[3] A minimum of one grab sample may be collected for storm water discharges from holding ponds or other impoundments with a retention period greater than 24 hours;

(iv) Storm water MS4 outfall monitoring stations must be monitored and sampled during the first wet weather event of the wet season. Samples must be analyzed for the following constituents:

[a] Any pollutants contributing to the highest water quality priorities for the Watershed Management Area as identified in the Water Quality Improvement Plan,
[b] Any non-storm water pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and
[c] Constituents listed in Table D-5.

Table D-5. Analytical Monitoring Constituents for Wet Weather MS4 Outfall Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Turbidity[1] • Total Hardness • pH • Specific Conductivity • Temperature • Dissolved Oxygen • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Sulfate • Methylene Blue Active Substances (MBAS) • Total Phosphorus[1] • Dissolved Phosphorus • Nitrite[1,2] • Nitrate[1,2] • Total Kjeldhal Nitrogen • Ammonia • Oil and Grease	• Diazinon • Chlorpyrifos • Pyrethroids	• Arsenic • Cadmium[1] • Chromium • Copper[1] • Iron • Lead[1] • Manganese • Mercury • Nickel • Selenium • Silver • Thallium • Zinc[1]	• Total Coliform • Fecal Coliform[3] • *Enterococcus*

Notes:
1. Constituent with a storm water action level (SAL) specified under Provision C.2.
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
3. *E. Coli* may be substituted for Fecal Coliform.

(v) Samples collected after the first wet weather monitoring event and during the remaining period of the wet season must be analyzed for the following constituents:

[a] Any pollutants contributing to the highest water quality priorities for the Watershed Management Area as identified in the Water Quality Improvement Plan.

[b] Any pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection.

(2) <u>Storm Water Pollutant Source Identification Monitoring Program</u> [D.1.b.(2)]

Each Copermittee must develop and conduct a program within its jurisdiction to identify the sources of pollutants in storm water discharged from the Copermittee's MS4 during wet weather conditions. Any available monitoring data not collected specifically to meet these requirements may be utilized by the Copermittee. The storm water pollutant source identification monitoring program must include focused monitoring which moves upstream into each MS4 outfall drainage area as necessary to identify sources of the highest water quality priorities in the receiving waters. The wet weather source identification monitoring program must begin no later than the wet season following the date the San Diego Water Board determines that the Water Quality Improvement Plan meets the requirements of this Order.

2. Watershed Monitoring Requirements

a. WATERSHED MONITORING STATIONS [D.2.a]

The Copermittees must identify watershed monitoring stations within the Watershed Management Area. The watershed monitoring stations must be selected in accordance with the following criteria:

(1) All mass loading stations (MLSs) previously established by the Copermittees in each Watershed Management Area must continue to be utilized as watershed monitoring stations;

(2) All temporary watershed assessment stations (TWASs), bioassessment stations, and stream assessment stations previously established by the Copermittees must be considered for continued use as watershed monitoring stations;

(3) Any dry weather ambient receiving water monitoring station identified pursuant to Provision D.1.a.(2)(a) may be considered for use as a watershed monitoring station;

(4) At least one reference watershed monitoring station must be selected for each Watershed Management Area; and

(5) At least one watershed monitoring station located between and hydrologically connected to each MLS and each reference station must be selected for each Watershed Management Area.

b. DRY WEATHER WATERSHED MONITORING [D.2.b]

The Copermittees must develop and conduct a program to monitor the condition of the receiving waters in each Watershed Management Area during dry weather conditions. Any available monitoring data not collected specifically to meet these requirements may be utilized by the Copermittees. For dry weather days, the Copermittees must develop and/or update its written dry weather watershed monitoring procedures to be consistent with the following criteria:

(1) Dry Weather Watershed Field Observations [D.2.b.(1)]

For each dry weather watershed monitoring event, the Copermittee must record field observations consistent with Table D-4 at each monitoring station. Dry weather watershed monitoring is required at least every two years for each monitoring station. At least two dry weather watershed monitoring events must be scheduled for each watershed monitoring station per monitoring year. One monitoring event is required during the dry season (May-September) and one monitoring event is required on a dry weather day during the wet season (October-April), after the first storm event.

(2) Dry Weather Watershed Field Monitoring [D.2.b.(2)]

If flow, or pooled or ponded water is present during the dry weather watershed monitoring event required pursuant to Provision D.2.b.(1), and conditions allow the collection of the data, the Copermittee must monitor and record the parameters in Table D-2.

(3) Dry Weather Watershed Analytical Monitoring [D.2.b.(3)]

Samples from each monitoring station must be collected for analysis at least every two years. At least two dry weather watershed analytical monitoring events must be scheduled for each watershed monitoring station per monitoring year. Samples must be collected once during the dry season (May-September) and once on a dry weather day during the wet season (October-April), after the first storm event. Analytical monitoring samples must be collected and analyzed as follows:

(a) Grab samples may be collected only for pH, temperature, specific conductivity, dissolved oxygen, hardness, oil and grease, and indicator bacteria;

(b) For all other constituents, time-weighted composites composed of 24 discrete hourly samples must be collected; and

(c) Analysis for the following constituents is required:

(i) Any other pollutants contributing to the highest water quality priorities for the Watershed Management Area as identified in the Water Quality Improvement Plan,

(ii) Any pollutants that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and

(iii) Constituents listed in Table D-5.

(4) Dry Weather Watershed Toxicity Monitoring [D.2.b.(4)]

Samples from each monitoring station must be collected for toxicity testing at least every two years. At least two dry weather watershed toxicity monitoring events must be scheduled for each watershed monitoring station per monitoring year. Samples must be collected once during the dry season (May-September) and once on a dry weather day during the wet season (October-April), after the first storm event. Toxicity testing must be conducted in accordance with the following table:

Table D-6. Toxicity Testing for Dry Weather Watershed Monitoring Station Flows

Dry Weather Watershed Monitoring Station	Freshwater Organisms	Estuarine and Marine Organisms
Mass Loading Stations[1]	3 acute[2] 3 chronic[2]	1 chronic[3]
Others Stations	3 acute[2] 3 chronic[2]	None

Notes:
1. Dry weather toxicity testing at a mass loading station may be omitted if the channel flows are diverted year-round during dry weather conditions to the sanitary sewer for treatment.
2. The presence of acute toxicity must be determined in accordance with USEPA protocol EPA-821-R-02-012. The presence of chronic toxicity must be determined in accordance with USEPA protocol EPA-821-R-02-013. Toxicity testing must include the use of *Pimephales promelas* (fathead minnow), *Hyalella azteca*, and *Psuedokirchneriella subcapitata* (formerly *Selenastrum capricornutum*, unicellular algae).
3. The presence of chronic marine toxicity must be determined in accordance with USEPA guidance EPA 600/R95/136, except for chronic mysid tests which must be conducted in accordance with USEPA protocol EPA-821-R-02-014. *Americamysis bahia* may be used as a marine test organism if *Holmesimysis costata* cannot be reasonably obtained. The use of, and justification for, *A. bahia* must be clearly reported in the Annual Report.

(5) Dry Weather Watershed Bioassessment Monitoring [D.2.b.(5)]

Bioassessment monitoring for each monitoring station is required at least every two years. Bioassessment monitoring is required to be conducted in May or June for each watershed monitoring station, and must be conducted as follows:

(a) The following bioassessment samples and measurements must be collected:

(i) Macroinvertebrate samples must be collected in accordance with the "Reachwide Benthos (Multihabitat) Procedure" in the most current Surface Water Ambient Monitoring Program (SWAMP) Bioassessment Standard Operating Procedures (SOP), and amendments, as applicable;[12]

[12] Ode, P.R.. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001. http://www.swrcb.ca.gov/water_issues/programs/swamp/tools.shtml#monitoring

(ii) The "Full" suite of physical habitat characterization measurements must be collected in accordance with the most current SWAMP Bioassessment SOP, and as summarized in the SWAMP Stream Habitat Characterization Form – Full Version;[13] and

(iii) Freshwater algae samples must be collected in accordance with the SWAMP Standard Operating Procedures for Collecting Algae Samples.[14] Analysis of samples must include algal taxonomic composition (diatoms and soft algae) and algal biomass.

(b) The bioassessment samples, measurements, and appropriate water chemistry data must be used to calculate the following:

(i) An Index of Biotic Integrity (IBI) for macroinvertebrates for each monitoring station where bioassessment monitoring was conducted, based on the most current calculation method;[15] and

(ii) An IBI for algae for each monitoring station where bioassessment monitoring was conducted, when a calculation method is developed.[16]

(6) Dry Weather Watershed Hydromodification Monitoring [D.2.b.(6)]

In addition to the hydromodification monitoring conducted as part of the Copermittees' Hydromodification Management Plans, for any year dry weather watershed monitoring is required, hydromodification monitoring is required to be conducted at least once during the dry weather season (May-September) for each monitoring station. The following hydromodification monitoring observations and measurements must be collected within an appropriate domain of analysis for the monitoring station:

(a) Channel conditions, including:

(i) Channel dimensions,

(ii) Hydrologic and geomorphic conditions, and

(iii) Presence and condition of vegetation and habitat;

[13] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf
[14] Fetscher et al. 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California.
[15] The most current calculation method at the time the Order was adopted is outlined in "A Quantitative Tool for Assessing the Integrity of Southern California Coastal Streams" (Ode, et al. 2005. Environmental Management. Vol. 35, No. 1, pp. 1-13). If an updated or new calculation method is developed, either both (i.e. current and updated/new) methods must be used, or historical IBIs must be recalculated with the updated or new calculation method.
[16] When a calculation method is developed, IBIs must be calculated for all available and appropriate historical data.

(b) Location of discharge points;

(c) Habitat integrity;

(d) Photo documentation of existing erosion and habitat impacts, with location (i.e. latitude and longitude coordinates) where photos were taken;

(e) Measurement or estimate of dimensions of any existing channel bed or bank eroded areas, including length, width, and depth of any incisions; and

(f) Known or suspected cause(s) of existing downstream erosion or habitat impact, including flow, soil, slope, and vegetation conditions, as well as upstream land uses and contributing new and existing development.

(7) <u>Dry Weather Watershed Sediment Quality Monitoring</u> [D.2.b.(7)]

Sediment monitoring must be performed by the Copermittees to assess compliance with sediment quality receiving water limits applicable to MS4 discharges to enclosed bays and estuaries. The monitoring may be performed either by individual or multiple Copermittees to assess compliance with receiving water limits, or through participation in a water body monitoring coalition. The Copermittees must identify sediment sampling stations that are spatially representative of the sediment within the water body segment or region of interest. Sediment quality monitoring must be conducted at least once every two years between June and September. Sediment quality monitoring must be conducted in conformance with the monitoring requirements set forth in the State Water Board Sediment Quality Control Plan.

c. WET WEATHER WATERSHED MONITORING [D.2.c]

The Copermittees in each Watershed Management Area must develop and conduct a program to monitor the condition in receiving waters and characterize storm water flows during wet weather days of the wet season. Any available monitoring data not collected specifically for this Order that meet the monitoring requirements may be utilized by the Copermittee. For wet weather days, the Copermittees must develop and/or update its written wet weather watershed monitoring procedures to be consistent with the following criteria:

(1) <u>Wet Weather Watershed Field Observations</u> [D.2.c.(1)]

Wet weather watershed monitoring events are required at least once every two years for each dry weather watershed monitoring station. Each monitoring station must be monitored during at least two wet weather events in any period (July 1 to June 30) that monitoring is required, including the first wet weather event of the wet season beginning October 1 and ending April 30, and at least one wet weather event after February 1. For each wet weather watershed monitoring event, the following narrative descriptions and observations must be recorded at each monitoring station:

(a) A narrative description of the station that includes the location, date and duration of the storm event(s) sampled, rainfall estimates of the storm event, and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(b) The flow rates and volumes measured or estimated. Data from nearby USGS gauging stations may be utilized, or flow rates may be measured or estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), section 3.2.1, or other method proposed by the Copermittees that is acceptable to the San Diego Water Board;

(c) Station condition (i.e. deposits or stains, vegetation condition, structural condition, observable biology); and

(d) Presence and assessment of trash in and around station.

(2) Wet Weather Watershed Field Monitoring [D.2.c.(2)]

For each wet weather watershed monitoring event, the parameters in Table D-2 must be monitored and recorded.

(3) Wet Weather Watershed Analytical Monitoring [D.2.c.(3)]

Samples from each wet weather watershed monitoring station must be collected for analysis at least two times during the term of this Order, at least once for the first wet weather event of the wet season, and at least once for a wet weather event after February 1. Wet weather samples must be collected and analyzed as follows:

(a) Grab samples may be collected only for pH, temperature, specific conductivity, dissolved oxygen, hardness, oil and grease, and indicator bacteria;

(b) For all other constituents, one of the following methods must be used to collect the samples:

(i) A 24-hour composite sample, using a minimum of 4 grab samples, collected during the first 24 hours of the storm water discharge, or for the entire storm water discharge if the storm event is less than 24 hours. Results of the analyses of individual grab samples may be averaged to obtain the daily average, or

(ii) A flow-weighted composite sample for either the entire discharge or for the first 3 hours of the discharge. The flow-weighted composite sample for the storm water discharge may be taken with a continuous sampler or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire discharge or for the first three hours of the discharge, with each aliquot being separated by a minimum period of fifteen minutes. Only one analysis of the composite of aliquots is required; and

(c) Analysis for the following constituents is required:

(i) Any other pollutants contributing to the highest water quality priorities for the Watershed Management Area as identified in the Water Quality Improvement Plan,

(ii) Any water pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and

(iii) Constituents listed in Table D-5.

(4) Wet Weather Watershed Toxicity Monitoring [D.2.c.(4)]

Samples from each wet weather watershed monitoring station must be collected for toxicity testing at least two times during the term of this Order, at least once for the first wet weather event of the wet season, and at least once for a wet weather event after February 1. Toxicity testing must be conducted in accordance with the following table:

Table D-7. Toxicity Testing for Wet Weather Watershed Monitoring Station Flows

Wet Weather Watershed Monitoring Station	Freshwater Organisms	Estuarine and Marine Organisms
Mass Loading Stations	3 acute[1]	1 acute[2] 2 chronic[2]
Others Stations	None	None

Notes:
1. The presence of acute toxicity must be determined in accordance with USEPA protocol EPA-821-R-02-012. Toxicity testing must include the use of *Pimephales promelas* (fathead minnow), *Hyalella azteca*, and *Psuedokirchneriella subcapitata* (formerly *Selenastrum capricornutum*, unicellular algae).
2. The presence of acute toxicity must be determined in accordance with USEPA protocol EPA-821-R-02-012. The presence of chronic marine toxicity must be determined in accordance with USEPA guidance EPA 600/R95/136, except for chronic mysid tests which must be conducted in accordance with USEPA protocol EPA-821-R-02-014. *Americamysis bahia* may be used as a marine test organism if *Holmesimysis costata* cannot be reasonably obtained. The use of, and justification for, *A. bahia* must be clearly reported in the Annual Report.

d. ALTERNATIVE WATERSHED MONITORING REQUIREMENTS [D.2.d]

In lieu of implementing the watershed monitoring requirements under Provisions D.2.a-c, the San Diego Water Board may direct the Copermittees to participate with other regulated entities, other interested parties, and the San Diego Water Board in the development, refinement, implementation, and coordination of regional monitoring and assessment programs to determine the status and trends of water quality conditions in 1) coastal waters, 2) enclosed bays, harbors, estuaries, and lagoons, and 3) streams.

e. WATERSHED MANAGEMENT AREA SPECIAL STUDIES [D.2.e]

(1) Within the term of this Order, the Copermittees must implement at least three special studies in each Watershed Management Area. The Copermittees are to determine which special studies will be developed and implemented in the Watershed Management Area. The monitoring plans for the Watershed Management Area special studies must be submitted with the Water Quality Improvement Plan required pursuant to Provision F.1. The Watershed Management Area special studies must, at a minimum, be in conformance with the following criteria:

(a) The special studies must be related to the highest water quality priorities identified by the Copermittees within the Watershed Management Area;

(b) The special studies must be implemented within the Watershed Management Area;

(c) The special studies must require some form of participation by all Copermittees within the Watershed Management Area; and

(d) One of the three required special studies may be implemented as part of a regional special study required pursuant to Provision D.3.

(2) The Copermittees must report the progress and findings of the Watershed Management Area Special Studies as part of the Annual Report for each Watershed Management Area, as required pursuant to Provision F.3.b.

3. Regional Special Studies

Within the term of this Order, the Copermittees must develop and implement at least two regional special studies for the San Diego Region. The Copermittees must determine which regional special studies will be developed and implemented. The regional special studies must be identified in the Water Quality Improvement Plans required pursuant to Provision F.1. The regional special studies must, at a minimum, be in conformance with the following criteria:

a. The special studies must be related to a water quality priority issue or potential water quality concern identified by the Copermittees for the entire San Diego Region;

b. The special studies must be implemented within the San Diego Region; and

c. The special studies must require some form of participation by all Copermittees enrolled under this Order.

4. Assessment Requirements

Each Copermittee must evaluate the data collected pursuant to Provisions D.1, D.2 and D.3 to identify causes of exceedances of action levels developed pursuant to Provision C, assess the quality of the discharges into and from the MS4s, and assess the quality of receiving waters. Each Copermittee must also assess the progress of the water quality improvement strategies required pursuant to Provision B.3 in restoring and protecting beneficial uses of receiving waters. Assessments must be performed as described in the following provisions:

a. MS4 DISCHARGES ASSESSMENTS [D.4.a]

(1) Jurisdictional Non-Storm Water Discharges Reduction Assessment [D.4.a.(1)]

(a) Non-Storm Water Action Levels [D.4.a.(1)(a)]

Each Copermittee must analyze the jurisdictional non-storm water monitoring data collected pursuant to Provision D.1.a and identify causes of NAL exceedances. The analysis must include, but not be limited to, all of the following considerations:

(i) For non-storm water discharges from the Copermittee's MS4 outfalls to receiving waters within the Copermittee's jurisdiction causing exceedances of NALs, the Copermittee must analyze its municipal, commercial, industrial, and residential inventories and activities, and other land use data, and identify sources or potential sources that may have caused or contributed to the NAL exceedances;

(ii) Each Copermittee must provide non-storm water monitoring and analytical data to demonstrate that NAL exceedances were caused by pollutants which are not anthropogenic in origin; and

(iii) Each Copermittee must provide non-storm water monitoring and analytical data to demonstrate that NAL exceedances were caused by pollutants which originate from sources or potential sources not within the authority of the Copermittee to control (e.g. Phase II dischargers or Caltrans).

(b) Calculate Jurisdictional Non-Storm Water Discharges and Pollutant Loads [D.4.a.(1)(b)]

Each Copermittee must analyze the jurisdictional non-storm water monitoring data collected pursuant to Provision D.1.a to calculate non-storm water discharges and pollutant loads from the MS4s and receiving waters in each jurisdiction. These calculations must be updated annually in the Annual Report required per Provision F.3.b. Each Copermittee must calculate:

(i) Monthly non-storm water discharges and pollutant loads from each known or potential source not within the authority of the Copermittee to control to an MS4 or receiving waters within the Copermittee's jurisdiction;

(ii) Monthly non-storm water discharges and pollutant loads from the Copermittee's MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each land use type within the drainage basin for each MS4 outfall;

(iii) Monthly non-storm water flows and pollutant loads in receiving waters at the downstream boundary of the Copermittee's jurisdiction; and

(iv) Monthly non-storm water flows and pollutant loads in receiving waters from areas or facilities subject to the Copermittee's legal authority that are discharged from the Copermittee's MS4 to downstream receiving waters.

(c) Review Progress and Evaluate Jurisdictional Actions [D.4.a.(1)(c)]

Each Copermittee must review the NAL exceedances, discharge and flow analyses, and pollutant load analyses required pursuant to Provisions D.4.a.(1)(a) and D.4.a.(1)(b) on an annual basis to:

(i) Identify reductions and progress in achieving reductions in non-storm water and illicit discharges and connections from different land uses and/or drainage areas to its MS4;

(ii) Assess the effectiveness of current actions being implemented by the Copermittee toward the reduction or elimination of non-storm water discharges from the MS4 within its jurisdiction; and

(iii) Identify modifications necessary to increase the effectiveness of the jurisdictional runoff management program toward reducing or eliminating non-storm water discharges to and from the MS4 within its jurisdiction.

(2) Watershed Management Area Non-Storm Water Assessment [D.4.a.(2)]

(a) Calculate Watershed Non-Storm Water Flows and Pollutant Loads [D.4.a.(2)(a)]

The Copermittees must analyze the jurisdictional non-storm water and watershed monitoring data collected per Provisions D.1.a and D.2.b to calculate non-storm water flows and pollutant loads in receiving waters for each Watershed Management Area. These calculations must be updated annually in the Annual Report required per Provision F.3.b. The Copermittees must develop or utilize appropriate methods or models to calculate:

(i) Monthly non-storm water runoff flows and pollutant loads at each watershed monitoring station from different land uses and drainage basins;

(ii) Monthly non-storm water flows and pollutant loads at each watershed monitoring station from all the Copermittees' MS4 outfalls to receiving waters, with an estimate of the percent contribution from different land uses; and

(iii) Monthly non-storm water flows and pollutant loads at each watershed monitoring station, with an estimate of the percent contribution from both areas or facilities subject to the Copermittees' legal authority and areas or facilities not subject to the Copermittees' legal authority.

(b) Evaluate Water Quality Improvement Strategies [D.4.a.(2)(b)]

The Copermittees in each Watershed Management Area must review the non-storm water flow and pollutant load analyses required pursuant to Provision D.4.a.(2)(a) on an annual basis to:

(i) Assess the effectiveness of the water quality improvement strategies being implemented within the Watershed Management Area toward reducing or eliminating non-storm water discharges and pollutant loads from entering and discharging from the MS4 to receiving waters; and

(ii) Identify modifications necessary to increase the effectiveness of the water quality improvement strategies toward reducing or eliminating non-storm water discharges and pollutant loads from entering and discharging from the MS4 to receiving waters.

(3) Jurisdictional Storm Water Pollutant Discharges Reduction Assessment [D.4.a.(3)]

(a) Storm Water Action Levels [D.4.a.(3)(a)]

(i) For storm water discharges from the Copermittee's storm water MS4 outfall monitoring stations with analytical monitoring data indicating exceedances of SALs, the Copermittee must analyze its municipal, commercial, industrial, and residential inventories and activities, and other land use data and identify sources or potential sources that may have caused or contributed to the SAL exceedances;

(ii) Each Copermittee must provide storm water monitoring and analytical data to demonstrate that SAL exceedances were caused by the constituents in storm water discharges from the MS4 which are not anthropogenic in origin; and

(iii) Each Copermittee must provide storm water monitoring and analytical data to demonstrate that SAL exceedances were caused by the constituents in storm water discharges from the MS4 which originate from sources or potential sources not within the authority of the Copermittee to control.

(b) Calculate Jurisdictional Storm Water Discharges and Pollutant Loads [D.4.a.(3)(b)]

Each Copermittee must analyze the jurisdictional storm water monitoring data collected pursuant to Provision D.1.b to calculate storm water discharges and pollutant loads from the MS4s in each jurisdiction. These calculations must be updated annually in the Annual Report required per Provision F.3.b. Each Copermittee must calculate or estimate:

(i) The monthly mean rainfall estimates (or summary of weather bureau data) and the monthly average number of storm events;

(ii) The average storm water runoff coefficient for each land use type within the Copermittee's jurisdiction;

(iii) The volume of storm water discharged from each of the Copermittee's MS4 outfalls to receiving waters within its jurisdiction for each storm event;

(iv) The pollutant loads from each of the Copermittee's MS4 outfalls to receiving waters within its jurisdiction for each storm event; and

(v) The percent contribution of pollutant loads from each land use type within the drainage basin to storm water discharges for each MS4 outfall within its jurisdiction, for each storm event.

(c) Review Progress and Evaluate Jurisdictional Actions [D.4.a.(3)(c)]

Each Copermittee must review the SAL exceedances, discharge analyses, and pollutant load analyses required pursuant to Provisions D.4.a.(3)(a) and D.4.a.(3)(b) on an annual basis to:

(i) Identify reductions and progress in achieving reductions in pollutant concentrations and/or pollutant loads from different land uses and/or drainage areas discharging from its MS4;

(ii) Assess the effectiveness of current actions being implemented by the Copermittee toward the reduction of pollutants in storm water discharges from the MS4 within its jurisdiction to the MEP; and

(iii) Identify modifications necessary to increase the effectiveness of the jurisdictional runoff management program toward reducing pollutants in storm water discharges from the MS4 within its jurisdiction to the MEP.

(4) Watershed Management Area Storm Water Assessment [D.4.a.(4)]

(a) Calculate Watershed Storm Water Flows and Pollutant Loads [D.4.a.(4)(a)]

The Copermittees must analyze the jurisdictional storm water and watershed monitoring data collected per Provisions D.1.b and D.2.c to calculate storm water flows and pollutant loads in receiving waters for each Watershed Management Area. These calculations must be updated annually in the Annual Report required per Provision F.3.b. The Copermittees must develop or utilize appropriate methods or models to calculate:

(i) Storm water runoff flows and pollutant loads at each watershed monitoring station from different land uses and drainage basins;

(ii) Storm water flows and pollutant loads at each watershed monitoring station from all the Copermittees' MS4 outfalls, with an estimate of the percent contribution from different land uses; and

(iii) Storm water pollutant loads in receiving waters at each watershed monitoring station, with an estimate of the percent contribution from both areas or facilities subject to the Copermittees' legal authority and areas or facilities not within the authority of the Copermittees to control.

(b) Evaluate Water Quality Improvement Strategies [D.4.a.(4)(b)]

The Copermittees in each Watershed Management Area must review the storm water flow and pollutant load analyses required pursuant to Provision D.4.a.(4)(a) on an annual basis to:

(i) Assess the effectiveness of the water quality improvement strategies being implemented in each Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to the MEP; and

(ii) Identify modifications necessary to increase the effectiveness of the water quality improvement strategies toward reducing pollutants in storm water discharges from the MS4s to the MEP.

b. RECEIVING WATERS ASSESSMENTS [D.4.b]

The Copermittees must annually perform assessments of receiving waters based on data collected pursuant to Provision D.2 and any appropriate receiving water monitoring data available from other sources. The receiving waters assessments must analyze the status and trends of water quality conditions in 1) coastal waters, 2) enclosed bays, harbors, estuaries, and lagoons, and 3) streams under dry weather and wet weather conditions. For each of the three types of receiving waters, the Copermittees in each Watershed Management Area must:

(1) Identify the most critical beneficial uses that must be protected or restored to ensure overall health of the receiving water;

(2) Determine whether or not those critical beneficial uses are being protected or must be restored; and

(3) Identify short-term and/or long-term improvements or degradation of those critical beneficial uses.

c. WATER QUALITY IMPROVEMENT ASSESSMENTS [D.4.c]

The Copermittees in each Watershed Management Area must review the numeric ~~targets~~goals in the Water Quality Improvement Plan, the data collected pursuant to Provisions D.1 and D.2, and the findings from the assessments required pursuant to Provisions D.4.a and D.4.b to assess the following:

(1) Beneficial uses of the receiving waters that are protected or must be restored;

(2) Appropriateness of final dry weather and wet weather numeric ~~targets~~goals for the highest water quality priorities that will restore the impacted beneficial uses in the receiving waters;

(3) Non-storm water and storm water pollutant load reductions, or other improvements to receiving water or water quality conditions, that are necessary to attain the final numeric ~~targets~~goals for restoring impacted beneficial uses in the receiving waters;

(4) Non-storm water and storm water pollutant load reductions necessary for the Copermittees to demonstrate that non-storm water and storm water discharges from their MS4s are not causing or contributing to exceedances of water quality objectives or impacts to beneficial uses in receiving waters;

(5) Non-storm water and storm water pollutant loads from their MS4s and/or receiving water flows that may be attributed to sources or potential sources not within the authority of the Copermittee to control and other non-anthropogenic sources identified by the Copermittees;

(6) Progress of the water quality improvement strategies toward attaining non-storm water and storm water pollutant load reductions or improvements to water quality conditions; and

(7) Progress toward achieving the interim and final numeric ~~targets~~goals for restoring impacted beneficial uses in the receiving waters.

5. Monitoring Provisions

Each Copermittee must comply with all the monitoring, reporting, and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

E. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAMS

The purpose of this provision is for each Copermittee to implement a program to control the ~~contribution~~ discharge of pollutants into ~~and the discharges~~and from their respective MS4s to receiving waters within its jurisdiction and to focus and prioritize those implementation actions based on the highest water quality priorities identified within the associated Water Quality Improvement Plan.

The goals of this program are: 1) to effectively prohibit non-stormwater discharges into the MS4s, 2) to reduce pollutants in stormwater discharges from the MS4s to the MEP, and 3) to address impacts of ~~provision is to reduce the discharge of pollutants from~~in ~~storm water to the MEP and effectively prohibit non-storm water discharges into~~ the MS4 discharges ~~provide the reasonable protection, preservation, enhancement, and restoration of water quality and designated beneficial uses of waters of the state~~so that such discharges do not impair water quality and designated beneficial uses of waters of the state**.** These goals will be accomplished through compliance with the jurisdictional runoff management program requirements of this Provision, and as modified or supplemented per Provision B (Water Quality Improvement Plans).

Each Copermittee must implement ~~all~~ the requirements of Provision E no later than 18~~2~~ months after the adoption of this Order, or in accordance with Provision F.5.a. Each Copermittee must update its jurisdictional runoff management program document, in accordance with Provision F.2.a, to include ~~all~~ the requirements of Provision E. The jurisdictional runoff management programs implemented by each Copermittee must be consistent with the Water Quality Improvement Plan for the applicable Watershed Management Area required by Provision B. As such, the requirements of the jurisdictional runoff management programs as outlined below may be modified and prioritized as appropriate for consistency with the highest water quality priorities identified in the Water Quality Improvement Plan for the applicable Watershed Management Area if appropriate justification is provided. Until the Copermittee has updated its jurisdictional runoff management program document with the requirements of Provision E, the Copermittee must continue implementing its current jurisdictional runoff management program.

Field Code Changed

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1. Modification of Jurisdictional Runoff Management Program Requirements

The requirements of this section apply to each Copermittee on a jurisdiction-wide basis. Copermittees that are in multiple WMAs may implement any activity or requirement at a level different than a specified minimum within any individual WMA so long as the requirement (as specified below) is met for the jurisdiction as a whole and compliance with all other applicable permit directives is maintained jurisdictionally and within each WMA.

Upon approval of the Executive Officer, specific minimum requirements may be modified or waived as follows:

a. Modifications within a WMA
Specific requirements may be reduced or waived for a WMA or a jurisdictional portion of a WMA only where the following conditions have been met:

i. The proposed change must be approved as a part of the approval of a Water Quality Improvement Plan or any update to it;

ii. Activities or requirements that can be reasonably demonstrated to provide an equivalent or higher level of water quality protection must be substituted for those being reduced or waived;

iii. Approved modifications will apply only to the portion of the WMA applicable to the Copermittee or Copermittees for which an approval has been granted; and

iv. Where a requirement has been reduced or waived within any WMA or portion of it, the requirement shall continue to apply to the remainder of the WMA, and to all remaining areas within the jurisdiction of the respective Copermittee(s) for which the modification has been granted.

b. Modifications within a Jurisdiction (Jurisdiction-Wide)
Specific requirements may be reduced or waived on a jurisdictional basis only where the following conditions have been met:

i. The Copermittee's proposed JRMP modifications must be submitted to the San Diego Water Board within 3 months of approval of the Water Quality Improvement Plan. The San Diego Water Board will issue a public notice and solicit public comments on the JRMP modification for a minimum of 30 days. Based on the comments received, the San Diego Water Board will determine whether to hold a public hearing or to limit public input to submittal of written comments. If no hearing is held the San Diego Water Board will notify the Copermittee that the JRMP modification has been approved following its review and determination that it meets the requirements of this Order;

ii. On RWQCB approval, the Copermittee's JRMP must be amended per Section II.F.2.a. to incorporate the modification(s);

iii. Activities or requirements that can be reasonably demonstrated to provide an equivalent or higher level of water quality protection must be substituted for those being reduced or waived; and

iv. Applicable portions of any WQIP to which an approved modification applies must be modified to reference or incorporate it, and the updated WQIP made available on the Regional Clearinghouse pursuant to Provision F.4.

1. Legal Authority Establishment and Enforcement

a. Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into ~~and from~~ its MS4 through statute, ordinance, permit, contract, order, or similar means. This legal authority must, at a minimum, authorize the Copermittee to:

(1) Effectively p~~P~~rohibit and eliminate ~~all~~ illicit discharges and illicit connections into its MS4;

(2) Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity into its MS4 and control the quality of runoff from industrial and construction sites[17]., ~~including industrial and construction sites which that do not have coverage under the statewide General Permit for Discharges of Storm Water Associated with Industrial Activities (Industrial General Permit) or General Permit for Discharges of Storm Water Associated with Construction Activities (Construction General Permit), as well as to those sites which do not;~~

(3) Control the discharge of spills, dumping, or disposal of materials other than storm water into its MS4;

(4) The permittees are encouraged to enter into interagency agreements with owners of other MS4 systems, such as Caltrans, school and college districts, universities, Department of Defense, Native American Tribes, etc., to control the contribution of pollutants from one portion of the MS4s to another portion. ;

~~(3) Control through interagency agreements among Copermittees the contribution of pollutants from one portion MS4 to another portion of the MS4;~~

~~(4) Control through interagency agreements with other owners of the MS4 such as Caltrans, the U.S. federal government, or sovereign Native American Tribes, where possible, the contribution of pollutants from one portion of the MS4 to another portion of the MS4;~~

(5) Require compliance with conditions in its statutes, ordinances, permits, contracts, orders, or similar means to hold dischargers to its MS4 accountable for their contributions of pollutants and flows;

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[17] The Permittees will only be responsible for administering and enforcing the codes and ordinances applicable to their jurisdictions (i.e.; a municipality is not responsible for administering and/or enforcing a permit issued by the State of California).

(6) Require the use of BMPs to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;

~~(6) Require documentation on the effectiveness of BMPs implemented to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;~~

~~(7)~~

~~(8)~~(7) Utilize enforcement mechanisms to require compliance with its statutes, ordinances, permits, contracts, orders, or similar means; and

~~(9)~~(8) Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with its statutes, ordinances, permits, contracts, orders, or similar means and with the requirements of this Order, including the effective prohibition of illicit discharges and connections to its MS4. The Copermittee's ordinance must include adequate legal authority, to the extent permitted by California and Federal Law and subject to the limitations on municipal action under the constitutions of California and the United States, ~~the Copermittee must also have authority~~ to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities, including construction sites, discharging into its MS4.

b. With the first Annual Report required by Provision F.3.b, each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in this Order.

2. Illicit Discharge Detection and Elimination

Each Copermittee must implement a program to actively detect and eliminate illicit discharges and improper disposal into the MS4, or otherwise require the discharger to apply for and obtain a separate NPDES permit. The illicit discharge detection and elimination program must include, at a minimum, the following requirements:

a. Non-Storm Water Discharges

Each Copermittee must address ~~all~~ non-storm water discharges as illicit discharges, where the likelihood exists that they are a source of pollutants to the waters of the state, unless ~~a non-storm water~~the discharge is either identified as a discharge authorized by a separate NPDES permit, or identified as a category of non-storm water discharges or flows that must be addressed pursuant to the following requirements:

~~(1) Discharges of non-storm water to the MS4 from the following categories must~~

~~be addressed as illicit discharges unless the discharge has coverage under NPDES Permit No. CAG919001 (Order No. R9-2007-0034, or subsequent order) for discharges to San Diego Bay, or NPDES Permit No. CAG919002 (Order No. R9-2008-0002, or subsequent order) for discharges to surface waters other than San Diego Bay:~~

~~(a) Uncontaminated pumped ground water;~~

~~(b) Discharges from foundation drains;~~

~~(c) Water from crawl space pumps; and~~

~~(d) Water from footing drains.~~

~~(2)~~(1) Discharges of non-storm water from water line flushing and water main breaks to the MS4 must be addressed as illicit discharges unless the discharge has coverage under a valid NPDES Permit ~~No. CAG 679001 (Order No. R9-2010-0003, or subsequent order)~~. This includes water line flushing and water main break discharges from water purveyors under the Copermittee's jurisdiction that has been issued a water supply permit by the California Department of Public Health or federal military installations. Discharges from recycled or reclaimed water lines to the MS4 must be addressed as illicit discharges, unless the discharges have coverage under a separate NPDES permit.

~~(3)~~(2) Discharges of non-storm water to the MS4 from the following categories must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a source of pollutants to receiving waters within the Copermittee's jurisdiction:

(a) Diverted stream flows;

(b) Rising ground waters;

(c) Uncontaminated ground water infiltration to MS4s;

(d) Uncontaminated pumped ground water;

~~(c)~~(e) Discharges from foundation drains;

(f) Springs;

(g) Water from crawl space pumps;

~~(d)~~(h) Water from footing drains;

~~(e)~~(i) Flows from riparian habitats and wetlands; and

~~(f)~~(j) Discharges from potable water sources.

~~(4)~~(3) Discharges of non-storm water into the MS4 from the following categories must be controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means where there is evidence that those discharges are a source of pollutants to waters of the state. Discharges of non-storm water into the MS4 from the following categories not controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means must be addressed by the Copermittee as illicit discharges.

(a) Air conditioning condensation

The discharge of air conditioning condensation ~~must~~ should be directed to landscaped areas or other pervious surfaces where feasible;

(b) Individual residential vehicle washing – Residents should be encouraged, through public outreach and education, to implement the following when washing their vehicles:

(i) Direct t~~T~~he discharge of wash water ~~must be directed~~ to landscaped areas or other pervious surfaces where feasible, and

(ii) Minimize the use of water for vehicle washing, use as little washing detergent and other vehicle wash products as possible, wash vehicles at commercial wash facilities, and implement other practices or behaviors that will prevent the discharge of pollutants associated with individual residential vehicle washing from entering the MS4; and

(c) Dechlorinated swimming pool discharges

(i) Eliminate residual chlorine, algaecide, filter backwash, or other pollutants from swimming pools prior to discharging to the MS4, and

(ii) The discharge of saline swimming pool water ~~to the MS4~~ must be directed to the sanitary sewer (with approval from the sanitary sewer agency) landscaped areas, ~~or~~ other pervious surfaces that can accommodate the volume of water, or to the MS4 if the MS4 discharges to a saltwater receiving water.

~~(5)~~(4) Firefighting discharges to the MS4 must be addressed by the Copermittees ~~as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a significant source of pollutants to receiving waters. Firefighting discharges to the MS4 not identified as a~~

~~significant source of pollutants to receiving waters, must be addressed, at a minimum,~~ as follows:

(a) Non-emergency firefighting discharges

(i) Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) to the MS4 must be addressed as illicit discharges.

(ii) Non-emergency firefighting discharges (i.e., discharges from controlled or practice blazes, firefighting training, and maintenance activities not associated with building fire suppression systems) must be addressed by a program, to be developed and implemented by the Copermittee in conjunction with the local Fire Authority/District, to reduce or eliminate pollutants in such discharges from entering the MS4.

~~(b) Emergency firefighting discharges~~

~~(b)~~

(b) ~~Each Copermittee must develop and encourage implementation of BMPs to reduce or eliminate pollutants in emergency firefighting discharges to the MS4s and receiving waters within its jurisdiction. During emergency situations, priority of efforts should be directed toward life, property, and the environment (in descending order). BMPs should not interfere with immediate emergency response operations or impact public health and safety.~~ Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Runoff Management Plan (JRMP), each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

~~(6)~~(5) If the Copermittee or San Diego Water Board identifies any category of non-storm water discharges listed under Provisions E.2.a.(1)-(4) as a source of pollutants to receiving waters, the category must be prohibited through ordinance, order, or similar means and addressed as an illicit discharge.

b. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must include the following measures within its program to prevent and detect illicit discharges to the MS4:

(1) Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas. The accuracy of the MS4 map must be confirmed during non-storm water MS4 monitoring events. The MS4 map

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must be included as part of the jurisdictional runoff management program document. Any geographic information system (GIS) layers or files used by the Copermittee to maintain the MS4 map must be made available to the San Diego Water Board upon request. The MS4 map must identify the following:

(a) All segments of the MS4 owned, operated, and maintained by the Copermittee,

(b) All known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4,

(c) All known locations of connections with other MS4s not owned or operated by the Copermittee (e.g. Caltrans MS4s),

(d) All known locations of MS4 outfalls that discharge runoff collected from areas within the Copermittee's jurisdiction,

(e) All segments of receiving waters within the Copermittee's jurisdiction that receive and convey runoff discharged from the Copermittee's MS4 outfalls ~~(i.e., receiving water segments that are both a receiving water and part of the MS4)~~, and

(f) Locations of the non-storm water MS4 monitoring stations, identified pursuant to Provision D.1.a.(1)(a), within its jurisdiction.~~;~~

Field Code Changed

(2) ~~Each Copermittee must use~~ Copermittee personnel and contractors should~~to~~ assist in identifying and reporting illicit discharges and connections~~,~~ if observed during the course of their daily employment activities;

(3) Each Copermittee must promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges into ~~or from~~ the MS4. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by the Copermittees. All public hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week;

(4) Each Copermittee must implement practices and procedures (including a notification mechanism) to prevent, respond to, contain, and clean up any spills that may discharge into the MS4 within their jurisdiction from any source. The Copermittee must coordinate with spill response teams to prevent to the extent possible entry of spills into the MS4, and prevent contamination of surface water, ground water, and soil. The Copermittee must coordinate spill prevention, containment, and response activities throughout all appropriate Copermittee departments, programs, and agencies; and

~~(4)~~(5) Each Copermittee must implement practices and procedures to prevent and limit infiltration of seepage from sanitary sewers (including private laterals and failing septic systems) to the MS4.

c. **VISUAL OBSERVATIONS, FIELD SCREENING AND/OR MONITORING**

Each Copermittee must conduct visual observations, field screening and/or monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect non-storm water and illicit discharges and connections to the MS4 in accordance with the jurisdictional non-storm water MS4 monitoring program requirements in Provision D.1.a.(1).

d. **INVESTIGATE AND ELIMINATE ILLICIT DISCHARGES AND CONNECTIONS**

Each Copermittee must include the following measures within its program to investigate and eliminate illicit discharges to the MS4:

(1) Each Copermittee must prioritize and determine when follow-up investigations will be performed in response to visual observations and/or water quality monitoring data collected during an investigation of a detected non-storm water or illicit discharge into ~~or from~~ the MS4. The criteria for follow-up investigations must include the following:

(a) Pollutants identified as causing or contributing to the highest water quality priorities identified in the Water Quality Improvement Plan;

(b) Pollutants identified as causing or contributing, or are threatening to cause or contribute to impairments in water bodies on the 303(d) List and/or in environmentally sensitive areas (ESAs), located within its jurisdiction;

(c) Pollutants identified from sources or land uses known to exist within the area, drainage basin, or watershed that discharges to the portion of the MS4 within its jurisdiction included in the investigation; and

(d) Pollutants identified as causing or contributing to and exceedance of an NAL described in Provision C.1; and

(e) Pollutants identified as an immediate and significant threat to human health or the environment.

(2) Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on reports, ~~or~~ notifications, visual observations, field screening, monitoring, or other appropriate information, indicate a reasonable potential of ~~receiving, containing, or~~ discharging pollutants to receiving waters within the Copermittees jurisdiction due to illicit discharges or~~,~~ illicit connections~~, or other sources of non-storm water~~. The

procedures must include the following:

(a) The Copermittee may develop criteria to assess the validity of, and prioritize the response to, each report or notification received. Each Copermittee must respond to each report or notification (e.g., public hotline reports, staff or contractor reports and notifications, etc.) of an incident in a timely manner. ~~The Copermittee may develop criteria to assess the validity of, and prioritize the response to, each report or notification received;~~

~~(b) Each Copermittee must immediately investigate and seek to identify the source(s) of discharges of non-storm water where flows are observed in and from the MS4 during the field screening and monitoring required pursuant to Provision D.1.a.(1). The investigation must include field investigations to identify sources or potential sources for the discharge, unless the source or potential source has already been identified during previous investigations;~~

~~(c) Each Copermittee must investigate and seek to identify the source(s) of non-storm water discharges from the MS4 where there is evidence of non-storm water having been discharged into or from the MS4 (e.g., pooled water). The investigation may include field investigations, reviewing Copermittee inventories, and other land use data to identify potential sources of the discharge; and~~

~~(d)~~(b) Procedures should address field investigations to identify sources or potential sources for the discharge, unless the source or potential source has already been identified during previous investigations.

(i) Obvious illicit discharges must be immediately investigated to identify the source(s) of discharges of non-storm water where flows are observed in and from the MS4 during the field screening and monitoring required pursuant to Provision D.1.a.(1);~~.~~

(ii) The investigation must include field investigations to identify sources or potential sources for the discharge, unless the source or potential source has already been identified during previous investigations;

(iii) The investigation may include field investigations, reviewing Copermittee inventories, and other land use data to identify potential sources of the discharge; and

~~(i)~~(iv) Procedures should address tracking of illicit discharges and connections.

(3) Each Copermittee must maintain records and a database of the

investigations, including the following information:

(i) Location of incident, including hydrologic subarea, portion of MS4 receiving the non-storm water or illicit discharge, and point of discharge or potential discharge from MS4 to receiving water,

(ii) Source of information initiating the investigation (e.g., public hotline reports, staff or contractor reports and notifications, monitoring data, etc.),

(iii) Date the information used to initiate the investigation was received,

(iv) Date the investigation was initiated,

(v) Dates of follow-up investigations,

(vi) Identified or suspected source of the illicit discharge or connection, if determined,

(vii) Known or suspected related incidents, if any,

(viii) Result of the investigation, and

(ix) If a source cannot be identified and the investigation is not continued, a rationale for why a discharge does not pose a threat to water quality and/or does not require additional investigation.

(4) Each Copermittee must initiate the implementation of procedures, in a timely manner, to detect, control, and/or eliminate all detected and identified illicit discharges and connections within its jurisdiction. The procedures must include the following:

(a) Procedures should address ~~Each Copermittee must enforce its~~ legal authority, as required under Provision E.1, to eliminate illicit discharges and connections to the~~its~~ MS4. If the Copermittee identifies the source as a controllable ~~source of non-storm water or~~ illicit discharge or connection, the Copermittee must implement its Enforcement Response Plan pursuant to Provision E.6 and enforce its legal authority to effectively prohibit and eliminate illicit discharges and connections to its MS4~~;~~. Responses to discharges may include:

(i) If the Copermittee identifies the source of the discharge as a category of non-storm water discharges in Provision E.2.a, and the discharge ~~to or from the MS4~~ is in exceedance of NALs developed ~~under Provision C.1~~in the Water Quality Implementation Plan, then the Copermittees must determine if this is an isolated incident or set of circumstances, or if the category of discharge must be addressed through the prohibition of that category of discharge as an illicit discharge pursuant to Provision E.2.a.(5);

(ii) If the Copermittee suspects the source of the non-storm water discharge as natural in origin (i.e. non-anthropogenically influenced) and in conveyance into the MS4, then the Copermittee must ~~collect the data and evidence necessary to demonstrate to the San Diego Water Board that it is natural in origin; and~~document the rationale for why the discharge does not need further investigation. This documentation shall be included in the Annual Report.

(iii) If the Copermittee is unable to identify ~~and document~~ the source of a recurring, documented ~~non-storm water~~illicit discharge into ~~or from~~ the MS4, then the Copermittee must ~~address the discharge as an illicit discharge and~~ update its jurisdictional runoff management program to address the common and suspected sources of the non-storm water discharge within its jurisdiction in accordance with the Copermittee's priorities.

(5) Each Copermittee must submit a summary of the ~~non-storm water discharges and~~ illicit discharges and connections investigated and eliminated within its jurisdiction with each Annual Report required under Provision F.3.b of this Order.

3. Development Planning

Each Copermittee within their respective jurisdictions, must ~~use their land use/planning authorities to~~ implement a development planning program that includes, at a minimum, the following requirements.

a. ~~PERMANENT~~ BMP REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

Each Copermittee, as practical and feasible, -must prescribe ~~the following~~ BMP requirements during the planning process (i.e. prior to project approval and issuance of grading or building permits) for all development projects ~~(regardless of project type or size)~~, where local permits are issued, including unpaved roads ~~and flood management projects~~, except emergency projects implemented for the protection of persons and property.

(1) General Requirements

(a) All BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters, and as close to the source as possible;

(b) Multiple development projects may use shared ~~permanent~~ treatment control or structural LID BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any development project from which the BMP will receive runoff; and

(c) Treatment control and structural LID~~Permanent~~ BMPs must not be constructed within a waters of the U.S. or waters of the state.

(2) Source Control BMP Requirements

The following source control BMPs must be implemented at all development projects where applicable and feasible:

(a) Prevention of illicit discharges into the MS4;

(b) Storm drain system stenciling or signage;

(c) Properly designed outdoor material storage areas;

(d) Properly designed outdoor work areas;

(e) Properly designed trash storage areas; and

(f) Any additional BMPs necessary to minimize pollutant generation at each project.

(3) Low Impact Development (LID) BMP Requirements

The following LID BMPs must be implemented at all development projects where applicable and feasible[18]:

(a) Maintenance or restoration of natural storage reservoirs and drainage corridors (including topographic depressions, areas of permeable soils, natural swales, and ephemeral and intermittent streams);[19]

(b) Buffer zones for natural water bodies (where buffer zones are technically infeasible, require project applicant to include other buffers such as trees, access restrictions, etc.);

(c) Conservation of natural areas within the project footprint including existing trees, other vegetation, and soils;

(d) Construction of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided public safety is not compromised;

(e) Minimization of the impervious footprint of the project;

[18] Implementation of LID BMPs shall be consistent with technical guidance developed by the Copermittees.

[19] Development projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. Projects proposing to dredge or fill waters of the State must obtain Waste Discharge Requirements.

(f) Minimization of soil compaction to landscaped areas;

(g) Disconnection of impervious surfaces through distributed pervious areas;

(h) Landscaped or other pervious areas designed and constructed to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4;

(i) Small collection strategies located at, or as close as possible to, the source (i.e. the point where storm water initially meets the ground) to minimize the transport of runoff and pollutants to receiving waters;

(j) Use of permeable materials for projects with low traffic areas and appropriate soil conditions;

(k) Landscaping with native or drought tolerant species; and

(l) Harvesting and using precipitation.

(4) Long-Term Treatment Control/Structural LID~~Permanent~~ BMP Maintenance

Each Copermittee must require the project applicant to submit proof of the mechanism under which ongoing long-term maintenance of all treatment control and structural LID~~permanent~~ BMPs will be conducted.

(5) Infiltration and Groundwater Protection

(a) Infiltration and treatment control BMPs designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins) must not cause or contribute to an exceedance of an applicable groundwater quality objective. At a minimum, such infiltration and treatment control BMPs must be in conformance with the design criteria listed below, unless the development project applicant demonstrates to the Copermittee that one or more of the specific design criteria listed below are not necessary to protect groundwater quality. The design criteria listed below do not apply to small infiltration systems dispersed throughout a development project.

(i) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(ii) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(iii) Infiltration treatment control BMPs must be adequately maintained to remove pollutants in storm water to the MEP;

(iv) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(v) The soil through which infiltration is to occur must have physical and chemical characteristics (e.g., appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(vi) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities as designated by each Copermittee, unless first treated or filtered to remove pollutants prior to infiltration; and

(vii) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(b) The Copermittees may collectively or individually develop alternative mandatory design criteria to that listed above for infiltration and treatment control BMPs which are designed to primarily function as centralized infiltration devices. Before implementing the alternative design criteria in the development planning process the Copermitee(s) must:

(i) Notify the San Diego Water Board of the intent to implement the alternative design criteria submitted; and

(ii) Comply with any conditions set by the San Diego Water Board.

b. PRIORITY DEVELOPMENT PROJECTS

(1) Definition of Priority Development Project

Priority Development Projects include the following:

(a) ~~All new development projects that fall under the Priority Development Project categories listed under Provision E.3.b.(2). Where a new development project feature, such as a parking lot, falls into a Priority Development Project category, the entire project footprint is subject to Priority Development Project requirements; and~~

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site, ~~or~~ and the redevelopment project is a Priority Development Project category listed under Provision E.3.b.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to Priority Development Project requirements, the performance and sizing requirements discussed in Provisions E.3.c.(2) and E.3.c.(3) apply only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development and was not subject to previous Priority Project Development requirements, the performance and sizing requirements apply to the entire development.

(c) Projects where redevelopment results in an increase of more than fifty percent of impervious surfaces of a previously existing development, and the existing development was subject to previous Priority Project Development requirements, only the altered portion is subject to the new Priority Development Project requirements.

(2) Priority Development Project Categories

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This category includes commercial, industrial, residential, mixed-use, and public development projects on public or private land which fall under the planning and building authority of the Copermittee.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is 5,000 square feet or more of impervious surface.

(d) Hillside development projects. This category includes any development which creates 5,000 square feet or more of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally sensitive areas (ESAs). This category includes any development located within, directly adjacent to, or discharging directly to an ESA, which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent to” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that collects runoff from the subject development or redevelopment site and terminates at or in receiving waters within the ESA.

(f) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce that has 5,000 square feet or more of impervious surface.

(g) Streets, roads, highways, and freeways~~, and residential driveways~~. This category is defined as any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other internal combustion vehicles.

(h) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more of impervious surface or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(i) Large development projects. This category includes any post-construction pollutant-generating new development projects that result in the disturbance of one acre or more of land.

(3) Priority Development Project Exemptions

Each Copermittee has the discretion to exempt the following projects from being defined as Priority Development Projects:

(a) Sidewalks constructed as part of new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(b) Bicycle lanes that are constructed as part of new streets or roads but are not hydraulically connected to the new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(c) Impervious trails constructed and designed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas;

(d) Sidewalks, bicycle lanes, ~~or~~ trails, driveways, or parking lots constructed with permeable surfaces.

(e) Single-family residential projects that are not part of a larger development or proposed subdivision.

(f) Any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles that follows the USEPA guidance regarding Management Wet Weather with Green Infrastructure: Green Streets[20] to the MEP.

~~(d)~~(g) Emergency public safety projects in any of the Priority Development Categories may be excluded if the delay caused due to the requirement for a SSMP compromises public safety, public health and/or environmental protection.

[20] http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm

c. PRIORITY DEVELOPMENT PROJECT ~~PERMANENT~~ BMP PERFORMANCE AND SIZING REQUIREMENTS

In addition to the BMP requirements listed for all development projects under Provision E.3.a, Priority Development Projects must also implement ~~permanent~~ BMPs that conform to performance and sizing requirements.

(1) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs listed under Provision E.3.a.(2).

(2) Retention and Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement BMPs to retain and treat pollutants onsite in the following order:

(a) Each Priority Development Project must be required to implement LID BMPs as described in Provision E.3.a.(3) or offsite regional groundwater replenishment if the following conditions apply:~~;~~

(i) The volume of stormwater runoff used to replenish groundwater must be equal to or greater than the design capture volume;

(ii) Pollutant reduction is provided through treatment of the design capture volume at the project site.

~~(a)~~(b) Each Priority Development Project must be required to implement LID BMPs that are sized and designed to retain the volume equivalent to runoff produced from a 24-hour 85th percentile storm event[21] or to retain the difference in the volume between the runoff volume produced in the post-project condition as compared to the pre-project condition resulting from a 24-hour 85th percentile storm event ("design capture volume");

[21] This volume is not a single volume to be applied to all areas covered by this Order. The size of the 85th percentile storm event is different for various parts of the San Diego Region. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of runoff for the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its BMP Design Manuals.

(c) If onsite retention of the design capture volume using LID BMPs is technically infeasible per Provision E.3.c.(4) flow-thru LID ~~and/or conventional treatment control~~ BMPs must be implemented to treat the portion of the design capture volume that is not retained onsite. Flow-thru LID treatment control BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

~~(b)~~(d) If retention and/or equivalent pollutant removal of the design capture volume to meet E.3.c.(2)(a) or E.3.c.(2)(b) are infeasible onsite ~~Additionally,~~ project applicants must perform mitigation for the portion of the pollutant load in the design capture volume that is not retained onsite, as described in Provision E.3.c.(4)(c).

~~(c)~~(e) All onsite treatment control BMPs must:

(i) Be correctly sized and designed so as to remove pollutants from storm water to the MEP;

(ii) Be sized to comply with the following numeric sizing criteria:

[a] Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained onsite; or

[b] Flow-based treatment control BMPs must be designed to mitigate (filter or treat) either: 1) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or 2) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(iii) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(3) Hydromodification Management ~~BMP Requirements~~

Each Copermittee must require each Priority Development Projects greater than one acre to implement hydromodification management BMPs as described in the Copermittees' current HMP, as applicable. ~~so that:~~

(a) Post-project runoff flow rates and durations do not exceed pre-project

~~development (naturally occurring)~~ runoff flow rates and durations by more than 10 percent (for the range of flows that result in increased potential for erosion or degraded channel conditions downstream of Priority Development Projects).

~~(i) In evaluating the range of flows that results in increased potential for erosion of natural (non-hardened) channels, the lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks.~~

~~(ii) For artificially hardened channels, analysis to identify the lower boundary must use characteristics of a natural stream segment similar to that found in the watershed. The lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or erodes the toe of the channel banks.~~

~~(iii)~~(i) The Copermittees may use monitoring results pursuant to Provision D.2.b.(6) to re-define the range of flows resulting in increased potential for erosion or degraded channel conditions, as warranted by the data.

(b) Post-project runoff flow rates and durations must compensate for the loss of sediment supply due to the development project, should loss of sediment supply occur as a result of the development project.

(c) If hydromodification management BMPs are technically infeasible per Provision E.3.c.(4) or it is identified that stream rehabilitation projects or regional mitigation projects are preferable for restoration of watershed functions, project applicants must perform mitigation for the portion of the runoff volume that is not controlled and will cause or contribute to increased potential for erosion of receiving waters downstream of the Priority Development Project, as described in Provision E.3.c.(4)(c) or contribute to an established mitigation fund per Provision (3)(d)(v).

(d) Offsite Hydromodification Mitigation Program

Each Copermittee, in collaboration with the other Copermittees may develop and implement a watershed based approach to hydromodification management that may include the following:

(i) Analysis to identify current land uses and proposed future development and changes in land use.

(ii) Development of watershed hydromodification management objectives.

(iii) Development of criteria to identify when stream rehabilitation or regional mitigation projects are preferable to onsite hydromodification controls for PDPs, in order to restore watershed functions and processes,.

(iv) Identification of opportunities for stream rehabilitation and mitigation projects to restore watershed functions and processes

(v) Development of a mitigation fund and program for implementation of stream rehabilitation and mitigation projects

~~(c)~~(e) Exemptions

Each Copermittee has the discretion to exempt a Priority Development Project from the hydromodification management BMP requirements where the project:

(i) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean;

(ii) Discharges storm water runoff into conveyance channels that are engineered for the capacity to convey the 10-year ultimate build out condition flow and are regularly maintained to ensure flow capacity ~~whose bed and bank are concrete lined~~ all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean;

(iii) Discharges to large rivers where large rivers are defined as reaches for which the contributing drainage area exceeds 100 square miles and with a 100-year design flow in excess of 20,000 cfs;

(iv) Discharges from infill redevelopment projects that meet criteria to be established in the Permittees' HMPs; or

(v) In-stream flood control and restoration projects.

(vi) Discharges storm water runoff into other areas identified by the San Diego Water Board as exempt from the requirements of Provisions E.3.c.(3)(a)-(c).

(4) Alternative Compliance for Technical Infeasibility

At the discretion of each Copermittee, alternative compliance may be allowed for certain Priority Development Projects to comply with Provisions E.3.c.(2) and E.3.c.(3), subject to the following requirements:

(a) Applicability

Priority Development Projects may be allowed alternative compliance if:

(i) The Copermittee reviews and approves site-specific hydrologic and/or design analysis performed by a registered professional engineer, geologist, architect, or landscape architect;

(ii) The project applicant demonstrates, and the Copermittee determines and documents, that retention LID and/or hydromodification management BMPs per Provisions E.3.c.(2) and E.3.c.(3) were incorporated into the project design to the maximum extent technically feasible given the project site conditions;

(iii) The project applicant is required to perform mitigation described in Provision E.3.c.(4)(c) with a net result of at least the same level of water quality protection as would have been achieved if the Priority Development Project had fully implemented the retention LID and hydromodification management BMP requirements under Provisions E.3.c.(2) and E.3.c.(3) onsite; or~~.~~

(iv) The project applicant is required to perform mitigation described in Provision E.3.c.(4)(c) and has the option or ability to contribute to a regionally important mitigation project/program as defined in the Water Quality Improvement Plan that would address strategic high-priority water quality protection and/or more-direct restoration of beneficial uses in receiving waters than if achieved if the Priority Development Project had fully implemented the retention LID and hydromodification management BMP requirements under Provisions E.3.c.(2) and E.3.c.(3) onsite.

(b) Criteria For Technical Infeasibility

Each Copermittee must develop, or develop in collaboration with the other Copermittees, criteria to determine technical infeasibility for fully implementing the retention LID and hydromodification management BMP requirements under Provisions E.3.c.(2) and E.3.c.(3) and include these requirements in the Treatment control/structural LID~~Permanent~~ BMP Sizing Criteria Design Manual pursuant to Provision E.3.d. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in Provision E.3.a.(5) due to the presence of shallow bedrock, contaminated soils, contaminated groundwater, near surface groundwater, underground facilities, or utilities;

(ii) Brownfield development sites or other locations where pollutant mobilization is a documented concern;

(iii) The design of the site precludes the use of soil amendments, plantings of vegetation, or other designs that can be used to infiltrate and evapotranspirate runoff;

(iv) Soils cannot be sufficiently amended to provide for the requisite infiltration rates;

(v) Locations with geotechnical hazards;

(vi) Insufficient onsite and/or offsite demand for storm water use;

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(vii) Modifications to an existing building to manage storm water are not feasible due to structural or plumbing constraints; and

(viii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with Provisions E.3.c.(2) and E.3.c.(3) onsite.

(c) Mitigation

Priority Development Projects that meet the Copermittee's technical infeasibility criteria developed pursuant to Provision E.3.c.(4)(b) must be required to mitigate for the increased flow rates, increased flow durations, and/or increased pollutant loads expected to be discharged from the site. ~~For the pollutant load in the volume of storm water~~ Copermittees may establish an offsite mitigation program that requires the developer to mitigate for the water quality equivalence not retained onsite with retention LID BMPs, or increased potential erosion of downstream receiving waters not fully controlled onsite with hydromodification management BMPs, the Copermittee must require the project applicant to either 1) implement an offsite mitigation project, and/or 2) provide sufficient funding for a public or private offsite mitigation project via a mitigation fund.

(i) *Mitigation Project Locations*

Offsite mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project, and preferably within the same hydrologic subarea. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project applicant demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar potential impacts expected from the Priority Development Project.

(ii) *Mitigation Project Types*

Offsite mitigation projects ~~must~~ may include, where applicable and feasible, retrofitting opportunities and stream and/or habitat rehabilitation or restoration opportunities identified in the Water Quality Improvement Plans, identified pursuant to Provision B.3.a. Other offsite mitigation projects may include green streets or infrastructure projects, groundwater recharge projects, or regional BMPs upstream of receiving waters. ~~In-stream rehabilitation or restoration measures to protect or prevent adverse physical changes to creek bed and banks must not include the use of non-naturally occurring hardscape material such as concrete, riprap, or gabions.~~ Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of Provision

E.3.c.(4)(a).

(iii) *Mitigation Project Timing*

The Copermittee and/or project applicant must develop a schedule for the completion of offsite mitigation projects, including milestone dates to identify, fund, design, and construct the projects. PDP implemented o~~O~~ffsite mitigation projects must be completed upon ~~the granting of occupancy for the first project that contributed funds~~completion of the PDP, ~~toward the offsite mitigation project,~~ unless a longer period is authorized by the San Diego Water Board. The timing of mitigation projects associated with a Copermittee offsite mitigation program will be developed by the Copermittees as part of developing -their offsite mitigation program.

(iv) *Mitigation Fund*

A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as a means for developing and implementing offsite mitigation projects, provided the projects conform to the requirements for project locations, types, and timing described above.

d. UPDATE ~~PERMANENT~~ TREATMENT CONTROL/STRUCTURAL LID~~STRUCTURAL~~ BMP SIZING CRITERIA DESIGN MANUAL (BMP DESIGN MANUAL)

Each Copermittee must update its ~~Permanent~~ Treatment Control/Structural LID BMP Sizing Criteria Design Manual (BMP Design Manual)[22] pursuant to Provision F.2.b or Provision F.5.a. Until the Copermittee has updated its BMP Design Manual with the requirements of Provision E.3.c, the Copermittee must continue implementing its current BMP Design Manual. Unless directed otherwise by the San Diego Water Board, the Copermittee must implement the BMP Design Manual within 180 days of completing the update. The update of the BMP Design Manual must include the following:

(1) Updated procedures to determine the nature and extent of storm water requirements applicable to a potential development or redevelopment project. These procedures must inform project applicants of the storm water management requirements applicable to their project including, but not limited to, general requirements for all development projects, LID and conventional BMP design procedures and requirements, hydromodification management requirements, requirements specific to phased projects, and procedures specific to private developments and public improvement projects;

(2) Updated procedures to identify pollutants and conditions of concern for selecting the most appropriate ~~permanent~~ treatment control or structural LID

[22] The Permanent BMP Sizing Criteria Design Manual was formerly known as the Standard Storm Water Mitigation Plan under Order Nos. R9-2007-0001, R9-2009-0002, and R9-2010-0016.

BMPs that consider, at a minimum, the following:

(a) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d));

(b) Priority pollutants or receiving water conditions contributing to the highest water quality priorities identified in the Water Quality Improvement Plan;

(c) Land use type of the project and pollutants associated with that land use type; and

(d) Pollutants expected to be present onsite.

(3) Updated procedures for designing ~~permanent~~ treatment control or structural LID BMPs, including any updated performance and sizing requirements to be consistent with the requirements of Provision E.3.c for all BMPs listed in the BMP Design Manual;

(4) Long-term maintenance criteria for each BMP listed in the BMP Design Manual; and

(5) Criteria and mitigation requirements, in accordance with the requirements under Provision E.3.c.(4), if the Copermittee elects to allow alternative compliance for technical infeasibility within its jurisdiction.

e. PRIORITY DEVELOPMENT PROJECT BMP IMPLEMENTATION AND OVERSIGHT

Each Copermittee must implement a program to ensure ~~permanent~~ treatment control or structural LID BMPs on all Priority Development Projects are designed, constructed, and maintained to remove pollutants in storm water to the MEP.

(1) ~~Permanent~~ Treatment Control/Structural LID BMP Approval and Verification Process

(a) Each Copermittee must ensure that for all Priority Development Project applications that have not received prior lawful approval by the Copermittee by 12 months after the adoption of this Order, or pursuant to Provision F.5.a, the requirements of Provision E.3 are implemented. For project applications that have received prior lawful approval by 12 months after the adoption of this Order, or pursuant to Provision F.5.a, the Copermittee may allow previous land development requirements to apply.

(b) Each Copermittee must identify the roles and responsibilities of various municipal departments in implementing the ~~permanent~~ treatment control/structural LID BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections.

(c) Each Copermittee must ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(d) Each Copermittee must ensure that prior to occupancy and/or intended use of any portion of the Priority Development Project, each ~~permanent~~ treatment control or -structural LID BMP must be inspected to verify that they have been constructed and are operating in compliance with all of its specifications, plans, permits, ordinances, and the requirements of this Order.

(2) Priority Development Project Inventory and Prioritization

(a) Each Copermittee must develop and regularly ~~continuously~~ maintain a watershed-based database to track and inventory all Priority Development Projects and associated ~~permanent~~ treatment control and structural LID BMPs within their jurisdiction. Inventories must be accurate and complete beginning from January 2002 for the San Diego County Copermittees, February 2003 for the Orange County Copermittees, and July 2005 for the Riverside County Copermittees. The database must include, at a minimum, the following information:

(i) Priority Development Project location (address and hydrologic subarea);

(ii) Descriptions of BMP type(s);

(iii) Date(s) of construction;

(iv) Party responsible for treatment control/structural LID~~permanent~~ BMP maintenance;

(v) Dates and findings of treatment control/structural LID~~permanent~~ BMP maintenance verifications; and

(vi) Corrective actions and/or resolutions.

(b) Each Copermittee must prioritize the Priority Development Projects with treatment control/structural LID~~permanent~~ BMPs within its jurisdiction. The designation of Priority Development Projects as high priority must consider the following:

(i) The highest water quality priorities identified in the Water Quality Improvement Plan;

(ii) Receiving water quality;

(iii) Number and sizes of treatment control/structural LID~~permanent~~ BMPs;

(iv) Recommended maintenance frequency of treatment control/structural LID~~permanent~~ BMPs;

(v) Likelihood of operation and maintenance issues of treatment control/structural LID~~permanent~~ BMPs;

(vi) Land use and expected pollutants generated; and

(vii) Compliance record.

(3) Treatment Control Structural LID ~~Permanent~~ BMP Maintenance Verifications and Inspections

Each Copermittee is required to verify that treatment control and structural LID ~~permanent~~ BMPs on each Priority Development Project are adequately maintained, and continue to operate effectively to remove pollutants in storm water to the MEP through inspections, self-certifications, surveys, or other equally effective approaches.

(a) All (100 percent) of the ~~permanent~~ treatment control and structural LID BMPs at Priority Development Projects that are designated as high priority must be inspected directly by the Copermittee annually prior to each rainy season;

(b) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be required by the Copermittee to provide assurance that the required maintenance of ~~permanent~~ treatment control and structural LID BMPs at each Priority Development Project has been completed; and

(c) Appropriate follow-up measures (including re-inspections, enforcement, etc.) must be conducted to ensure that ~~permanent~~ treatment control and structural LID BMPs at each Priority Development Project continue to reduce pollutants in storm water to the MEP as originally designed.

f. DEVELOPMENT PROJECT ENFORCEMENT

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all development projects, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

4. Construction Management

Each Copermittee must implement a construction management program within their jurisdiction that includes, at a minimum, the following requirements:

a. Project Approval Process

Prior to approval and issuance of any construction, grading, or building permits for a project each Copermittee must:

(1) Require a project-specific storm water pollution prevention plan (SWPPP), or ~~equivalent~~ construction BMP or erosion and sediment control plan, to be submitted by the project applicant for the Copermittee's approval;

(2) Ensure the SWPPP, or ~~equivalent~~ construction BMP or erosion and sediment control plan, complies with the local grading ordinance, other applicable local ordinances, and the requirements of this Order;

(3) Ensure the SWPPP, or ~~equivalent~~ construction BMP or erosion and sediment control plan, includes seasonally appropriate and effective BMPs and management measures described in Provision E.4.c, as applicable to the project; and

~~(4)~~ Verify that the project applicant has obtained coverage under ~~applicable permits, including, but not limited to~~ the Construction General Permit. ~~, Clean Water Act Section 401 Water Quality Certification and Section 404 Permit, and California Department of Fish and Game Streambed Alteration Agreement.~~

~~(5)~~(4)

b. Construction Site Inventory and Tracking

(1) Each Copermittee must maintain, and update at least ~~monthly~~quarterly, a watershed-based inventory of all construction sites requiring construction, grading, or building permits within its jurisdiction. The inventory must include:

(a) Relevant contact information for each site (e.g., name, address, phone, and email for the owner and contractor);

(b) The basic site information including location (address and hydrologic subarea), Waste Discharge Identification (WDID) number (if applicable), size of the site, and approximate area of disturbance;

(c) Whether or not the site is considered a high threat to water quality, as defined in Provision E.4.b.(2) below;

(d) The project start and anticipated completion dates;

(e) Current construction phase;

(f) The required inspection frequency, as defined in the Copermittee's jurisdictional runoff management program document;

(g) The date the Copermittee approved the project-specific SWPPP, or equivalent construction BMP or erosion and sediment control plan; and

(h) Whether or not there are ongoing enforcement actions administered to the site.

(2) Each Copermittee must identify all construction sites within its jurisdiction that represent a high threat to downstream surface water quality. At a minimum, high threat to water quality sites must include:

(a) Sites located within a hydrologic subarea where sediment is known or suspected to contribute to the highest water quality priorities identified in the Water Quality Improvement Plan;

(b) Sites located within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment;

(c) Sites located within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(d) Other sites determined by the Copermittees or the San Diego Water Board as a high threat to water quality.

c. Construction Site BMP and Management Measure Implementation

Each Copermittee must implement, or require the implementation of effective

BMPs to reduce discharges of pollutants in storm water from construction sites to the MEP, and prevent non-storm water discharges into the MS4. These BMPs must be site specific, seasonally appropriate, and construction phase appropriate. BMPs and management measures must be implemented at each construction site year round. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30). Copermittees must implement, or require the implementation of, BMPs and management measures in the following categories:

(1) Project Planning;

(2) Good Site Management "Housekeeping", including waste management;

(3) Non-storm Water Management;

(4) Erosion Control;

(5) Sediment Control;

(6) Run-on and Run-off Control; and

(7) Active/Passive Sediment Treatment Systems, where applicable.

d. CONSTRUCTION SITE INSPECTIONS

Each Copermittee must conduct construction site inspections to ensure compliance with its permits and applicable local ordinances, and the requirements of this Order. Priority for site inspections must consider threat to water quality pursuant to Provision E.4.b as well as the nature of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) Inspection Frequency

(a) Each Copermittee must conduct inspections at all inventoried sites, including high threat to water quality sites, at an appropriate frequency for each phase of construction to ensure the site reduces the discharge of pollutants in storm water from construction sites to the MEP, and prevents non-storm water discharges from entering the MS4.

(b) Each Copermittee must establish appropriate inspection frequencies for high threat to water quality sites, and all other sites, for each phase of construction. Inspection frequencies appropriate for addressing the highest water quality priorities identified in the Water Quality Improvement Plan, and for complying with the requirements of this Order must be identified in each Copermittee's jurisdictional runoff management program document.

(c) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to ensure site compliance with its permits and applicable local ordinances, and the requirements of this Order.

(2) Inspection Content

Inspections of construction sites by the Copermittee must include, at a minimum:

(a) Verification of coverage under the Construction General Permit (Notice of Intent (NOI) and/or WDID number) during initial inspections, when applicable;

(b) Assessment of compliance with its permits and applicable local ordinances related to pollution prevention, including the implementation and maintenance of applicable BMPs;

(c) Assessment of BMP adequacy and effectiveness;

(d) Visual observations of actual non-storm water discharges;

(e) Visual observations of actual or potential discharge of sediment and/or construction related materials from the site;

(f) Visual observations of actual or potential illicit connections; and

(g) If any violations are found and BMP enhancements are needed, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.

(3) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried construction sites. The Copermittee must retain all inspection records in an electronic database or tabular format, which must be made available to the San Diego Water Board upon request. Inspection records must include, at a minimum:

(a) Site name, location (address and hydrologic subarea), and WDID number (if applicable);

(b) Inspection date;

(c) Weather conditions during inspection;

(d) Approximate amount of rainfall since last inspection;

(e) Description and photo documentation of problems observed with BMPs and indication of need for BMP addition/repair/replacement and any scheduled re-inspection, and date of re-inspection;

(f) Descriptions of any other specific inspection comments which must, at a minimum, include rationales for longer compliance time~~.~~;

(g) Description of enforcement actions issued in accordance with the Enforcement Response Plan pursuant to Provision E.6; and

(h) Resolution of problems noted and date problems fixed.

e. Construction Site Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried construction sites, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

5. Existing Development Management

Comment [A3]: The OC Copermittees are offering alternative language for this section – see attachment for Existing Development. In lieu of the alternative language – the proposed revisions are provided below.

Each Copermittee must implement an existing development management program that includes, at a minimum, the following requirements:

a. Existing Development Inventory and Tracking

Each Copermittee must maintain an updated watershed-based inventory and/or map of ~~all~~ its existing development that has the reasonable potential to discharge ~~may potentially generate~~ a pollutant load into ~~and from~~ the MS4. The map should be ~~A continually~~ regularly updated and identify ~~map showing~~ the locations of inventoried existing development categories listed below, the watershed management area boundaries, the water bodies, and the significant, regional retrofits implemented ~~and pollutants generated~~ at the inventoried existing development~~ ~~and/or significant, regional rehabilitations implemented at channels and/or receiving waters. The use of an automated database system, such as GIS, is highly recommended.

The inventory must, at a minimum, include the following types of facilities:

(1) The following municipal facilities:

(a) Flood management projects and flood control devices ~~and structures~~,

(b) Operating or closed municipal landfills,

(c) Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewer collection systems,

(d) Corporate yards, including maintenance and storage yards for materials, waste, equipment, and vehicles,

(e) Hazardous waste collection facilities, ~~and~~

(f) ~~Other treatment, storage or disposal facilities for municipal waste~~Solid waste transfer facilities; and

~~(f)~~(g) Land application sites;

(2) Identification of ~~if a business is a~~ mobile businesses;

(3) ~~Identification if an area is a~~ Common Interest Areas (CIAs) / Home Owner Associations (HOAs), ander mobile home parks;

The inventory must, at a minimum, include the following information for each of the facilities, as applicable:

(1) Name, location (address and/or hydrological subarea) of each facility, area, and/or activity;

(2) A description of the facility, area, and/or activity, including classification as municipal, commercial, industrial, or residential;

(3) SIC and/or NAICS Code~~, if applicable~~;

(4) Industrial General Permit ~~NOI and/or~~ WDID number~~, if applicable~~;

(5) Identification of pollutants generated and/or potentially generated by the facility, area, and/or activity;

(6) Status of facility, area, and/or activity as active or inactive;

(7) Whether the facility, area, and/or activity is adjacent to an ESA;

(8) Whether the facility, area, and/or activity is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired;

~~(4) Whether the facility, area, and/or activity contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan; and~~

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b. RETROFITTING AND CHANNEL REHABILITATION IN AREAS OF EXISTING DEVELOPMENT

Each Copermittee must develop and implement a program to retrofit areas of existing development to reduce the discharge of pollutants in storm water from the MS4 to the MEP and effectively prohibit non-storm water discharges into its MS4, and rehabilitate channels and/or receiving waters to restore impaired beneficial uses of streams within its jurisdiction, as feasible.

(1) Each Copermittee must identify areas of existing development as candidates for retrofitting, and channels and/or receiving waters ~~in areas of existing development~~ as candidates for rehabilitation within its jurisdiction, as feasible. Areas of existing development must be selected based on a likelihood that retrofitting and channel rehabilitation will address the highest water quality priorities identified in the Water Quality Improvement Plan prepared pursuant to Provision B.

(2) Each Copermittee must evaluate and rank the areas of existing development identified pursuant to Provisions E.5.a and E.5.b.(1) for retrofitting and channel rehabilitation. The evaluation must include an assessment of those areas where pollutant removal from storm water and effective prohibition of non-storm water discharges through retrofitting existing development will provide the most benefit to water quality. The evaluation must also include an assessment of the channels and/or receiving waters within its jurisdiction where ~~channel~~ rehabilitation will improve beneficial uses of streams within or immediately downstream of the Copermittee's jurisdiction. Data collected during the implementation of the Water Quality Improvement Plan must be used to inform each area assessment and rank determination.

(3) Each Copermittee must ~~implement~~ prioritize for implementation retrofit and channel rehabilitation projects that address the highest water quality priorities identified in the Water Quality Improvement Plan pursuant to Provision B.3.a. The Copermittee ~~must~~ should encourage private landowners to implement retrofit designs, at a minimum through the use of public education and outreach~~and channel rehabilitation projects whenever practical. Private~~

~~landowners should be encouraged through the Copermittee's use of subsidies, penalties, or other incentives~~.

(4) Each Copermittee must evaluate the flood management and flood control devices and structures in its inventory to determine if it is feasible to retrofit the device or structure, to provide additional pollutant removal from storm water. A Copermittee must consider the highest water quality priorities identified in their Water Quality Improvement Plan as part of each assessment. Evaluation of facilities can occur as a part of routine maintenance of these facilities.

(5) Where retrofitting and channel rehabilitation within specific areas of existing development under the Copermittees jurisdiction are determined to be infeasible to restore and protect receiving waters from the highest water quality priorities identified in the Water Quality Improvement Plan, each Copermittee may~~ust~~ identify, develop, and prioritize for implementation regional retrofitting and channel rehabilitation projects (i.e. projects that can receive and/or treat storm water from one or more areas of existing development and will result in a net benefit to water quality and the environment) adjacent to and/or downstream of the areas of existing development. The Copermittees may collaborate and cooperate with each other to develop regional retrofitting and channel rehabilitation projects. The Copermittees are also encouraged to partner with existing efforts in other Watershed Management Areas, and the Integrated Regional Water Management (IRWM) Groups in San Diego County, South Orange County, and Southwest Riverside County.

(6) Upon Regional Board Executive Officer approval the Copermittees may reallocate resources in the WQIPs for retrofit and rehabilitation project(s).

c. EXISTING DEVELOPMENT BMP IMPLEMENTATION AND MAINTENANCE

(1) Pollution Prevention

Each Copermittee must ~~require~~ promote the use of pollution prevention methods by the inventoried existing development through public outreach.

(2) Designate BMPs

Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development with the reasonable potential to discharge pollutant loads from their MS4, including special event venues~~, that have the potential to generate pollutants~~. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(3) BMP Implementation

Each Copermittee must implement, or require the implementation of, designated BMPs at inventoried existing development that have the reasonable potential to ~~generate~~ discharge pollutants loads into~~from~~ the~~ir~~ MS4s. A Copermittee must require additional pollution prevention measures and enhanced BMPs at inventoried existing development that discharges pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(4) BMP Operation and Maintenance

Each Copermittee must operate and maintain, or require the operation and maintenance of designated BMPs at all inventoried existing development that have been identified by the Copermittee as having the reasonable potential to discharge pollutant loads into~~from~~ their~~ir~~ MS4.

(a) Each Copermittee must implement a schedule of operation and maintenance activities for its MS4 and related structures (including but not limited to catch basins, storm drain inlets, detention basins, etc.), and verify proper operation of all its municipal structural treatment controls designed to reduce pollutants (including floatables) in storm water discharges to or from its MS4s and related drainage structures.

(b) Each Copermittee must implement procedures during the operation and maintenance of public streets, unpaved roads, paved roads, and paved highways and freeways, conducted under their authority and within their jurisdiction, that will reduce the contribution of storm water pollutants to the MEP and effectively prohibit the discharge of non-storm water pollutants from the MS4 to receiving water bodies. During maintenance of unpaved roads, each Copermittee must examine the feasibility of replacing existing culverts or designing new culverts/bridge crossings to maintain natural stream geomorphology.

(c) Each Copermittee must implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers. Copermittees that operate both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate seeping sewage from infiltrating the MS4. Copermittees that do not operate both a municipal sanitary sewer system and a MS4 must keep themselves informed of relevant and appropriate maintenance activities and sanitary sewage projects in their jurisdiction that may cause or contribute to seepage of sewage into the MS4.

(5) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must implement procedures, or require the implementation of procedures, to reduce the contribution of pollutants in storm water to the MEP and effectively prohibit non-storm water discharges associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from inventoried existing development ~~into and from the MS4s.~~ identified by the Copermittee as having the reasonable potential to discharge pollutant loads into ~~or from their~~ the MS4. The Copermittee must require additional pollution prevention measures and enhanced BMPs at inventoried existing development that discharges pesticides, herbicides, or fertilizers identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. Such BMPs must include, as appropriate educational activities, permits, certifications and other measures for applicators and distributors.

d. EXISTING DEVELOPMENT INSPECTIONS

Each Copermittee must conduct inspections of inventoried existing development that have been identified by the Copermittee as having the reasonable potential to discharge pollutant loads ~~from their~~into the MS4 to ensure compliance with applicable local ordinances and permits, and the requirements of this Order.

(1) Inspection Frequency

(a) Each Copermittee must establish appropriate inspection frequencies for inventoried existing development based on the priorities set forth in the Water Quality Improvement Plan, and the potential for discharging pollutants via storm water and non-storm water discharge~~runoff~~. At a minimum, inventoried existing municipal, industrial, commercial, and residential-association development ~~that has been~~ identified by the Copermittee as having the reasonable potential to discharge pollutant loads from their MS4 must be inspected once during the permit term~~every five years~~. Effective self-certification or third-party inspection programs may be utilized for this purpose. Inventoried existing development must also be inspected within ~~six~~ twelve months ~~of any change in property ownership or~~ after any redevelopment or land use change associated with a potential ~~change~~ increase in pollutant generating activity. The frequency of inspection at inventoried existing development must be appropriate to ensure that applied BMPs are sufficient to reduce the discharge of pollutants in storm water from the MS4 to the MEP and effectively prohibit non-storm water discharges to the MS4.

(b) Inventoried existing development must be inspected, as needed, in response to valid public complaints and findings from the Copermittee's municipal and contract staff inspections.

(c) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e. re-inspection, enforcement) necessary to ensure compliance with its applicable local ordinances and permits, the most current jurisdictional runoff management program document, the Water Quality Improvement Plan, and the requirements of this Order.

(2) Inspection Content

Inspections of existing development by the Copermittee must include, at a minimum:

(a) Assessment of compliance with its applicable local ordinances and permits related to non-storm water and storm water discharges and runoff;

(b) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

(c) Verification of coverage under the Industrial General Permit (NOI and/or WDID number), when applicable;

(d) Visual observations of actual non-storm water discharges, if present;

(e) Visual observations of actual or potential discharge of pollutants, if present;

(f) Visual observations of actual or potential illicit connections if present; and

(g) If any violations are found and BMP enhancements are needed, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.

(3) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried existing development. The Copermittee must retain all inspection records in an electronic database or tabular format, which must be made available to the San Diego Water Board upon request. Inspection records must be sufficiently detailed in order to determine compliance with the requirements of this Order and any progress made towards addressing the highest water quality priorities identified in the Water Quality Improvement Plan. Inspection records must include, at a minimum:

(a) Existing development name and location (address and hydrologic subarea);

(b) Inspection and re-inspection date(s);

(c) Weather conditions during inspection;

(d) Description and photo documentation of problems observed with BMPs and indication of need for BMP addition/repair/replacement and any scheduled re-inspection, and date of re-inspection;

(e) Verification of compliance with designated BMPs, as applicable~~Description of actions to reduce pollutants in storm water runoff to the MEP and actions to effectively prohibit non-storm discharges into the MS4 at the inventoried existing development~~;

~~(f) Photo documentation of observed actions or BMPs to reduce pollutants in storm water runoff to the MEP and actions to effectively prohibit non-storm~~

~~discharges into the storm drain;~~

~~If the facility, area, and/or activity has been designated or identified as a contributor to the highest water quality priorities identified in the Water Quality Improvement Plan, then the inspection report must include a description of any specific or additional actions taken to reduce or eliminate the contribution of the facility, area, and/or activity to the highest water quality priorities;~~

~~(g)~~(f) Descriptions of any other specific inspection comments which must, at a minimum, include rationales for longer compliance time;

~~(h)~~(g) Description of enforcement actions issued in accordance with the Enforcement Response Plan pursuant to Provision E.6; and

~~(i)~~(h) Resolution of problems noted and date problems fixed.

e. Existing Development Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried existing development identified by the Copermittees as having the reasonable potential to discharge pollutant loads from the MS4 within their jurisdiction, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

6. Enforcement Response Plans

Each Copermittee must develop and implement an Enforcement Response Plan as part of its jurisdictional runoff management program document. The Enforcement Response Plan must include the protocols for progressively stricter responses, including timeframes allowed for corrections of problems, and for various field violation scenarios. Copermittees may continue to utilize and implement established, equivalent guidelines and procedures for enforcement . The Enforcement Response Plan must include, at a minimum, the following requirements:

a. Illicit Discharge Detection and Elimination Enforcement Component

The Enforcement Response Plan must describe required enforcement actions to eliminate non-storm water discharges and illicit discharges or connections to the Copermittee's MS4.

(1) The Enforcement Response Plan must include a definition of "high level enforcement" for non-storm water discharges and illicit discharges or connections. "High level enforcement" for non-storm water discharges and illicit discharges or connections may be defined differently for construction

Comment [A4]: The OC Copermittees are offering alternative language for this section – see attachment for Enforcement Response Plans
In lieu of the alternative language – the proposed revisions are provided below.

sites, municipal, commercial, industrial, and residential areas of existing development.

(2) Non-storm water discharges and illicit discharges or connections must be addressed with an escalating series of enforcement actions as follows:

(a) If the non-storm water discharge or~~and~~ illicit discharge or connection is a source of pollutants contributing to the highest water quality priorities identified in the Water Quality Improvement Plan, then ~~high level~~ enforcement actions must begin at a high level ~~immediately issued~~, and subsequent high level enforcement actions must continue to escalate, as necessary, to compel the elimination of the discharge or connection as soon as possible; or

(b) If the non-storm water discharge and illicit discharge or connection is not a source of pollutants contributing to the highest water quality priorities identified in the Water Quality Improvement Plan, then escalating enforcement actions must be issued, and enforcement actions must result in the elimination of the discharge or connection as quickly as the Copermittee's available resources allow.

(3) If the Copermittee identifies the source, and the source is a controllable non-storm water discharge (i.e. anthropogenically influenced) or a controllable illicit discharge or connection, then the Copermittee must implement the following:

(a) Immediately enforce its legal authority, or notify the entity with applicable legal authority, to eliminate controllable sources of non-storm water and illicit discharges or connections upon identifying the source; and

(b) For controllable sources of non-storm water discharges and illicit discharges or connections that cannot be eliminated immediately upon identification, the discharge or connection must be eliminated in a timely manner with the goal of eliminating the discharge or connection within 10 business days after the source is identified. If more than 10 business days are required to eliminate the discharge or connection, a rationale must be recorded in the electronic database or equivalent tabular system used to track the investigations of non-storm water and illicit discharges and connections.

(4) If the Copermittee identifies the source as a non-storm water discharge to or from the MS4 that is in exceedance of NALs developed pursuant to Provision C.1, and in violation or threatened violation of an existing separate NPDES permit (e.g. the groundwater dewatering NPDES permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the

discharger and discharge characteristics.

b. DEVELOPMENT PROJECTS ENFORCEMENT COMPONENT

The Enforcement Response Plan must describe required enforcement actions to compel compliance with the Copermittee's BMP Design Manual requirements for development projects.

(1) The Enforcement Response Plan must include a definition of "high level enforcement" for development projects.

(2) The enforcement process must include appropriate sanctions to compel compliance with requirements of the Copermittee's BMP Design Manual or this Order. Sanctions must include, at a minimum, the following tools or their equivalent:

(a) Non-monetary penalties;

(b) Fines;

(c) Bonding requirements;

(d) Administrative and criminal penalties;

(e) Liens; and

(f) Permit or occupancy denials.

(3) Occupancy must be denied until a development project is in full compliance with the Copermittee's BMP Design Manual requirements. Documentation of full compliance with the Copermittee's BMP Design Manual requirements must be recorded in the electronic database or equivalent tabular system used to track development projects.

(4) Violations or other non-compliance that contribute or potentially contribute to the highest water quality priorities identified in the Water Quality Improvement Plan must be issued high level enforcement actions. High level enforcement actions must continue to escalate, as necessary, to compel compliance as soon as possible.

(5) For violations of ~~permanent~~ treatment control and structural LID BMP maintenance requirements, all violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 3~~1~~0 ~~business~~ calendar days after the violations are discovered. If more than 3~~1~~0 ~~business~~ calendar days are required for compliance, a rationale must be recorded in the electronic database or equivalent tabular system used to track treatment control and structural LID ~~permanent~~ BMP

inspections.

c. Construction / Existing Development Enforcement Component

The Enforcement Response Plan must describe required enforcement actions to compel compliance with its permits and applicable local ordinances, and the requirements of this Order, at construction sites and areas of existing development.

(1) The Enforcement Response Plan must include a definition of “high level enforcement” for construction sites and areas of existing development. “High level enforcement” may be defined differently for construction sites, municipal, commercial, industrial, and residential areas of existing development.

(2) The enforcement process must include, at a minimum, appropriate sanctions to compel compliance, such as:

(a) Verbal and written notices of violation;

(b) Cleanup requirements;

(c) Fines;

(d) Bonding requirements;

(e) Administrative and criminal (if intentional or negligent) penalties;

(f) Liens;

(g) Stop work orders; and

(h) Permit and occupancy denials.

(3) Violations or other non-compliance that contribute or potentially contribute to the highest water quality priorities identified in the Water Quality Improvement Plan must be issued high level enforcement actions. High level enforcement actions must continue to escalate, as necessary, to compel compliance as soon as possible.

(4) All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 3~~1~~0 ~~business~~ calendar days after the violations are discovered. If more than 3~~1~~0 calendar~~business~~ days are required for compliance, then a rationale must be recorded in the electronic database or equivalent tabular system used to track construction site and existing development inspections.

d. Reporting of Non-Compliant Sites

(1) Each Copermittee must notify the San Diego Water Board in writing within 48 hours of issuing high level enforcement (as defined in the Copermittee's Enforcement Response Plan) to a construction site that significantly impacts ~~poses a significant threat to~~ water quality as a result of violations or other non-compliance with its permits and applicable local ordinances, and the requirements of this Order. Written notification may be provided electronically in email form.

(2) Each Copermittee must notify the San Diego Water Board of non-filers under the Industrial General Permit and Construction General Permit by email to Nonfilers_R9@waterboards.ca.gov.

7. Public Education and Participation

a. Each Copermittee must implement a public education and participation program, as appropriate, to promote and encourage the development of programs, management practices, control techniques and systems, design and engineering methods, and behaviors that reduce the discharge of pollutants in storm water to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving waters. The public education program must include, at a minimum, the following:

(1) Educational activities, public information activities, and other appropriate outreach activities intended to reduce the pollutants of concern associated with ~~the application of pesticides, herbicides and fertilizer in~~ storm water discharges ~~to and~~ from its MS4 to the MEP. Activities shall be determined and prioritized by the Copermittees by jurisdiction and/or watershed to address the highest water quality issues of concern identified within the corresponding WQIP(s);

~~(2) Educational activities, public information activities, and other appropriate outreach activities to facilitate the proper management and disposal of used oil and toxic materials; and~~

~~(3)~~(2) Appropriate education and training measures for specific ~~construction site operators and other~~ target audiences, as determined and prioritized by the Copermittee(s) by jurisdiction and/or watershed to address the highest water quality issues of concern identified within the corresponding WQIP(s).

b. Each Copermittee must incorporate a mechanism for public participation and where necessary intergovernmental coordination in updating, developing, and implementing its jurisdictional runoff management program.

8. Fiscal Analysis

a. Each Copermittee must secure the resources necessary to meet all the requirements of this Order.

b. Each Copermittee must conduct an annual fiscal analysis of their jurisdictional runoff management programs. ~~following:~~

The Copermittees must identify the various categories of expenditures necessary to implement the requirements of this Order, including a description of the specific items to be accounted for in each category of expenditures. For each category of expenditures, the fiscal analysis must include the following:

(1) The capital and operation and maintenance expenditures necessary to implement the requirements of this Order;
~~(2) The staff resources needed and allocated to meet the requirements of this~~

~~Order, including any development, implementation, and enforcement activities required;~~

~~(3)~~(2) The estimated expenditures ~~for Provisions E.8.b.(1) and E.8.b.(1)(2)~~ during the reporting period~~, the preceding reporting period,~~ and the next reporting period; and

~~(4)~~(3) The source(s) of funds that are proposed to meet the necessary expenditures ~~described in Provisions E.8.b.(1) and E.8.b.(1)(2),~~ including legal restrictions on the use of such funds.

c. Each Copermittee must submit a summary of the annual fiscal analysis with each Annual Report required pursuant to Provision F.3.b.

d. Each Copermittee must provide the documentation used to develop the summary of the annual fiscal analysis upon request by the San Diego Water Board.

F. REPORTING

The purpose of this provision is to determine and document compliance with the requirements set forth in this Order. The goal of this provision is to communicate to the San Diego Water Board and the people of the State of California the implementation status of each jurisdictional runoff management program and compliance with the requirements of this Order. This goal is to be accomplished through the submittal of specific deliverables to the San Diego Water Board by the Copermittees.

1. Water Quality Improvement Plans

The Copermittees for each Watershed Management Area must develop and submit a complete Water Quality Improvement Plan in accordance with the requirements of Provision B, no later than 18~~2~~ months after the adoption of, or enrollment under this Order for a 30 day public review and comment period. The San Diego Water Board will issue a public notice and solicit public comments on the Water Quality Improvement Plan for a minimum of 30 days. Based on the comments received, the San Diego Water Board will determine whether to hold a public hearing or to limit public input to submittal of written comments. If no hearing is held the San Diego Water Board will notify the Copermittees that the Water Quality Improvement Plan has been accepted as complete following its review and determination that the Water Quality Improvement Plan meets the requirements of this Order. The San Diego Water Board shall notify the Copermittees within six (6) months of the submittal date. Water Quality Improvement Plans must be made available as~~on the Regional Clearinghouse~~ required pursuant to Provision F.4.

2. Updates

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATES

Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E. The update must be completed no later than 18~~2~~ months after the adoption of, or enrollment under, this Order. Updated jurisdictional runoff management program documents must be made available as ~~on the Regional Clearinghouse~~ required pursuant to Provision F.4. Subsequent updates may be submitted as part of the Annual Reports, and updated jurisdictional runoff management program documents must be made available ~~on the Regional Clearinghouse~~as required pursuant to Provision F.4.

Jurisdictional Runoff Management Program document updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

b. ~~PERMANENT~~ TREATMENT CONTROL/STRUCTURAL LID BMP SIZING CRITERIA DESIGN MANUAL UPDATES

Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provision E.3.d, as needed. The update must be completed no later than 18~~2~~ months after the adoption of, or enrollment under, this Order. Updated BMP Design Manuals must be made available as ~~on the Regional Clearinghouse~~ required pursuant to Provision F.4. Subsequent updates may be submitted as part of the Annual Reports. Updated BMP Design Manuals must be made available as required pursuant to Provision F.4~~on the Regional Clearinghouse~~.

BMP Design Manual updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

c. Water Quality Improvement Plan Updates

The Copermittees for each Watershed Management Area must submit updates to the Water Quality Improvement Plan as part of the Annual Reports. Updated Water Quality Improvement Plans must be made available as ~~on the Regional Clearinghouse~~ required pursuant to Provision F.4.

Water Quality Improvement Plan updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

3. Progress Reporting

a. Progress Report Presentations

The Copermittees for each Watershed Management Area must appear before the San Diego Water Board, as requested by the San Diego Water Board, to provide progress reports on the implementation of the Water Quality Improvement Plan and jurisdictional runoff management programs.

b. Annual Reports

(1) The Copermittees for each Watershed Management Area must submit an Annual Report for each reporting period, which begins July 1 and ends June 30 in the following year, no later than October 31 following the end of the reporting period. The first Annual Report must be prepared for the reporting period beginning July 1 after adoption of the permit, and upon San Diego Water Board's determination that ~~from the date the San Diego Water Board determines that~~ the Water Quality Improvement Plan meets the requirements of this Order to June 30 in the following year. Annual Reports must be made available ~~on the Regional Clearinghouse~~as required pursuant to Provision F.4. Each Annual Report must include the following:

(a) The jurisdictional and watershed monitoring data collected pursuant to Provisions D.1 and D.2, summarized and presented in tabular and graphical form;

(b) Progress of the special studies required pursuant to Provisions D.2 and D.3, and the results or findings when a special study, or each phase of a special study, is completed;

(c) The findings from the assessments required pursuant to Provision D.4;

(d) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following:

(i) The progress toward achieving the interim and final numeric ~~targets~~goals for the highest water quality priorities for the Watershed Management Area,

(ii) The water quality improvement strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods, and are planned to be implemented during the next reporting period,

(iii) Previously proposed modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area, and

(iv) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;

(e) A completed Jurisdictional Runoff Management Program Annual Report Form (Attachment D) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative.

(2) Each Copermittee must complete and submit a Jurisdictional Runoff Management Program Annual Report Form (Attachment D) no later than October 31 of each year until the first Annual Report is required to be submitted.

(3) Each Copermittee must provide any data or documentation utilized in developing the Annual Report upon request by the San Diego Water Board. Any monitoring data utilized in developing the Annual Report must be uploaded to the California Environmental Data Exchange Network

(CEDEN).[23] Any monitoring and assessment data utilized in developing the Annual Report must be provided as ~~on the Regional Clearinghouse~~ required pursuant to Provision F.4.

c. **Regional Monitoring and Assessment Report**

(1) The Copermittees must submit a Regional Monitoring and Assessment Report no later than 180 days in advance of the expiration date of this Order. The Regional Monitoring and Assessment Report may be submitted as part of the ROWD required pursuant to Provision F.5.b. The Copermittees must review the jurisdictional and watershed monitoring data, data analyses, and assessments required pursuant to Provision D.4, to assess the following:

(a) The beneficial uses of the receiving waters within the San Diego Region that are protected or must be restored;

[23] Data must be uploaded to CEDEN Southern California Regional Data Center (http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx) using the templates provided on the CEDEN website.

(b) The progress toward restoring impacted beneficial uses in the receiving waters within the San Diego Region; and

(c) Pollutants or conditions of emerging concern that may impact beneficial uses in the receiving waters within the San Diego Region.

(2) The Regional Monitoring and Assessment Report must include recommendations for improving the implementation and assessment of the Water Quality Improvement Plans and jurisdictional runoff management programs, where feasible.

(3) Each Copermittee must provide any data or documentation utilized in developing the Regional Monitoring and Assessment Report upon request by the San Diego Water Board. Any monitoring and assessment data utilized in developing the Regional Monitoring and Assessment Report must be provided as ~~on the Regional Clearinghouse~~ required pursuant to Provision F.4.

4. ~~Regional Clearinghouse~~ Mechanism for Data and Information Sharing[24]

The Copermittees must identify and implement a mechanism to ~~develop, update, and maintain an internet-based Regional Clearinghouse that can be used to~~ store, disseminate, and share the Copermittees' Water Quality Improvement Plans, Annual Reports, jurisdictional runoff management program documents, monitoring data, special studies, and ~~any~~ other pertinent data or information generated by the Copermittees during the implementation of this Order. Monitoring data collected pursuant to Provision D must be uploaded to CEDEN~~,~~[25] ~~with links to the uploaded data available on the Regional Clearinghouse~~. ~~The Regional Clearinghouse may be linked to other internet-based data portals and databases where the original documents and data are stored.~~ ~~The Regional Clearinghouse~~Copermittees must make this information~~be~~ available and accessible to members of the public. The ~~Regional Clearinghouse~~mechanism for sharing Copermittee data and information must be developed and made available to the public no later than 18~~2~~ months after the adoption of this Order.

5. Report of Waste Discharge

a. The Orange County Copermittees and the Riverside County Copermittees, are required to submit a complete ROWD pursuant to the requirements of their

[24] The Copermittees may elect to develop and maintain the clearinghouse(s) provided by other Copermittees or agencies.

[25] Data must be uploaded to CEDEN Southern California Regional Data Center (http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx) using the templates provided on the CEDEN website.

current Orders and are enrolled under this Order upon expiration of their current Orders. Upon expiration of their current Orders, the Copermittees in each county must comply with the requirements of this Order by July 1 after enrollment under this Order, unless early enrollment is granted pursuant to Provision F.6 of this Order. The current Orders for the Orange County Copermittees and Riverside County Copermittees are rescinded upon their expiration date except for enforcement purposes.

b. The Copermittees must submit to the San Diego Water Board a complete ROWD as an application for the re-issuance of this NPDES permit. The ROWD must be submitted no later than 180 days in advance of the expiration date of this Order. The Copermittees may elect to develop and submit the ROWD individually or collaboratively. The ROWD must contain the following minimum information:

(1) Names and addresses of the Copermittees;

(2) Names and titles of the primary contacts of the Copermittees;

(3) Proposed changes to the Copermittees' Water Quality Improvement Plans and the supporting justification;

(4) Proposed changes to the Copermittees' jurisdictional runoff management programs and the supporting justification;

(5) Any other information necessary for the re-issuance of this Order; and

(6) Any other information required by federal regulations for NPDES permit reissuance.

6. Application for Early Enrollment

a. The Orange County Copermittees, collectively, or Riverside County Copermittees, collectively, may apply for early enrollment under this Order by submitting a Report of Waste Discharge Form 200 for each individual Copermittee in the respective county, with a written request for early enrollment under this Order that certifies the following conditions have been met:

(1) A Water Quality Improvement Plan has been developed in accordance with the requirements of Provision B, which can and will be implemented immediately upon enrollment under this Order;

(2) Each Copermittee in the county has updated its jurisdictional runoff management program document to incorporate the requirements of Provision E, which can and will be implemented immediately upon enrollment under this Order; and

(3) Each Copermittee in the county has updated its BMP Design Manual to incorporate the requirements of Provision E.3.d, which can and will be implemented immediately upon enrollment under this Order.

b. The San Diego Water Board will review the application for early enrollment and associated documents for completeness. A Notice of Enrollment (NOE) under this Order will be issued to the Copermittees in the respective county by the San Diego Water Board upon completion of the early enrollment application requirements. The effective enrollment date will be specified in the NOE and the Copermittees in the respective county are authorized to have MS4 discharges pursuant to the requirements of this Order starting on the date specified in the NOE. The existing Order for that county is rescinded upon the effective enrollment date specified in the NOE except for enforcement purposes.

7. Reporting Provisions

Each Copermittee must comply with all the reporting and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

G. PRINCIPAL WATERSHED COPERMITTEE RESPONSIBILITIES

1. The Copermittees within each Watershed Management Area must designate a Principal Watershed Copermittee and notify the San Diego Water Board of the name of the Principal Watershed Copermittee. ~~An individual Copermittee should not be designated a Principal Watershed Copermittee for more than two Watershed Management Areas.~~ The notification may be submitted with the Water Quality Improvement Plan required pursuant to Provision F.1 of this Order.

2. The Principal Watershed Copermittee is responsible for, at a minimum, the following:

   a. Serving as liaison between the Copermittees in the Watershed Management Area and the San Diego Water Board on general permit issues, and when necessary and appropriate, representing the Copermittees in the Watershed Management Area before the San Diego Water Board.

   b. Facilitating the development of the Water Quality Improvement Plan in accordance with the requirements of Provision B of this Order

   c. Coordinating the submittal of the deliverables required by Provisions F.1, F.2, F.3.a, and F.3.b of this Order.

   d. Coordinating and developing, with the other ~~Principal Watershed~~ Copermittees, the requirements of Provisions F.3.c, F.4, and F.5.b of this Order.

H. MODIFICATION OF PROGRAMS

1. Modifications of the Order may be initiated by the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the San Diego Water Board.

2. Minor modifications to the Order may be made by the San Diego Water Board where the proposed modification complies with all the prohibitions and limitations, and other requirements of this Order.

3. Proposed modifications outside of the WQIP process that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

I. STANDARD PERMIT PROVISIONS AND GENERAL PROVISIONS

Each Copermittee must comply with all the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

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ATTACHMENT A

DISCHARGE PROHIBITIONS

1. Basin Plan Waste Discharge Prohibitions

California Water Code Section 13243 provides that a Regional Water Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste or certain types of waste is not permitted. The following waste discharge prohibitions in the Water Quality Control Plan for the San Diego Basin (Basin Plan) are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by a National Pollutant Discharge Elimination System (NPDES) permit or a dredged or fill material permit (subject to the exemption described in California Water Code Section 13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this San Diego Water Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services (DHS) and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the San Diego Water Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the San Diego Water Board.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the San Diego Water Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "*storm water*" is prohibited unless authorized by the San Diego Water Board. [The federal regulations, 40 CFR 122.26(b)(13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities.] [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the San Diego Water Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

16. The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

17. The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

18. The discharge of treated sewage from vessels, which do not have a properly functioning US Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at mean lower low water (MLLW) is prohibited.

2. Attachment B to State Water Board Resolution 2012-~~001X~~ 0012

Copermittees that discharge into Areas of Special Biological Significance must comply with State Water Board Resolution No. 2012-0012.

~~**Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges**~~

~~I. PROVISIONS FOR POINT SOURCE DISCHARGES OF STORM WATER AND NONPOINT SOURCE WASTE DISCHARGES~~

~~The following terms, prohibitions, and special conditions (hereafter collectively referred to as special conditions) are established as limitations on point source storm water and nonpoint source discharges. These special conditions provide Special Protections for marine aquatic life and natural water quality in Areas of Special Biological Significance (ASBS), as required for State Water Quality Protection Areas pursuant to California Public Resources Code Sections 36700(f) and 36710(f). These Special Protections are adopted by the State Water Board as part of the California Ocean Plan (Ocean Plan) General Exception.~~

~~The special conditions are organized by category of discharge. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) will determine categories and the means of regulation for those categories [e.g., Point Source Storm Water National Pollutant Discharge Elimination System (NPDES) or Nonpoint Source].~~

~~**A. PERMITTED POINT SOURCE DISCHARGES OF STORM WATER**~~

~~1. General Provisions for Permitted Point Source Discharges of Storm Water~~

~~a. Existing storm water discharges into an ASBS are allowed only under the following conditions:~~

~~(1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;~~

~~(2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in these Special Protections; and~~

~~(3) The discharges:~~

~~(i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;~~

~~(ii) Are designed to prevent soil erosion;~~

~~(iii) Occur only during wet weather;~~

~~(iv) Are composed of only storm water runoff.~~

~~b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.~~

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~~c. The discharge of trash is prohibited. Minimize the discharge of trash to the maximum extent practicable over the course of the permit term.~~

~~d. Only discharges from existing storm water outfalls are allowed. Any proposed or new storm water runoff discharge shall be routed to existing storm water discharge outfalls and shall not result in any new contribution of waste to an ASBS (i.e., no additional pollutant loading). "Existing storm water outfalls" are those that were constructed or under construction prior to January 1, 2005. "New contribution of waste" is defined as any addition of waste beyond what would have occurred as of January 1, 2005. A change to an existing storm water outfall, in terms of re-location or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.~~

~~e. Non-storm water discharges are prohibited except as provided below:~~

~~(1) The term "non-storm water discharges" means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.~~

~~(2) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:~~

~~(i) Discharges associated with emergency fire fighting operations.~~

~~(ii) Foundation and footing drains.~~

~~(iii) Water from crawl space or basement pumps.~~

~~(iv) Hillside dewatering.~~

~~(v) Naturally occurring groundwater seepage via a storm drain.~~

~~(vi) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.~~
~~Rising ground waters.~~
~~Springs.~~
~~Flows from riparian habitats and wetlands.~~
~~Discharges from potable water sources.~~
~~Uncontaminated pumped groundwater.~~
~~Water line flushing.~~
~~Water main breaks.~~

~~(3) Authorized non-storm water discharges shall not have a reasonable potential to cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.~~

~~2. Compliance Plans for Inclusion in Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP).~~

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~~The discharger shall specifically address the prohibition of non-storm water runoff and the goal ofrequirement to maintaining natural water quality for storm water discharges to an ASBS in an ASBS Compliance Plan to be included in its SWMP or a SWPPP, as appropriate to permit type. If a statewide permit includes a SWMP, then the discharger shall prepare a stand-alone compliance plan for ASBS discharges . The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (for permits issued by Regional Water Boards).~~

~~a. The Compliance Plan shall include a map of surface drainage of storm water runoff, showing areas of sheet runoff, prioritize discharges, and describe any structural Best Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat and which are identified to require installation of structural, non-structural, and/or source BMPs, as feasible. The map shall also show the storm water conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion, and waste and hazardous material storage areas, if applicable. The SWMP or SWPPP shall also include a procedure for updating the map and plan when changes are made to the storm water conveyance facilities.~~

~~b. The ASBS Compliance Plan shall describe the measures by which all non-authorized non-storm water runoff (e.g., dry weather flows) has been reduced and/or preventedeliminated, how these measures will be maintained over time, and how these measures are monitored and documented.~~

~~c. For Municipal Separate Storm Sewer System (MS4s), the ASBS Compliance Plan shall require minimum inspection frequencies as follows:~~

~~(1) The minimum inspection frequency for construction sites shall be weekly during rainy season;~~

~~(2) The minimum inspection frequency for industrial facilities shall be monthly during the rainy season;~~

~~(3) The minimum inspection frequency for commercial facilities (e.g., restaurants) shall be twice during the rainy season; and~~

~~(4) Storm water outfall drains equal to or greater than 18 inches (457 mm) in diameter or width shall be inspected once prior to the beginning of the rainy season and once during the rainy season and maintained to remove trash and other anthropogenic debris.~~

~~d. The ASBS Compliance Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural, non-structural, and/or source control BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that such installation would pose a threat to health or safety. BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be~~

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~~designed to the maximum extent practicable. achieve on average the following target levels:~~

~~(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or~~

~~(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges. The baseline for the reduction is the effective date of the Exception. The baseline for these determinations is the effective date of the Exception, and the reductions must be achieved and documented within four (4) years of the effective date.~~

~~e. The ASBS Compliance Plan shall address erosion control and the prevention of anthropogenic sedimentation in ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.~~

~~f. The ASBS Compliance Plan shall describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule. The ASBS Compliance Plan shall include non-structural BMPs that address public education and outreach. Education and outreach efforts must adequately inform the public that direct discharges of pollutants from private property not entering an MS4 are prohibited. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development (LID) measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control storm water runoff discharges (at the end-of-pipe) during a design storm, permittees must first consider using LID practices to infiltrate, use, or evapotranspirate storm water runoff on-site.~~

~~g. The BMPs and implementation schedule shall be designed to ensurewith the goal that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.~~

~~h. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results.~~

~~(1) The report shall identify the constituents in storm water runoff that alter natural ocean water quality and the sources of these constituents.~~

~~(2) The report shall describe BMPs that are currently being implemented, BMPs that are identified in the SWMP or SWPPP for future implementation, and any additional BMPs that may be added to the SWMP or SWPPP to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.~~

~~(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits), the discharger shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required.~~

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~~(4) As long as the discharger has complied with the procedures described above and is implementing the revised SWMP or SWPPP, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent.~~

~~(5) Compliance with this section does not excuse violations of any term, prohibition, or condition contained in these Special Protections.~~

~~3. Compliance Schedule~~

~~a. On the effective date of the Exception, all Discharger shall obtain the legal authority necessary to prevent and eliminate non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.~~

~~b. Within one year from the effective date of the Exception, the discharger shall submit a written ASBS Compliance Plan to the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that describes its strategy to comply with these special conditions, including the requirement goal to maintain natural water quality in the affected ASBS. The ASBS Compliance Plan shall include a time schedule to implement appropriate non-structural and structural controls (implementation schedule) to comply with these special conditions for inclusion in the discharger's SWMP or SWPPP, as appropriate to permit type.~~

~~c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these special conditions shall be implemented.~~

~~d. Within four (4) years of the effective date of the Exception, any structural controls identified in the ASBS Compliance Plan that are necessary to comply with these special conditions shall be operational.~~

~~e. Within four (4) years of the effective date of the Exception, all dischargers must implement non-structural and/or structural BMPs to assist in meeting the goal comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water, pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data, and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.~~

~~f. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.~~

~~If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to~~

~~this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.~~

~~The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:~~

~~(1) for municipalities, a demonstration of significant hardship to discharger ratepayers, by showing the relationship of storm water fees to annual household income for residents within the discharger's jurisdictional area, and the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or~~
~~(2) for other governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process.~~

~~B. NONPOINT SOURCE DISCHARGES~~

~~[NOT INCLUDED]~~
~~[PROVISIONS FOR NONPOINT SOURCE DISCHARGES NOT APPLICABLE]~~

~~II. ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES~~

~~[NOT INCLUDED]~~
~~[ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES NOT APPLICABLE]~~

~~III. ADDITIONAL REQUIREMENTS – WATERFRONT AND MARINE OPERATIONS~~

~~[NOT INCLUDED]~~
~~[ADDITIONAL REQUIREMENTS FOR WATERFRONT AND MARINE OPERATIONS NOT APPLICABLE]~~

~~IV. MONITORING REQUIREMENTS~~

~~Monitoring is mandatory for all dischargers to assure compliance with the Ocean Plan. Monitoring requirements include both: (A) core discharge monitoring, and (B) ocean receiving water monitoring. The State and Regional Water Boards must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).~~

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~~Safety concerns: Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notification to the State and Regional Water Boards if hazardous conditions prevail.~~

~~Analytical Chemistry Methods: All constituents must be analyzed using the lowest minimum detection limits comparable to the Ocean Plan water quality objectives. For metal analysis, all samples, including storm water effluent, reference samples, and ocean receiving water samples, must be analyzed by the approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the Ocean Plan.~~

~~A. CORE DISCHARGE MONITORING PROGRAM~~

~~1. General sampling requirements for timing and storm size:~~

~~Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected when post-storm receiving water is sampled, and analyzed for the same constituents as receiving water and reference site samples (see section IV B) as described below.~~

~~2. Runoff flow measurements~~

~~a. For municipal/industrial storm water outfalls in existence as of December 31, 2007, 18 inches (457mm) or greater in diameter/width (including multiple outfall pipes in combination having a width of 18 inches, runoff flows must be measured or calculated, using a method acceptable to and approved by the State and Regional Water Boards.~~

~~b. This will be reported annually for each precipitation season to the State and Regional Water Boards.~~

~~3. Runoff samples – storm events~~

~~a. For outfalls equal to or greater than 18 inches (0.46m) in diameter or width:~~

~~(1) samples of storm water runoff shall be analyzed during the same storm as receiving water samples for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination, ; and~~

~~(2) samples of storm water runoff shall be analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS~~

~~(3) If an applicant has no outfall greater than 36 inches, then storm water runoff from the applicant's largest outfall shall be further analyzed during the same storm as receiving water samples for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates).~~

~~b. For outfalls equal to or greater than 36 inches (0.91m) in diameter or width:~~

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~~(1) samples of storm water runoff shall be analyzed during the same storm as receiving water samples for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and~~

~~(2) samples of storm water runoff shall be further analyzed during the same storm as receiving water samples for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates) and~~

~~(3) samples of storm water runoff shall be analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.~~

~~c. For an applicant not participating in a regional monitoring program [see below in Section IV (B)] in addition to (a.) and (b.) above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Ocean Plan Table A constituents, Table B constituents for marine aquatic life protection (except for toxicity, only chronic toxicity for three species shall be required), DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, and Ocean Plan indicator bacteria. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each Region.~~

~~4. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.~~

~~B. OCEAN RECEIVING WATER AND REFERENCE AREA MONITORING PROGRAM~~

~~In addition to performing the Core Discharge Monitoring Program in Section II.A above, all applicants having authorized discharges must perform ocean receiving water monitoring. In order to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS, dischargers may choose either (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program.~~

~~1. Individual Monitoring Program: The requirements listed below are for those dischargers who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met:~~

~~a. Three times annually, during wet weather (storm events), the receiving water at the point of discharge from the outfalls described in section (IV)(A)(3)(c) above shall be sampled and analyzed for Ocean Plan Table A constituents, Table B constituents for marine~~

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~~aquatic life, DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and Ocean Plan indicator bacteria.~~

~~The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where storm water runoff is sampled. Receiving water shall be sampled at approximately the same time prior to (pre-storm) and during (or immediately after) the same storm (post storm). Reference water quality shall also be sampled and analyzed for the same constituents pre-storm and post-storm, during the same storms when receiving water is sampled. Reference stations will be determined by the State Water Board's Division of Water Quality and the applicable Regional Water Board(s).~~

~~b. Sediment sampling shall occur at least three times during every five (5) year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Ocean Plan Table B constituents for marine aquatic life, DDT, PCBs, PAHs, pyrethroids, and OP pesticides. For sediment toxicity testing, only an acute toxicity test using the amphipod Eohaustorius estuarius must be performed.~~

~~c. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and at a reference site. The survey shall be performed at least once every five (5) year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.~~

~~d. Once during each five (5) year period, a bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge sites and at representative reference sites. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (Mytilus californianus) and/or sand crabs (Emerita analoga or Blepharipoda occidentalis). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, or add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.~~

~~e. Marine Debris: Representative quantitative observations for trash by type and source shall be performed along the coast of the ASBS within the influence of the discharger's outfalls. The design, including locations and frequency, of the marine debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.~~

~~f. The monitoring requirements of the Individual Monitoring Program in this section are minimum requirements. After a minimum of one (1) year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board (statewide permits) or Executive officer of the Regional Water Board (Regional Water Board permits) may require additional monitoring, or adjust, reduce or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.~~

~~2. Regional Integrated Monitoring Program: Dischargers may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise prescribed individual monitoring approach (in Section IV.B.1) if approved by the State Water Board's Division of Water Quality and the Regional Water Boards.~~

~~a. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10% development), and shall not be located in CWA Section 303(d) listed waterbodies or have tributaries that are 303(d) listed. Reference areas shall be free of wastewater discharges and anthropogenic non-storm water runoff. A minimum of low threat storm runoff discharges (e.g. stream highway overpasses and campgrounds) may be allowed on a case-by-case basis. Reference areas shall be located in the same region as the ASBS receiving water monitoring occurs. The reference areas for each Region are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.~~

~~b. ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e. at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e. co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.~~

~~c. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected when annual storm water runoff is sampled. Sampling shall occur in a minimum of two storm seasons. For those ASBS dischargers that have already participated in the Southern California Bight 2008 ASBS regional monitoring effort, sampling may be limited to only one storm season.~~

~~d. Receiving water and reference samples shall be analyzed for the same constituents as storm water runoff samples. At a minimum, constituents to be sampled and analyzed in~~

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~~reference and discharge receiving waters must include oil and grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, Ocean Plan PAHs, pyrethroids, OP pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed.~~

~~3. Waterfront and Marine Operations: In addition to the above requirements for ocean receiving water monitoring, additional monitoring must be performed for marinas and boat launch and pier facilities:~~

~~a. For all marina or mooring field operators, in mooring fields with 10 or more occupied moorings, the ocean receiving water must be sampled for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.~~

~~(1) For mooring field operators opting for an individual monitoring program (Section IV.B.1 above), this sampling must occur weekly (on the weekend) from May through October.~~

~~(2) For mooring field operators opting to participate in a regional integrated monitoring program (Section IV.B.2 above), this sampling must occur monthly from May through October on a high use weekend in each month. The Water Boards may allow a reduction in the frequency of sampling, through the regional monitoring program, after the first year of monitoring.~~

~~b. For all mooring field operators, the subtidal sediment (sand or finer, if present) within mooring fields and below piers shall be sampled and analyzed for Ocean Plan Table B metals (for marine aquatic life beneficial use), acute toxicity, PAHs, and tributyltin. For sediment toxicity testing, only an acute toxicity test using the amphipod Eohaustorius estuarius must be performed. This sampling shall occur at least three times during a five (5) year period. For mooring field operators opting to participate in a regional integrated monitoring program, the Water Boards may allow a reduction in the frequency of sampling after the first sampling effort's results are assessed.~~

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ATTACHMENT B

STANDARD PERMIT PROVISIONS AND GENERAL PROVISIONS

1. Standard Permit Provisions

Code of Federal Regulations Title 40 Section 122.41 (40 CFR 122.41) includes conditions, or provisions, that apply to all National Pollutant Discharge Elimination System (NPDES) permits. Additional provisions applicable to NPDES permits are in 40 CFR 122.42. All applicable provisions in 40 CFR 122.41 and 40 CFR 122.42 must be incorporated into this Order and NPDES permit. The applicable 40 CFR 122.41 and 40 CFR 122.42 provisions are as follows:

a. DUTY TO COMPLY [40 CFR 122.41(a)]

The Copermittee must comply with all of the provisions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

(1) The Copermittee must comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement. [40 CFR 122.41(a)(1)]

(2) The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the CWA, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who *negligently* violates Section 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the CWA, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of

not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.
[40 CFR 122.41(a)(2)]

(3) Any person may be assessed an administrative penalty by the San Diego Regional Water Quality Control Board (San Diego Water Board), State Water Resources Control Board (State Water Board), or United States Environmental Protection Agency (USEPA) for violating Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.
[40 CFR 122.41(a)(3)]

b. DUTY TO REAPPLY [40 CFR 122.41(b)]

If a Copermittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Copermittee must apply for and obtain a new permit.

c. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE [40 CFR 122.41(c)]

It shall not be a defense for a Copermittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

d. DUTY TO MITIGATE [40 CFR 122.41(d)]

The Copermittee must take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

e. PROPER OPERATION AND MAINTENANCE [40 CFR 122.41(e)]

The Copermittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Copermittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a Copermittee only when the operation is necessary to achieve compliance with the conditions of this permit.

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f. PERMIT ACTIONS [40 CFR 122.41(f)]

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Copermittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

g. PROPERTY RIGHTS [40 CFR 122.41(g)]

This permit does not convey any property rights of any sort, or any exclusive privilege.

h. DUTY TO PROVIDE INFORMATION [40 CFR 122.41(h)]

The Copermittee must furnish to the San Diego Water Board, State Water Board, or USEPA within a reasonable time, any information which the San Diego Water Board, State Water Board, or USPEA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Copermittee must also furnish to the San Diego Water Board, State Water Board, or USPEA upon request, copies of records required to be kept by this permit.

i. INSPECTION AND ENTRY [40 CFR 122.41(i)]

The Copermittee must allow the San Diego Water Board, State Water Board, USEPA, and/or their authorized representative (including an authorized contractor acting as their representative), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the Copermittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit; [40 CFR 122.41(i)(1)]

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit; [40 CFR 122.41(i)(2)]

(3) Inspect and photograph at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; [40 CFR 122.41(i)(3)] and

(4) Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location. [40 CFR 122.41(i)(4)]

j. MONITORING AND RECORDS [40 CFR 122.41(j)]

(1) Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity. [40 CFR 122.41(j)(1)]

(2) Except for records of monitoring information required by this permit related to the Copermittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR Part 503), the

Copermittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board at any time. [40 CFR 122.41(j)(2)]

(3) Records for monitoring information must include: [40 CFR 122.41(j)(3)]

(a) The date, exact place, and time of sampling or measurements; [40 CFR 122.41(j)(3)(i)]
(b) The individual(s) who performed the sampling or measurements; [40 CFR 122.41(j)(3)(ii)]
(c) The date(s) analyses were performed; [40 CFR 122.41(j)(3)(iii)]
(d) The individual(s) who performed the analyses; [40 CFR 122.41(j)(3)(iv)]
(e) The analytical techniques or methods used; [40 CFR 122.41(j)(3)(v)] and
(f) The results of such analyses. [40 CFR 122.41(j)(3)(vi)]

(4) Monitoring must be conducted according to test procedures under 40 CFR Part 136 unless another method is required under 40 CFR Subchapters N or O. [40 CFR 122.41(j)(4)]

In the case of pollutants for which there are no approved methods under 40 CFR Part 136 or otherwise required under 40 CFR Subchapters N and O, monitoring must be conducted according to a test procedure specified in the permit for such pollutants. [40 CFR 122.44(i)(1)(iv)]

(5) The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. [40 CFR 122.41(j)(5)]

k. SIGNATORY REQUIREMENT [40 CFR 122.41(k)]

(1) All applications, reports, or information submitted to the San Diego Water Board, State Water Board, or USEPA must be signed and certified. (See 40 CFR 122.22) [40 CFR 122.41(k)(1)]

(a) *For a municipality, State, Federal, or other public agency.* [All applications must be signed] [b]y either a principal executive officer or ranking elected official. [40 CFR 122.22(a)(3)]

(b) All reports required by permits, and other information requested by the San Diego Water Board, State Water Board, or USEPA must be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if: [40 CFR 122.22(b)]

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(i) The authorization is made in writing by a person described in paragraph (a) of this section; [40 CFR 122.22(b)(1)]

(ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company, (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) [40 CFR 122.22(b)(2)] and,

(iii) The written authorization is submitted to the San Diego Water Board and State Water Board. [40 CFR 122.22(b)(3)]

(c) *Changes to authorization.* If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the San Diego Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative. [40 CFR 122.22(c)]

(d) *Certification.* Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." [40 CFR 122.22(d)]

(2) The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both. [40 CFR 122.41(k)(2)]

I. REPORTING REQUIREMENTS [40 CFR 122.41(l)]

(1) *Planned changes.* The Copermittee must give notice to the San Diego Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when: [40 CFR 122.41(l)(1)]

(a) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); [40 CFR 122.41(l)(1)(i)] or

(b) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which

are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).
[40 CFR 122.41(l)(1)(ii)]

(c) The alteration or addition results in a significant change in the Copermittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. [40 CFR 122.41(l)(1)(iii)]

(2) *Anticipated noncompliance*. The Copermittee must give advance notice to the San Diego Water Board or State Water Board of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
[40 CFR 122.41(l)(2)]

(3) *Transfers*. This permit is not transferable to any person except after notice to the San Diego Water Board. The San Diego Water Board may require modification or revocation and reissuance of the permit to change the name of the Copermittee and incorporate such other requirements as may be necessary under the CWA.
[40 CFR 122.41(l)(3)]

(4) *Monitoring reports.* Monitoring results must be reported at the intervals specified elsewhere in this permit. [40 CFR 122.41(l)(4)]

(a) Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the San Diego Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. [40 CFR 122.41(l)(4)(i)]

(b) If the Copermittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or another method required for an industry-specific waste stream under 40 CFR Subchapters N or O, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the San Diego Water Board or State Water Board.
[40 CFR 122.41(l)(4)(ii)]

(c) Calculations for all limitations which require averaging of measurements must utilize an arithmetic mean unless otherwise specified in the permit.
[40 CFR 122.41(l)(4)(iii)]

(5) *Compliance schedules*. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date. [40 CFR 122.41(l)(5)]

(6) *Twenty-four hour reporting.*

(a) The Copermittee must report any noncompliance that may endanger health or the environment. Any information must be provided orally within 24 hours from the time the Copermittee becomes aware of the circumstances. A written submission must also be provided within five (5) days of the time the Copermittee becomes aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6)(i)]

(b) The following must be included as information which must be reported within 24 hours under this paragraph: [40 CFR 122.41(l)(6)(ii)]

(i) Any unanticipated bypass that exceeds any effluent limitation in the permit (See 40 CFR 122.41(g)). [40 CFR 122.41(l)(6)(ii)(A)]
(ii) Any upset which exceeds any effluent limitation in the permit. [40 CFR 122.41(l)(6)(ii)(B)] and,
(iii) Violation of a maximum daily discharge limitation for any of the pollutants listed by the San Diego Water Board in the permit to be reported within 24 hours. (See 40 CFR 122.44(g)) [40 CFR 122.41(l)(6)(ii)(C)]

(c) The San Diego Water Board may waive the above-required written report on a case-by-case basis if the oral report has been received within 24 hours. [40 CFR 122.41(l)(6)(iii)]

(7) *Other noncompliance.* The Copermittee must report all instances of noncompliance not reported in accordance with the standard provisions required under 40 CFR 122.41(l)(4), (5), and (6), at the time monitoring reports are submitted. The reports must contain the information listed in the standard provisions required under 40 CFR 122.41(l)(6). [40 CFR 122.41(l)(7))]

(8) *Other information.* When the Copermittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the San Diego Water Board, State Water Board, or USEPA, the Copermittee must promptly submit such facts or information. [40 CFR 122.41(l)(8)]

~~**m. BYPASS** [40 CFR 122.41(m)]~~

~~(1) *Definitions.*~~

~~(a) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. [40 CFR 122.41(m)(1)(i)] or~~

~~(b) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. [40 CFR 122.41(m)(1)(ii)]~~

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~~(2) *Bypass not exceeding limitations.* The Copermittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the standard provisions required under 40 CFR 122.41(m)(3) and (4). [40 CFR 122.41(m)(2)]~~

~~(3) *Notice.*~~

~~(a) *Anticipated bypass.* If the Copermittee knows in advance of the need for a bypass, it must submit a notice, if possible at least ten days before the date of the bypass. [40 CFR 122.41(m)(3)(i)] or~~

~~(b) *Unanticipated bypass.* The Copermittee must submit notice of an unanticipated bypass in accordance with the standard provisions required under 40 CFR 122.41(l)(6) (24-hour notice). [40 CFR 122.41(m)(3)(ii)]~~

~~(4) *Prohibition of Bypass.*~~

~~(a) Bypass is prohibited, and the San Diego Water Board may take enforcement action against a Copermittee for bypass, unless: [40 CFR 122.41(m)(4)(i)]~~

~~(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; [40 CFR 122.41(m)(4)(i)(A)]~~
~~(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; [40 CFR 122.41(m)(4)(i)(B)] and,~~
~~(iii) The Copermittee submitted notice in accordance with the standard provisions required under 40 CFR 122.41(m)(3). [40 CFR 122.41(m)(4)(i)(C)]~~

~~(b) The San Diego Water Board may approve an anticipated bypass, after considering its adverse effects, if the San Diego Water Board determines that it will meet the three conditions listed above. [40 CFR 122.41(m)(4)(ii)]~~

~~n.~~m. **UPSET** [40 CFR 122.41(n)]

(1) *Definition.* "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Copermittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. [40 CFR 122.41(n)(1)]

(2) *Effect of an upset*. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the standard provisions required under 40 CFR 122.41(n)(3) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. [40 CFR 122.41(n)(2)]

(3) *Conditions necessary for a demonstration of upset*. A Copermittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that: [40 CFR 122.41(n)(3)]

(a) An upset occurred and that the Copermittee can identify the cause(s) of the upset; [40 CFR 122.41(n)(3)(i)]
(b) The permitted facility was at the time being properly operated; [40 CFR 122.41(n)(3)(ii)] and
(c) The Copermittee submitted notice of the upset in accordance with the standard provisions required under 40 CFR 122.41(l)(6)(ii)(B) (24-hour notice). [40 CFR 122.41(n)(3)(iii)]
(d) The Copermittee complied with any remedial measures pursuant to the standard provisions required under 40 CFR 122.41(d). [40 CFR 122.41(n)(3)(iii)]

(4) *Burden of proof*. In any enforcement proceeding, the Copermittee seeking to establish the occurrence of an upset has the burden of proof. [40 CFR 122.41(n)(4)]

~~o.~~n. **STANDARD PERMIT PROVISIONS FOR MUNICIPAL SEPARATE STORM SEWER SYSTEMS**
[40 CFR 122.42(c)]

The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the San Diego Water Board or State Water Board under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report must include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions; [40 CFR 122.42(c)(1)]

(2) Proposed changes to the storm water management programs that are established as permit conditions. Such proposed changes must be consistent with 40 CFR 122.26(d)(2)(iii); [40 CFR 122.42(c)(2)] and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under 40 CFR 122.26(d)(2)(iv) and (v); [40 CFR 122.42(c)(3)]

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; [40 CFR 122.42(c)(4)]

(5) Annual expenditures and budget for year following each annual report;

[40 CFR 122.42(c)(5)]

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; [40 CFR 122.42(c)(6)]

(7) Identification of water quality improvements or degradation. [40 CFR 122.42(c)(7)]

~~p.~~o. **STANDARD PERMIT PROVISIONS FOR STORM WATER DISCHARGES** [40 CFR 122.42(d)]

The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) must require compliance with the conditions of the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

2. General Provisions

In addition to the standard provisions required to be incorporated into the Order and NPDES permit pursuant to 40 CFR 122.41 and 40 CFR 122.42, several other general provisions apply to this Order. The general provisions applicable to this Order and NPDES permit are as follows:

a. DISCHARGE OF WASTE IS A PRIVILEGE

No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights. [CWC Section 13263(g)]

b. DURATION OF ORDER AND NPDES PERMIT

(1) *Effective date*. This Order and NPDES permit becomes effective on the date of its adoption provided the USEPA has no objection. If the USEPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. R9-2007-0001 upon the effective date of this Order, and supercedes Order Nos. R9-2009-0002 and R9-2010-0016 upon their expiration.

(2) *Expiration*. This Order and NPDES permit expires five years after adoption. [40 CFR 122.46(a)]

(3) *Continuation of expired order*. After this Order and NPDES permit expires, the terms and conditions of this Order and NPDES permit are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

c. AVAILABILITY

A copy of this Order must be kept at a readily accessible location and must be available to on-site personnel at all times.

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d. CONFIDENTIALITY OF INFORMATION

Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the San Diego Water Board office.

Claims of confidentiality for the following information will be denied:
[40 CFR 122.7(b)]

(1) The name and address of any permit applicant or Copermittee;
[40 CFR 122.7(b)(1)] and

(2) Permit applications and attachments, permits, and effluent data.
[40 CFR 122.7(b)(2)]

e. EFFLUENT LIMITATIONS

(1) *Interim effluent limitations*. The Copermittee must comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by the San Diego Water Board.

(2) *Other effluent limitations and standards*. If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in the permit, the San Diego Water Board shall institute proceedings under these regulations to modify or revoke and reissue the permit to conform to the toxic effluent standard or prohibition. [40 CFR 122.44(b)(1)]

f. DUTY TO MINIMIZE OR CORRECT ADVERSE IMPACTS

The Copermittee must take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

g. PERMIT ACTIONS

The filing of a request by the Copermittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order. (See 40 CFR 122.41(f)) In addition, the following provisions apply to this Order:

(1) Upon application by any affected person, or on its own motion, the San Diego Water Board may review and revise the requirements in this Order. All requirements must be reviewed periodically. [CWC Section 13263(e)]

(2) This Order may be terminated or modified for cause, including, but not limited to, all of the following: [CWC Section 13381]

(a) Violation of any condition contained in the requirements of this Order. [CWC Section 13381(a)]

(b) Obtaining the requirements in this Order by misrepresentation, or failure to disclose fully all relevant facts. [CWC Section 13381(b)]

(c) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. [CWC Section 13381(c)]

(3) When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

h. NPDES PERMITTED NON-STORM WATER DISCHARGES

The San Diego Water Board has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The San Diego Water Board or State Water Board may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to an MS4.

i. MONITORING

In addition to the standard provisions required under 40 CFR 122.41(j) and (l)(4), the following general monitoring provisions apply to this Order:

(1) Where procedures are not otherwise specified in Order, sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's Surface Water Ambient Monitoring Program (SWAMP), adopted by the State Water Resources Control Board (State Water Board).

(2) Pursuant to 40 CFR 122.41(j)(2) and CWC Section 13383(a), each Copermittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least five (5) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board at any time.

(3) All chemical, bacteriological, and toxicity analyses must be conducted at a laboratory certified for such analyses by the California Department of Public Health or a laboratory approved by the San Diego Water Board.

(4) For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Copermittees must instruct their laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Copermittee can demonstrate that a particular ML is not attainable, in accordance

with procedures set forth in 40 CFR Part 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Copermittee must submit documentation from the laboratory to the San Diego Water Board for approval prior to raising the ML for any priority toxic pollutant.

j. ENFORCEMENT

(1) The San Diego Water Board is authorized to enforce the terms of this Order under several provisions of the CWC, including, but not limited to, CWC Sections 13385, 13386, and 13387.

(2) Nothing in this Order shall be construed to protect the Copermittee from its liabilities under federal, state, or local laws.

(3) The CWC provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

(4) Except as provided in the standard conditions required under 40 CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the Copermittee from civil or criminal penalties for noncompliance.

(5) Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties to which the Copermittee is or may be subject to under Section 311 of the CWA.

(6) Nothing in this Order shall be construed to preclude institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

k. SEVERABILITY

The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

l. APPLICATIONS

Any application submitted by a Copermittee for reissuance or modification of this Order must satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the California Code of Regulations.

m. IMPLEMENTATION

All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

n. REPORT SUBMITTALS

(1) All report submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

(2) Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal.

(3) The Principal Watershed Copermittee(s) must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

(4) Unless otherwise directed, the Copermittees must submit one hard copy and one electronic copy of each report required under this Order to the San Diego Water Board, and one electronic copy to the USEPA.

(5) The Copermittees must submit reports and provide notifications as required by this Order to the following:

EXECUTIVE OFFICER
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

ADMINISTRATIVE DRAFT

ATTACHMENT C

ACRONYMS AND ABBREVIATIONS

AMAL	Average Monthly Action Level
ASBS	Area(s) of Special Biological Significance
BMP	Best Management Practice
~~BMP Design Manual~~	~~Permanent BMP Sizing Criteria Design Manual~~
Basin Plan	Water Quality Control Plan for the San Diego Basin
CEQA	California Environmental Quality Act
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
ERP	Enforcement Response Plan
ESAs	Environmentally Sensitive Areas
GIS	Geographic Information System
IBI	Index of Biotic Integrity
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
ML	Minimum Level
MS4	Municipal Separate Storm Sewer System
NAL	Non-Storm Water Action Level
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
ROWD	Report of Waste Discharge (application for NPDES reissuance)
SAL	Storm Water Action Level
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SIC	Standard Industrial Classification Code
State Water Board	State Water Resources Control Board
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
WDID	Waste Discharge Identification Number
WLA	Waste Load Allocation

WQBEL	Water Quality Based Effluent Limitation

DEFINITIONS

Active/Passive Sediment Treatment - Using mechanical, electrical or chemical means to flocculate or coagulate suspended sediment for removal from runoff from construction sites prior to discharge.

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Average Monthly Action Level – The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month or the geometric mean for bacteria, as applicable.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote tangible and intangible economic, social, and environmental goals. "Beneficial Uses" of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. ~~-~~In the case of municipal ~~storm water~~discharge permits, BMPs may be used in place of numeric effluent limits.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biotic integrity) of a water body.

Biocriteria - Under the CWA, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The USEPA defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use… (that)…describe the characteristics of water body segments least impaired by human activities."

Biofiltration - Practices that use vegetation and amended soils to detain and treat runoff from impervious areas. Treatment is through filtration, infiltration, adsorption, ion exchange, and biological uptake of pollutants.

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. *Environmental Management* 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

BMP Design Manual – A plan developed to eliminate, reduce, or mitigate the impacts of runoff from development projects, including Priority Development Projects.

Channel Rehabilitation and Improvement –Remedial measures or activities for the purpose of improving or restoring the environmental health of streams, channels or river systems. Techniques may vary from in-stream restoration techniques to off-line stormwater management practices installed in the system corridor or upland areas. Rehabilitation techniques may include, but are not limited to the following: riparian zone restoration, constructed wetlands, bank stabilization, channel modifications, and daylighting of drainage systems. Effectiveness may be measured in various manners, including: assessments of habitat, reduced streambank erosion, and restoration of water and sediment transport balance.

Clean Water Act Section 303(d) Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Construction Site – Any project, including projects requiring coverage under the Construction General Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, disturbances to ground such as stockpiling, and excavation.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

Copermittee – An incorporated city within the County of Orange, County of Riverside, or County of San Diego in the San Diego Region (Region 9), the County of Orange, the County of Riverside, the County of San Diego, the Orange County Flood Control District, the Riverside County Water Conservation and Flood Control District, the San Diego Regional Airport Authority, or the Unified Port District of San Diego.

Copermittees – All of the individual Copermittees, collectively.

Critical Channel Flow (Qc) – The channel flow that produces the critical shear stress that initiates bed movement or that erodes the toe of channel banks. When measuring Qc, it should be based on the weakest boundary material – either bed or bank.

Daily Discharge – Defined as either: (1) the total mass of the constituent discharged over the calendar day or any 24 hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g. concentration.)

The Daily Discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day, or other 24 hour period other than a day), or by the arithmetic mean of analytical results from one or more grab samples taken over the course of a day.

Development Projects - Construction, rehabilitation, redevelopment, or reconstruction of any public or private ~~residential project, industrial, commercial, or any other~~ projects involving land disturbance activities.

Dry Season – The period of time from May 1 to September 30 ~~when rainfall is not expected to occur the San Diego~~.

Dry Weather – Weather is considered dry if the preceding 72 hours has been without measurable precipitation (> 0.1 inch).

Enclosed Bays – Enclosed bays are indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost bay works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Environmentally Sensitive Areas (ESAs) - Areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Orange; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees.

Estuaries – Waters, including coastal lagoons, located at the mouth of streams that serve as areas of mixing fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and ocean water. Estuaries do not include inland surface waters or ocean waters.

Existing Development – Any area that has been developed and exists for municipal, commercial, industrial, or residential purposes, uses, or activities. May include areas that are not actively used for its originally developed purpose, but may be re-purposed or redeveloped for another use or activity.

Flow Duration – The long-term period of time that flows occur above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams (not a single storm event duration). The simplest way to visualize this is to consider a histogram of pre- and post-project flows using long-term records of hourly data. To maintain pre-development flow duration means that the total number of hours (counts) within each range of flows in a flow-duration histogram cannot increase between the pre- and post-development condition. Flow duration within the range of geomorphologically significant flows is important for managing erosion.

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical reactivity. These also include materials named by the USEPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code" [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Hydromodification – The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport. In addition, alteration of stream and river channels, such as stream channelization, concrete lining, installation of dams and water impoundments, and excessive streambank and shoreline erosion are also considered hydromodification, due to their disruption of natural watershed hydrologic processes.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Inactive Areas – Areas of construction activity that are not active and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

Infiltration – Water other than wastewater that enters a sewer system (including sewer service connections and foundation drains) from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow [40 CFR 35.2005(20)]. In the context of low impact development, infiltration may also be defined as the percolation of water into the ground. Infiltration is often expressed as a rate (inches per hour), which is determined through an infiltration test.

Inland Surface Waters – Includes all surface waters of the ~~State~~ U.S. that do not include the ocean, enclosed bays, or estuaries.

Jurisdictional Runoff Management Program Document – A written description of the specific jurisdictional runoff management measures and programs that each Copermittee will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

Low Impact Development (LID) – A storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions.

Low Impact Development Best Management Practices (LID BMPs) – LID BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States through storm water management and land development strategies that emphasize conservation ~~s~~and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. LID BMPs include retention practices that do not allow runoff, such as infiltration, rain water harvesting and reuse, and evapotranspiration. LID BMPs also include flow-through practices such as biofiltration that may have some discharge of storm water following pollutant reduction.

Major Outfall – As defined in the Code of Federal Regulations, a major outfall is a MS4 outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (i.e. discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres); or, for MS4s that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or equivalent), a MS4 outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (i.e. discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

Maximum Daily Action Level (MDAL) –The highest allowable daily discharge of a pollutant, over a calendar day (or 24 hour period). For pollutants with action levels expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with action levels expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Maximum Extent Practicable (MEP) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) for storm water that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their runoff management programs. Their total collective and individual activities conducted pursuant to the runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the San Diego Water Board, the San Diego Water Board defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> "*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective*

BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
c. Public Acceptance: Does the BMP have public support?
d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc.?

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Monitoring Year – The monitoring year begins annually on July 1st and ends on June 30th.

Municipal Separate Storm Sewer System (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26. Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.21(a)(vi).

National Pollutant Discharge Elimination System (NPDES) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges and NPDES permitted discharges.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act, a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during~~,~~ or as a result of~~,~~ the treatment or disposal of wastes."

Ocean Waters – the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Board's California Ocean Plan.

Order – Unless otherwise specified, refers to this Order, Order No. R9-2012-0011 (NPDES No. CAS0109266)

~~**Permanent BMP Sizing Criteria Design Manual** – A plan developed to eliminate, reduce, or mitigate the impacts of runoff from development projects, including Priority Development Projects.~~

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act, pollution is "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Permanent BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, remove, or educate to prevent the release of pollutants to surface waters from development projects in perpetuity, after construction of a project is completed.

Pre-Development Runoff Conditions (Discharge Rates, Durations, Etc.) – Runoff conditions that existed onsite before the existing development was constructed, or exists onsite before planned development activities occur. ~~This definition includes natural watershed hydrology before any human induced land alterations.~~

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Priority Development Projects - New development and redevelopment projects defined under Provision E.3.b of Order No. R9-2012-0011.

Properly Designed – Designed in accordance with the Copermittee's BMP design manual and/or any appropriate design requirements set forth by the Copermittee and based on widely accepted design criteria.

Rainy Season (aka Wet Season) – The period of time from October 1 to April 30~~ when the San Diego Region experiences the most rainfall~~.

Receiving Waters – Waters of the United States.

Receiving Water Limitations - Waste discharge requirements issued by the San Diego Water Board typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; parking lots; resurfacing existing roadways; cutting and reconfiguring of surface parking lots; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair.

Retain –Keep or hold in a particular place, condition, or position without discharge to surface waters.

Retrofit – Retrofit is defined as a stormwater management practice (usually structural) put into place after development has occurred in watersheds where practices previously did not exist or are ineffective. The purpose of retrofits is to improve water quality, protect downstream channels, reduce flooding, or meet other specific objectives. Some examples of retrofits include, but are not limited to the following: green roofs, downspout and impervious cover disconnection, permeable pavement, bioretention, rain barrels, rain gardens, vacant lot stabilization, trash area enclosures, additional trash and waste disposal containers.

Runoff - All flows in a storm water conveyance system that consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water including dry weather flows.

San Diego Water Board – As used in this document the term "San Diego Water Board" is synonymous with the term "Regional Board" as defined in Water Code section 13050(b) and is intended to refer to the California Regional Water Quality Control Board for the San Diego

Region as specified in Water Code Section 13200.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment Control BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and runoff.

State Water Quality Protection Area – A nonterrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration in natural water quality, including, but not limited to, areas of special biological significance that have been designated by the State Water Board through its water quality control planning process. Areas of special biological significance are a subset of State Water Quality Protection Areas, and require special protection as determined by the State Water Resources Control Board pursuant to the California Ocean Plan adopted and reviewed pursuant to Article 4 (commencing with Section 13160) of Chapter 3 of Division 7 of the California Water Code and pursuant to the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (California Thermal Plan) adopted by the State Water Board.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage. ~~Surface runoff and drainage pertains to runoff and drainage resulting from precipitation events.~~

Structural BMP – Any structural control which detains, retains, or filters, to reduce the release of pollutants to surface waters from development projects (e.g. treatment control BMPs) which remains after construction.

Total Maximum Daily Load (TMDL) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Basin Plan, state in part…"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge".

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Unpaved Road – Any long, narrow stretch without pavement used for traveling by motor passenger vehicles between two or more points. Unpaved roads are generally constructed of dirt, gravel, aggregate or macadam and may be improved or unimproved.

Waste - As defined in CWC Section 13050(d), “waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.”

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California’s water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans. Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne’s definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

Water Quality Standards - Water quality standards, as defined in Clean Water Act section 303(c) consist of the beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of a water body and criteria (referred to as water quality objectives in the California Water Code) necessary to protect those uses. Under the Water Code, the water boards establish beneficial uses and water quality objectives in water quality control or basin plans. Together with an anti-degradation policy, these beneficial uses and water quality objectives serve as water quality standards under the Clean Water Act. In Clean Water Act parlance, state beneficial uses are called “designated uses” and state water quality objectives are called “criteria.” Throughout this Order, the relevant term is used depending on the statutory scheme.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the State is

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broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State ~~regardless of circumstances or condition~~. Under this definition, a portions of the MS4 may ~~is always considered~~be considered to be a Waters of the State. However, man-made portions of the MS4 constructed for the sole purpose flow and/or pollutant reduction are not considered waters of the state.

Waters of the United States - As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: "(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Wet Season (aka Rainy Season) – The period of time from October 1 to April 30 when the San Diego Region experiences the most rainfall.

Wet Weather – Weather is considered wet if there is a storm event of 0.1 inches and greater and ~~the following~~ preceded by 72 hours of dry weather, unless defined in another manner within another regulatory mechanism such as a TMDL.

ATTACHMENT D

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY ________________

I. COPERMITTEE INFORMATION		
Copermittee Name:		
Copermittee Primary Contact Name:		
Copermittee Primary Contact Information: Address: City: County: State: Zip: Telephone: Fax: Email:		
II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☐ ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	☐ ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☐ ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Number of non-storm water discharges reported by the public		
Number of non-storm water discharges detected by Copermittee staff or contractors		
Number of non-storm water discharges investigated by the Copermittee		
Number of sources of non-storm water discharges identified		
Number of non-storm water discharges eliminated		
Number of sources of illicit discharges or connections identified		
Number of illicit discharges or connections eliminated		
Number of enforcement actions issued		
Number of high level enforcement actions issued		
V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Was an update to the ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual required or recommended by the San Diego Water Board?	YES NO	☐ ☐
If YES to the question above, did the Copermittee update its ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual and make it available on the Regional Clearinghouse?	YES NO	☐ ☐
Number of proposed development projects in review		
Number of Priority Development Projects in review		
Number of Priority Development Projects approved		
Number of approved Priority Development Projects exempt from any BMP requirements		
Number of approved Priority Development Projects requiring mitigation		
Number of Priority Development Projects granted occupancy		
Number of completed Priority Development Projects in inventory		
Number of high priority Priority Development Project ~~permanent~~ structural BMP inspections		
Number of Priority Development Project ~~permanent~~ structural BMP violations		
Number of enforcement actions issued		

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
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Number of high level enforcement actions issued	

FY ______________

VI. CONSTRUCTION MANAGEMENT PROGRAM		
Has the Copermittee implemented a construction management program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Number of construction sites in inventory		
Number of active construction sites in inventory		
Number of inactive construction sites in inventory		
Number of construction sites closed/completed during reporting period		
Number of construction site inspections		
Number of construction site violations		
Number of enforcement actions issued		
Number of high level enforcement actions issued		

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM		
Has the Copermittee implemented an existing development management program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

	Municipal	Commercial	Industrial	Residential
Number of existing developments in inventory				
Number of existing development inspections				
Number of follow-up inspections				
Number of existing development violations				
Number of enforcement actions issued				
Number of high level enforcement actions issued				

VIII. PUBLIC EDUCATION AND PARTICIPATION		
Has the Copermittee implemented a public education program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Has the Copermittee implemented a mechanism for public participation and where necessary intergovernmental coordination that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
IX. FISCAL ANALYSIS		
Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☐ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature	Date
Print Name	Title
Telephone Number	Email

**JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM**

ADMINISTRATIVE DRAFT

ATTACHMENT E

SPECIFIC PROVISIONS FOR TOTAL MAXIMUM DAILY LOADS APPLICABLE TO ORDER NO. R9-2012-0011

These provisions implement Total Maximum Daily Loads (TMDLs), adopted by the San Diego Water Board and approved by USEPA under Clean Water Act section 303(c), which are applicable to discharges regulated under this Order. The provisions and schedules for implementation of the TMDLs described below must be incorporated into the Water Quality Improvement Plans and monitoring requirements, required pursuant to Provisions B and D of this Order, respectively, for the specified Watershed Management Areas.

1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed Resolution No. R9-2002-0123
2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin Resolution No. R9-2005-0019
3. ~~Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed Resolution No. R9-2005-0036~~
4. ~~4.~~3. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek Resolution No. R9-2007-0043
5. ~~5.~~4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Resolution No. R9-2008-0027
6. ~~6.~~5. Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) Resolution No. R9-2010-0001

1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed

a. Applicability

(1) TMDL Basin Plan Amendment: Resolution No. R9-2002-0123

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date: August 14, 2002
State Water Board Approval Date: July 16, 2003
Office of Administrative Law Approval Date: September 11, 2003
US EPA Approval Date: November 3, 2003

(3) TMDL Effective Date: September 11, 2003

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Chollas Creek

(6) Responsible Copermittees: City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, Unified Port District of San Diego

b. Water Quality Based Effluent Limitations

The WQBELs for Chollas Creek consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 1.c:

Table 1.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Receiving Water Limitation	Averaging Period
Diazinon	Acute	0.08 µg/L	1 hour
	Chronic	0.05 µg/L	4 days

(2) Effluent Limitations

Discharges from the MS4s must not contain concentrations that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 1.c:

Table 1.2
Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Constituent	Exposure Duration	Effluent Limitation	Averaging Period
Diazinon	Acute	0.072 µg/L	1 hour
	Chronic	0.045 µg/L	4 days

(3) Best Management Practices

~~The following~~BMPs for Chollas Creek may~~must~~ be incorporated into the Water Quality Improvement Plan for the San Diego Bay Watershed Management Area and implemented by the Responsible Copermittees:

~~(a) The Responsible Copermittees must implement BMPs capable of achieving the WQBELs under Specific Provision 1.b for Chollas Creek.~~

~~(b) The Responsible Copermittees must implement the Diazinon Toxicity Control Plan and Diazinon Public Outreach/Education Program as described in the report titled, *Technical Report for Total Maximum Daily Load for Diazinon in Chollas Creek Watershed, San Diego County*, dated August 14, 2002, including subsequent modifications, in order to achieve the WQBELs under Specific Provision 1.b.~~

~~(c)~~(a) The Responsible Copermittees should coordinate any implemented~~the~~ BMPs to address this TMDL with Caltrans ~~wherever and whenever~~as possible.

c. Compliance Schedule

The Responsible Copermittees were required to achieve their WLA by December 31, 2010. The Responsible Copermittees must be in compliance with the WQBELs under Specific Provision 1.b.

d. Compliance Determination

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision II.A as described in Provision II.A.4.

~~d.~~e. Specific Monitoring and Assessment Requirements

(a) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Investigation Order No. R9-2004-0277, *California Department of Transportation and San Diego Municipal Separate Storm Sewer System Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed*. The monitoring reports required under Investigation Order No. R9-2004-0277 must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

~~(b) The Responsible Copermittees must monitor the effluent of the MS4 outfalls for diazinon within the Chollas Creek watershed, and calculate or estimate the monthly and annual diazinon loads, in accordance with the requirements of Provisions D.1, D.4.a.(1)(b), and D.4.a.(3)(b) of this Order. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.~~

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2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2005-0019

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	February 9, 2005
State Water Board Approval Date:	September 22, 2005
Office of Administrative Law Approval Date:	December 2, 2005
US EPA Approval Date:	February 8, 2006

(3) TMDL Effective Date: December 2, 2005

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Shelter Island Yacht Basin

(6) Responsible Copermittees: City of San Diego, San Diego Unified Port District

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for Shelter Island Shoreline Park consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 2.c:

Table 2.1
Receiving Water Limitations as Concentrations in Shelter Island Yacht Basin

Constituent	Exposure Duration	Effluent Limitation	Averaging Period
Dissolved Copper	Acute	4.8 µg/L	1 hour
	Chronic	3.1 µg/L	4 days

(2) Effluent Limitations

Discharges from the MS4s must not contain pollutant loads that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 2.c:

Table 2.2
Effluent Limitations as Annual Loads in MS4 Discharges to Shelter Island Yacht Basin

Constituent	Effluent Limitation
Dissolved Copper	30 kg/yr

(3) Best Management Practices

The Responsible Copermittees may~~ust~~ implement BMPs to support the achievement of ~~capable of achieving~~ the WQBELs under Specific Provision 2.b for Shelter Island Yacht Basin

c. COMPLIANCE SCHEDULE

The Responsible Copermittees are ~~was~~ required to achieve the respective ~~its~~ WLAs ~~upon the effective date of the TMDL, December 2, 2005~~by December 2, 2022. The Responsible Copermittees must be in compliance with the WQBELs under Specific Provision 2.b.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(6) There is no discharge from the MS4, or
(7) Applicable effluent limitations are met, or
(8) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(9) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(10) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision II.A as described in Provision II.A.4.

~~d.~~e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

The Responsible Copermittees must implement the monitoring and assessment requirements issued under Order No. R9-2005-0019. ~~monitor the effluent of its MS4 outfalls for dissolved copper, and calculate or estimate the monthly and annual dissolved copper loads, in accordance with the requirements of Provisions D.1, D.4.a.(1)(b), and D.4.a.(3)(b) of this Order.~~ The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

~~3. Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed~~

~~a. APPLICABILITY~~

~~(1) TMDL Basin Plan Amendment: Resolution No. R9-2005-0036~~

~~(2) TMDL Adoption and Approval Dates:~~

~~San Diego Water Board Adoption Date: February 9, 2005~~
~~State Water Board Approval Date: November 16, 2005~~
~~Office of Administrative Law Approval Date: February 1, 2006~~
~~US EPA Approval Date: March 22, 2006~~

~~(3) TMDL Effective Date: February 1, 2006~~

~~(4) Watershed Management Area: Santa Margarita River~~

~~(5) Water Body: Rainbow Creek~~

~~(6) Responsible Copermittee: County of San Diego~~

~~b. WATER QUALITY BASED EFFLUENT LIMITATIONS~~

~~The WQBELs for Rainbow Creek consist of the following~~

~~(1) Receiving Water Limitations~~

~~Discharges from the MS4s must not have a reasonable potential to cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 3.c.(1):~~

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~~**Table 3.1**~~
~~*Receiving Water Limitations as Concentrations in Rainbow Creek*~~

~~Constituent~~	~~Receiving Water Limitation~~
~~Nitrate (as N)~~	~~10 mg/L~~
~~Total Nitrogen~~	~~1 mg/L~~
~~Total Phosphorus~~	~~0.1 mg/L~~

~~(2) Effluent Limitations~~

~~(a) Discharges from the MS4s must not contain concentrations that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 3.c.(1):~~

~~**Table 3.2**~~
~~*Effluent Limitations as Concentrations in MS4 Discharges to Rainbow Creek*~~

~~Constituent~~	~~Effluent Limitation~~
~~Nitrate (as N)~~	~~10 mg/L~~
~~Total Nitrogen~~	~~1 mg/L~~
~~Total Phosphorus~~	~~0.1 mg/L~~

~~(b) Pollutant loads from given land uses discharging to and from the MS4s must not exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 3.c.(1):~~

~~**Table 3.3**~~
~~*Effluent Limitations as Annual Loads in MS4 Discharges to Rainbow Creek*~~

~~Land Use~~	~~Total N~~	~~Total P~~
~~Commercial nurseries~~	~~116 kg/yr~~	~~3 kg/yr~~
~~Park~~	~~3 kg/yr~~	~~0.1 kg/yr~~
~~Residential areas~~	~~149 kg/yr~~	~~12 kg/yr~~
~~Urban areas~~	~~27 kg/yr~~	~~6 kg/yr~~

~~Interim effluent limitations expressed as pollutant loads are given in the compliance schedule under Specific Provision 3.0.~~

~~(3) Best Management Practices~~

~~(a) The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 3.b for Rainbow Creek.~~

~~(b) The Responsible Copermittee should coordinate the BMPs to address this TMDL with Caltrans and other sources wherever and whenever possible.~~

~~c. COMPLIANCE SCHEDULE~~

~~(1) WLA Compliance Date~~

~~The Responsible Copermittee is required to achieve its WLAs, thus must be in compliance with the WQBELs under Specific Provision 3.b, by December 31, 2021.~~

~~(2) Interim Compliance Requirements~~

~~**Table 3.4**~~
~~*Interim Effluent Limitations as Annual Loads in MS4 Discharges from Specific Land Uses to Rainbow Creek*~~

	~~Total N Interim Effluent Limitations (kg/yr)~~			~~Total P Interim Effluent Limitations (kg/yr)~~		
	~~Interim Compliance Date~~			~~Interim Compliance Date~~		
~~Land Use~~	~~2009~~	~~2013~~	~~2017~~	~~2009~~	~~2013~~	~~2017~~
~~Commercial nurseries~~	~~399~~	~~299~~	~~196~~	~~20~~	~~16~~	~~10~~
~~Park~~	~~5~~	~~3~~	~~3~~	~~0.15~~	~~0.10~~	~~0.10~~
~~Residential areas~~	~~507~~	~~390~~	~~260~~	~~99~~	~~74~~	~~47~~
~~Urban areas~~	~~40~~	~~27~~	~~27~~	~~9~~	~~6~~	~~6~~

~~COMPLIANCE DETERMINATION~~

~~Compliance may be demonstrated via any one of the following methods:~~

- ~~There is no discharge from the MS4, or~~
- ~~Applicable effluent limitations are met, or~~
- ~~Receiving waters meet the applicable receiving water limitations or water quality objective, or~~
- ~~Loading from the MS4 is such that it does not cause water quality objective exceedances, or~~
- ~~For Permittee(s) that are implementing a Regional Board-approved WQIP, WQBELs will be implemented as BMPs and compliance will be based upon implementing all provisions of the WQIP in accordance with the approved milestones and schedule.~~

~~d. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS~~

~~The Responsible Copermittee must implement the Sampling and Analysis Plan for Rainbow Creek Nutrient Reduction TMDL Implementation Water Quality Monitoring, dated January 2010. The results of any monitoring conducted during the reporting period, and assessment of whether the interim and final WQBELs have been achieved must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.~~

~~4.~~3. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2007-0043

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date: June 13, 2007
State Water Board Approval Date: July 15, 2008
Office of Administrative Law Approval Date: October 22, 2008
US EPA Approval Date: December 18, 2008

(3) TMDL Effective Date: October 22, 2008

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Chollas Creek

(6) Responsible Copermittees: City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, San Diego Unified Port District ~~of San Diego~~

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELsfor Chollas Creek consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 4.c.(1):

Table 4.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
Dissolved Copper	Acute	$(0.96) \times e^{[0.9422 \times \ln(\text{hardness}) - 1.700]} \times \text{WER*}$	1 hour
	Chronic	$(0.96) \times e^{[0.8545 \times \ln(\text{hardness}) - 1.702]} \times \text{WER*}$	4 days
Dissolved Lead	Acute	$[1.46203 - 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 1.460]} \times \text{WER*}$	1 hour
	Chronic	$[1.46203 - 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 4.705]} \times \text{WER*}$	4 days
Dissolved Zinc	Acute	$(0.978) \times e^{[0.8473 \times \ln(\text{hardness}) + 0.884]} \times \text{WER*}$	1 hour
	Chronic	$(0.986) \times e^{[0.8473 \times \ln (\text{hardness}) + 0.884]} \times \text{WER*}$	4 days

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Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

(2) Effluent Limitations

Discharges from the MS4s must not contain pollutant loads that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 4.c.(1):

Table 4.2
Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
Dissolved Copper	Acute	90% x (0.96) x $e^{[0.9422 \times \ln(hardness) - 1.700]}$ x WER*	1 hour
	Chronic	90% x (0.96) x $e^{[0.8545 \times \ln(hardness) - 1.702]}$ x WER*	4 days
Dissolved Lead	Acute	90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(hardness) - 1.460]}$ x WER*	1 hour
	Chronic	90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(hardness) - 4.705]}$ x WER*	4 days
Dissolved Zinc	Acute	90% x (0.978) x $e^{[0.8473 \times \ln(hardness) + 0.884]}$ x WER*	1 hour
	Chronic	90% x (0.986) x $e^{[0.8473 \times \ln(hardness) + 0.884]}$ x WER*	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

(3) Best Management Practices

(a) The Responsible Copermittees may ~~must~~ implement BMPs to support the achievement of ~~capable of achieving the~~ WQBELs under Specific Provision 4.b for Chollas Creek.

(b) The Responsible Copermittees should coordinate the BMPs to address this TMDL with Caltrans and the U.S. Navy ~~wherever and whenever~~as possible.

c. COMPLIANCE SCHEDULE

(1) WLA Compliance Date

The Responsible Copermittee is required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 4.b, by October 22, 2028.

(2) Interim Compliance Requirements

The Responsible Copermittee must comply with the following interim WQBELs by the interim compliance date:

Table 4.3
Interim Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Interim Compliance Date	Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
October 22, 2018	Dissolved Copper	Acute	1.2 x 90% x (0.96) x $e^{[0.9422 \times \ln(\text{hardness}) - 1.700]}$ x WER*	1 hour
		Chronic	1.2 x 90% x (0.96) x $e^{[0.8545 \times \ln(\text{hardness}) - 1.702]}$ x WER*	4 days
	Dissolved Lead	Acute	1.2 x 90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(\text{hardness}) - 1.460]}$ x WER*	1 hour
		Chronic	1.2 x 90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(\text{hardness}) - 4.705]}$ x WER*	4 days
	Dissolved Zinc	Acute	1.2 x 90% x (0.978) x $e^{[0.8473 \times \ln(\text{hardness}) + 0.884]}$ x WER*	1 hour
		Chronic	1.2 x 90% x (0.986) x $e^{[0.8473 \times \ln(\text{hardness}) + 0.884]}$ x WER*	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision II.A as described in Provision II.A.4.

~~d.~~e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

(a) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Investigation Order No. R9-2004-0277, *California Department of Transportation and San Diego Municipal Separate Storm Sewer System Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed*, when it is amended to include monitoring requirements for the Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek. The monitoring reports required

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under Investigation Order No. R9-2004-0277 must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

(b) The Responsible Copermittees must ~~monitor the effluent of the MS4 outfalls discharging to Chollas Creek for dissolved copper, lead, and zinc, and calculate or estimate the monthly and annual dissolved copper, lead, and zinc loads, in accordance with the requirements of Provisions D.1, D.4.a.(1)(b), and D.4.a.(3)(b) of this Order~~implement the monitoring and assessment requirements issued under Order No. R9-2007-0043, as consistent with this Order. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

~~5.~~4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay

a. Applicability

(1) TMDL Basin Plan Amendment: Resolution No. R9-2008-0027

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date: June 11, 2008
State Water Board Approval Date: June 16, 2009
Office of Administrative Law Approval Date: September 15, 2009
US EPA Approval Date: October 26, 2009

(3) TMDL Effective Date: September 15, 2009

(4) Watershed Management Areas: See Table 5.0

(5) Water Bodies: See Table 5.0

(6) Responsible Copermittees: See Table 5.0

Table 5.0
Applicability of Total Maximum Daily Loads for Indicator Bacteria Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County	Dana Point Harbor	Baby Beach	-City of Dana Point -County of Orange
San Diego Bay	San Diego Bay	Shelter Island Shoreline Park	-Unified Port of San Diego

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for segments or areas of the water bodies listed in Table 5.0 consist of the following:

(1) Receiving Water Limitations

(a) Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedules under Specific Provisions 5.c.(1)(a) and 5.c.(2):

Table 5.1
Receiving Water Limitations as Bacteria Densities in the Water Body

Constituent	Receiving Water Limitations: Single Sample Maximum[1,2]	Receiving Water Limitations: 30-Day Geometric Mean[2]
Total Coliform	10,000 MPN/100mL	1,000 MPN/100mL
Fecal Coliform	400 MPN/100mL	200 MPN/100mL
Enterococcus	104 MPN/100mL	35 MPN/100mL

Notes:
1. During wet weather days, only the single sample maximum receiving water limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved.

(b) If the above receiving water limitations are not met in the receiving water, the Responsible Copermittees must demonstrate that the discharges from the MS4s are not causing or contributing to the violation of receiving water limitations. ~~The Copermittee must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 5.b.(2)~~.

For both (a) and (b) above, if the REC-1 water quality objectives cannot be met in the receiving waters, and if the natural and background sources appear to be the sole source of the continued impairment, the natural sources exclusion approach (NSEA) may be applied. The Municipal Dischargers are responsible for collection of the data to support the application of the NSEA to recalculate the TMDL.

~~(2) Effluent Limitations~~

~~Discharges from the MS4s must not contain densities that exceed the following effluent limitations by the end of the compliance schedules under Specific Provisions 5.c.(1)(a) and 5.c.(2) to demonstrate the discharge is not causing or contributing to a violation of receiving water quality standards:~~

~~**Table 5.2**~~
~~*Effluent Limitations as Bacteria Densities in MS4 Discharges to the Water Body*~~

~~Constituent~~	~~Effluent Limitations: Single Sample Maximum[1,2]~~	~~Effluent Limitations: 30-Day Geometric Mean[2]~~
~~Total Coliform~~	~~10,000 MPN/100mL~~	~~1,000 MPN/100mL~~
~~Fecal Coliform~~	~~400 MPN/100mL~~	~~200 MPN/100mL~~
~~*Enterococcus*~~	~~104 MPN/100mL~~	~~35 MPN/100mL~~

~~Notes:~~
~~1. During wet weather days, only the single sample maximum effluent limitations are required to be achieved.~~
~~2. During dry weather days, the single sample maximum and 30-day geometric mean effluent limitations are required to be achieved.~~

~~Interim effluent limitations expressed as pollutant loads are given in the compliance schedule under Specific Provision 5.c.~~

~~(3)~~(2) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 5.0 fulfill the Bacteria Load Reduction Plan (BLRP) requirements in Resolution No. R9-2008-0027.

(b) The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 5.0 for the segments or areas of the water bodies listed in Table 5.0

c. COMPLIANCE SCHEDULE

(1) Baby Beach in Dana Point Harbor

(a) ~~WLA~~ Waste Load Reduction Compliance Dates

The Responsible Copermittees for MS4 discharges to Baby Beach shall implement BMPs capable of achieving the following Waste Load Reduction Milestones.~~are required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 5.0, according to the following compliance schedule:~~

Table 5.3
TMDL Waste Load Reduction Milestones

Action	Dry Weather	Wet Weather
Meet 50% wasteload reductions	December 2012*	December, 2016*
Meet 100% wasteload reductions	December, 2014*	December, 2019*

~~*Compliance Schedule Dates to Achieve Baby Beach WLAs*~~

~~Constituent~~	~~Dry Weather WLA Compliance Date~~	~~Wet Weather WLA Compliance Date~~
~~Total Coliform~~	~~September 15, 2014~~	~~September 15, 2009~~
~~Fecal Coliform~~		~~September 15, 2009~~
~~*Enterococcus*~~		~~September 15, 2019~~

~~(b) Interim Compliance Requirements~~

~~The Responsible Copermittees for MS4 discharges to Baby Beach must comply with the following interim WQBELs by the interim compliance date:~~

~~**Table 5.4**~~
~~*Interim Effluent Limitations as Loads in MS4 Discharges to Baby Beach*~~

~~Constituent~~	~~Interim Compliance Date~~	~~Dry Weather Interim Effluent Limitation~~	~~Wet Weather Interim Effluent Limitation~~
~~Total Coliform~~	~~September 15, 2012~~	~~$5.32x10^9$ MPN/day~~	~~NA*~~
~~Fecal Coliform~~	~~September 15, 2012~~	~~$0.59x10^9$ MPN/day~~	~~NA*~~
~~*Enterococcus*~~	~~September 15, 2012~~	~~$0.42x10^9$ MPN/day~~	~~NA**~~
	~~September 15, 2016~~	~~NA*~~	~~$207x10^9$ MPN/30days~~

~~Notes:~~
~~* The WQBELs under Specific Provision 5.b must already be achieved by the given interim compliance date.~~
~~** There is no corresponding interim WQBEL for the given interim compliance date.~~

(2) Shelter Island Shoreline Park in San Diego Bay

The Responsible Copermittee for MS4 discharges to Shelter Island Shoreline Park is required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 5.0, by December 31, 2012.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective

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exceedances, or

(5) Demonstration of elimination of controllable sources of indicator bacteria loading and application of Natural Source Exclusion Approach (NSEA), if applicable, or

(6) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision II.A as described in Provision II.A.4.

~~d.~~e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

(1) Monitoring Stations and Procedures

~~(a)~~ The Responsible Copermittees must implement the monitoring requirements issued under Order No. R9-2008-0027. ~~designate the MS4 outfalls within their jurisdiction discharging to the segments or areas of the water bodies listed in Table 5.0 as high priority non-storm water MS4 monitoring stations, in accordance with the requirements of Provision D.1.~~

~~(b) The Responsible Copermittees must establish at least one monitoring station within the receiving water body.~~

~~(2) Monitoring Procedures~~

~~(a) The Responsible Copermittees must monitor the effluent of the designated MS4 outfalls within their jurisdiction discharging during dry weather conditions to the segments or areas of the water bodies listed in Table 5.0 in accordance with the dry weather jurisdictional monitoring requirements of Provision D.1.a.(1)(b). Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(b) The Responsible Copermittees must monitor, within the first 24 hours of each storm event,[26] the effluent of the designated MS4 outfalls within their jurisdiction discharging to the segments or areas of the water bodies listed in Table 5.0 in accordance with the wet weather jurisdictional monitoring requirements of Provision D.1.b.(1)(b) of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(c) The Responsible Copermittees must collect samples from the monitoring stations within the receiving water body for each dry weather and wet~~

~~[26] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].~~

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~~weather MS4 outfall monitoring event. Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(d)~~(a)

~~(3)~~(2) Assessment and Reporting Requirements

(a) The Responsible Copermittees must analyze the dry weather and wet weather monitoring data to assess whether the interim and final WQBELs have been achieved.

(b) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

~~6.~~5. Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2010-0001

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	February 10, 2010
State Water Board Approval Date:	December 14, 2010
Office of Administrative Law Approval Date:	April 4, 2011
US EPA Approval Date:	June 22, 2011

(3) TMDL Effective Date: April 4, 2011

(4) Watershed Management Areas: See Table 6.0

(5) Water Bodies: See Table 6.0

Subsequent to TMDL adoption, the Regional Board determined that the following water bodies are not subject to further action under Resolution No. R9-2010-001, and therefore are not subject to Bacteria TMDL requirements described herein and are not included in Table 6.0:

Watershed Management Area	Water Body	Segment or Area
Carlsbad	Pacific Ocean Shoreline	at Moonlight State Beach
San Dieguito River	Pacific Ocean Shoreline	at San Dieguito Lagoon mouth
Penasquitos	Pacific Ocean Shoreline	Torrey Pines State Beach at Del Mar (Anderson Canyon)

~~(5)~~(6) Responsible Copermittees: See Table 6.0

Table 6.0
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County	Pacific Ocean Shoreline	Cameo Cove at Irvine Cove Drive – Riviera Way	-City of Laguna Beach -County of Orange -Orange County Flood Control District
		at Heisler Park - North	
	Pacific Ocean Shoreline	at Main Laguna Beach	-City of Aliso Viejo -City of Laguna Beach -City of Laguna Woods -County of Orange -Orange County Flood Control District
		Laguna Beach at Ocean Avenue	
		Laguna Beach at Cleo Street	
		Arch Cove at Bluebird Canyon Road	
		Laguna Beach at Dumond Drive	
	Pacific Ocean Shoreline	Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach	-City of Aliso Viejo -City of Laguna Beach -City of Laguna Hills -City of Laguna Niguel -City of Laguna Woods -City of Lake Forest -City of Mission Viejo -County of Orange -Orange County Flood Control District
	Aliso Creek	Entire reach (7.2 miles) and associated tributaries: - Aliso Hills Channel - English Canyon Creek - Dairy Fork Creek - Sulfur Creek - Wood Canyon Creek	
	Aliso Creek Mouth	at mouth	

Table 6.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County (cont'd)	Pacific Ocean Shoreline	Aliso Beach at West Street	-City of Dana Point -City of Laguna Beach -City of Laguna Niguel -County of Orange -Orange County Flood Control District
		Aliso Beach at Table Rock Drive	
		100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)	
		at Salt Creek (large outlet)	
		Salt Creek Beach at Salt Creek service road	
		Salt Creek Beach at Strand Road	
	Pacific Ocean Shoreline	at San Juan Creek	-City of Dana Point -City of Laguna Hills -City of Laguna Niguel -City of Mission Viejo -City of Rancho Santa Margarita -City of San Juan Capistrano -County of Orange -Orange County Flood Control District
	San Juan Creek	lower 1 mile	
	San Juan Creek Mouth	at mouth	
	Pacific Ocean Shoreline	at Poche Beach	- City of Dana Point -City of San Clemente -County of Orange -Orange County Flood Control District
		Ole Hanson Beach Club Beach at Pico Drain	
		San Clemente City Beach at El Portal Street Stairs	
		San Clemente City Beach at Mariposa Street	
		San Clemente City Beach at Linda Lane	
		San Clemente City Beach at South Linda Lane	
		San Clemente City Beach at Lifeguard Headquarters	
		under San Clemente Municipal Pier	
		San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane)	
		San Clemente State Beach at Riviera Beach	
		Can Clemente State Beach at Cypress Shores	
San Luis Rey River	Pacific Ocean Shoreline	at San Luis Rey River mouth	-City of Oceanside -City of Vista -County of San Diego

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Table 6.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
Carlsbad	Pacific Ocean Shoreline	at Moonlight State Beach	-City of Carlsbad -City of Encinitas -City of Escondido ~~-City of Oceanside~~ -City of San Marcos ~~-City of Solana Beach~~ ~~-City of Vista~~ -County of San Diego
San Dieguito River	Pacific Ocean Shoreline	at San Dieguito Lagoon mouth	-City of Del Mar -City of Escondido -City of Poway -City of San Diego -City of Solana Beach -County of San Diego
Penasquitos	Pacific Ocean Shoreline	Torrey Pines State Beach at Del Mar (Anderson Canyon)	-City of Del Mar -City of Poway -City of San Diego -County of San Diego
Mission	Pacific Ocean Shoreline	La Jolla Shores Beach at El Paseo Grande	-City of San Diego
		La Jolla Shores Beach at Caminito del Oro	
		La Jolla Shores Beach at Vallecitos	
		La Jolla Shores Beach at Avenida de la Playa	
		at Casa Beach, Children's Pool	
		South Casa Beach at Coast Boulevard	
		Whispering Sands Beach at Ravina Street	
		Windansea Beach at Vista de la Playa	
		Windansea Beach at Bonair Street	
		Windansea Beach at Playa del Norte	
		Windansea Beach at Palomar Avenue	
		at Tourmaline Surf Park	
		Pacific Beach at Grand Avenue	
	Tecolote Creek	Entire reach and tributaries	-City of San Diego

Table 6.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I- Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
San Diego River	Forrester Creek	lower 1 mile	-City of El Cajon ~~-City of La Mesa~~ -City of Santee -County of San Diego
	San Diego River	lower 6 miles	-City of El Cajon -City of La Mesa -City of San Diego -City of Santee -County of San Diego
	Pacific Ocean Shoreline	at San Diego River mouth at Dog Beach	
San Diego Bay	Chollas Creek	lower 1.2 miles	-City of La Mesa -City of Lemon Grove -City of San Diego -County of San Diego - San Diego Unified Port District

The TMDLs that have been developed for the Pacific Ocean shorelines are applicable to all the beaches located on the shorelines of the hydrologic subareas (HSAs), hydrologic areas (HAs), and hydrologic units (HUs) listed above. Beginning with the 2008 303(d) List, specific beach segments of the Pacific Ocean shoreline are listed individually. Specific beach segments from some of the Pacific Ocean shorelines listed in the above table have been delisted from the 2008 303(d) list that was approved by the San Diego Board on December 16, 2009, and therefore are not subject to any further action as long as monitoring data continues to support compliance with water quality standards.

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for segments or areas of the water bodies listed in Table 6.0 consist of the following:

(1) Receiving Water Limitations

(a) Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedules under Specific Provision 6.c.(1):

Table 6.1
Receiving Water Limitations for Beaches as Bacteria Densities and Allowable Exceedance Frequencies in the Water Body

Indicator Bacteria	Wet Weather Days [a]		Dry Weather Days [b]	
	Wet Weather Numeric Objective [c] (MPN/100mL)	Wet Weather Allowable Exceedance [d] Frequency	Dry Weather Numeric Objective [e] (MPN/100mL)	Dry Weather Allowable Exceedance Frequency
Fecal Coliform	400	22%	200	0%
Total Coliform	10,000	22%	1,000	0%
Enterococcus	104	22%	35	0%

a. Wet weather days defined as days with rainfall events of 0.2 inches or greater and the following 72 hours.
b. Dry weather days defined as days with less than 0.2 inch of rainfall observed on each of the previous 3 days.
c. Wet weather numeric objectives based on the single sample maximum water quality objectives in the California Ocean Plan (2005). Compliance with the wet weather TMDLs in the receiving water is based on the frequency that the wet weather days in any given year exceed the wet weather numeric objective, but 30-day geometric mean must also be met.
d. The wet weather allowable exceedance frequency is set at 22%. In the calculation of the wet weather TMDLs, the San Diego Regional Board chose to apply the 22 percent allowable exceedance frequency as determined for Leo Carillo Beach in Los Angeles County. At the time the wet weather watershed model was developed, the 22 percent exceedance frequency from Los Angeles County was the only reference beach exceedance frequency available. The 22 percent allowable exceedance frequency used to calculate the wet weather TMDLs is justified because the San Diego Region watersheds' exceedance frequencies will likely be close to the value calculated for Leo Carillo Beach, and is consistent with the exceedance frequency that was applied by the Los Angeles Regional Board.
e. Dry weather numeric objectives based on the 30-day geometric mean water quality objectives in the California Ocean Plan (2005). Compliance with the dry weather TMDLs in the receiving water is based on the frequency that the dry weather days in any given year exceed the dry weather numeric objective.

Table 6.2 *Receiving Water Limitations for Creeks as Bacteria Densities and Allowable Exceedance Frequencies in the Water Body*

Indicator Bacteria	Wet Weather Days [a]		Dry Weather Days [b]	
	Wet Weather Numeric Objective [c] (MPN/100mL)	Wet Weather Allowable Exceedance [d] Frequency	Dry Weather Numeric Objective [e] (MPN/100mL)	Dry Weather Allowable Exceedance Frequency
Fecal Coliform	400	22%	200	0%
Enterococcus	61 (104) [f]	22%	33	0%

a. Wet weather days defined as days with rainfall events of 0.2 inches or greater and the following 72 hours.
b. Dry weather days defined as days with less than 0.2 inch of rainfall observed on each of the previous 3 days.
c. Wet weather numeric objectives based on the single sample maximum (or equivalent) water quality objectives in the Water Quality Control Plan for the San Diego Basin (1994). Compliance with the wet weather TMDLs in the receiving water is based on the frequency that the wet weather days in any given year exceed the wet weather numeric objective, but 30-day geometric mean must also be met.
d. The wet weather allowable exceedance frequency is set at 22%. In the calculation of the wet weather TMDLs, the San Diego Regional Board chose to apply the 22 percent allowable exceedance frequency as determined for Leo Carillo Beach in Los Angeles County. At the time the wet weather watershed model was developed, the 22 percent exceedance frequency from Los Angeles County was the only reference beach exceedance frequency available. The 22 percent allowable exceedance frequency used to calculate the wet weather TMDLs is justified because the San Diego Region watersheds' exceedance frequencies will likely be close to the value calculated for Leo Carillo Beach, and is consistent with the exceedance frequency that was applied by the Los Angeles Regional Board.
e. Dry weather numeric objectives based on the 30-day geometric mean (or equivalent) water quality objectives in Water Quality Control Plan for the San Diego Basin (1994). Compliance with the dry weather TMDLs in the receiving water is based on the frequency that the dry weather days in any given year exceed the dry weather numeric objective.
f. A wet weather numeric objective for *Enterococcus* of 104 MPN/100mL may be applied as a receiving water limitation for creeks, instead of 61 MPN/100mL, if one or more of the creeks addressed by these TMDLs (San Juan Creek, Aliso Creek, Tecolote Creek, Forrester Creek, San Diego River, and/or Chollas Creek) is designated with a "moderately to lightly used area" or less frequent usage frequency in the Basin Plan. Otherwise, the wet weather numeric objective of 61 MPN/100mL for Enterococcus will be used to assess compliance with the wet weather allowable exceedance frequency.

	~~Receiving Water Limitations~~			
~~Constituent~~	~~Single Sample Maximum[1,2] (MPN/100mL)~~	~~Single Sample Maximum Allowable Exceedance Frequency[3]~~	~~30-Day Geometric Mean[2] (MPN/100mL)~~	~~30-Day Geometric Mean Allowable Exceedance Frequency~~
~~Total Coliform~~	~~10,000~~	~~22% / 0%~~	~~1,000~~	~~0%~~

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~~Fecal Coliform~~	~~400~~	~~22% / 0%~~	~~200~~	~~0%~~
~~*Enterococcus*~~	~~104[4] / 61[5]~~	~~22% / 0%~~	~~35[4] / 33[5]~~	~~0%~~

~~Notes:~~

~~1. During wet weather days, only the single sample maximum receiving water limitations are required to be achieved.~~
~~2. During dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved.~~
~~3. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days. The 0% single sample maximum allowable exceedance frequency applies to dry weather days.~~
~~4. This *Enterococcus* receiving water limitation applies to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.~~
~~5. This *Enterococcus* receiving water limitations applies to segments or areas of creeks or creek mouths listed in Table 6.0.~~

Interim receiving water limitations expressed as allowable receiving water exceedance frequencies are ~~given~~ presented in ~~the compliance schedule under~~ Specific Provision 6.c (2).

The allowable exceedance frequencies in Table 6.1 and Table 6.2 can be updated by the Regional Board Executive Officer if sufficient data is provided regarding reference systems in the San Diego Region.

(b) If the above receiving water limitations are not met in the receiving water, the Responsible Copermittees must demonstrate that the discharges from the MS4s are not causing or contributing to the violation of receiving water limitations. ~~The Copermittee may incorporate follow-up investigations and monitoring into the WQIP, as consistent with Provisions D and E.2 of this Order.~~ ~~must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 6.b.(2).~~

(2) Effluent Limitations

Discharges from the MS4s must not cause or contribute ~~contain densities that exceed the following effluent limitations by the end of the compliance schedules under Specific Provision 6.c.(1) to demonstrate the discharge is not causing or contributing~~ to a violation of receiving water ~~quality standards~~limitations. The mass-based waste load allocations presented in Resolution No. R9-2010-0001 can be used to demonstrate that loading from the MS4 is such that it does not cause water quality objective exceedances, as described in bullet (4) under Specific Provision 6.d.

~~**Table 6.2**~~
~~*Effluent Limitations as Bacteria Densities and Allowable Exceedance Frequencies in MS4 Discharges to the Water Body*~~

	~~Effluent Limitations~~			
~~Constituent~~	~~Single Sample Maximum[1,2] (MPN/100mL)~~	~~Single Sample Maximum Allowable Exceedance Frequency[3]~~	~~30-Day Geometric Mean[2] (MPN/100mL)~~	~~30-Day Geometric Mean Allowable Exceedance Frequency~~
~~Total Coliform~~	~~10,000~~	~~22% / 0%~~	~~1,000~~	~~0%~~
~~Fecal Coliform~~	~~400~~	~~22% / 0%~~	~~200~~	~~0%~~
~~*Enterococcus*~~	~~104[4] / 61[5]~~	~~22% / 0%~~	~~35[4] / 33[5]~~	~~0%~~

~~Notes:~~

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~~1. During wet weather days, only the single sample maximum effluent limitations are required to be achieved.~~
~~2. During dry weather days, the single sample maximum and 30-day geometric mean effluent limitations are required to be achieved.~~
~~3. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days. The 0% single sample maximum allowable exceedance frequency applies to dry weather days~~
~~4. This *Enterococcus* effluent limitation applies to MS4 discharges to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.~~
~~5. This *Enterococcus* effluent limitation applies to MS4 discharges to segments or areas of creeks or creek mouths listed in Table 6.0.~~

~~Interim effluent limitations expressed as allowable exceedance frequencies are given in the compliance schedule under Specific Provision 6.c.~~

(3) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 6.0 that continue to have 303(d) listings for RED-1 indicator bacteria will incorporate ~~fulfill the Comprehensive~~ Load Reduction Plans ~~(CLRPs)~~ drafted pursuant to ~~requirements in~~ Resolution No. R9-2010-0001.

(b) The Responsible Copermittee ~~must~~ may implement BMPs to support the achievement of ~~capable of achieving the~~ WQBELs under Specific Provision 6.b for the segments or areas of the water bodies listed in Table 6.0.

(c) The Responsible Copermittees may implement ~~should coordinate the~~ BMPs to support the achievement of ~~address~~ this TMDL with Caltrans and owners/operators of small MS4s ~~wherever and whenever~~as possible.

c. Compliance Schedule

(1) ~~WLA~~ Waste Load Reduction Compliance Dates

The Responsible Copermittees for MS4 discharges to a segment or area of the water bodies listed in Table 6.0 are required to achieve the ~~WLA~~Waste Load Reductions, thus must be in compliance with the WQBELs under Specific Provision 6.b, according to the following compliance schedule:

Table 6.3
Compliance Schedule Dates to Achieve Indicator Bacteria ~~WLAs~~Waste Load Reductions

Constituent	Dry Weather WLA Compliance Date	Wet Weather WLA Compliance Date
Total Coliform	April 4, 2021	April 4, 2031
Fecal Coliform		
Enterococcus		

1 - Total coliform receiving water limitations apply only to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.

(2) Interim Compliance Requirements

The Responsible Copermittees must comply with the following interim WQBELs by the interim compliance dates supported by Order No. R9-2010-0001.

(a) Interim Dry Weather WQBELs

The Responsible Copermittees must comply with dry weather interim WQBELs demonstrating 50% exceedance frequency reductions by the interim compliance dates presented in Table 6.5. Data from year(s) between 1996-2002 (as available) may be used to characterize the "existing" dry weather exceedances frequency as the baseline from which interim reductions in exceedances frequency must be measured.

~~Interim dry weather WQBELS are expressed as receiving water limitations. The Responsible Copermittee must calculate the "existing" exceedance frequencies of the 30-day geometric mean water quality objectives for each of the indicator bacteria by analyzing the monitoring data collected between January 1, 2002 and April 4, 2011.~~ "Existing" exceedance frequencies may be calculated by segment or area of a water body, or by water body, and/or by Watershed Management Area listed in Table 6.0. Separate "existing" exceedance frequencies must be calculated for beaches and creeks/creek mouths, where applicable.

The Responsible Copermittees must achieve a 50 percent reduction in each~~the~~ "existing" exceedance frequency, or otherwise demonstrate 50% reduction progress toward the final allowable exceedances frequency or compliance metric, by the interim compliance dates for dry weather givenin Table 6.5. Metric(s) expressing the 50 percent reduction in ~~of the 30-day geometric mean WQBELs for the segments or areas of the water bodies listed in Table 6.0 by the interim compliance dates for achieving the interim dry weather WQBELs given in Table 6.5. A 50 percent reduction in the "existing" exceedance frequency is equivalent to half of the "existing" exceedance frequency of the 30-day geometric mean WQBELs~~dry weather exceedances frequency (i.e. interim dry weather WQBLs, which may be expressed as receiving water limitations) calculated by the Responsible Copermittees must be included in the Water Quality Improvement Plans for the applicable Watershed Management Areas.
~~The "existing" exceedance frequencies and the interim dry weather allowable exceedance frequencies (i.e. interim dry weather WQBELs) calculated by the Responsible Copermittees must be included in the Water Quality Improvement Plans for the applicable Watershed Management Areas.~~

(b) Interim Wet Weather WQBELs

The Responsible Copermittees must achieve the interim allowable wet weather exceedances frequencies identified in ~~WQBELs in~~ Table 6.4, or otherwise demonstrate 50% progress towards the final wet weather compliance metric, ~~expressed as interim allowable exceedance frequencies,~~ by the interim compliance dates for achieving the interim wet weather WQBELs given in Table 6.5, unless an alternative interim

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compliance schedule is identified in the applicable LRP.

Table 6.4
Interim Wet Weather WQBELs Expressed as
Interim Wet Weather Allowable Exceedance Frequencies

Watershed Management Area	Water Body	Segment or Area	Interim Wet Weather Allowable Exceedance Frequencies		
			Total Coliform	Fecal Coliform	*Entero-coccus*
South Orange County	Pacific Ocean Shoreline	Cameo Cove at Irvine Cove Drive – Riviera Way	38%	37%	39%
		at Heisler Park - North			
	Pacific Ocean Shoreline	at Main Laguna Beach			
		Laguna Beach at Ocean Avenue			
		Laguna Beach at Cleo Street			
		Arch Cove at Bluebird Canyon Road			
		Laguna Beach at Dumond Drive			
	Pacific Ocean Shoreline	Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach	41%	41%	42%
	Aliso Creek	Entire reach (7.2 miles) and associated tributaries: - Aliso Hills Channel - English Canyon Creek - Dairy Fork Creek - Sulfur Creek - Wood Canyon Creek	41%	41%	42%
	Aliso Creek Mouth	at mouth	41%	41%	42%
	Pacific Ocean Shoreline	Aliso Beach at West Street	36%	36%	36%
		Aliso Beach at Table Rock Drive			
		100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)			
		at Salt Creek (large outlet)			
		Salt Creek Beach at Salt Creek service road			
		Salt Creek Beach at Strand Road			

Table 6.4 (Cont'd)
Interim Wet Weather WQBELs Expressed as
Interim Wet Weather Allowable Exceedance Frequencies

Watershed Management Area	Water Body	Segment or Area	Interim Wet Weather Allowable Exceedance Frequencies		
			Total Coliform	Fecal Coliform	*Entero-coccus*
South Orange County (cont'd)	Pacific Ocean Shoreline	at San Juan Creek	44%	44%	48%
	San Juan Creek	lower 1 mile	44%	44%	47%
	San Juan Creek Mouth	at mouth	44%	44%	47%
	Pacific Ocean Shoreline	at Poche Beach Ole Hanson Beach Club Beach at Pico Drain San Clemente City Beach at El Portal Street Stairs San Clemente City Beach at Mariposa Street San Clemente City Beach at Linda Lane San Clemente City Beach at South Linda Lane San Clemente City Beach at Lifeguard Headquarters under San Clemente Municipal Pier San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane) San Clemente State Beach at Riviera Beach Can Clemente State Beach at Cypress Shores	35%	35%	36%
San Luis Rey River	Pacific Ocean Shoreline	at San Luis Rey River mouth	45%	44%	47%
Carlsbad	Pacific Ocean Shoreline	at Moonlight State Beach	40%	40%	41%
San Dieguito River	Pacific Ocean Shoreline	at San Dieguito Lagoon mouth	33%	33%	36%

Table 6.4 (Cont'd)
Interim Wet Weather WQBELs Expressed as
Interim Wet Weather Allowable Exceedance Frequencies

Watershed Management Area	Water Body	Segment or Area	Interim Wet Weather Allowable Exceedance Frequencies: Total Coliform	Fecal Coliform	*Entero-coccus*
Penasquitos	Pacific Ocean Shoreline	Torrey Pines State Beach at Del Mar (Anderson Canyon)	26%	26%	26%
	Pacific Ocean Shoreline	La Jolla Shores Beach at El Paseo Grande	37%	37%	37%
		La Jolla Shores Beach at Caminito del Oro			
		La Jolla Shores Beach at Vallecitos			
		La Jolla Shores Beach at Avenida de la Playa			
		at Casa Beach, Children's Pool			
		South Casa Beach at Coast Boulevard			
		Whispering Sands Beach at Ravina Street			
		Windansea Beach at Vista de la Playa			
		Windansea Beach at Bonair Street			
		Windansea Beach at Playa del Norte			
		Windansea Beach at Palomar Avenue			
		at Tourmaline Surf Park			
		Pacific Beach at Grand Avenue			
	Tecolote Creek	Entire reach and tributaries	49%	49%	51%
San Diego River	Forrester Creek	lower 1 mile	46%	43%	49%
	San Diego River	lower 6 miles	46%	43%	49%
	Pacific Ocean Shoreline	at San Diego River mouth at Dog Beach	46%	43%	51%
San Diego Bay	Chollas Creek	lower 1.2 miles	41%	41%	43%

(c) Interim WQBEL Compliance Dates

The Responsible Copermittees must achieve the interim WQBELs under Specific Provisions 6.c.(2)(a) and 6.c.(2)(b) by the interim compliance dates given in Table 6.5, unless an alternative interim compliance schedule is identified in the applicable LRP.

Table 6.5
Interim Compliance Dates to Achieve Interim WQBELs

Watershed Management Area	Water Body	Segment or Area	Interim Compliance Dates: Interim Dry Weather WQBELs	Interim Compliance Dates: Interim Wet Weather WQBELs
South Orange County	Pacific Ocean Shoreline	Cameo Cove at Irvine Cove Drive – Riviera Way	April 4, 2016	April 4, 2021
		at Heisler Park - North		
	Pacific Ocean Shoreline	at Main Laguna Beach	April 4, 2016	April 4, 2021
		Laguna Beach at Ocean Avenue		
		Laguna Beach at Cleo Street		
		Arch Cove at Bluebird Canyon Road		
		Laguna Beach at Dumond Drive		
	Pacific Ocean Shoreline	Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach	April 4, 2016	April 4, 2021
	Aliso Creek	Entire reach (7.2 miles) and associated tributaries: - Aliso Hills Channel - English Canyon Creek - Dairy Fork Creek - Sulfur Creek - Wood Canyon Creek	April 4, 2018	April 4, 2021
	Aliso Creek Mouth	at mouth	April 4, 2018	April 4, 2021
	Pacific Ocean Shoreline	Aliso Beach at West Street	April 4, 2016	April 4, 2021
		Aliso Beach at Table Rock Drive		
		100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)		
		at Salt Creek (large outlet)		
		Salt Creek Beach at Salt Creek service road	April 4, 2017	April 4, 2021
		Salt Creek Beach at Strand Road	April 4, 2017	April 4, 2021

Table 6.5 (Cont'd)
Interim Compliance Dates to Achieve Interim WQBELs

Watershed Management Area	Water Body	Segment or Area	Interim Compliance Dates: Interim Dry Weather WQBELs	Interim Compliance Dates: Interim Wet Weather WQBELs
South Orange County (cont'd)	Pacific Ocean Shoreline	at San Juan Creek	April 4, 2016	April 4, 2021
	San Juan Creek	lower 1 mile	April 4, 2018	April 4, 2021
	San Juan Creek Mouth	at mouth	April 4, 2016	April 4, 2021
	Pacific Ocean Shoreline	at Poche Beach	April 4, 2016	April 4, 2021
		Ole Hanson Beach Club Beach at Pico Drain	April 4, 2016	April 4, 2021
		San Clemente City Beach at El Portal Street Stairs	April 4, 2017	April 4, 2021
		San Clemente City Beach at Mariposa Street		
		San Clemente City Beach at Linda Lane	April 4, 2016	April 4, 2021
		San Clemente City Beach at South Linda Lane	April 4, 2018	April 4, 2021
		San Clemente City Beach at Lifeguard Headquarters	April 4, 2017	April 4, 2021
		under San Clemente Municipal Pier		
		San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane)	April 4, 2018	April 4, 2021
		San Clemente State Beach at Riviera Beach	April 4, 2016	April 4, 2021
		Can Clemente State Beach at Cypress Shores	April 4, 2017	April 4, 2021
San Luis Rey River	Pacific Ocean Shoreline	at San Luis Rey River mouth	April 4, 2017	April 4, 2021
Carlsbad	Pacific Ocean Shoreline	at Moonlight State Beach	April 4, 2016	April 4, 2021
San Dieguito River	Pacific Ocean Shoreline	at San Dieguito Lagoon mouth	April 4, 2016	April 4, 2021

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Table 6.5 (Cont'd)
Interim Compliance Dates to Achieve Interim WQBELs

Watershed Management Area	Water Body	Segment or Area	Interim Compliance Dates: Interim Dry Weather WQBELs	Interim Compliance Dates: Interim Wet Weather WQBELs
Penasquitos	Pacific Ocean Shoreline	Torrey Pines State Beach at Del Mar (Anderson Canyon)	April 4, 2016	April 4, 2021
	Pacific Ocean Shoreline	La Jolla Shores Beach at El Paseo Grande		
		La Jolla Shores Beach at Caminito del Oro		
		La Jolla Shores Beach at Vallecitos		
		La Jolla Shores Beach at Avenida de la Playa		
		at Casa Beach, Children's Pool		
		South Casa Beach at Coast Boulevard		
		Whispering Sands Beach at Ravina Street		
		Windansea Beach at Vista de la Playa		
		Windansea Beach at Bonair Street		
		Windansea Beach at Playa del Norte		
		Windansea Beach at Palomar Avenue		
		at Tourmaline Surf Park		
		Pacific Beach at Grand Avenue		
	Tecolote Creek	Entire reach and tributaries		
San Diego River	Forrester Creek	lower 1 mile	April 4, 2018	April 4, 2021
	San Diego River	lower 6 miles		
	Pacific Ocean Shoreline	at San Diego River mouth at Dog Beach		
San Diego Bay	Chollas Creek	lower 1.2 miles	April 4, 2018	April 4, 2021

(1) Submittals to Support TMDL Basin Plan Amendment

The Responsible Copermittees are encouraged to submit data to support the TMDL reopener scheduled for April 2016 including but not limited to data related to reference watershed monitoring and beneficial use usage frequency.

For the watersheds where there are no longer any impairments listed on the 2008 303(d) List, the Phase I MS4s and Caltrans are not required to submit a load reduction plan as part of the TMDL.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(5) Demonstration of elimination of controllable sources of indicator bacteria loading and application of Natural Source Exclusion Approach (NSEA), if applicable, or
(6) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision II.A as described in Provision II.A.4.

The Phase I MS4s may demonstrate that their discharges are not causing the exceedances in the receiving waters by providing data from their discharge points to the receiving waters, by providing data collected at jurisdictional boundaries, and/or by using other methods accepted by the San Diego Water Board. Otherwise, at the end of the dry weather TMDL compliance schedule, the municipal Phase I MS4s will be held responsible and considered out of compliance unless other information or evidence indicates another controllable or uncontrollable source is responsible for the exceedances in the receiving waters. If controllable sources other than discharges from the municipal Phase I MS4s are identified before or after the end of the dry weather TMDL Compliance Schedule as causing the exceedances, those controllable sources will be responsible for reducing their bacteria loads and/or demonstrating that discharges from those sources are not causing the exceedances. The San Diego Water Board shall implement additional actions (e.g., issue enforcement actions, amend existing NPDES requirements or conditional waivers), as needed, to bring all controllable sources into compliance with the dry weather TMDLs.

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~~d.~~e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

The Bacteria Load Reduction Plans (BLRPs) and/or CLRPs to be submitted by the Copermittees and approved by the Regional Board Executive Officer contain monitoring programs. Implementation of those Regional Board-approved monitoring programs constitutes compliance with the Monitoring Station and Monitoring Procedure requirements, described below.

(1) Monitoring and Assessment Requirements for Beaches

(a) Monitoring Stations

For beaches addressed by these TMDLs, monitoring locations should consist of, at a minimum, the same locations used to collect data required under MS4 NPDES monitoring requirements and beach monitoring for Health and Safety Code section 115880.[75] If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters.

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~~(i) The Responsible Copermittees maymust designate the MS4 outfalls within their jurisdiction discharging to the Pacific Ocean Shoreline segments or areas listed in Table 6.0 as high priority non-storm water MS4 monitoring stations, in accordance with the requirements of Provision D.1 of this Order. Monitoring stations may be selected based on stations utilized under other monitoring programs. Outfalls may be monitored for follow up source identification, at minimum, as consistent with this Order.~~

~~(ii) For the Pacific Ocean Shoreline segments or areas listed in Table 6.0 with MS4 outfalls, the Responsible Copermittees must establish at least one monitoring station within the receiving water. Monitoring stations may be selected based on stations utilized under other monitoring programs.~~

(b) Monitoring Procedures

(i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly.

The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations for an adequate number of storm events that occur during the rainy season (i.e., October 1 through April 20) to represent wet weather conditions. At least one sample must be collected within the first 24 hours of the end of a storm event[27].

~~(i) The Responsible Copermittees must monitor receiving waters the effluent of the designated MS4 outfalls within their jurisdiction discharging during dry weather to the Pacific Ocean Shoreline segments or areasas listed in Table 6.0 in accordance with the dry weather jurisdictional monitoring set forth in the WQIP.requirements of Provision D.1.a.(1)(b) of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(ii) The Responsible Copermittees must monitor, within the first 24 hours of each monitored storm event,[28] the receiving water effluent of the designated MS4 outfalls within their jurisdiction as discharging to the Pacific Ocean Shoreline segments or areas listed in Table 6.0 in accordance with the wet weather jurisdictional monitoring requirements of Provision D.1.b.(1)(b) of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteriamonitoring requirements set forth in the WQIP.~~

~~(iii)~~(ii) ~~The Responsible Copermittees must collect samples from the~~

[27] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

~~[28] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].~~

~~monitoring stations within the receiving water body for each dry weather and wet weather MS4 outfall monitoring event monitored.~~ Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(c) Assessment and Reporting Requirements

(i) The Responsible Copermittees must analyze the dry weather and wet weather monitoring data to assess whether the interim and final WQBELs for the Pacific Ocean Shoreline segments or areas listed in Table 6.0 have been achieved.

[a] Commonly referred to as AB 411 monitoring

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~~(i)~~(ii) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

(2) Monitoring and Assessment Requirements for Creeks and Creek Mouths

(a) Monitoring Stations

For creeks addressed by these TMDLs, monitoring locations should consist of, at a minimum, a location at or near the mouth of the creek (e.g., Mass Loading Station or Mass Emission Station) and one or more locations upstream of the mouth (e.g., Watershed Assessment Stations). If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters.

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~~(i) The Responsible Copermittees must establish at least one receiving water monitoring station at or near the mouth of the creeks listed in Table 6.0. Monitoring stations may be selected based on stations utilized under other monitoring programs. Outfalls may be monitored for follow-up source identification, at minimum, as consistent with this Order.~~

~~(ii) The Responsible Copermittees must establish at least one receiving water monitoring station upstream of the station established for Specific Provision 6.d.(2)(a)(i). At least one monitoring station must be established for each Responsible Copermittee at the most downstream location within its jurisdiction, and one monitoring station at the most upstream location within its jurisdiction.~~

~~(iii) The Responsible Copermittees may must identify the MS4 outfalls discharging to the segments or areas of the creeks and creek mouths listed in Table 6.0. The Responsible Copermittees must may identify the MS4 outfalls that are monitored in accordance with the dry weather jurisdictional monitoring requirements of Provision D.1.a.(1)(b) of this Order and the wet weather jurisdictional monitoring requirements of Provision D.1.b.(1)(a) of this Orderunder other monitoring programs and in accordance with the WQIP.~~

(b) Monitoring Procedures

(i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations ~~at least monthly~~according to the WQIP.

(i) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations for an adequate number of storm events that occur during the rainy season (i.e., October 1 through April 20) to represent wet weather conditions. At least one sample must be collected within the first 24 hours of the end of a storm event[29].
~~each storm event monitored, according to the WQIP.~~[30]

(ii) Samples collected from receiving water monitoring stations must be analyzed for ~~total coliform,~~ fecal coliform, and *Enterococcus* indicator bacteria.

(c) Assessment and Reporting Requirements

(i) The Responsible Copermittees must analyze the receiving water monitoring data to assess whether the interim and final receiving water WQBELs for the creeks and creek mouths listed in Table 6.0 have been achieved.

~~(ii) If the receiving water WQBELs for the creeks and creek mouths listed in Table 6.0 have not been achieved, the Responsible Copermittees must review the MS4 outfall monitoring data to assess whether the interim and final effluent WQBELs have been achievedfollow the process set forth in the WQIP.~~

[29] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

~~[30] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].~~

~~(iii) If receiving water WQBELs for the creeks and creek mouths listed in Table 6.0 have not been achieved, tThe Responsible Copermittee must identify and incorporate additional MS4 outfall and receiving water monitoring stations and/or adjust monitoring frequencies to identify sources causing exceedances of the receiving water WQBELs.actions to be implemented in the WQIP.~~

~~(iv)~~(ii) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

6. Enforcement Response Plans [Alternative to Provision E.6]

Each Copermittee must develop and implement an Enforcement Response Plan as part of its jurisdictional runoff management program document. The Enforcement Response Plan must describe the applicable protocols and options for enforcing compliance with the provisions of this Order. The Copermittees may continue to utilize and implement established, equivalent guidelines and procedures for enforcement.

The Enforcement Response Plan must include the following:

a. Enforcement Response Plan Components
The Enforcement Response Plans shall include the following individual components:

i. The Illicit Discharge Detection and Elimination Enforcement Components provided in Provision E.2.
ii. The Development Projects Enforcement Component provided in provision E.3.

Existing enforcement plans or procedures may be used to partially or wholly satisfy the requirements of any Enforcement Response Plan component.

a. Enforcement Approaches and Options
Each Enforcement Response Plan component must describe the Copermittee's approach to correcting noncompliance with its permits, applicable local ordinances, and this Order. It must describe protocols for progressively stricter responses, including, as applicable, timeframes allowed to bring areas or facilities into compliance. The enforcement process must include appropriate sanctions to compel compliance, such as:

1) Verbal and written notices of violation;
2) Cleanup requirements;
3) Fines
4) Bonding requirements;
5) Administrative and criminal penalties;
6) Liens;
7) Stop work orders; and
8) Permit and occupancy denials.

c. **Correction of Violations**

1) Violations must be corrected in a timely manner with the goal of correcting them within 30 calendar days after the violations are discovered and prior to the next predicted rain event, when possible.
2) If more than 30 calendar days are required for compliance, then a

rationale must be recorded in the applicable electronic database or tabular system used to track compliance.

d. **ESCALATED ENFORCEMENT PRIORITIES**

1) Each Enforcement Response Plan must include a definition of “escalated enforcement priorities”. Escalated enforcement priorities shall be defined to include any enforcement scenario where a violation or other non-compliance is determined to constitute a significant contribution to any of the highest water quality priorities identified in the Water Quality Improvement Plan. Escalated enforcement priorities may be defined differently for development planning; construction sites; commercial, industrial, and municipal sources; and residential management areas.

2) Where a violation involving a pollutant or stressor that has been identified as a highest water quality priority is not determined to represent an escalated enforcement priority, a rationale must be recorded in the applicable electronic database or tabular system used to track compliance.

3) High level enforcement actions must continue to escalate, as necessary, to compel compliance as soon as possible.

e. Reporting of Non-Compliant Sites

(1) Each Copermittee must notify the San Diego Water Board in writing within 48 hours of issuing escalated enforcement (as defined in the Copermittee’s Enforcement Response Plan) to a construction site that poses a significant threat to water quality as a result of violations or other non-compliance with its permits and applicable local ordinances, and the requirements of this Order. Written notification may be provided electronically in email form.

(2) Each Copermittee must notify the San Diego Water Board of non-filers under the Industrial General Permit and Construction General Permit by email to Nonfilers_R9@waterboards.ca.gov.

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5. Existing Development Management [Alternative to Provision E.5]

Each Copermittee must implement an existing development management program that includes the following requirements:

a. Industrial, Commercial, and Municipal Sources

(1) Source Identification and Prioritization

Each Copermittee must identify known sources and maintain an updated watershed-based inventory of its existing industrial, commercial, and municipal development that has the reasonable potential to discharge a pollutant load to and from the MS4. The use of an automated database system, such as GIS, is highly recommended. The inventory must, at a minimum, include:

(a) Name, location (address and/or hydrological subarea) of each source;

(b) A designation of the source as municipal, commercial, or industrial;

(c) SIC Code or NAICS Code, if applicable;

(d) Industrial General Permit NOI and/or WDID number, if applicable;

(e) Identification of pollutants generated or potentially generated by the source;

(f) Whether the source is adjacent to an ESA;

(g) Whether the source is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates or potentially generates pollutants for which the water body segment is impaired; and

(h) Whether the source contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan;

(2) BMP Implementation and Maintenance

Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development with the reasonable potential to discharge pollutant loads from their MS4, including special event venues. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(a) Pollution Prevention

Each Copermittee must promote the use of pollution prevention methods, where appropriate.

(b) BMP Operation and Maintenance

(i) Each Copermittee must properly operate and maintain, or require the proper operation and maintenance of designated BMPs at sources within its jurisdiction.

(ii) Each Copermittee must implement a schedule of operation and maintenance activities for its MS4 and related structures (including but not limited to catch basins, storm drain inlets, detention basins, etc.), and verify proper operation of all its municipal structural treatment controls. Operations and maintenance activities may include:

[a] Inspections of MS4 and related structures;

[b] Cleaning of MS4 and related structures; and

[c] Proper disposal of materials removed from cleaning of MS4 and related structures.

(iii) Each Copermittee must implement a schedule of operation and maintenance activities for public: streets, unpaved roads, paved roads, and paved highways and freeways within its jurisdiction.

(iv) Each Copermittee must implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers. Copermittees that operate both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate seeping sewage from infiltrating the MS4. Copermittees that do not operate both a municipal sanitary sewer system and a MS4 are encouraged to coordinate with sewering agencies to keep themselves informed of relevant and appropriate maintenance activities and capital projects in their jurisdiction.

(c) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must implement procedures, or require the implementation of procedures, as appropriate, to reduce discharges of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers at sources within its jurisdiction.

(3) Measures to Address Highest Water Quality Priorities

Each Copermittee must conduct or require measures as necessary to address sources or areas that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. These measures must be identified as applicable in each WQIP strategy, and may include any of the following:

(a) Copermittee Program Activities

Each Copermittee may make modifications to its program activities (e.g. increased or focused education, inspections, etc.) to address sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(b) Additional Control Measures

Each Copermittee may require additional pollution prevention measures and control measures at sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan, including consideration of retrofit and channel rehabilitation and improvement opportunities, as identified in Provision 5.a.2.(c)

(c) Retrofit

Each Copermittee must develop a strategy to facilitate the implementation of retrofit projects. Existing development in high priority areas should be assessed for inclusion in the retrofit plan. Retrofit plans should focus on pollutants and areas identified as high priority within the Water Quality Improvement Plans, with the highest priority projects included in the Water Quality Improvement Plans.

(i) Retrofit projects may be prioritized based on their relative benefit to water quality, feasibility, cost effectiveness, and community acceptance.

(ii) Retrofit projects in the highest priority areas should be included in the review for the Water Quality Improvement Plan to provide additional pollutant removal from storm water discharges.

(d) Channel Rehabilitation and Improvement

Each Copermittee must develop a strategy to facilitate the implementation of channel rehabilitation and improvement projects within their jurisdiction. Existing channels in high priority areas should be assessed for inclusion in the channel rehabilitation and improvement plan. Channel rehabilitation and improvement plans should focus on pollutants and areas identified as high priority within the Water Quality Improvement Plans.

(i) Channel rehabilitation and improvement projects may be selected to address hydromodification, restore wetland and riparian habitat, or to address other water quality issues prioritized in the Water Quality Improvement Plan.

(ii) Channel rehabilitation and improvement projects may be prioritized based on their relative benefit to water quality, feasibility, cost effectiveness, and community acceptance.

(iii) Channel rehabilitation and improvement projects in the highest priority areas should be included in the review for the Water Quality Improvement Plan to provide additional pollutant removal from storm water discharges.

(4) Inspection Requirements:

(a) Inspection Frequency

(i) Each Copermittee must establish appropriate inspection frequencies for inventoried industrial, commercial, and municipal sources based on the potential for discharging pollutants via storm water and non-storm water discharges, and should reflect the priorities set forth in the Water Quality Improvement Plan.

(ii) Each Copermittee must conduct inspections annually with a level of effort equivalent to 20% of their industrial, commercial, and municipal inventory combined[12]. If facilities require multiple inspections during any given year, those additional inspections may count towards this total.

(iii) Inventoried existing development must be inspected, as needed, in response to valid public complaints and findings from the Copermittee's municipal and contract staff inspections.

(iv) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e. education and outreach, re-inspection,

[1] Excludes linear facilities (MS4 and roads).

enforcement) as necessary to confirm compliance in accordance with its enforcement response plan pursuant to Provision E.6.

(b) Inspection Content

Inspections of industrial, commercial, and municipal facilities by the Copermittee may include the following:

(i) Industrial, commercial, and municipal facilities name and location (address and hydrologic subarea);

(ii) Inspection and re-inspection date(s);

(iii) Assessment of compliance with its applicable local ordinances and permits related to non-storm water and storm water discharges and runoff;

(iv) Assessment of BMPs implementation;

(v) Verification of coverage under the Industrial General Permit (NOI and/or WDID number), when applicable;

(vi)

(vii) Visual observations of actual non-storm water discharges, if present;

(viii) Visual observations of actual or potential discharge of pollutants, if present; and

(ix) Visual observations of actual or potential illicit connections, if present.

(c) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried industrial, commercial, and municipal facilities. The Copermittee must maintain all inspection records in an electronic database or tabular format, either in paper or electronic inspection records files, which must be made available to the San Diego Water Board upon request.

Inspection records must include the information necessary to effectively manage and implement the industrial, commercial, and municipal facilities inspection program, as described in each Copermittee's jurisdictional runoff management plan

b. Residential Sources

(1) Source Identification and Prioritization:

An inventory of residential sources within each Copermittees jurisdiction must be developed as follows:

(a) Designation of Residential Management Areas

Each Copermittee must divide areas of residential development into Residential Management Areas. Residential Management Areas may be designated by one or more of the following: Hydrologic Sub Area, land use (e.g. single family, multi family, rural, Common Interest Areas, or Home Owner Associations), or other accepted methods to be included in each Copermittee-approved jurisdictional runoff management plan.

(b) Prioritization of Residential Management Areas

Copermittees must prioritize Residential Management Areas for the purposes of prioritizing and directing their residential programs. Prioritization must consider whether the Residential Management Area contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan, and consideration of other program information or information from other relevant programs:

(c) A regularly updated map must be developed showing the locations of inventoried Residential Management Areas, watershed boundaries, and water bodies at or near them.

(2) BMP Implementation and Maintenance

(a) Designate BMPs

Each Copermittee must designate and require the implementation of a minimum set of BMPs for all residential sources or target audiences with the reasonable potential to discharge significant pollutant loads from their MS4.The designated minimum BMPs must be source-specific, and must address each of the following as appropriate.

(i) Pollution Prevention

Each Copermittee must promote the use of pollution prevention

ADMINISTRATIVE DRAFT

methods, where appropriate.

(ii) BMP Operation and Maintenance

Each Copermittee must operate and maintain, or require the operation and maintenance of designated BMPs for sources within its jurisdiction.

(iii) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must require and encourage, as appropriate, the implementation of practices to reduce discharges of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers at residential sources within its jurisdiction.

(3) Measures to Address Highest Water Quality Priorities

Each Copermittee must conduct or require measures as necessary to address sources or areas that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. These measures must be identified as applicable in each WQIP strategy, and may include any of the following:

(a) Copermittee Program Activities

Each Copermittee may make modifications to its program activities (e.g. increased or focused education, inspections, etc.) to address sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(b) Additional Control Measures

Each Copermittee may require additional pollution prevention and control measures at sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(c) Retrofit

Each Copermittee must encourage through education or other means the implementation of retrofit projects at residential sources or areas.

(4) Residential Management Area Oversight:

(a) Residential Area Assessment

Each Copermittee must conduct representative evaluations (e.g. visual observations, surveys, water use analysis, if available, and other data) of its prioritized RMAs to update implementation strategies.

(b) Residential Program Update

Within two years, each Copermittee must develop and submit for Regional Board approval an updated residential program strategy based on assessment findings. Until Copermittees implement an updated residential program, they must continue performing their existing programs.

(c) Follow up Actions

Each Copermittee must prioritize and implement its follow up actions (e.g. education and outreach, re-assessment, enforcement) in accordance with its Enforcement Response Plan pursuant to Provision E.6.

(d) Assessment Tracking and Records

Assessment records must be tracked and sufficiently detailed in order to determine compliance with the requirements of this Order and any progress made toward the modification of residential management strategies, or addressing the highest water quality priorities identified in the Water Quality Improvement Plan.

c. Existing Development Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried existing development identified by the Copermittee as having the reasonable potential to discharge pollutant loads from the MS4 within their jurisdiction, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

ORANGE COUNTY PERMITTEES

ATTACHMENT C

MONITORING PRINCIPLES

Orange County Monitoring Principles

The Permittees from San Diego County have developed an alternative monitoring program from the one identified in the Draft Administrative Order. While we agree in many cases with the alternative approach, the Orange County Permittees do not believe that this proposal represents a model for the permit that would be appropriate for Orange County, and think any monitoring program should reflect the following principles:

1. Support the question-driven monitoring and assessment program using the SMC model stormwater monitoring program as guidance. The WQIP should be the vehicle for establishing the monitoring program to support the watershed priorities. As such the proposed monitoring program should include:
   a. Wet Weather and Dry Weather Monitoring
   b. Receiving Water and Outfall Monitoring
   c. Supplemental Monitoring as appropriate
   d. Scope and schedule for monitoring
2. Monitoring should focus on the watershed and constituents of concern. Therefore initial monitoring should focus on the receiving water condition to identify the critical water quality issues (both dry and wet weather) and from there move to outfall monitoring to better support the stormwater program to address the critical water quality issues.
3. Monitoring should provide the opportunity to measure the overall watershed condition while being supported by a focused and complimentary outfall monitoring program that evaluates the sources and stressors affecting watershed condition. The assessment and feedback approach using a question driven framework would follow this general framework:
   a. Provide a comprehensive regional assessment of receiving waters in years 1 of the permit term (assessment).
   b. Conduct intensive outfall monitoring within each watershed or hydrologic subarea on an annual basis or rotating basis in the intervening years (sources and stressors).
   c. Conduct a comprehensive re-assessment of receiving water conditions in year 5 of the permit term to measure progress in addressing outfall discharges (feedback).
4. Dry weather monitoring should have the following objectives:
   a. As a diagnostic tool to support the Illegal Discharge / Illicit Connection (ID/IC) program
      i. Develop action levels that reflect a probabilistic and targeted sampling program.
      ii. Conduct investigation to identify the discharge.
   b. As an assessment tool to effectively prohibit non-stormwater discharges.
      i. Develop action levels that reflect protection of beneficial uses and watershed water quality issues.
      ii. Conduct investigation to identify the source(s).
5. Wet weather monitoring should have the following objectives:
   a. Assess the long term changes in the receiving water
      i. Conduct comprehensive monitoring at Mass Load Stations (MLS) every five years
   b. Assess the impacts of stormwater discharges on the receiving water
      i. Conduct outfall monitoring on an annual basis.

Although we have not provided specific comments on the monitoring provision of the Draft Adminstrative Order our assessment of the future Tentative Order will be based on these principles.

Walsh, Laurie@Waterboards

From:	Suppes, Christy <Christy.Suppes@ocpw.ocgov.com>
Sent:	Monday, September 17, 2012 4:08 PM
To:	Walsh, Laurie@Waterboards
Cc:	Gibson, David@Waterboards; Felix, Tony@Waterboards; Crompton, Chris; Skorpanich, Mary Anne; Boon, Richard; Onuma, Kevin; 'jon.vanrhyn@sdcounty.ca.gov'; 'Padres, Claudio'; 'syhasenin@sandiego.gov'; Ruano, Betty; bfowler@danapoint.org; Crompton, Chris; 'Chris Macon - Laguna Woods'; Suppes, Christy; 'Devin Slaven - Lake Forest'; 'E. (Max) Maximous - Rancho Santa Margarita'; Fortuna, James; Gin, Vincent; Sharp, Grant; 'Humza Javed - Laguna Hills'; 'Jean Jambon - Laguna Niguel'; Voss, Jenna; Shook, Jennifer; 'Joe Ames - Mission Viejo'; jwhitman@cityofalisoviejo.com; 'Jonathan Orduna - Laguna Niguel'; krosenfield@ci.laguna-hills.ca.us; 'Leslie Keane - Laguna Woods'; 'Lisa Zawaski - Dana Point'; 'Luis Estevez - Lake Forest'; Skorpanich, Mary Anne; 'Mary Vondrak - San Clemente'; 'Mike Phillips - Laguna Beach'; 'Moy Yahya - Aliso Viejo'; 'Nancy Palmer - Laguna Niguel'; 'Nasser Abbaszadeh - San Juan Capistrano'; Nguyen, Duc; 'Peter Meier - Lake Forest'; 'Rae Beimer - Rancho Santa Margarita'; Boon, Richard; 'Richard Schlesinger - Mission Viejo'; 'Tom Bonigut - San Clemente'; 'Tracy Ingebrigtsen - Laguna Beach'; Yi, Greg; 'Ziad Mazboudi - San Juan Capistrano'
Subject:	County of Orange Comments Addendum - Administrative Draft Order No. R9-2012-0111
Attachments:	OC Comment Addendum - Draft Admin Order R9-2012-0011.pdf; OC Comment - Attachment A-Addendum.pdf

ORANGE COUNTY
OC Public Works
Our Community. Our Commitment.

Ignacio G. Ochoa, P.E., Interim Director
300 N. Flower Street
Santa Ana, CA

P.O. Box 4048
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Telephone: (714) 834-2300
Fax: (714) 967-0896

September 17, 2012

By E-Mail and U.S. Mail

Laurie Walsh
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4353

Subject: County of Orange Comment Submittal on the Administrative Draft Municipal Separate Storm Sewer (MS4) Permit (Tentative Order No. R9-2012-0011)

Dear Ms. Walsh:

On September 14, the County provided you with comments on the subject Permit. Since that time, the County has been provided with the comment letter prepared by Rancho Mission Viejo. This comment letter requests inclusion of language from current Order No. R9-2009-0002, specifically, *Provision F.1.d.(11) Where a development project……*

The County supports the inclusion of this provision in the future Tentative Order. Attached is an Addendum modifying our comments to include a provision that would continue the current alternative compliance option for watershed-based planning approaches for land development.

Christy Suppes
OC Watershed Program - Stormwater External
2301 N. Glassell St., Orange, CA 92865
(714) 955-0673 tel / (714) 955-0639 fax
christy.suppes@ocpw.ocgov.com
www.ocwatersheds.com

Please note my working hours are 7:30 AM - 5:00 PM, Monday - Thursday, and 7:30 AM - 4:00 PM every other Friday.
For the month of September, I will be in the office on the following Friday(s): 14th and 28th.

ORANGE COUNTY PERMITTEES

A – ADDENDUM

REDLINE/STRIKEOUT DRAFT PERMIT AND COMMENT TABLE

	COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Comment #	**Permit Section**	**Permit Page[1]**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
102a	E.3.c.5	71	Alternative Compliance for Watershed-Based Planning	Inclusion of new section "E.3.c.5 Alternative Compliance for Watershed-Based Planning" is needed to maintain continuity with same provision in R9-2009-0002 F.1.d(11)	**As shown in the attached revised Permit, include additional language, as follows:** (5) Alternative Compliance for Watershed-Based Planning Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the Regional Board, such standards shall govern review of projects with respect to Provision E.3 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85^{th} percentile storm event as defined in Provision E.3.c. and

[1] Refers to the page numbers of the original Administrative Draft issued by the Regional Board on April 9, 2012

	COUNTY OF ORANGE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Comment #	**Permit Section**	**Permit Page**[1]	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
					that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration sized for the design capture volume that has not been retained. Where regional LID implementation has been shown to be technically infeasible (per Section E.3.c.(4)(b)) any volume up to and including the design capture volume, not retained by LID BMPs, not treated by LID biolfiltration, must be treated using conventional treatment control BMPs in accordance with Section E.3.c.(2)(d) and participation in the mitigation program in Section D.3.c.(4)(c).

for the completion of offsite mitigation projects, including milestone dates to identify, fund, design, and construct the projects. PDP implemented offsite mitigation projects must be completed upon completion of the PDP, unless a longer period is authorized by the San Diego Water Board. The timing of mitigation projects associated with a Copermittee offsite mitigation program will be developed by the Copermittees as part of developing their offsite mitigation program.

(iv) *Mitigation Fund*

A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as a means for developing and implementing offsite mitigation projects, provided the projects conform to the requirements for project locations, types, and timing described above.

(5) Alternative Compliance for Watershed-Based Planning

Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the Regional Board, such standards shall govern review of projects with respect to Provision E.3 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in Provision E.3.c. and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration sized for the design capture volume that has not been retained. Where regional LID implementation has been shown to be technically infeasible (per Section E.3.c.(4)(b)) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section E.3.c.(2)(d) and participation in the mitigation program in Section E.3.c.(4)(c).

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ORANGE COUNTY
OC Public Works
Our Community. Our Commitment.

Ignacio G. Ochoa, P.E., Interim Director
300 N. Flower Street
Santa Ana, CA

P.O. Box 4048
Santa Ana, CA 92702-4048

Telephone: (714) 834-2300
Fax: (714) 967-0896

September 17, 2012

By E-Mail and U.S. Mail

Laurie Walsh
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4353

Subject: County of Orange Comment Submittal on the Administrative Draft Municipal Separate Storm Sewer (MS4) Permit (Tentative Order No. R9-2012-0011)

Dear Ms. Walsh:

On September 14, the County provided you with comments on the subject Permit. Since that time, the County has been provided with the comment letter prepared by Rancho Mission Viejo. This comment letter requests inclusion of language from current Order No. R9-2009-0002, specifically, *Provision F.1.d.(11) Where a development project……*

The County supports the inclusion of this provision in the future Tentative Order. Attached is an Addendum modifying our comments to include a provision that would continue the current alternative compliance option for watershed-based planning approaches for land development.

Please contact me directly if you have any questions. For technical questions, please contact Chris Crompton at (714) 955-0630 or Richard Boon at (714) 955-0670.

Sincerely,

Richard Boon for
Mary Anne Skorpanich, Manager
OC Watersheds

Attachments: A – Addendum: Redline/Strikeout Draft Permit and Comment Table

Cc: David Gibson, San Diego Regional Board
Tony Felix, San Diego Regional Board
South Orange County Permittees
Orange County Technical Advisory Committee
Kevin Onuma, Orange County Flood Control District

Walsh, Laurie@Waterboards

From:	McPherson, Sheri <Sheri.McPherson@sdcounty.ca.gov>
Sent:	Friday, September 14, 2012 2:59 PM
To:	Walsh, Laurie@Waterboards; Chiu, Wayne@Waterboards; Becker, Eric@Waterboards; Barker, David@Waterboards
Cc:	Tesoro, Cid; Brownyard, Teresa; Snyder, Todd
Subject:	County of San Diego Comments on Administrative Draft Permit (R9-2012-0011)
Attachments:	09-14-12 County comment letter to RB admin draft.pdf

Laurie,

Please find attached the County of San Diego's comment letter on the Administrative Draft MS4 Permit (R9-2012-0011).

Please let me know if you have questions.

Thank you,

Sheri

Sheri McPherson
County of San Diego
Watershed Protection Program
(858) 495-5285
sheri.mcpherson@sdcounty.ca.gov

****As of August 10, 2012 our offices will be relocated to 5510 Overland Avenue, Suite 410, San Diego, CA 92123. All email addresses, phone numbers and fax numbers will remain the same.**

County of San Diego

DEPARTMENT OF PUBLIC WORKS

RICHARD E. CROMPTON
DIRECTOR

5510 OVERLAND AVE, SUITE 410
SAN DIEGO, CALIFORNIA 92123-1295
(858) 694-2212 FAX: (858) 694-3597
Web Site: www.sdcounty.ca.gov/dpw/

September 14, 2012

Ms. Laurie Walsh
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

SUBJECT: COUNTY OF SAN DIEGO COMMENT SUBMITTAL ON THE ADMINISTRATIVE DRAFT MUNICIPAL SEPARATE STORM SEWER (MS4) PERMIT (TENTATIVE ORDER NO. R9-2012-0011)

Dear Ms. Walsh,

Thank you for the opportunity to comment on *Tentative Order No. R9-2012-0011 -- National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region* (Administrative Draft Permit).

The comments provided herein are offered by the County of San Diego in addition to those that the County has submitted separately on behalf of the 21 Copermittees subject to Order 2007-0001. While the Copermittee comments represent a general consensus developed since the release of the Administrative Draft Permit in April 2012, we believe that additional input is needed to reflect the unique perspective of the County as Regional Principal Permittee and as a large jurisdiction covering portions of eight watershed management areas.

Below we have identified several additional issues for Regional Board consideration. We believe in particular that the first three issues warrant additional discussion, and we are anxious to continue dialoguing with Regional Board staff, representatives of the Orange and Riverside permit regions, and other parties as appropriate. We would also like to emphasize that the comment letters submitted by both of these counties provide suggested principles that we agree are both useful and appropriate as a basis for much of this discussion.

1. Relationship of WQIP and JRMP Requirements.

The relationship of Water Quality Improvement Plan (WQIP) and Jurisdictional Runoff Management Plan (JRMP) requirements must be clarified. In spite of the extensive discussion that has already occurred on this issue, there appears to be a considerable variety of opinions on the specific content to be addressed in each plan, how these plans are related, and how each supports compliance with applicable permit performance standards. We suggest that the following questions be considered as a basis for continued discussion:

- What is the required content, relationship, and phasing of all submittals under the permit?
- Must a WQIP contain all jurisdictional commitments within a WMA or only those related to the highest priority water quality issues?
- Is the JRMP intended to be a procedural document generally describing Copermittee programs? Or should it contain specific watershed and/or jurisdictional commitments?
- Will implementation of a publicly vetted and Regional Board-approved WQIP constitute compliance with the permit?
- What specific content should be contained in WQIP Annual Reports? Are these reports sufficient to describe jurisdictional compliance as a whole?
- What are appropriate timeframes for reporting various data, information, and results?

2. Adaptive Management Provisions.

Adaptive management provisions of the Administrative Draft Permit should be fleshed out to ensure that they support meaningful program improvement over time. In particular, the County believes that a clear distinction should be made between normal iterative management processes (i.e., ongoing adjustments to programs and plans in response to experience obtained during routine implementation) and adaptive management (a structured process of identifying and addressing specific knowledge gaps with an aim toward resolving them over time). We believe that the two processes are fundamentally different in their aims, and with respect to the planning and resource commitments needed to sustain them. The best permit will be one that recognizes these distinctions, and that ensures the proper application of both processes. We suggest that the following questions be considered as a basis for continued discussion:

- Where are iterative and adaptive management processes most needed?
- Where do Copermittees have the discretion to make modifications? Where are approvals needed?
- Are there specific permit provisions that can or cannot be modified?
- Are there standards, criteria, other conditions that must be met to allow modification?
- Where approvals are needed for modifications, what is the process for obtaining them? What is the role of public review in this process?

Adaptive management provisions in the Administrative Draft Permit are currently consolidated under Section II.B.5. The Copermittees have suggested the addition of clarifying text in the introduction to Section II.E, as well as other specific edits throughout Section II.B. The County supports these changes, but additionally proposes that a separate section be established in the permit to consolidate, clarify, and emphasize iterative and adaptive management provisions.

3. Offsite Mitigation Programs.

Section II.E.3 of the Administrative Draft Permit requires the imposition of onsite retention and HMP controls for Priority Development Projects (PDPs). During discussions, Copermittees and industry representatives have emphasized the impracticability of meeting the proposed retention standard for all PDP sites. As an alternative that would provide greater flexibility in achieving compliance onsite, the Copermittees have proposed that a second tier of LID treatment options be added to the permit. The County strongly supports this proposal. However, even assuming acceptance of this proposed modification it's likely that PDPs will in some instances be unable to meet all applicable standards onsite. Therefore, we view the development of a mitigation program as an eventual necessity. Given this, it's critical that any limitations or constraints on the development or application of such programs be fully vetted prior to permit adoption. In particular, the County remains concerned that the mitigation project timing requirements contained in the Administrative Draft Permit would make regional controls infeasible in some cases or impose unrealistic and unacceptable liabilities on Copermittees for their completion and performance. Likewise, the use of mitigation funds, either internal or private, must be further explored to better understand their potential role. The required use of mitigation programs is new to this permit, and it's pragmatic to approach their imposition with caution. Unless the potential difficulties associated with such an undertaking are met up front, it's possible that the County will have little incentive to actively pursue them.

4. Attachment E, Total Maximum Daily Load for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed.

The Rainbow Creek TMDL for Total Nitrogen and Phosphorous assigns a Load Allocation (LA) to the County MS4. The Administrative Draft Permit incorporates this Load Allocation as Wasteload Allocation (WLA). We are aware of no legal basis for such a change, and therefore believe it was made in error. We request that the Regional Board strike the Rainbow Creek TMDL from Attachment E of the Administrative Draft Permit.

5. Provision E.2.A, Non-Storm Water Discharge of Irrigation Runoff.

Section B.2 of Order R9-2007-0001 requires that discharges from irrigation water, lawn watering, and landscape irrigation be prohibited only where they have been identified as a significant source of pollutants to waters of the U.S. Section E.2.a of the Administrative Draft Permit categorically defines each of these discharge types as illicit discharges. Since an accompanying Technical Report has not been provided with the Administrative Draft Permit, the County is unaware of any rationale for the removal of these exemptions. We request that this rationale be provided as part of the public record. If not, we respectfully request that irrigation water, lawn watering, and landscape irrigation be added to Section E.2.a.(3) of the Administrative Draft Permit. If sufficient rationale is provided for their removal, we alternatively request that they be added to Section E.2.a.(4) since their control through statute, ordinance, permit, contract, order, or similar means would seem to constitute an appropriate management response.

Again, thank you for the opportunity to participate in the development of a new for the San Diego Region. We look forward to continued discussion of the issues raised above. Please contact Jon Van Rhyn (858) 495-5133 if you have any questions.

Sincerely,

CID TESORO, LUEG Program Manager
Watershed Protection Program,
Department of Public Works
County of San Diego

Walsh, Laurie@Waterboards

From:	Jill Witkowski <jill@sdcoastkeeper.org>
Sent:	Friday, September 14, 2012 4:35 PM
To:	Walsh, Laurie@Waterboards
Cc:	Chiu, Wayne@Waterboards; Becker, Eric@Waterboards; Barker, David@Waterboards; Colin Kelly
Subject:	Comments on Administrative Draft MS4 Permit--San Diego Region
Attachments:	2012-0406 Tentative Order--Enviro Redline.docx; 9-14-12 Enviro Group MS4 comments FINAL.pdf

Dear Ms. Walsh:
Attached please find comments on the administrative draft of the San Diego Regional Municipal Separate Storm Sewer System permit, Tentative Order No. R9-2012-0011, submitted by San Diego Coastkeeper, Orange County Coastkeeper, Inland Empire Waterkeeper, Surfrider Foundation—San Diego Chapter, Surfrider Foundation—South Orange County Chapter, Environmental Health Coalition, Preserve Wild Santee, Friends of Rose Canyon, Coastal Environmental Rights Foundation, Laguna Bluebelt Coalition, South Laguna Civic Association, and Save Hobo Aliso.

Also attached, for your reference, is a redline document incorporating some of the suggestions mentioned in the attached comment letter. Please let me know if you have difficulty opening any other attachments.

Thank you,
Jill

Jill Witkowski
Waterkeeper
San Diego Coastkeeper®

www.sdcoastkeeper.org
2825 Dewey Rd, Suite 200
San Diego, CA 92106
619.758.7743 x119

September 14, 2012

Via e-mail to lwalsh@waterboards.ca.gov
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

RE: Comments from Environmental Groups on Tentative Order Number: R9-2012-0011

Dear Ms. Walsh:

San Diego Coastkeeper, Orange County Coastkeeper, Inland Empire Waterkeeper, Surfrider Foundation—San Diego Chapter, Surfrider Foundation—South Orange County Chapter, Environmental Health Coalition, Preserve Wild Santee, Friends of Rose Canyon, Coastal Environmental Rights Foundation, Laguna Bluebelt Coalition, South Laguna Civic Association, and Save Hobo Aliso (the "Environmental Groups") respectfully submit the following comments on the administrative draft of the San Diego Regional Municipal Separate Storm Sewer System permit, Tentative Order No. R9-2012-0011 ("Administrative Draft Permit").

EXECUTIVE SUMMARY

The Environmental Groups appreciate the opportunity to provide exhaustive comments on the pre-public notice draft of the San Diego Region's municipal stormwater permit. The focused meeting approach has provided the Environmental Groups an opportunity to work collaboratively with Regional Board staff, Copermittees, and other stakeholder groups. While the Administrative Draft

Permit is step in the right direction, there are several areas of concern remaining. Moreover, these concerns are not necessarily the same throughout the region. The priority issues list below is meant to assist the Regional Board staff in identifying the highest priority issues for environmentalists in each county.

SAN DIEGO COUNTY PRIORITY ISSUES:

1. The adaptive management process should not provide a safe harbor for enforcement action where discharges from the MS4 cause or contribute to violation of receiving water standards. (§ II.)
2. The Permit should demand water quality improvements within the permit term. (§II.)
3. The public should be included in developing Water Quality Improvement Plans and adaptive management. (§ V.B.)
4. Each Copermittee should be accountable for meeting watershed goals. (§V.F. at 14)
5. The Permit should require aggressive action to effectively prohibit non-stormwater discharges, particularly from overwatering, car washing, and swimming pool discharges. (§ III.)
6. The Permit should encourage collaboration between Copermittees and stakeholders. (§§ V.B, VI.C, VI.J.)

ORANGE COUNTY PRIORITY ISSUES:

1. The Permit should promote regular inspections of inventoried existing development to ensure compliance with applicable local ordinances and permits. (§ L.)
2. The Administrative Draft Permit fails to property incorporate adopted Total Maximum Daily Loads. (§ IV.)
3. The adaptive management process should not provide a safe harbor for enforcement action where discharges from the MS4 cause or contribute to violation of receiving water standards. (§ II.)

RIVERSIDE COUNTY PRORITIY ISSUES:

1. The Administrative Draft Permit fails to property incorporate adopted Total Maximum Daily Loads. (§ IV.)
2. The Regional Clearinghouse could become an important tool to increase transparency. (§ X.C.)

BACKGROUND

Southern California's unique, breathtaking beaches are one of the area's main attractions, with tourism contributing to approximately 75% of California's ocean-related jobs. The San Diego tourism industry is the third largest industry in the county, and is critical to the region's economy supporting businesses and jobs.[1] Hosting more than 31 million visitors each year, the industry employs over 160,000 San Diegans directly and indirectly and generates an economic impact of over $17 billion new dollars generated for the regional economy and hundreds of millions in statute and local taxes each year.[2]

[1] *See* http://www.sandiego.org/industry-research.aspx.
[2] *See* http://www.sandiego.org/industry-research.aspx.

Southern California's ocean-based tourism economy hinges on people being able to access the water. But polluted runoff keeps people out of the water and off the beaches for at least 72 hours after a rain event. Even in dry weather, recreational beach users are told to avoid runoff discharge locations by at least 75 feet. People ignoring these warnings often get sick. To safeguard our region's tourism economy and keep people healthy, the San Diego Regional Water Quality Control Board ("Regional Board") must adopt stringent requirements in this permit.

The current draft permit is unique in California in that it abandons the county-by-county permitting process and proposes a regional MS4 permit covering three counties. That being said, the draft permit undoubtedly addresses pollution and runoff concerns more progressively than any previous permit to date keeping in mind that it should implement the goals of the Clean Water Act to "restore and maintain the chemical, physical and biological integrity of the nation's waters" by "eliminating the discharges of pollutants by 1985, and to enhance water quality nationally to a 'fishable/swimmable' level by 1983." (33 U.S.C. § 1251(a)(1-2)(2012).

We have failed to achieve the Clean Water Act's goals in the San Diego Region. To achieve the Clean Water Act's goals, we must recognize the effects storm water runoff has on our shores and waterways. Twenty seven years after we should have eliminated pollutant discharges, beaches are still being closed after rainfalls because the water is too contaminated for us to safely swim. This is simply unacceptable. In a community that relies on tourism, in a time of economic hardship, in an area growing exponentially, the San Diego region must re-evaluate our its interests and implement measures strong enough to protect what is arguably our single greatest asset.

COMMENTS

I. An Expanded Regional MS4 Permit is both Legal and Appropriate.

A. The Regional Board Has Legal Authority to Issue a Regional Permit.

The Regional Board has the legal authority to issue an expanded region-wide permit.[3] The legislature directed regional boards to "coordinate their respective activities so as to achieve a unified and effective water quality control program."[4] In order to achieve this, the Regional Board has the authority to "formulate and adopt water quality control plans for all areas within the region."[5] Most importantly, the statutory language assumes Regional Boards may enact plans which include multiple counties; "regional boards shall not adopt any water quality control plan unless a public hearing is first held…in the affected county or ***counties***."[6] The Regional Board has the statutory authority to use a regional permit instead of county specific permits.

[3] *See* Cal. Water Code §§ 13000, 13001, 13140, 13240, 13370, 13377.
[4] Cal. Water Code § 13001.
[5] Cal. Water Code § 13040.
[6] *See* Cal. Water Code § 13244 (emphasis added).

B. The Regional Board Should Issue a Regional Permit.

The Regional Board has taken an important step in bringing together the permits for all three of the counties under the jurisdiction of Region 9. Having all of Region 9 governed by one MS4 permit promotes efficiency and consistency, allowing Regional Board staff the opportunity to focus on compliance and enforcement issues. As staff would have more time to work with Copermittees on specific compliance issues, the region would likely benefit with improved water quality. Further, uniform requirements across all of Region 9 will clarify expectations regarding work plans and budget allocations, and encourage watershed-based cooperation to address water quality problems.

II. THE ADMINISTRATIVE DRAFT PERMIT PROTECTS RECEIVING WATERS.

The Administrative Draft Permit includes receiving water limitations that prohibit discharges from the MS4s from causing or contributing to water quality standard violations.[7] This prohibition is appropriate to achieve Clean Water Act mandates.

While the Administrative Draft Permit directs the Copermittees to strive to improve water quality through the adaptive management process, engaging in adaptive management does not provide Copermittees a "safe harbor" from enforcement action for water quality violations.[8] This approach is appropriate and complies with the Clean Water Act.[9]

However, the Administrative Draft Permit fails to aggressively seek water quality improvements. Indeed, the Administrative Draft Permit suggests that, because water quality degradation in the San Diego region occurred over several decades, "a decade or more may be necessary to realize demonstrable improvement to the quality of waters in the Region."[10]

Our region deserves better. Just because it may be difficult to see water quality improvements does not mean that we cannot and should not demand aggressive action to see water quality improvements for at least some pollutants in some portions of our watersheds. Region 9 had 274 water body segments on the 2008 303(d) list for some type of pollution—156 of these requiring a TMDL. If you count the impairment per pollutant for each water body, the number of listed segments skyrockets from 274 to 1570.[11]

The Permit should not bow to Copermittee pessimism that measurable water quality improvements will take decades to achieve. Instead, the Permit should demand that we significant water quality improvement within the permit term.

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[7] *See* Tentative Order No. R9-2012-0011 §II.A.2 at 9.
[8] *See* Tentative Order No. R9-2012-0011 § II.A.4.(c) at 12.
[9] The Clean Water Act regulations specify that permit-holders have a duty to "comply with all conditions of th[e] permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application." 40 C.F.R. § 122.41(a).
[10] *See* Tentative Order No. R9-2012-0011 § I. at 4.
[11] *See* http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/303dlist.shtml.

III. THE ADMINISTRATIVE DRAFT PERMIT'S TOUGH STANCE ON NON-STORMWATER DISCHARGES IS APPROPRIATE.

A. The Administrative Draft Permit Properly Tightened Non-Storm Water Exemptions.

The Administrative Draft Permit takes an important step by ratcheting down exemptions for non-storm water discharges. The Clean Water Act requires that municipal stormwater permits "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."[12] The Administrative Draft Permit fulfills this requirement by prohibiting non-stormwater discharges into the MS4 unless they are "authorized by a separate NPDES permit" or the discharge falls within a category of non-stormwater discharges that must be addressed under the permit's illicit discharge detection and elimination provisions.[13] This wording meets the Clean Water Act requirements of "effectively prohibiting" non-stormwater discharges while providing clarity regarding how a Copermittee can meet the "effectively prohibit" standard.[14]

This more specific language is necessary because the Copermittees have done a poor job "effectively prohibiting" non-stormwater discharges under the current permit language.[15] Non-stormwater discharges are rampant throughout the region and municipalities have failed to take reasonable steps to effectively prohibit non-stormwater discharges. The Administrative Draft Permit's language prohibiting non-stormwater discharges except in limited situations emphasizes the importance of eliminating non-stormwater discharges and forces the Copermittees to take real action to effectively prohibit non-stormwater discharges. The Environmental Groups urge the Regional Board to leave the Administrative Draft Permit language prohibiting non-stormwater discharges

B. The Administrative Draft Permit Properly Prohibits Non-Stormwater Discharges that are Easily Preventable or Likely to be A Significant Source of Pollutants to Receiving Waters.

The Administrative Draft Permit properly prohibits discharges of pumped ground water, discharges from fountain drains, water from crawl space pumps, and water from footing drains.[16] Likewise, the Administrative Draft Permit properly prohibits water line flushing and water main breaks.[17] While the Administrative Draft Permit does not specifically address landscape irrigation, it has removed the non-stormwater exemption included in the current MS4 permit. These prohibitions are appropriate because they are discharges that can be controlled relatively easily and are likely to be significant sources of pollutants. These provisions therefore meet the Clean Water Act requirements that municipalities effectively prohibit non-stormwater discharges.

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[12] 33 U.S.C. § 1342(p)(3)(B)(ii).
[13] *See* Tentative Order No. R9-2012-0011 § II.A.1(b) at 9.
[14] 33 U.S.C. § 1342(p)(3)(B)(ii).
[15] 33 U.S.C. § 1342(p)(3)(B)(ii).
[16] *See* Tentative Order No. R9-2012-0011 § II.E.2(a)(1) at 56.
[17] *See* Tentative Order No. R9-2012-0011 § II.E.2(a)(2) at 56.

C. The Permit Should Not Allow Non-Stormwater Discharges into San Diego Bay.

The Administrative Draft Permit carves out an exception when it prohibits discharges of pumped ground water, discharges from fountain drains, water from crawl space pumps, and water from footing drains.[18] The Administrative Draft Permit prohibits these non-stormwater discharges, except if those discharges drain to San Diego Bay.[19] The Regional Board has failed to justify why San Diego Bay does not deserve the same protection provided to other surface waters in San Diego, Orange, and Riverside Counties. The Clean Water Act requires the MS4 permit to "effectively prohibit" non-stormwater discharges and does not carve out or sacrifice certain water bodies.[20] The Permit should remove the carve-out allowing pumped groundwater, discharges from foundation drains, water from crawl spaces and water from footing drains to flow unrestricted to San Diego Bay.

D. In Order to Effectively Prohibit Non-Stormwater Discharges, the Copermittees' Legal Authority Must Authorize the Copermittees to Control the Contribution of Pollutants in Discharges of Runoff from Residential and Commercial Properties.

The Administrative Draft Permit requires that Copermittees must establish, maintain, and enforce adequate legal authority to "control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4…."[21] Residential and commercial properties are also likely causing or contributing to water quality problems throughout the region. Therefore, the Copermittees must likewise establish legal authority to address those problems. Without legal authority to address pollution problems stemming from residential and commercial properties, Copermittees will never be able to address the full range of pollution sources within its jurisdiction.

E. The Permit Should Take a More Aggressive Stance on Vehicle Washing.

The Administrative Draft Permit addresses individual residential vehicle washing as a non-stormwater discharges that "must be controlled… through statute, ordinance, permit, contract, order or similar means."[22] But these "requirements" provide so much flexibility that they are meaningless. To address vehicle washing as a non-stormwater discharge that Copermittees must "effectively prohibit," the Permit must take a more aggressive stance on vehicle washing.

1. <u>The Permit should prohibit wash water from vehicle washing from leaving the residential property.</u>

The Administrative Draft Permit states that wash water from residential vehicle washing must be "directed to landscaped areas or other pervious surfaces where feasible" and that residents should "minimize the use of water for vehicle washing, use as little detergent… as possible, wash vehicles at

[18] *See* Tentative Order No. R9-2012-0011 § II.E.2.a.(2) at 54.
[19] *See id.*
[20] 33 U.S.C. § 1342(p)(3)(B)(ii).
[21] *See* Tentative Order R9-2012-0011 § II.E.1.a.(2) at 54.
[22] *See* Tentative Order R9-2012-0011 § II.E.2.a.(4) at 57.

commercial facilities, and implement other practices of behaviors" to prevent pollutants from residential car washing from entering the stormdrain.[23]

To effectively address residential vehicle washing as a source of non-stormwater discharges, which Copermittees must "effectively prohibit," the Permit should tighten requirements related to residential vehicle washing. The Permit should "effectively prohibit" non-stormwater discharges from residential vehicle washing by prohibiting residents from allowing wash water to leave their property.

2. <u>The Permit should prohibit fundraising or group car washes unless water is directed to landscaped areas or other pervious surfaces.</u>

The Administrative Draft Permit fails to address fundraising or group car washes as a source of non-stormwater discharges. Because of the volume of cars washed within a short time period and the fact that car washes are often held at gas stations or drugstores on a highly-trafficked corner—places with lots of pavement, sources of trash, oil and gas, and a nearby stormdrain—these car washes are sources of problematic non-stormwater discharges. The Permit should require Copermittees to prohibit fundraising or group car washes unless water is directed to landscaped areas or other pervious surfaces.

F. The Permit Should Require All Dechlorinated Swimming Pool Discharges be Directed to the Sanitary Sewer, Landscaped Areas, or Other Pervious Surfaces.

The Administrative Draft Permit allows residents to dump dechlorinated swimming pool discharges to storm drains.[24] This requirement should apply to all pool discharges because of the threat to water quality from extremely large discharges entering storm drains. Unless the discharges directly enter the storm drain, they will gather significant amounts of pollutants along roads, sidewalks, and other impervious surfaces before entering the storm drain. Therefore, the Permit should require all discharges of dechlorinated pool water be directed to the sanitary sewer, landscaped areas, or other pervious surfaces that can handle the volume of water.

G. The Permit Should Require that Exempted Sources of Non-Storm Water be Reduced Whenever Feasible.

The Permit should require that Copermittees take steps to reduce exempted sources of non-storm water when feasible. Even if the exempted category of non-storm waters poses little threat of containing contaminants on its own, all non-storm waters gather additional pollutants as they travel along impervious surfaces to storm drains. Without such a requirement, Copermittees are free to rely on exemptions and do nothing about discharges even when they can be easily prevented. For example, San Diego Coastkeeper recently reported a leaking pipe to the City of San Diego that had been identified by a resident living nearby. In response to the complaint, the City of San Diego reported that, because the pipe was leaking potable water, the discharge was not illegal. The City

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[23] *See id.*
[24] *See* Tentative Order R9-2012-0011 § II.E.2.a.(4)(c) at 57.

failed to identify whether it was possible to fix the leak, instead it took the easy route and relied on an exemption in the current Stormwater permit.

This flies in the face of the Clean Water Act, which requires that all non-storm water discharges be effectively prohibited.[25] The Regional Board should include language to compel Copermittees to reduce or eliminate ***all*** non-stormwater discharges, where possible. There is no acceptable reason that easily preventable non-storm water discharges should be allowed to go unattended.

H. The Permit Should Require Copermittees to Maintain a Hotline and Online Pollution Reporting System as Part of Their Illicit Discharge Detection and Elimination Programs.

The Administrative Draft Permit recognizes that public hotline reports can provide valuable information to help Copermittees identify and eliminate illicit discharges.[26] However, the Administrative Draft Permit fails to require Copermittees to maintain telephone and online reporting hotlines. By not explicitly requiring methods for the public to formally contact the Copermittees to report illicit discharges and pollution problems, the Administrative Draft Permit invites Copermittees to eliminate this portion of their jurisdictional program.

Instead, the Permit should require that each Copermittee must maintain a telephone hotline to accept stormwater complaints from the public. The Permit should also require Copermittees to maintain an email address (not just an online form) to allow e-mail reporting of stormwater complaints. As part of these requirements, Copermittees should be required to make this information available prominently on the Copermittee's webpage, and all the contacts should be listed on one page of the regional clearinghouse.

1. <u>The Permit should require Copermittees to provide follow up information to those who request it.</u>

Further, the Permit should require Copermittees to respond with follow-up or complaint resolution information to any person using the telephone or e-mail complaint reporting system. San Diego Coastkeeper often passes on to local jurisdictions pollution reports that the organization receives from individuals wishing to remain anonymous. San Diego Coastkeeper always asks for follow-up after the complaint has been investigated, and while some jurisdictions are good about providing the information, others are inconsistent or resistant. Providing the public and interested environmental groups with information about the resolution of pollution complaints, when requested, is important to foster public buy-in to the stormwater program and to encourage citizens to report pollution problems when they see them.

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[25] *See* 33 U.S.C. § 1342.
[26] *See* Tentative Order R9-2012-0011 at § II.E.2.d.(2)(a) at 60.

2. The Permit should require the Copermittees to make their hotline response databases publicly available.

The Permit should require that the Copermittees make their hotline response databases publicly available on the Regional Clearinghouse. This will increase transparency regarding Copermittee response to hotline complaints. It will also help environmental groups and stakeholders to work with Copermittees to educate the public so that hotline calls and reports become more effective.

IV. THE ADMINISTRATIVE DRAFT PERMIT FAILS TO PROPERLY INCORPORATE ADOPTED TOTAL MAXIMUM DAILY LOADS.

A. The Permit Must Include Mass Limits In Order to Comply with the Total Maximum Daily Loads That Include Mass Limits.

The Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay (adopted June 11, 2008) and the Total Maximum Daily Loads for Indicator Bacteria, Project I—Twenty Beaches and Creeks in the San Diego Region (adopted February 10, 2010) include both effluent limitations and wasteload allocations. However, the Administrative Draft Permit excludes the wasteload allocations. Not only are wasteload allocations a requirement of a valid Total Maximum Daily Load (TMDL),[27] but a large amount of time and effort went into developing the wasteload allocations to limit the total amount of bacteria loading into local waters. Weight-based wasteload allocations included in the TMDLs must be included in the Permit.

B. The Administrative Draft Permit Properly Prohibits Exceedances for Diazinon in Chollas Creek and Dissolved Copper in the Shelter Island Yacht Basin.

The Administrative Draft Permit properly removed allowable exceedances from the Diazinon TMDL in Chollas Creek and the Dissolved Copper TMDL in the Shelter Island Yacht Basin.[28] It is proper for the Regional Board to prohibit exceedances for Diazinon in Chollas Creek and Dissolved Copper in Shelter Island Yacht Basin because this will result in better water quality for Chollas Creek and San Diego Bay.

C. The Administrative Draft Permit Should Reflect the Correct Limit for Total Nitrogen in Rainbow Creek.

The TMDL for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed states that as of 2009, Total Nitrogen load allocation for Commercial Nurseries is 390 kg/yr. However, the Administrative Draft Permit states the total Nitrogen load allocation for Commercial Nurseries is 399 kg/yr.[29] The Permit must reflect the 390 kg/yr value in the Rainbow Creek Watershed Nitrogen and Phosphorus TMDL.

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[27] *See* 40 C.F.R. 130.2(i).
[28] *See* Tentative Order R9-2012-0011 Attachment E at E-2 and E-4.
[29] *See* Tentative Order R9-2012-0011 Attachment E, Table 3.4 at E-8.

D. The Administrative Draft Permit Improperly Calculates the Limit for Total Coliform at Baby Beach in Dana Point Harbor.

The dry weather interim effluent limitation for Total Coliform is incorrect.[30] According to the TMDL for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay, the City of Dana Point and the County of Orange must achieve a 50% reduction of indicator bacteria at Baby Beach by the 3rd year after approval, which is 2012. The dry weather municipal MS4 existing wasteload for Total Coliform at the time the TMDL was completed was 9.0 billion MPN/day. The wasteload allocation outlined by the TMDL is 0.86 billion MPN/day. Therefore, a 50% reduction means the City of Dana Point and the County of Orange must meet an interim allocation by 2012 of 4.93 billion MPN/day. However, the Administrative Draft Permit lists this interim limitation as 5.32 billion MPN/day. To comply with the TMDL, the Permit must reflect the TMDL's requirement, which is 4.93 billion MPN/day by 2012.[31]

E. The Permit Should List Previous Wet Weather Interim Effluent Limits to Maintain Compliance.

The Administrative Draft Permit does not list numeric values for wet weather interim effluent limitations to be reached by 2012 for any TMDL that includes them. Even if the Copermittees have already complied with the interim limits, the Permit should include these values to maintain compliance with the loading limits.

V. WATER QUALITY IMPROVEMENT PLANS HAVE THE POTENTIAL TO ENCOURAGE COPERMITTEES WITHIN A WATERSHED TO WORK TOGETHER TO IMPROVE WATER QUALITY.

The Water Quality Improvement Plans are the focal point of the Administrative Draft Permit. Their goal, to "guide Copermittees' jurisdictional runoff management program implementation efforts towards achieving the outcome of improved water quality in MS4 discharges and receiving waters," is proper. This approach recognizes that watersheds span multiple jurisdictions and that water quality will not improve unless all jurisdictions in a watershed work together. However, the Water Quality Improvement Plan process has room for improvement.

A. The Water Quality Improvement Plans Should Best Protect, Preserve, Enhance, and Restore Waters of the State.

The Administrative Draft Permit states that the goal of the Water Quality Improvement Plans is "to attain ***reasonable*** protection, preservation, enhancement, and restoration of water quality and

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30 *See* Tentative Order No. R9-2012-0011 at Attachment E, Table 5.4 at E-14.

31 Calculation:

9.0 billion MPD/day – 0.86 billion MPD/day = 8.14 (Total to be reduced)

8.14 billion MPD/day / 2 = 4.07 billion MPD/day (50% of reduction)

9.0 billion MPD/day – 4.07 billion MPD/day = 4.93 billion MPD/day (2012 Interim Target) designated beneficial uses of waters of the state."[32] "Reasonable" protection, preservation, and restoration of our waters is not enough. The State Water Board's mission is to "preserve, enhance, and restore the quality of California's water resources."[33] The Regional Board's mission is to "develop and enforce water quality objectives and implementations plans that will ***best protect*** the state's waters…."[34]

To properly reflect the goals of the Water Quality Improvement Plans and to bring them in line with the State Water Board's and the Regional Board's mission, the goal of the Water Quality Improvement Plans should be "to ***best*** protect, preserve, enhance, and restore water quality and designated beneficial uses of waters of the state."[35]

B. The Public Should Be Included in Developing Water Quality Improvement Plans.

The Administrative Draft Permit relegates public participation in Water Quality Improvement Plans to a lone 30 day public review and comment period after the Copermittees have spent an entire year developing Water Quality Improvement Plans.[36] Not only is there only one 30-day public review period, but it is likely that each of the nine Water Quality Improvement Plans will be subject to concurrent public review periods. For organizations like San Diego Coastkeeper and Orange County Coastkeeper that would review Water Quality Improvement Plans for multiple watersheds, concurrent 30-day review periods for all 9 plans will preclude meaningful participation or comments.

1. <u>The Permit should encourage Copermittees to involve stakeholders throughout the Water Quality Improvement Plan development process.</u>

Too often Copermittees and environmental groups view each other as adversaries instead of potential partners and resources. But environmental groups and other stakeholders have key information, data, knowledge, and resources that can assist Copermittees in developing a robust Water Quality Improvement Plan. The Permit should encourage Copermittees to identify key stakeholders in each watershed and involve those stakeholders either formally or informally throughout the Water Quality Improvement Plan development process. Involving key stakeholders early and often as Water Quality Improvement Plans are developed will ensure that Copermittees hear and address stakeholder concerns and suggestions early in the process and avoid a situation where completed plans would need to be completely revised in response to comments received after Water Quality Improvement Plans are completed.

2. <u>The Permit should include more public review and comment points and stagger the review periods.</u>

To ensure meaningful public participation in the Water Quality Improvement Plan development

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32 Tentative Order No. R9-2012-0011§ II.B. at 13 (emphasis added).
33 State Water Board Website http://www.waterboards.ca.gov/about_us/water_boards_structure/mission.shtml
34State Water Board Website (emphasis added)
http://www.waterboards.ca.gov/about_us/water_boards_structure/mission.shtml.
35 Tentative Order No. R9-2012-0011 § II.B. at 13 (emphasis added).
36 *See* Tentative Order No. R9-2012-0011 § II.F.1 at 91.

process, the Permit should include additional public review periods and stagger the final review of Water Quality Improvement Plans so not all 9 plans are reviewable concurrently. Formal public review and comment periods should be incorporated at each major decision step in the Water Quality Improvement Plan process. To allow the watershed groups maximum flexibility, the Permit could require watershed groups to submit a public involvement plan setting a schedule for public review of each main component of the plan as it is developed. This approach could also facilitate a staggering of Water Quality Improvement Plan review periods.

3. The Permit should include language explicitly involving the public in setting water quality priorities.

Water quality priorities are the foundation of Water Quality Improvement Plans. Because the entire Water Quality Improvement Plan will be based on the watershed's water quality priorities, the public must be actively involved in identifying priority pollutants or receiving water conditions within each watershed.

To facilitate public participation in identifying a watershed's priority pollutants, the Permit should:

- Specify that "all available physical, chemical, and biological receiving water monitoring data" includes data collected by third parties.

- Mandate that watershed groups make a "call for data" and allow interested third parties 30 days to submit data to the watershed groups for consideration.

- Require watershed groups to submit a preliminary priority pollutant list for Regional Board and public review and comment, along with a case for support identifying data and information relied on to select the priority pollutants or receiving water conditions. This review and comment period should be held prior to identifying pollutant sources, developing numeric targets and schedules, or selecting water quality improvement strategies.

4. The Permit should involve the public in identifying pollutant sources and stressors.

Environmental Groups and other key stakeholders often have specific information regarding pollutant sources within a watershed. Groups like San Diego Coastkeeper and Orange County Coastkeeper frequently receive calls from concerned citizens about facilities, neighborhoods, or activities that may be generating pollutants. These groups and others also have the capacity to reach out to their members and volunteers to specifically solicit information about potential pollutant sources.

To facilitate public participation in identifying pollutant sources, the Draft Permit should:

- Specify that "review of available data" includes complaints received through stormwater hotlines or reported by citizens or environmental groups.

- Mandate that watershed groups make a "call for data" and allow interested third parties 90 days to submit pollutant source data to the watershed groups for consideration.

- Emphasize that pollutant source identification is an ongoing process and does not only occur during the development of the Water Quality Improvement Plan.

- Specifically allow that Copermittees or stakeholder groups may perform special studies to further refine pollutant source identification, and that such information will be considered during the adaptive management process.

- Require watershed groups to submit a preliminary pollutant source list for Regional Board and public review and comment, along with a case for support identifying data and information relied on to select the priority pollutants or receiving water conditions. This review and comment period should be held prior to developing numeric targets and schedules, or selecting water quality improvement strategies.

5. The Permit must require hearings for proposed Water Quality Improvement Plans.

California law requires the Regional Board hold a public hearing before adopting any water quality control plan.[37] Water Quality Improvement Plans qualify as "water quality control plans" and therefore are subject to public hearing requirements.[38] The criteria to be considered a "water quality control plan" subject to a public hearing are that the plan: *(1)* is created for a specific area or region; *(2)* protects the beneficial uses of waters; *(3)* sets limits to protect beneficial uses; *(4)* includes an implementation program designed to meet water quality objectives.[39] The Water Quality Improvement Plans meet all the criteria of a water quality control plan.[40] Therefore, the permit must require, not merely allow, public hearings for Water Quality Improvement Plans.[41]

C. The Permit Should Specify the Regional Board Staff's Role in Developing Water Quality Improvement Plans.

Just as involving key stakeholders early and often as Water Quality Improvement Plans are developed will avoid the potential for having to start from scratch on the plans, Regional Board staff participation throughout the Water Quality Improvement Plan process is imperative. The Draft Permit should reflect when and how the Regional Board staff intends to be involved in Water Quality Improvement Plan development. At a minimum, the Regional Board should receive monthly updates from watershed groups and should provide formal review of water quality priorities, pollutant sources identified, numeric targets and schedules, strategies and schedules, and monitoring and assessment plans as they are developed.

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[37] *See* Cal. Water Code § 13244.
[38] *See* Cal. Water Code § 13050(j).
[39] *See id.*
[40] *See* Tentative Order No. R9-2012-0011 §§ II. B.1., B.2(a) & (d), B.3 at 13-18.
[41] *See* Tentative Order No. R9-2012-0011 § II. F.1.

D. Copermittees Should Implement Water Quality Improvement Plans as Soon as the Plans are Approved.

The Administrative Draft Permit contains inconsistent deadline requirements for Water Quality Improvement Plans. Administrative Draft Permit requires Copermittees "to implement" all the requirements in Provision B, related to the Water Quality Improvement Plans, within one year of the permit's adoption.[42] But the Administrative Draft Permit also allows Copermittees 180 days after submission "to commence with implementation of the Water Quality Improvement Plan."[43] Copermittees should begin implementing Water Quality Improvement Plans as soon as they are approved.

E. The Permit Should Require Interim and Final Numeric Targets and Schedules Based on Applicable Water Quality Standards.

The Administrative Draft Permit states that Copermittees must develop and incorporate interim and final numeric targets into their Water Quality Improvement Plans.[44] The permit should direct Copermittees that final targets must be compliance with applicable water quality standards. Interim targets should reflect incremental, yet demonstrable, progress towards improving water quality. Interim targets will allow the Copermittees, the Regional Board, and the public to fully assess Copermittees' progress towards compliance with final targets.

F. Each Copermittee Should Be Held Accountable For Achieving Watershed Numeric Targets.

During the focused meeting process, some Copermittees indicated that they intended to focus jurisdictional program efforts on one watershed and effectively ignore water quality priorities in other watersheds that are also within its jurisdiction. While this approach may be consistent with jurisdictions focusing resources where they can have the most impact, it also presents the potential that watershed priorities will be "orphaned" or that one jurisdiction will carry the primary or sole burden of implementing water quality improvement strategies within the watershed.

In order to help identify this problem, the Water Quality Improvement Plan schedules for implementing water quality improvement strategies must indicate which jurisdiction(s) is responsible for each strategy and cross-reference the section and page in the jurisdictional plan where each Copermittee commits to implementing the strategy.[45]

To avoid this potential problem and ensure that each jurisdiction remains actively involved in ensuring that each watershed within its jurisdiction achieves its interim and numeric targets, the Permit should reflect that each jurisdiction will be held accountable for achieving the watershed numeric targets.[46] Further, the Permit should specify that the Regional Board will reject any Water

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[42] *See* Tentative Order No. R9-2012-0011 § II.B. at 13.
[43] Tentative Order No. R9-2012-0011 § II.B.6 at 21 and § F.1 at 91.
[44] *See* Tentative Order No. R9-2012-0011 § II.B.2.d at 17.
[45] *See* Tentative Order No. R9-2012-0011 § II.B.3.b(1) at 19.
[46] *See* Tentative Order No. R9-2012-0011 § II.B.2.d at 18.

Quality Improvement Plan including orphaned priorities.[47]

These proposed changes are consistent with the Administrative Draft Permit's special study requirements. The Administrative Draft Permit requires Copermittees to implement at least three special studies within each Watershed Management Area, and the special studies require some form of participation by all Copermittees within the Watershed Management Area.[48] This requirement demonstrates the Regional Board's commitment to avoiding "orphaned" water quality priorities or having the primary responsibility for watershed strategy implementation fall to only Copermittee.

G. The Adaptive Management Process Should Include a Formal Public Participation Process.

The Administrative Draft Permit recognizes that public participation is an important element in the adaptive management process.[49] However, the Administrative Draft Permit fails to detail how and when the Copermittees are to solicit recommendations for modifications to the Water Quality Improvement Plans or Jurisdictional Runoff Management Plans as part of a public participation process.

For Water Quality Improvement Plans, the permit should include a process during which the Copermittees in each Watershed Management Area prepare a progress report, akin to a Report of Waste Discharge, that details the water quality improvement strategies completed or in progress, along with water quality data (from the Copermittees and third parties) and an assessment of progress towards interim and final numeric targets. Before revising the Water Quality Improvement Plan, the Copermittees must solicit comments from the Regional Board and public. The revised Water Quality Improvement Plan should be subject to public comment and a public hearing.

The Administrative Draft requires Copermittees to create a means "for public participation…in updating, developing, and implementing [their] jurisdictional runoff management program."[50] Part of the adaptive management process for Jurisdictional Runoff Management Programs requires Copermittees to take into account recommendations they receive.[51] To involve the public in the adaptive management process for jurisdictional runoff management programs, the Permit should require each Copermittee to solicit public comment on its initial findings and proposed changes before changes to the jurisdictional runoff management program is finalized.

H. The Adaptive Management Process for Water Quality Improvement Plans Should Occur More Frequently Than Every Three Years.

The Administrative Draft Permit currently requires Copermittees to implement the iterative process at least once every three years.[52] The Copermittees should be required to implement the iterative

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[47] *See* Tentative Order No. R9-2012-0011 § II.F.1 at 91.
[48] *See* Tentative Order No. R9-2012-0011 § II.D.2.e. at 46.
[49] *See* Tentative Order No. R9-2012-0011 § II.B.5.a.(h) at 20.
[50] *See* Tentative Order No. R9-2012-0011 § II.E.7(b) at 90.
[51] *See* Tentative Order No. R9-2012-0011 § II.B.5(b)(1)(e) at 21.
[52] *See* Tentative Order No. R9-2012-0011 § II.B.5.a.(1) at 20.

process at least every two years. More frequent adaptive management encourages the Copermittees to modify programs to address new information as it becomes available. It also compels the Copermittees to develop an adaptive management process that is nimble and can quickly incorporate change as needed.

Further, the proposed three year requirement will effectively cause the Copermittees to engage in one long and one short adaptive management process within a permit cycle instead of two equally spaced processes.

The sample calendar below illustrates the challenge with the current schedule:

Activity	**Frequency/Timing**	**Hypothetical Date**
Permit issued		January 1, 2013
Water Quality Improvement Plan Submitted	Within 12 months of permit issuance *§ B*	December 31, 2013
Public process	30 days after submittal *§F.1.*	January 2-31, 2014
Water Quality Improvement Plan Implemented	Within 180 days after submittal *§B.6.*	May 30, 2014
Adaptive Management	At least once every three years *§B.5.a.*	May 30, 2017
Report of Waste Discharge including proposed changes to Water Quality Improvement Plans	180 days before permit expires *§F.5.b.*	May 30, 2018
Permit Expires	5 years from issuance	December 31, 2018

I. Interim Numeric Targets Should Align With the Adaptive Management Process Schedule.

The Administrative Draft Permit requires watershed groups to set final and interim numeric targets and schedules.[53] While the Administrative Draft Permit provides some guidance that "interim numeric targets must be based on measurable criteria or indicators that can demonstrate incremental progress toward achieving the final numeric targets," there is no guidance regarding the scheduling of the interim numeric targets. The Permit should specify that the interim numeric targets should be set on the same schedule as the adaptive management process. This will provide the Copermittees with concrete goals to evaluate during the adaptive management process and require the Copermittees to collect sufficient data to evaluate progress to those goals by the time the adaptive management process occurs.

53 *See* Tentative Order No. R9-2012-0011 § II.B.2.d. at 17-18.

VI. ACTION LEVELS ARE ONLY SUFFICIENT IF THE REGIONAL BOARD DETERMINES NUMERIC EFFLUENT LIMITS ARE INFEASIBLE.

A. The Clean Water Act Requires the Regional Board to Assess Whether Numeric Effluent Limits are Feasible.

The Clean Water Act, its regulations, and case law all require that NPDES permits contain numeric effluent limitations when feasible. The Regional Board has failed to assess whether any numeric effluent limitations are feasible for this permit. Numeric effluent limitations are not *de facto* infeasible in stormwater permits, nor are they limited to end-of-pipe limits.

Numeric effluent limitations can be expressed as: *(1)* pollutant reduction levels for parameters that are applied system-wide rather than to individual discharge locations; *(2)* requirements to meet performance standards for specific pollutant parameters or *(3)* in-stream targets for specific pollutant parameters.[54]

The Regional Board must make a good faith effort to assess the feasibility of including numeric effluent limits within this permit in order to comply with the Clean Water Act's technology-forcing provisions.

B. Non-Storm Water Numeric Action Levels Should Be Numeric Effluent Limits.

The Clean Water Act requires that all municipal stormwater permits "effectively prohibit" no-stormwater discharges.[55] Yet the Administrative Draft Permit includes detailed "Non-Storm Water Action Levels" to set water-quality based goals for non-stormwater discharges.[56] Because Copermittees are responsible for "effectively prohibiting" non-stormwater discharges within their jurisdictions, mere "action levels" for non-stormwater discharges are inappropriate. These levels should be included as enforceable numeric effluent limits. By allowing non-stormwater discharges that fall within the numeric effluent limits and do not cause or contribute to a violation of water quality standards, the permit would provide an effective mechanism to determine whether or not Copermittees are effectively prohibiting non-stormwater discharges within their jurisdiction. Further, these numeric effluent limits are feasible because the Clean Water Act recognizes that non-stormwater discharges should be eliminated.

VII. MONITORING AND ASSESSMENT REQUIREMENTS MUST ENSURE THAT COPERMITTEES IDENTIFY PROGRESS TOWARDS WATERSHED GOALS AND TRACK THE HEALTH OF THE WATERSHEDS.

The Administrative Draft Permit sets out a comprehensive system of monitoring and assessment procedures that will ensure Copermittees are able to detect and eliminate illicit discharges and connections. The Regional Board must recognize the importance of extensive monitoring in

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[54] *See* Environmental Protection Agency, *Establishing Total Maximum Daily Load Wasteload Allocations for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs*, November 22, 2002.
[55] *See* 33 U.S.C. § 1342; Clean Water Act § 402(p)(3)(B)(ii).
[56] *See* Tentative Order No. R9-2012-0011 § II.C.1. at 22-24.

making continued progress towards clean waters in the San Diego Region. If the Permit does not include enough monitoring, the watersheds in Region 9 will be in danger of increased pollutant discharges that Copermittees will not be able to detect.

A. The Permit Must Include Sufficient General Monitoring Requirements to Detect Changing Conditions Within Watersheds.

During the focused meeting process, some Copermittees proposed drastically reducing the amount of monitoring required in the Administrative Draft Permit. One Copermittee representative even likened routine watershed monitoring to a colonoscopy.

The permit must continue to require the Copermittees to not just monitor areas with known pollution problems, but also to track areas currently meeting water quality standards to ensure that they do not become impaired or impacted. Environmental Groups seek to avoid a monitoring program that fails to provide relevant information to the public and regulators as to actual water quality impairments.

Copermittees should be encouraged to partner with local environmental groups to assist in monitoring areas to track general trends of watershed health. Many local groups already sample water quality and would be interested in partnering with Copermittees and watershed groups to ensure that baseline water quality data for the whole watershed is collected. For example, San Diego Coastkeeper has a state-certified water quality laboratory and has been using volunteers to collect water quality data and assess the health of our watersheds for years.

B. The Permit Should Allow Visual Observations to Be Included within Copermittees' Inspection Programs.

The Administrative Draft Permit does not explicitly allow Copermittees to create an inspection program that relies on visual observations. While visual observations alone should not comprise the Copermittees' entire inspection program, the Permit should allow Copermittees to include visual inspections as a key component of inspection programs.

Further, to assist Copermittees in completing visual inspections, particularly in residential areas or shopping centers, the Permit should explicitly allow Copermittees to use information gathered from volunteer monitoring or patrol programs. Such programs could be operated by the Copermittees or environmental groups and would be subject to a training program to ensure volunteers are able to spot potential violations and avoid trespassing or confronting property owners.

C. The Permit Should Specify that Copermittees Must Accept Quality-Controlled Data Received from Third Parties.

The Administrative Draft Permit and the Regional Board staff have indicated that Copermittees should use third party water quality monitoring data to assist in assessing our watersheds and the

Copermittees' progress towards achieving water quality standards.[57] However, some Copermittees are reluctant to use data collected by third parties. One Copermittee articulated its distaste for third party-collected data by saying that third party data is not as rigorous as data collected by the Copermittees and therefore trying to compare third party data to Copermittee data is "like comparing apples and oranges."

The Permit should specify that Copermittees must use third party data that meets particular criteria. These criteria should require third parties to maintain and make available for review the following information: *(1)* a quality assurance project plan; *(2)* a list of methods used; and *(3)* standard operating procedures.

Additionally, the Administrative Draft Permit's "Assessment Requirements" should specify that Copermittees must evaluate not just "the data collected pursuant to Provisions D.1, D.2, and D.3" to identify causes of exceedances, but must also solicit and evaluate third party data that meets that permit criteria to identify causes of water quality problems.

D. If the Permit Allows Copermittees to Use Modeling to Determine Water Quality Conditions, the Permit Must Include Safeguards to Ensure Reliable Modeling Results.

The Administrative Draft Permit does not contemplate Copermittees using modeling as a tool to monitor and assess water quality. During the focused meeting process, the Copermittees have asked to use modeling to assess water quality, and the Regional Board staff appeared receptive to the idea.

Modeling can be an important predictive tool, or it can be meaningless garbage. The quality of the modeling hinges on the quality and quantity of the data on which the model is based, along with the skill of the modeler. To ensure that any water quality modeling completed in conjunction with the permit produces robust results, the permit must include stringent safeguards. These safeguards must include: *(1)* requiring the input data to include recent (no older than five years) water quality information from within the watershed, *(2)* requiring Copermittees to use an experienced and qualified water quality modeling professional to complete the model, *(3)* requiring Regional Board oversight to assess whether the monitoring results are in line with common-sense predictions of water quality, and (4) quality control hindcasting in certain segments to validate the model for use in subsequent years.

E. The Monitoring and Assessment Requirements Should Begin Immediately Upon Enrollment Under the Order.

The Administrative Draft Permit 's monitoring and assessment requirements appear to go into effect immediately upon adoption, but it does not say so explicitly. This could create confusion amongst Copermittees because other provisions of the Administrative Draft Permit state specific time frames for implementation.[58] The Regional Board should explicitly say in the Permit that Provision D's requirements go into effect immediately upon enrollment to avoid ambiguity.

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[57] *See* Tentative Order No. R9-2012-0011 § II.B.2 at 15.
[58] *See* Tentative Order R9-2012-0011 at §§ II.B, B.5, B.6, C, E, F.1, and F.3.

F. The Permit Should Not Allow Historical Data to Excuse Copermittees from Analyzing Non-Stormwater Discharges.

The Clean Water Act requires that Copermittees effectively prohibit non-stormwater discharges. Therefore, it is inappropriate for the permit to allow Copermittees to skip analyzing non-stormwater discharges that it fails to eliminate.[59] The Copermittees must analyze all non-stormwater discharges and demonstrate that those discharges comply with the non-stormwater numeric effluent limits.

If the Permit allows Copermittees to avoid analyzing constituents if historical data indicates analysis is not needed, the Permit should limit "historical data" to that collected within the past ten years. Technology has increased by leaps and bounds in recent years (i.e. minimum detection limits,) and more accurately detects pollutants.

G. The Permit Must Clarify the Dry Weather Watershed Monitoring Frequency Requirements.

Several sections of the Dry Weather Watershed Monitoring section have seemingly contradictory timing requirements. The Administrative Draft Permit states:

> Dry weather watershed monitoring is required at least every two years for each monitoring station. At least two dry weather watershed monitoring events must be scheduled for each watershed monitoring station per monitoring year. One monitoring event is required during the dry season (May-September) and one monitoring event is required on a dry weather day during the wet season (October-April), after the first storm event. *See* Tentative Order No. R9-2012-0011 at D.2(b)(3).

This language is unclear and implies that monitoring must occur at least once every two years but also twice per year. Similar language can be found in sections D.2(b)(4), and (5), as well as parts (1) and (4) from section D.2.c. The Permit must resolve these seemingly contradictory statements to ensure the Copermittees are able to fully understand and meet their requirements.

H. To Detect Illicit Flows, the Permit Should Require Copermittees to Install a Network of Flow Meters.

Many Copermittees have taken issue with the Administrative Draft Permit's dry weather monitoring requirements. The Copermittees argue that the proposed program is cumbersome, costly, and would not result in identifying illicit flows.

To replace the dry weather monitoring scheme in the Administrative Draft Permit with an approach that will identify illicit flows, the Permit should require Copermittees to install a network of flow meters. The flow meters could constantly monitor flows and alert Copermittees when flow peaks.

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[59] *See* Tentative Order R9-2012-0011 § II.D.1.a(1)(c)(iii) at 30.

This will more accurately allow Copermittees to identify illicit dry weather flows than the dry weather monitoring program as currently proposed.

I. The Permit Should Require Additional Information for Claims that Non-Stormwater Discharges Originate Outside a Copermittee's Jurisdiction.

The Administrative Draft Permit currently requires Copermittees to screen discharges entering their systems and to identify those discharges from sources outside the control of the Copermittee.[60] The Permit should require Copermittees to explain from what jurisdiction the discharge is entering their system and the evidence supporting that conclusion. This will increase accountability and transparency in the Permit by making sure those responsible for violations are easily identified.

J. The Permit Should Allow Third Party Participations in Special Studies.

The Administrative Draft Permit requires Copermittees to implement at least three special studies within each Watershed Management Area and at least two regional special studies for the San Diego Region.[61] These studies are important to ensure that the Copermittees work together to identify sources of high priority pollutants and assess the efficiency of various best management practices within a watershed to achieve watershed goals. The Administrative Draft Permit's approach properly requires each Copermittee within a watershed to participate in each of the watershed's special studies. However, the Permit should also specifically allow Copermittees to partner with environmental groups or other third parties to complete regional special studies.

For example, Copermittees within the Peñasquitos watershed group might partner with San Diego Coastkeeper to complete a pilot project combining GPS-based water quality data and volunteer patrols to track pollution up a watershed to identify a pollution problem's source. Or perhaps Copermittees within the Carlsbad watershed might work with the Building Industry Alliance and the Escondido Creek Watershed Conservancy to create a pilot Escondido Creek restoration project and assess the feasibility of using such restoration as a regional mitigation project for development within the Carlsbad watershed.

By encouraging the Copermittees to partner with third parties to complete special studies, the Permit could foster watershed-based collaboration and leverage efficiencies and additional resources that third parties bring to the table.

K. The Permit Should Designate County of San Diego as the Lead Copermittee for San Diego County.

The current San Diego Regional MS4 permit designates the County of San Diego as the lead copermittee. This process has ensured that the Copermittees coordinate their reporting, monitoring, assessment, and programs. It has also led to regular public meetings where the San Diego Copermittees meet and discuss the permit, compliance and reporting. These meetings provided Regional Board staff, environmental groups, consultants, and other interested parties and

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[60] *See* Tentative Order R9-2012-0011 § II.D.4.a(1)(a)(iii) at 46.
[61] *See* Tentative Order R9-2012-0011 §§ II.D.2.e, D.3 at 46.

opportunity and venue to connect with all the San Diego Copermittees at the same time. This regional coordination was also a great asset to the focused meeting process, with the San Diego Copermittees bringing organized and coordinated suggestions for improving the permit.

As the region moves forward with a new permit, the Copermittees, Regional Board staff, and interested parties could greatly benefit from continued coordination and regular public meetings among the Copermittees. Further, the Administrative Draft Permit requires Copermittees to develop two special studies for the entire San Diego Region "related to a water quality priority issue or potential water quality concern identified by the Copermittees for the entire San Diego Region."[62] It will be difficult, if not impossible, for the San Diego Copermittees to identify water quality priority issues for the entire region without collaboration. That collaboration should involve the public, particularly when identifying water quality priority issues for the entire region. Therefore, the permit should require continued Copermittee collaboration for the San Diego Copermittees that includes meetings open to the public.

VIII. THE PERMIT'S DEVELOPMENT PLANNING PROVISIONS MUST AGGRESSIVELY PROMOTE PRACTICES TO ELIMINATE DEVELOPMENT AS A POLLUTANT SOURCE CAUSING OR CONTRIBUTING TO WATER QUALITY PROBLEMS.

Low Impact Development ("LID") is an acknowledged and proven Best Management Practice ("BMP") for effective storm water management for new and significant redevelopment projects. LID BMPs are often less expensive to install, require less maintenance and provide ecosystem benefits that conventional stormwater controls cannot offer. For example, a recent analysis of the economics of LID found the benefits to include reduced flooding, improved water quality, increased ground water recharge, reduced public expenditures on stormwater infrastructure, reduced energy use, improved air quality, and enhanced aesthetics and property value.[63]

The report goes on to describe American Forests' CITYgreen model as it applies to San Diego. The model calculates the volume of stormwater absorbed by San Diego's existing tree canopy and estimates the amount of cost-avoided in stormwater management this canopy allows. The study concludes that San Diego would have to expend $0.16 billion to expand their existing stormwater infrastructure to treat the amount the cities trees already manage. Studies and analyzes like these help explain the myriad benefits of LID as a system the Copermittees can use to effectively manage stormwater while also ensuring the wise expenditure of funds.

The Administrative Draft Permit fails to underscore the key role LID plays in achieving the region's water quality goals. Other nearby MS4 permits contain language reflecting that recent studies have found LID best management practices to be effective storm water management tools that minimize adverse impacts on storm water runoff quality and quantity resulting from urban developments.[64] The Permit should include this language in order to clarify and reinforce that LID BMPs are

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[62] *See* Tentative Order R9-2012-0011 at § II.D.3 at 46.
[63] MacMullen, Ed, The Economics of Low-Impact Development: A Literature Review, ECONorthwest 19 (November 2007).
[64] *See* Orange County Permit, Order No. R8-2009-0033 at L.61.

preferred over any other non-LID method.

A. The Permit Should Stress Low-Impact Development Best Management Practices as the Preferred Best Management Practices for Use in Water Quality Improvement Strategies.

The Administrative Draft Permit requires Copermittees to develop water quality improvement strategies that prioritize measures that can be taken to reduce pollutants.[65] Rather than giving Copermittees the ability to equally prioritize structural and non-structural Best Management Practices, the Permit should clearly state that LID BMPs are the preferred method and should receive the highest priority. The Administrative Draft Permit fails to mention of LID in the Water Quality Improvement Strategies section. At the very least, the Water Quality Improvement Strategies section should reference section II.E.3(a)(3) where LID definitions and examples are given. The Permit should include a chart which prioritizes LID, similar to the structure of the North Orange County permit.

B. The Permit Should Prioritize Various Low-Impact Development Best Management Practices and Include Examples of these Best Management Practices.

The Administrative Draft Permit fails to incorporate an LID BMP prioritization regime similar to existing MS4 permits in Orange and Riverside counties.[66] Although the Administrative Draft Permit defines LID BMPs to include retention practices such as "infiltration, rainwater harvesting and reuse, evapotranspiration" and flow-through practices such as biofiltration. However, it leaves much of the judgment as to which LID BMPs would be utilized onsite to the proponent of the project.[67]

The Orange County MS4 permit adopted by the Santa Ana Regional Board prioritized LID principles by first instituting preventative measures (mostly non-structural measures, e.g., preservation of natural features to a level consistent with MEP; reducing impervious areas, etc.) and second, requiring mitigation. Mitigation is generally structural measures, such as infiltration, harvest and reuse, and biotreatment. However, even the LID BMPs required under the mitigation section were prioritized. If a party could not satisfy permit requirements to the MEP by utilizing preventative measures, then the party would be required to determine whether it was feasible to infiltrate, harvest and re-use and bio-filter/bio-retain, in that order. In so doing, the Regional Board provided guidance and certainty to those engaged in new or significant redevelopment rather than a mechanism that requires LID BMPs without stating a clear preference. As such, the Administrative Draft Permit should be modified to include a prioritization of LID BMPs.

C. The Permit Should De-Emphasize Biofiltration as a Low-Impact Development Best Management Practice.

The Administrative Draft Permit's definitions section lists biofiltration as a flow-through LID BMP

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[65] *See* Tentative Order No. R9-2012-0011 at § II.B.3. at18.
[66] *See* Orange County Permit, Order No. R8-2009-0033 at XII.C.4
[67] *See* Tentative Order R9-2012-0011 at Attachment C "Definitions."

that may have discharge storm water following pollutant reduction.[68] The Permit should de-emphasize biofiltration and other flow-through practices as LID BMPs because retention Best Management Practices are environmentally preferable due to their ability to prevent discharges. Including "biofiltration" in the definition of LID BMP, without including a LID BMP prioritization schedule, may create unnecessary reliance on "biofiltration" methods when other LID options would be preferable.

D. The Permit Should Require Biofiltration to Reach Equivalent Water Quality Standards as Other Best Management Practices.

The Administrative Draft Permit includes "biofiltration" as an available Low Impact Development Best Management Practice without requiring verifiable standards that effective biofiltration BMPs must satisfy. Without standards, developers are free to include biofiltration systems that do not guarantee onsite retention of pollutants. Additionally, the permit contains no oversight of any proposed biofiltration device to guarantee that it is properly sized and designed. While the Administrative Draft Permit requires that flow-through treatment control BMPs must "be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern," the Administrative Draft Permit fails to specify what those efficiency rates are or how they are to be calculated.[69]

Structural, proprietary, and/or engineered biofiltration devices should be permitted where appropriate. However, the Permit should hold those biofiltration devices to equivalent water quality standards and require proper monitoring to prove their initial and continued effectiveness as pollution control devices. For example, the Permit should require a four to five year post-construction monitoring regimen with at least annual reporting that includes data on wet and dry seasons to analyze biofiltration effectiveness for major developments.

E. The Permit Must Have More Stringent Post-Development Hydromodification Requirements for Flow Rates and Durations to be Consistent with the Riverside County Hydromodification Requirements, to Maintain Progress in Managing Development Storm Water Runoff, and to Comply with Anti-Backsliding Requirements.

The Administrative Draft Permit requires Copermittees to achieve post-development flow rates and durations that "do not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent."[70]

However, Riverside County's MS4 permit does not allow 10% leeway for hydromodification post-development flow rates and durations. Instead, the Riverside County permit requires that "estimated post-project runoff discharge rates and durations must not exceed pre-development discharge rates and durations."[71] The Riverside County permit justified its hydromodification

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[68] *See* Tentative Order R9-2012-0011 at Attachment C "Definitions."
[69] *See* Tentative Order R9-2012-0011 § II.D.3.c.(2)(d)(iii) at 67.
[70] Tentative Order R9-2012-0011 § II.E.3(c)(3)(a).
[71] *See* Order R9-2010-0016 at F.1.h.

requirement, stating:

> The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses.[72]

In light of this statement, and no such finding to the contrary in the Administrative Draft Permit , the Regional Board should not allow a 10% increase in flow rates or duration post-development.

The Permit cannot allow priority development projects to exceed naturally occurring runoff flow rates by 10 percent. The 10 percent exception would introduce inconsistent requirements within the Region and constitute illegal backsliding from Riverside County's MS4 permit. The Riverside County permit is currently the most recently enacted MS4 permit in Region 9 and represents the MEP standard that must be applied to the Permit.

More importantly, easing Riverside County's hydromodification requirements in favor of a 10 percent exception violates the Clean Water Act's anti-backsliding provisions. By allowing Riverside County to comply with a less stringent standard in a subsequent permit, the new Permit violates provisions enacted to ensure that permit standards continue to get increasingly more stringent instead of bowing to political pressure to ease standards.

F. The Permit Should Not Include Likelihood of Increased Erosion as a Criterion for Hydromodification Because Erosion is Not the Only Purpose of Hydromodification Requirements.

The Administrative Draft Permit currently allows Copermittees to achieve post-development flow rate and duration that is 10% above "the range of flows that result in increased potential for erosion or degraded channel conditions."[73] But erosion is not the only purpose of hydromodification requirements. As the Riverside County permit recognized, increased flow volume and duration can lead to erosion, as well as "impair stream habitat in natural drainages, and negatively impact beneficial uses."[74]

Developers should not be excused from complying with hydromodification requirements merely because the immediate channel into which a developments discharges would be entering are likely to erode. If the Permit provides an exception for developments that discharge into concrete channels or other channels not subject to erosion, the Regional Board will send the message that it has no interest in possibly reclaiming those creeks as natural drainages. Further, the exception fails to recognize that while the immediate receiving water may not be easily eroded, the discharges may impact downstream channels and habitat.

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[72] Order R9-2010-0016 at Findings D.2(g).
[73] *See* Tentative Order R9-2012-0011 § II.E.3(c)(3)(a).
[74] *See* Order R9-2010-0016 at Findings D.2(g).

G. The Permit Must Include Priority Development Requirements for Restaurants that are Less than 5000 Square Feet to be Consistent with Previous Permits.

The Riverside, Orange County and San Diego MS4 permits require restaurants where land development is less than 5,000 square feet to meet all SSMP requirements except for structural treatment BMP, numeric sizing criteria requirements and hydromodification requirement.[75] The Administrative Draft Permit fails to include this MEP provision. The Permit should include this language to be consistent with other MS4 permits and to make certain that all restaurant development projects are properly covered under the Permit.

H. The Permit Should Include a Water Quality Credit System.

The Administrative Draft Permit does not include any provisions or requirements for a water quality credit system. The only mention of a credit system is an example of a mitigation fund that Copermittees may implement as part of a mitigation plan under alternative compliance.[76] The Permit should include a requirement for water quality credits similar to what has been adopted in the Orange County permit: a "credit system clearly exhibits that it will not allow PDPs to result in a new impact from pollutant loadings over and above the impact cause by projects meeting LID requirements."[77] Including this language in the Permit will ensure water quality credits will be allocated to specific projects that actually offer a water quality benefit and will clarify the requirements of a water quality credit system.

I. The Permit Should Define "Infeasible" or Require Developers to Examine the Range of Feasible Projects and Select the Projects with the Greatest Water Quality Benefits.

The Administrative Draft Permit uses the term "feasible" and "infeasible" throughout the permit. For example, the Administrative Draft Permit requires LID BMPs to be implemented at all development projects where applicable and feasible.[78] The Administrative Draft Permit also allows Priority Development Projects to pursue "alternative compliance" with hydromodification requirements where fully implementation of hydromodification projects is "technically infeasible." The Administrative Draft Permit does not define "feasible" and specifically tasks Copermittees with defining "technical infeasibility."[79]

Allowing Copermittees to develop their own criteria as to what is "technically infeasible" runs the risk of Copermittees bowing to political pressure from building industry lobbyists and incorporating economic factors into the infeasibility standard. To ensure a robust and consistent standard of "technical infeasibility," the Regional Board should define a standard and explicitly direct that "technical infeasibility" cannot consider financial or economic factors.

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[75] *See, e.g.*, Riverside Permit, F.1(d)(2)(c); Orange County Permit, F.1(d)(2)(c); San Diego Permit, D.1(d)(2)(e).
[76] *See* Tentative Order R9-2012-0011 § II.E.3(c)(4)(c)(iv).
[77] *See* Order No. R9-2009-0002 at F.1(d)(7)(g).
[78] *See* Tentative Order R9-2012-0011 § II.E.3(a)(3).
[79] *See* Tentative Order R9-2012-0011 § II.E.3(c)(4)(b).

Further, the development community has consistently articulated engineers' and geotechnical experts' concerns that forcing infiltration could compromise the structural integrity of development projects and expose developers to liability. While the Environmental Groups recognize the development community's concerns, the answer is not to eliminate hydromodification requirements in San Diego County. Instead, the answer is for the Regional Board to articulate, in conjunction with Copermittees, Environmental Groups, the development community, and the green building community, a fair definition of technical infeasibility that maximizes environmental protection and public safety.

J. The Permit Could Incorporate Hydromodification Requirements to Prioritize On-site Measures while Recognizing Hydromodification's Watershed Impacts.

As an alternative to the current hydromodification scheme, the Permit could adopt an approach to hydromodification that would both prioritize on-site infiltration measures while recognizing that hydromodification "disrupts… natural watershed hydrologic processes."[80]

Some Copermittees and the development community have been urging the Regional Board staff to allow developers to proceed directly to regional mitigation projects instead of on-site measures, where the regional mitigation projects would have at least the same water quality benefits. While regional mitigation projects may have great benefits for the watershed, they should only be allowed in limited circumstances and with certain safeguards in place. First, the regional mitigation project should have ***greater*** water quality benefits than full-implementation of on-site infiltration. Second, the mitigation projects must have safeguards to ensure there is sufficient funding to complete the project before any individual developer is off the hook for on-site mitigation. This is important to avoid the situation where a developer "pays in" a few thousand dollars to a multi-million dollar restoration project, but not enough funds are ultimately raised and the project viability is compromised—and hence, the development has never mitigated its impact.

To avoid this, there should be a time-limit on restoration projects, perhaps through a "Kickstarter" approach. Under this approach, there is a limited amount of time for investors to pledge money for a project. If the monetary goal is raised, the project goes forward and all investors contribute their money. If the project raises insufficient funds, the investors keep their money and must find another project to serve as their mitigation. This approach could also allow Copermittees to pledge money toward the project and then operate the project as a quasi-mitigation bank for developments within the watershed. Another alternative would be for Copermittees to pre-identify and fund regional mitigation opportunities themselves, and then hold these assets in a mitigation bank for sale to developers of future projects.

Also, the Permit could include a requirement to focus not on what is "infeasible," but what is feasible. This approach could foster creativity and get developers, Copermittees, and environmental groups working together on projects to benefit the entire watershed.

[80] *See* Tentative Order R9-2012-0011 at Attachment C-4.

K. The Permit Should Require the Incorporation of USEPA Green Street Implementation for New or Significant Re-Development throughout the Region.

The Environmental Groups encourages the Regional Board to modify the Permit's Priority Development Program to require the adoption of USEPA Green Streets. As written, the Administrative Draft Permit's Jurisdictional Runoff Management Program Priority Development Project Section states that streets, roads, highways, freeways, and residential driveways with an impervious area greater than 5,000 square feet and is used for transportation purposes is a priority area.[81] The north Orange County MS4 permit adopted by the Santa Ana Regional Board explicitly incorporates USEPA guidance, "Managing Wet Weather with Green Infrastructure: Green Streets."[82] This USEPA guidance is required to be implemented to the MEP.[83]

L. The Permit Should Promote Regular Inspections of Inventoried Existing Development to Ensure Compliance with Applicable Local Ordinances and Permits.

The Administrative Draft Permit establishes a five-year minimum inspection cycle for inventoried existing development along with a requirement of an inspection within six months of any change in property ownership.[84] Copermittees have argued for a weakening of those minimum requirements and indicated a system that would allow for a focusing of resources on those facilities which may be of a higher priority.

The Environmental Groups do not oppose the focusing of scarce resources towards higher priority pollutants or areas, so long as each facility in a Copermittee's jurisdiction is inspected at least once during this Permit term. State Water Resources Control Board audits and private consultants have concluded that industrial and commercial inspections are a necessary component of stormwater permitting. A 2006 Tetra Tech report assessing California's Industrial Storm Water Program contained a central finding stating that "*compliance improves with field inspector presence*."[85] The report goes onto state, "[r]egulatory presence (1) shows the facility representatives that the [regulator] takes the program seriously and (2) keeps stormwater compliance in the minds of facility representatives."[86]

The proven benefit of a robust inspection program and the relatively modest requirement that each facility is inspected no less than once every five years is not a regulatory burden on the Copermittees. Therefore, the Environmental Groups oppose any material modification to lessen inspection frequency.

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[81] *See* Tentative Order No. R9-2012-0011 at § II.E.3.b.(2)(g).
[82] *See* Order No. R8-2009-0030, as amended by Order No. R8-2010-0062, § XII.B.2.h.
[83] *See id.*
[84] *See* Tentative Order No. R9-2012-0011 at § II.E.5.d.(1)(a).
[85] Assessment Report on Tetra Tech's Support of California's Industrial Stormwater Program, 22 (July 12, 2006).
[86] *Id.*

M. The Permit Should Promote Retrofitting Existing Development as a Primary Strategy to Achieve Water Quality Improvement.

The Administrative Draft Permit appropriately requires each Copermittee to develop a program to retrofit existing development.[87] However, the retrofit sections could be improved by avoiding "orphan" areas and including environmental groups and other stakeholders in retrofit program.

1. <u>Identifying "high priority" areas for implementation runs the risk of abandoning other areas.</u>

Identifying areas that will address high priority water quality concerns seems like a reasonable start. However, as in other sections of the Permit, and consistent with our comments in this letter,[88] we have concerns that this will leave other areas as "orphans" and not result in comprehensive adoption of rebates and other incentives, nor an equitable distribution of the requirements and the resulting benefits to all affected jurisdictions.

2. <u>Environmental groups and other stakeholders should be actively involved in retrofit implementation</u>.

Much like our comments on including environmental organizations and citizen monitoring,[89] we strongly recommend additional language in the Permit to encourage partnerships with non-governmental organizations working on pollution prevention programs for existing development. In other areas of the State, as well as locally, this type of cooperative effort between government and non-government results in reduced costs and increased benefits.

IX. THE ADMINISTRATIVE DRAFT PERMIT'S ENFORCEMENT APPROACH IS APPROPRIATE.

A. The Permit Must Include Enforcement Response Plans to Ensure Improved Water Quality in the Region.

The Administrative Draft Permit's substantive enforcement requirements assist Copermittees to hold accountable dischargers who contribute to water quality standards violations. These enforcement requirements outlined in are appropriate should be retained as-is in the Permit.[90] Strong enforcement provisions are appropriate to encourage Copermittees, industrial and construction dischargers, and the development community to find better and more cost-effective BMPs and alternative methods for achieving water quality standards. The Permit should further strengthen these requirements to address facilities which could fall through the cracks under the Administrative Draft Permit's language.

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[87] *See: See* Tentative Order No. R9-2010-0016 at § II.E. (b)
[88] See eg, Section IV B (5) (F) of this letter.
[89] See eg, Section IV B (1), (2) and (3) of this letter.
[90] *See* Tentative Order No. R9-2010-0016 at § II.E.6

B. The Permit Must Maintain Escalating Enforcement Actions to Ensure Violators of Water Quality Standards Stop Unauthorized Practices.

Increasing enforcement action, like the provisions in E.6, help deter dischargers from compromising water quality.[91] The Permit should retain these requirements; however in our experience Copermittees are too lenient on repeat offenders. Failure to appropriately "ratchet up" enforcement should be considered a failure to comply with these provisions of the Permit.

C. The Permit Should Include Reporting Requirements for Sites Which are Repeatedly Subject to Low Level Enforcement.

The Administrative Draft Permit requires Copermittees to notify the Regional Board after issuing any "high level enforcement action" to a construction site, but there is no similar requirement for sites that receive multiple low level enforcement actions.[92] The Regional Board should be aware of repeat violators not associated with the highest water quality priorities. The Permit should require Copermittees to notify the Regional Board of such dischargers.

D. The Permit Should Require Board Notification for All Violators Subject to High Level Enforcement Actions, Not Only Construction Sites.

The Administrative Draft Permit requires Copermittees to inform the Regional Board after issuing any "high level enforcement action" to a construction site.[93] There is no reason this requirement should only apply to construction sites. The Regional Board should be notified of any discharger subject to high level enforcement. The Regional Board should remove the word "construction" from Provision E.6(d)(1) to correct this issue and include all sites.

E. The Permit Should Require Copermittees to Automatically Notify the Regional Board of Non-Compliant Sites Threatening the Highest Water Quality Priorities Because These Violations are Already Significant.

The Administrative Draft Permit requires Copermittees to report to the Regional Board issuance of a high level enforcement action to a site that poses a "significant threat to water quality."[94] When the site threatens the highest water quality priorities, violations requiring the issuance of high level enforcement actions are already significant because Copermittees have identified these waters as their highest water quality priorities. Therefore, the Regional Board should require Copermittees to automatically notify the Regional Board of any high level enforcement action issued that affects the highest water quality priorities.

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[91] *See* Tentative Order No. R9-2010-0016 at E.6(a)(2)-(3), (b)(4), and (c)(3).
[92] *See* Tentative Order No. R9-2010-0016 at E.6(d).
[93] *See* Tentative Order No. R9-2010-0016 at E.6(d)(1).
[94] *See* Tentative Order No. R9-2010-0016 at E.6(d)(1).

F. The Permit Must Preserve the Enforcement Requirements for Violations of Highest Water Quality Priorities.

It is proper for the permit to require Copermittees to automatically start enforcement at high level for any violation that threatens or potentially threatens the highest water quality priorities.[95]

G. The Permit Should Modify Reporting Requirements for Continued Exceedances of Water Quality Standards to Encourage Copermittees to Take Initiative in Finding Exceedances.

The Administrative Draft Permit currently requires Copermittees to submit updates on their Water Quality Improvement Plans when either the Copermittee or the Regional Board determines that discharges from the facility are causing or contributing to an exceedance.[96] The Permit could facilitate better practices by the Copermittees if this requirement were changed to reward the efforts of Copermittees that seek out troublesome discharges on their own.

X. THE PERMIT'S REPORTING PROVISIONS MUST BE STRENGTHENED TO ENSURE MEANINGFUL PUBLIC PARTICIPATION.

A. The Permit Must Require More Detailed Annual Reporting than Proposed in the Administrative Draft Permit.

The Administrative Draft Permit modifies the existing reporting standards for Copermittees' and significantly reduced the volume of data that must be disclosed to a double-sided, single page form.[97] For many of the Copermittees' actions, the form only requires the disclosure of the number of times an action occurred (e.g. number of non-storm water discharges eliminated), without any details regarding the discharges or what actions were taken to fix them.

The Regional Board, Copermittees and the Environmental Groups agree that valuable and scarce resources should not be spent on the completion and submission of reports that do not provide value equal to the amount of time spent in preparing the reports. However, Annual Reports provide a mechanism to public agencies to reflect on their performance over the past twelve months and a shortened report may negatively impact the ability of these agencies to fully calculate the effectiveness of their programs. The Environmental Groups encourage the Regional Board to revise the Annual Report requirements to include a more robust analysis of the Copermittees' programs. This modification may allow Copermittees to incorporate cross-references to other documents to avoid additional costs of Annual Report preparation.

B. The Permit Should Require Copermittees to Submit Water Quality Data to CEDEN.

The Administrative Draft Permit requires Copermittees to submit their water quality monitoring data to the California Environmental Data Exchange Network (CEDEN). This requirement is

[95] *See* Tentative Order No. R9-2012-0011 at E.6(a)(2)(a) and (c)(3).
[96] *See* Tentative Order R9-2012-0011 § II.A.4(a)(1).
[97] *See* Tentative Order No. R9-2010-0016 at F.3(b)(2).

important because it ensures that CEDEN will become a comprehensive source of water quality data for the region.

C. The Regional Clearinghouse Could Become an Important Tool To Increase Transparency.

The Administrative Draft Permit requires the Copermittees to develop, update and maintain an internet-based Regional Clearinghouse to serve as a collection point for Water Quality Improvement Plans, Annual Reports, jurisdictional runoff management program document, monitoring data, and any other edata or information generated through this process.[98] The Regional Clearinghouse has the potential to become a powerful tool to increase transparency and facilitate public participation in developing Water Quality Improvement Plans and jurisdictional programs.

However, the Regional Clearinghouse needs to be set up in a way so that reports and data are easy to locate. The allocation of scarce financial resources dedicated towards collecting information and providing it to the public via a system that is difficult to navigate fails to satisfy the purpose of this or any other permit. The San Diego Copermittees' current website, Project Clean Water, is difficult to navigate and tends to obscure information, rather than make it accessible. Furthermore, unless the public has been made aware of the availability of this tool, few should be expected to access it. Therefore, the Regional Clearinghouse should be prominently displayed on Copermittee's water quality websites and the Regional Board should encourage distribution of information relating to this tool as well as how-to recommendations on reducing water usage to residents. Any and all public information should have contact information, including e-mail and phone numbers, for stormwater program managers for each Copermittee.

D. The Regional Clearinghouse Should Include a Database for Mobile Sources, Along with Each Copermittee's Industrial, Commercial, and Municipal Inventories.

The San Diego Copermittees had been developing a mobile sources database to help track mobile sources across jurisdictions. San Diego Coastkeeper was particularly interested in making that information publicly accessible in order to assist jurisdictions in holding mobile sources accountable. Unfortunately, the San Diego Copermittees refused to make the database publicly accessible.

In order to ensure an accurate picture of the potential sources of water quality impairments the Regional Board must provide a comprehensive procedure that allows for concerned members of the public, and the non-profit community that represents them, the ability to assist Copermittees in resolving chronic water quality problems. One of the most effective means of achieving improved water quality are regulations that encourage public involvement in their enforcement.[99] In this instance, the Environmental Groups seek the access to data compiled by public agencies, likely without the financial resources to comprehensively review their data, in order to ensure compliance with this Permit and its stated goal of improved water quality. Therefore, this Permit should require

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[98] *See* Tentative Order No. R9-2012-0011 § II.F.4.

[99] *See* State Water Resources Control Board, Office of Enforcement, Citizen Suit Enforcement under the Federal Clean Water Act: A Snapshot of the California Experience Based on Notices of Intent to Sue March 2009 through June 2010. 7 (May 2011).

the Regional Clearinghouse to include a publicly accessible mobile sources inventory and tracking system as well as each Copermittee's industrial, commercial, and municipal inventories.

E. The Permit Should Require a Best Management Practices Database.

The Clean Water Act requires Copermittees to reduce pollutants in waters discharged to and from the MS4 to the Maximum Extent Practicable ("MEP"). Because the Clean Water Act is a technology-forcing statute, MEP is an ever-evolving standard, forcing better technology and new approaches over time. In order for the Regional Board to assess MEP, the Permit should require the Copermittees to create a publicly accessible BMP database. This will allow Copermittees to share innovative techniques, technology, and practices and help the Regional Board staff and environmental groups to push the Copermittees to "raise the bar" and pursue ever-improving strategies to achieve water quality standards

XI. THE PERMIT MUST ADJUST EARLY ENROLLMENT REQUIREMENTS FOR ORANGE AND RIVERSIDE COUNTIES.

The previous permits from Orange and Riverside counties were not on the same time schedule as the San Diego permit and were not set to expire until 2014 and 2015 respectively. These currently effective permits had requirements for the Copermittees to complete several special studies in addition to the core monitoring requirements. Some of the special studies had implementation dates that have not yet passed.

The Riverside County permit outlines requirements for a Trash and Litter Investigation, and an Agricultural, Federal, and Tribal Input Study which both must be submitted by September 1, 2012, and also an Intermittent and Ephemeral Stream Perennial Conversion Study which must be submitted by April 1, 2013. The current Administrative Draft Permit requires Copermittees to conduct special studies but makes no reference to the past studies that are still pending implementation.

Will these studies no longer be required? Or will this portion of the superseded permits still be in effect? The Permit must adjust the early enrollment requirements for Orange and Riverside counties to ensure these studies are completed even if they undergo early enrollment.

XII. THE PERMIT SHOULD REQUIRE A NARRATIVE FISCAL ANALYSIS.

The Administrative Draft Permit does not require Copermittees to include a narrative description of causes of a 25 percent or greater annual change in any budget line item in the annual reports. The current permits for Riverside and Orange Counties include such a provision.[100] This provision holds Copermittees to a higher standard in their annual analysis while creating accountability to such increases in their budgets. The Permit should include a similar standard.

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[100] *See* Order No. R9-2010-0016 at H.2(b); Order No. R9-2009-0002 at H.2(b).

XIII. THE ENVIRONMENTAL GROUPS REQUEST NOTICE.

The Environmental Groups request notice of any further documentation, decisions, findings or actions taken in regards to this matter.

CONCLUSION

In conclusion, the Environmental Groups appreciate the effort the Regional Board and its staff have put towards developing an MS4 permit for the San Diego Region which effectively and efficiently addresses the environmental concerns of the watershed in a transparent and comprehensive approach. We look forward to a constructive relationship with the Regional Board and hope our comments will assist in the development of a thoughtful and progressive permit.

Respectfully submitted,

Jill Witkowski
San Diego Coastkeeper

Colin Kelly
Orange County Coastkeeper

Garry Brown
Inland Empire Waterkeeper

Penny Elia
Save Hobo Aliso

Michael Beanan
South Laguna Civic Association
Laguna Bluebelt Coalition

Livia Borak
Coastal Environmental Rights Foundation

Julia Chunn-Heer
Surfrider Foundation,
San Diego Chapter

Doug Reese
Surfrider Foundation,
South Orange County Chapter

Nicole Capretz
Environmental Health Coalition

Van Collinsworth
Preserve Wild Santee

Debby Knight
Friends of Rose Canyon

ADMINISTRATIVE DRAFT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE
ORDER NO. R9-2012-0011
NPDES NO. CAS0109266

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHEDS WITHIN THE SAN DIEGO REGION

The San Diego County Copermittees in Table 1a are subject to waste discharge requirements set forth in this Order.

Table 1a. San Diego County Copermittees

City of Carlsbad	City of Oceanside
City of Chula Vista	City of Poway
City of Coronado	City of San Diego
City of Del Mar	City of San Marcos
City of El Cajon	City of Santee
City of Encinitas	City of Solana Beach
City of Escondido	City of Vista
City of Imperial Beach	County of San Diego
City of La Mesa	San Diego County Regional Airport Authority
City of Lemon Grove	Unified Port District of San Diego
City of National City	

The Orange County Copermittees in Table 1b are subject to waste discharge requirements set forth in this Order upon expiration of Order No. R9-2009-0002, NPDES No. CAS0108740 on December 16, 2014.

Table 1b. Orange County Copermittees

City of Aliso Viejo	City of Ranch Santa Margarita
City of Dana Point	City of San Clemente
City of Laguna Beach	City of San Juan Capistrano
City of Laguna Hills	City of Laguna Woods
City of Laguna Niguel	County of Orange
City of Lake Forest	Orange County Flood Control District
City of Mission Viejo	

ADMINISTRATIVE DRAFT

The Riverside County Copermittees in Table 1c are subject to waste discharge requirements set forth in this Order upon expiration of Order No. R9-2010-0016, NPDES No. CAS0108766 on November 10, 2015.

Table 1c. Riverside County Copermittees

City of Murrieta	County of Riverside
City of Temecula	Riverside County Flood Control and Water Conservation District
City of Wildomar	

The Orange County Copermittees and Riverside County Copermittees may enroll under this Order at a date earlier than the expiration date of their current Orders subject to the conditions described in Provision F.6 of this Order and the Copermittees in the respective county receive a Notice of Enrollment (NOE) from the San Diego Water Board.

The term Copermittee in this Order refers to any San Diego County, Orange County, or Riverside County Copermittee enrolled under this Order, unless specified otherwise.

This Order provides permit coverage for the Copermittee discharges described in Table 2.

Table 2. Discharge Locations and Receiving Waters

Discharge Points	Locations throughout San Diego Region
Discharge Description	Municipal Separate Storm Sewer System (MS4) Discharges
Receiving Waters	Inland Surface Waters, Enclosed Bays and Estuaries, and Coastal Ocean Waters of the San Diego Region

Table 3. Administrative Information

This Order was adopted by the San Diego Water Board on:	**Month Day, 2012**
This Order will become effective on:	**Month Day, 2012**
This Order will expire on:	**Month Day, 2017**
The Copermittees must file a Report of Waste Discharge (ROWD) in accordance with Title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than 180 days in advance of the Order expiration date.	

I, David W. Gibson, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on Month Day, 2012.

TENTATIVE

David W. Gibson
Executive Officer

ADMINISTRATIVE DRAFT

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ADMINISTRATIVE DRAFT

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I. FINDINGS

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board), finds that:

JURISDICTION

1. **MS4 Ownership or Operation.** Each of the Copermittees owns or operates an MS4, through which it discharges storm water and non-storm water into waters of the U.S. within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

2. **Legal and Regulatory Authority.** This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations (Code of Federal Regulations [CFR] Title 40, Part 122 [40 CFR 122]) adopted by the United States Environmental Protection Agency (USEPA), and chapter 5.5, division 7 of the California Water Code (CWC) (commencing with section 13370). This Order serves as an NPDES permit for discharges from MS4s to surface waters. This Order also serves as waste discharge requirements (WDRs) pursuant to article 4, chapter 4, division 7 of the CWC (commencing with section 13260).

3. **CWA Technology Based Standards and Prohibitions.** Pursuant to CWA section 402(p)(3)(B), NPDES permits for storm water discharges from MS4s must include requirements to effectively prohibit non-storm water discharges into MS4s, and require controls to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP).

4. **CWA NPDES Permit Conditions.** Pursuant to CWA section 402(a)(2), NPDES permits must prescribe conditions to assure compliance with CWA section 402(p)(3)(B) and 40 CFR 122.26(d)(2)(iv)(B). This Order prescribes conditions to assure compliance with the CWA requirements for owners and operators of MS4s to effectively prohibit non-storm water discharges in to the MS4s, and require controls to reduce the discharge of pollutants in storm water from the MS4s to the MEP.

5. **CWA and CWC Monitoring Requirements.** Pursuant to 40 CFR 122.48, NPDES permits must specify requirements for recording and reporting monitoring results. In addition, CWC sections 13267 and 13383 authorize the San Diego Water Board to require technical and monitoring reports. This Order establishes monitoring and reporting requirements to implement federal and State requirements.

6. **Total Maximum Daily Loads.** CWA section 303(d)(1)(A) requires that "[e]ach state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Clean Water Act Section 303(d) List of Water Quality Limited Segments, commonly referred to as the 303(d) List. The CWA requires the 303(d) List to be updated every two years. Requirements of this Order implement the TMDLs adopted by the San Diego Water Board and approved by USEPA.

7. **Non-Storm Water Discharges.** Pursuant to CWA section 402(p)(3)(B)(ii), this Order requires each Copermittee to effectively prohibit discharges of non-storm water into its MS4. Nevertheless, non-storm water discharges into and from the MS4s continue to be reported to the San Diego Water Board by the Copermittees and other persons. Monitoring conducted by the Copermittees, as well as the 303(d) List, have identified dry weather, non-storm water discharges from the MS4s as a source of pollutants causing or contributing to receiving water quality impairments in the San Diego Region. The federal regulations [40 CFR 122.26(d)(2)(iv)(B)] require the Copermittees to have a program to prevent all types of non-storm water discharges, or illicit discharges, from entering the MS4. The federal regulations, however, allow for specific categories of non-storm water discharges or flows to be addressed as illicit discharges only where such discharges are identified as sources of pollutants to waters of the U.S.

8. **In-Stream Treatment Systems.** Pursuant to federal regulations [40 CFR 131.10(a)], in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of a runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Runoff treatment must occur prior to the discharge of runoff into receiving waters. Treatment control best management practices (BMPs) must not be constructed in waters of the U.S. or state. Construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body.

DISCHARGE CHARACTERISTICS AND RUNOFF MANAGEMENT

9. **Point Source Discharges of Pollutants.** Discharges from the MS4s contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the state. A discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. Storm water and non-storm water discharges from the MS4s contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4s are subject to the conditions and requirements established in the Basin Plan for point source discharges.

10. **Potential Beneficial Use Impairment.** The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution, contamination, or nuisance.

11. **Pollutants Generated by Land Development.** Land development has created and continues to create new sources of non-storm water discharges and pollutants in storm water discharges as human population density increases. This brings higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, and trash. Pollutants from these sources are dumped or washed off the surface by non-storm water or storm water flows into and from the MS4s. When development converts natural vegetated pervious ground cover to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area contains greater pollutant loads and is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area.

12. **Runoff Discharges to Receiving Waters.** The MS4s discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within the eleven hydrologic units comprising the San Diego Region. Numerous receiving water bodies and water body segments have been designated as impaired by the San Diego Water Board pursuant to CWA section 303(d).

13. **Pollutants in Runoff.** The most common pollutants in runoff discharged from the MS4s include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., cadmium, copper, lead, and zinc), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

14. **Human Health and Aquatic Life Impairment.** Pollutants in runoff discharges from the MS4s can threaten and adversely affect human health and aquatic organisms. Adverse responses of organisms to chemicals or physical agents in runoff range from physiological responses such as impaired reproduction or growth anomalies to mortality. Increased volume, velocity, rate, and duration of storm water runoff greatly accelerate the erosion of downstream natural channels. This alters stream channels and habitats and can adversely affect aquatic and terrestrial organisms.

15. **Water Quality Effects.** The Copermittees' water quality monitoring data submitted to date documents persistent exceedances of Basin Plan water quality objectives for runoff-related pollutants at various watershed monitoring stations. Persistent toxicity has also been observed at several watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have

Poor to Very Poor Index of Biotic Integrity (IBI) ratings. These findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in the San Diego Region. Non-storm water discharges from the MS4s have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds, and contribute significantly to exceedances of applicable receiving water quality objectives.

16. **Non-Storm Water Discharges.** Non-storm water discharges from the MS4s are not considered storm water discharges and therefore are not subject to the MEP standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4s. Pursuant to CWA 402(p)(3)(B)(ii), non-storm water discharges into the MS4s must be effectively prohibited.

17. **Best Management Practices.** Pollutants can be effectively reduced in runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and runoff, therefore keeping pollutants onsite and out of receiving waters. Treatment control BMPs remove pollutants that have been mobilized by storm water or non-storm water flows.

18. **BMP Implementation.** Runoff needs to be addressed during the three major phases of development (planning, construction, and use) in order to reduce the discharge of storm water pollutants to the MEP, effectively prohibit non-storm water discharges, and protect receiving waters. Development which is not guided by water quality planning policies and principles can result in increased pollutant load discharges, flow rates, and flow durations which can negatively affect receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development can generate substantial pollutant loads which are discharged in runoff to receiving waters.

19. **Long Term Planning and Implementation.** Federal regulations require municipal storm water permits to expire 5 years from adoption, after which the permit must be renewed and reissued. The San Diego Water Board recognizes that the degradation of water quality and impacts to beneficial uses of the waters in the San Diego Region occurred over several decades. The San Diego Water Board ~~further recognizes that a decade or more may be necessary to realize~~ expects to see demonstrable improvement to the quality of waters in the Region once Copermittees are given the flexibility to focus resources on addressing priority issues first. This Order includes a long term planning and implementation approach that will require more than a single permit term to ~~complete.~~achieve comprehensive water quality improvements throughout the Region.

FINDINGS

WATER QUALITY STANDARDS

20. Basin Plan. The San Diego Water Board adopted a Water Quality Control Plan for the San Diego Basin (Basin Plan) on September 8, 1994 that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for receiving waters addressed through the plan. The Basin Plan was subsequently approved by the State Water Resources Control Board (State Water Board) on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and approved by the State Water Board. Requirements of this Order implement the Basin Plan.

The Basin Plan identifies the following existing and potential beneficial uses for inland surface waters in the San Diego Region: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Freshwater Replenishment (FRSH), Hydropower Generation (POW), and Preservation of Biological Habitats of Special Significance (BIOL). The following additional existing and potential beneficial uses are identified for coastal waters of the San Diego Region: Navigation (NAV), Commercial and Sport Fishing (COMM), Estuarine Habitat (EST), Marine Habitat (MAR), Aquaculture (AQUA), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction, and/or Early Development (SPWN), and Shellfish Harvesting (SHELL).

21. Ocean Plan. The State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, and 2005. The State Water Board adopted the latest amendment on April 21, 2005 and it became effective on February 14, 2006. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean. Requirements of this Order implement the Ocean Plan.

The Ocean Plan identifies the following beneficial uses of ocean waters of the state to be protected: Industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture; preservation and enhancement of designated Areas of Special Biological Significance; rare and endangered species; marine habitat; fish spawning and shellfish harvesting

22. Sediment Quality Control Plan. On September 16, 2008, the State Water Board adopted the Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality (Sediment Quality Control Plan). The Sediment Quality Control Plan became effective on August 25, 2009. The Sediment Quality Control Plan establishes 1) narrative sediment quality objectives for benthic community protection from exposure to contaminants in sediment and to protect human health, and 2) a program of implementation using a multiple lines of evidence approach to interpret

the narrative sediment quality objectives. Requirements of this Order implement the Sediment Quality Control Plan.

23. **National Toxics Rule and California Toxics Rule.** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the National toxics Rule (NTR) applied in California. On May 18, 2000, USEPA adopted the California Toxics Rule (CTR). The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants

24. **Antidegradation Policy.** This Order is in conformance with the federal Antidegradation Policy described in 40 CFR 131.12, and State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*. Federal regulations at 40 CFR 131.12 require that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The San Diego Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies.

CONSIDERATIONS UNDER FEDERAL LAW

25. **Coastal Zone Act Reauthorization Amendments.** Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This Order addresses the management measures required for the urban category, with the exception of septic systems. The runoff management programs developed pursuant to this Order fulfill the need for coastal cities to develop a runoff non-point source plan identified in the Non-Point Source Program Strategy and Implementation Plan. The San Diego Water Board addresses septic systems through the administration of other programs.

26. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 USCA sections 1531 to 1544). This Order requires compliance with receiving water limits, and other requirements to protect the beneficial uses of waters of the State. The Copermittees are responsible for meeting all requirements of the applicable Endangered Species Act.

CONSIDERATIONS UNDER STATE LAW

27. **Unfunded Mandates.** This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following:

    a. This Order implements federally mandated requirements under CWA section 402. (33 USC 1342(p)(3)(B).)

    b. The local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges.

    c. The local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order.

    d. The Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301(a) (33 USC 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations).

    e. The local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

    f. The provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 USC 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions and requirements of any applicable wasteload allocation. (40 CFR 122.44(d)(1)(vii)(B).)

28. **California Environmental Quality Act.** The issuance of WDRs and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with CWC section 13389.

STATE WATER BOARD DECISIONS

29. **Compliance with Prohibitions and Limitations.** The receiving water limitation language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The receiving water limitation language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the

implementation of improved and better-tailored BMPs over time. Implementation of the iterative approach to comply with receiving water limitations based on applicable water quality standards is necessary to ensure that storm water discharges from the MS4 ultimately will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

30. **Special Conditions for Areas of Special Biological Significance.** On March 20, 2012, the State Water Board approved Resolution No. 2012-001**X** approving an exception to the Ocean Plan prohibition against discharges to Areas of Special Biological Significance (ASBS) for certain nonpoint source discharges and NPDES permitted municipal storm water discharges. The Resolution requires monitoring and testing of marine aquatic life and water quality in several ASBS to protect California's coastline during storms when rain water overflows into coastal waters. Specific terms, prohibitions, and special conditions were adopted to provide special protections for marine aquatic life and natural water quality in ASBSs. The City of San Diego's municipal storm water discharges to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's municipal storm water discharges to the Heisler Park ASBS are subject terms and conditions of the Resolution. The Special Protections contained in Attachment B to the Resolution applicable to these discharges are hereby incorporated in this Order as if fully set forth herein.

ADMINISTRATIVE FINDINGS

31. **Executive Officer Delegation of Authority.** The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC section 13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC section 13223 or this Order explicitly states otherwise.

32. **Standard Provisions.** Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment B to this Order.

33. **Fact Sheet.** The Fact Sheet for this Order contains background information, regulatory and legal citations, references and additional explanatory information and data in support of the requirements of this Order. The Fact Sheet is hereby incorporated into this Order and constitutes part of the Findings of this Order.

34. **Public Notice.** The San Diego Water Board notified the Copermittees, and interested agencies and persons of its intent to prescribe WDRs for MS4 discharges of pollutants to waters of the U.S. and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet.

35. **Public Hearing.** The San Diego Water Board held a public hearing on Month Day, 2012 and heard and considered all comments pertaining to the terms and conditions of this Order. Details of the public hearing are provided in the Fact Sheet.

II. PROVISIONS

THEREFORE, IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND LIMITATIONS

The purpose of this provision is to describe the conditions under which storm water and non-storm water discharges into and from MS4s are prohibited or limited. The goal of this provision is to protect, preserve, enhance, and restore the water quality and designated beneficial uses of waters of the state. This goal will be accomplished through implementation of control measures that effectively prohibit non-storm water discharges into and from the Copermittees' MS4s, and reduce pollutants in storm water discharges from the Copermittees' MS4s to the MEP.

1. Discharge Prohibitions

a. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance in receiving waters of the state are prohibited.

b. Non-storm water discharges into and from MS4s are prohibited, unless such discharges are either authorized by a separate NPDES permit, or the discharge is a category of non-storm water discharges or flows that must be addressed pursuant to Provisions E.2.a.(1)-(5) of this Order.

c. Discharges from MS4s are subject to all waste discharge prohibitions in the Basin Plan, included in Attachment A to this Order.

d. Discharges from MS4s to ASBS are prohibited. Storm water discharges from the City of San Diego's MS4 to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's MS4 to the Heisler Park ASBS are authorized under this Order subject to the Special Protections contained in Attachment B to State Water Board Resolution No. 2012-001**X** applicable to these discharges, included in Attachment A to this Order.

2. Receiving Water Limitations

a. Discharges from MS4s must not cause or contribute to the violation of water quality standards in any receiving waters, including but not limited to all applicable provisions contained in:

(1) The San Diego Water Board's Basin Plan, including beneficial uses, water quality objectives, and implementation plans;

ADMINISTRATIVE DRAFT

(2) State Water Board plans for water quality control including the following:

(a) Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries (Thermal Plan), and

(b) The Ocean Plan, including beneficial uses, water quality objectives, and implementation plans;

(3) State Water Board policies for water and sediment quality control including the following:

(a) Water Quality Control Policy for the Enclosed Bays and Estuaries of California,

(b) Sediment Quality Control Plan which includes the following narrative objectives:

(i) Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities, and

(ii) Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health,

(c) The Statement of Policy with Respect to Maintaining High Quality of Waters in California (State Water Board Resolution No. 68-16).

(4) Priority pollutant criteria promulgated by the USEPA through the following:

(a) National Toxics Rule (NTR)[1] (promulgated on December 22, 1992 and amended on May 4, 1995), and

(b) California Toxics Rule (CTR)[2,3]

b. Discharges from MS4s composed of storm water runoff must not alter natural ocean water quality in an ASBS.

c. Discharges from MS4s must not cause or contribute to the violation of any receiving water limitations expressed as water quality based effluent limitations (WQBELs) required to meet the WLAs established for the TMDLs in Attachment E to this Order, pursuant to the applicable TMDL compliance schedules.

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[1] 40 CFR 131.36
[2] 65 Federal Register 31682-31719 (May 18, 2000), adding Section 131.38 to 40 CFR
[3] If a water quality objective and a CTR criterion are in effect for the same priority pollutant, the more stringent of the two applies.

3. Effluent Limitations

a. Pollutants in storm water discharges from MS4s must be reduced to the MEP.[4]

b. Pollutants in discharges from MS4s must be reduced to comply with any effluent limitations expressed as WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order, pursuant to the applicable TMDL compliance schedules.

4. Compliance with Discharge Prohibitions and Receiving Water Limitations

Each Copermittee must comply with the discharge prohibitions and receiving water limitations of this Order through timely implementation of control measures and other actions as specified in Provisions B and E of this Order, including any modifications.

a. If exceedance(s) of water quality standards persist in receiving waters notwithstanding implementation of this Order, the Copermittees must comply with the following procedures:

(1) Upon a determination by ~~either~~ the Copermittees ~~or the San Diego Water Board~~ that discharges from the MS4 are causing or contributing to an exceedance of an applicable water quality standard, the Copermittees must submit the following updates to the Water Quality Improvement Plan required under Provision B as part of the Annual Report required under Provision F.3.b, unless the San Diego Water Board directs an earlier submittal:

(a) The water quality improvement strategies being implemented that are effective and will continue to be implemented;

(b) Additional water quality improvement strategies (i.e. BMPs, retrofitting projects, stream and/or habitat rehabilitation or restoration projects) that will be implemented to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards;

(c) Updates to the schedule for implementation of the existing and additional water quality improvement strategies; and

(d) Updates, when necessary, to the schedule for achieving compliance with the discharge prohibitions and receiving water limitations of this Order;

[4] This does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment must occur prior to the discharge of runoff into receiving waters per Finding 8.

(2) Upon a determination by the San Diego Water Board that discharges from the MS4 are causing or contributing to an exceedance of an applicable water quality standard (that was not identified pursuant to A.4(a)(1)), the Copermittees must submit the updates required under Provision A.4(a)(1)(a)-(d) to the Water Quality Improvement Plan required under Provision B within 30 days, unless the San Diego Water Board directs a later submittal:

(3)

~~(2)~~(4) The San Diego Water Board may require the incorporation of additional modifications to the Water Quality Improvement Plan required under Provision B. The applicable Copermittees must submit any modifications to the update to the Water Quality Improvement Plan within 30 days of notification that additional modifications are required by the San Diego Water Board, or as otherwise directed;

~~(3)~~(5) Within 30 days of the San Diego Water Board determination that the update to the Water Quality Improvement Plan meets the requirements of this Order, the Copermittees must revise the jurisdictional runoff management program documents to incorporate the updated water quality improvement strategies that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

~~(4)~~(6) The Copermittees must implement the revised jurisdictional runoff management programs and updated jurisdictional monitoring and assessment component of the Water Quality Improvement Plan.

b. The Copermittees must repeat the procedure set forth above to comply with discharge prohibitions and receiving water limitations of this Order for continuing or recurring exceedances of the same water quality standard(s) following implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board.

c. Nothing in Provisions A.4.a and A.4.b prevents the San Diego Water Board from enforcing any provision of this Order while the applicable Copermittees prepare and implement the above update to the Water Quality Improvement Plan and jurisdictional runoff management programs.

ADMINISTRATIVE DRAFT

B. WATER QUALITY IMPROVEMENT PLANS

The purpose of this provision is to develop Water Quality Improvement Plans that guide the Copermittees' jurisdictional runoff management program implementation efforts towards achieving the outcome of improved water quality in MS4 discharges and receiving waters. The goal of the Water Quality Improvement Plan is to ~~attain the reasonable~~ best protect~~ion~~, preserve~~ation~~, enhance~~ment~~, and restore~~ation of~~ water quality and designated beneficial uses of waters of the state. This goal will be accomplished through an adaptive planning and management process that identifies the highest water quality priorities within a watershed and implements strategies, control measures, and BMPs to achieve improvements in the quality of discharges from the MS4s and receiving waters.

The Copermittees must develop Water Quality Improvement Plans that 1) prioritize water quality issues resulting from discharges to and from the MS4s within each Watershed Management Area, 2) identify pollutant sources and other stressors associated with those water quality priorities, 3) define numeric targets and schedules to achieve improvement of water quality priorities, 4) describe water quality improvement strategies to achieve numeric targets, and 5) execute a coordinated monitoring and assessment program to determine progress towards achieving improved water quality.

The Copermittees must implement all the requirements of Provision B no later than 12 months after the adoption of this Order, or in accordance with Provision F.5.a of this Order.

1. Watershed Management Areas

The Copermittees must develop Water Quality Improvement Plans for each of the Watershed Management Areas in Table B-1. A total of nine Water Quality Improvement Plans must be developed for the San Diego Region.

Table B-1. Watershed Management Areas

Watershed Management Area	Hydrologic Unit(s)	Major Surface Water Bodies	Responsible Copermittees
South Orange County	San Juan (901.00)	Aliso Creek San Juan Creek San Mateo Creek Pacific Ocean	- City of Aliso Viejo[1] - City of Dana Point[1] - City of Laguna Beach[1] - City of Laguna Hills[1] - City of Laguna Niguel[1] - City of Laguna Woods[1] - City of Lake Forest[1] - City of Mission Viejo[1] - City of Rancho Santa Margarita[1] - City of San Clemente[1] - City of San Juan Capistrano[1] - County of Orange[1] - Orange County Flood Control District[1]

Table B-1. Watershed Management Areas

Watershed Management Area	Hydrologic Unit(s)	Major Surface Water Bodies	Responsible Copermittees
Santa Margarita River	Santa Margarita (902.00)	Murrieta Creek Temecula Creek Santa Margarita River Santa Margarita Lagoon Pacific Ocean	- City of Murrieta[2] - City of Temecula[2] - City of Wildomar[2] - County of Riverside[2] - County of San Diego[3] - Riverside County Flood Control and Water Conservation District[2]
San Luis Rey River	San Luis Rey (903.00)	San Luis Rey River San Luis Rey Estuary Pacific Ocean	- City of Escondido - City of Oceanside - City of Vista - County of San Diego
Carlsbad	Carlsbad (904.00)	Buena Vista Lagoon Agua Hedionda Lagoon Batiquitos Lagoon San Elijo Lagoon Pacific Ocean	- City of Carlsbad - City of Encinitas - City of Escondido - City of Oceanside - City of San Marcos - City of Solana Beach - City of Vista - County of San Diego
San Dieguito River	San Dieguito (905.00)	San Dieguito River San Dieguito Lagoon Pacific Ocean	- City of Del Mar - City of Escondido - City of Poway - City of San Diego - City of Solana Beach - County of San Diego
Penasquitos	Penasquitos (906.00)	Los Penasquitos Lagoon Mission Bay Pacific Ocean	- City of Del Mar - City of Poway - City of San Diego - County of San Diego
San Diego River	San Diego (907.00)	San Diego River Pacific Ocean	- City of El Cajon - City of La Mesa - City of Poway - City of San Diego - City of Santee - County of San Diego
San Diego Bay	Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)	Sweetwater River Otay River San Diego Bay Pacific Ocean	- City of Chula Vista - City of Coronado - City of Imperial Beach - City of La Mesa - City of Lemon Grove - City of National City - City of San Diego - County of San Diego - San Diego County Regional Airport Authority - Unified Port of San Diego
Tijuana River	Tijuana (911.00)	Tijuana River Tijuana Estuary Pacific Ocean	- City of Imperial Beach - City of San Diego - County of San Diego

Notes:
1. The Orange County Copermittees will be enrolled under this Order upon expiration of Order No. R9-2009-0002, or earlier if the Orange County Copermittees meet the conditions in Provision F.6.
2. The Riverside County Copermittees will be enrolled under this Order upon expiration of Order No. R9-2010-0016, or earlier if the Riverside County Copermittees meet the conditions in Provision F.6.
3. The County of San Diego will not be required to implement the requirements of Provision B for the Santa Margarita River Watershed Management Area until the Riverside County Copermittees are enrolled under this Order. Until then, the County of San Diego is responsible for implementing and complying with the requirements of Provisions D.1, D.4.a.(1)&(3), E, F.2.a-b, F.3.b, and F.4 for the areas of the Santa Margarita River Watershed Management Area within its jurisdiction.

2. Identification of Water Quality Priorities

The Copermittees must identify the water quality priorities within each Watershed Management Area that will be addressed by the Water Quality Improvement Plan. Where appropriate, Watershed Management Areas may be separated into subwatersheds to focus water quality prioritization and jurisdictional runoff management program implementation efforts by receiving water.

a. ASSESSMENT OF RECEIVING WATER CONDITIONS

The Copermittees must review pollutant sources, discharges, and receiving water conditions and assess the following, at a minimum, to determine the degree of adverse impacts to receiving water beneficial uses:

(1) Receiving waters listed as impaired on the CWA Section 303(d) List of Water Quality Limited Segments (303(d) List);

(2) TMDLs adopted and under development by the San Diego Water Board;

(3) Receiving waters recognized as sensitive or highly valued by the Copermittees, including estuaries designated under the National Estuary Program under CWA section 320, wetlands defined by the State or U.S. Fish and Wildlife Service's National Wetlands Inventory as wetlands, and receiving waters identified as ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-001**X** (Attachment A);

(4) Water quality standards established in the Basin Plan;

(5) Known historical versus current physical, chemical, and biological water quality conditions;

(6) All available physical, chemical, and biological receiving water monitoring data, including data produced by third parties. Data to be considered shall ~~including~~include, but is not limited to, data describing:

(a) Chemical constituents;

(b) Water quality parameters (i.e. pH, temperature, conductivity, etc.);

(c) Toxicity Identification Evaluations for both receiving water column and sediment;

(d) Trash impacts;

(e) Bioassessments; and

(f) Physical habitat.

(7) Available evidence of erosional impacts in receiving waters due to accelerated flows (i.e. hydromodification); and

(8) Available evidence of adverse impacts to the chemical, physical, and biological integrity of receiving waters.

To ensure that Copermittees consider all available data when identifying priorities, Copermittees must make a call for data. The call for data must solicit third party water monitoring data and other evidence from the public regarding available evidence of adverse impacts to the chemical, physical, and biological integrity of receiving waters. The Copermittees must allow the public at least 30 days to submit data and information for consideration.

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b. IDENTIFY PRIORITY POLLUTANTS AND RECEIVING WATER CONDITIONS

The Copermittees must use the information gathered in Provision B.2.a. to develop a list of water quality priorities as pollutants and/or receiving water conditions that are the highest threat to water quality or that most adversely affect the physical, chemical, and biological integrity of receiving waters. The Copermittees must identify the highest water quality priorities to be addressed by the Water Quality Improvement Plan.

After developing the list of water quality priorities, the Copermittees must submit the proposed list, along with data supporting the list, to the Regional Board for a 30 day review and comment period for the public and Regional Board staff.

c. POLLUTANT SOURCE AND/OR STRESSOR IDENTIFICATION

The Copermittees must identify known and suspected storm water and non-storm water pollutant sources and any other stressors causing or contributing to the highest water quality priorities. The identification of known and suspected sources of the highest water quality priorities as identified for Provision B.2.b must consider the following:

(1) Pollutant generating facilities or areas within the Watershed Management Area, including:

(a) Each Copermittee's inventory of construction, municipal, commercial, industrial, and residential facilities, areas, and/or activities,

(b) Publicly owned parks and/or recreational areas,

(c) Open space areas,

(d) All currently operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, and

(e) Areas not within the Copermittees' jurisdictions (e.g., tribal lands, state lands, federal lands) that may be pollutant sources related to the highest water quality priorities within the Watershed Management Area;

(2) Locations of the Copermittees' MS4s, including the following:

(a) All MS4 outfalls that discharge to receiving waters, and

(b) Locations of major structural controls for storm water and non-storm water (e.g., retention basins, detention basins, major infiltration devices, etc.);

(3) Other known and suspected sources of non-storm water or pollutants in storm water discharges to receiving waters within the Watershed Management Area, including the following:

(a) Other MS4 outfalls (e.g., Phase II Municipal and Caltrans),

(b) Other NPDES permitted discharges,

(c) Any other discharges that may be considered point sources (e.g., private outfalls), and

(d) Any other discharges that may be considered non-point sources (e.g., agriculture, wildlife or other natural sources);

(4) Review of available data, including but not limited to:

(a) Findings from the Copermittees' illicit discharge detection and elimination programs,

(b) Findings from the Copermittees' MS4 outfall monitoring,

(c) Findings from the Copermittees' receiving water monitoring,

(d) Findings from the Copermittees' MS4 discharges and receiving water assessments, and

(e) Any other available data, information, or studies related to pollutant sources and conditions that contribute to the highest water quality priorities as identified for Provision B.2.b.

To ensure that Copermittees consider all available information when identifying pollutant sources and stressors, Copermittees must make a call for information. The call for data must solicit information from the public regarding known and suspected sources. The Copermittees must allow the public at least 90 days to submit data and information for

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After developing the list of pollutant sources, the Copermittees must submit the proposed list, along with data supporting it, to the Regional Board for a 30 day review and comment period for the public and Regional Board staff.

~~(e)~~

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d. NUMERIC TARGETS AND SCHEDULES

The Copermittees must develop and incorporate interim and final numeric targets[5] and schedules into the Water Quality Improvement Plans. Numeric targets and schedules must be used to measure progress towards addressing the highest water quality priorities and an ultimate outcome of protections, preservation, enhancement, and restoration of receiving water beneficial uses. When developing numeric targets and corresponding schedules, the Copermittees must consider the following:

[5] Interim and final numeric targets may take a variety of forms such as pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric targets are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators. The final goals must be linked to applicable water quality criteria.

(1) Final numeric targets must be based on measureable criteria or indicators, to be achieved in the receiving waters and/or MS4 discharges for the highest water quality priorities which will result in the restoration and/or protection of water quality standards in receiving waters;

(2) Interim numeric targets must be based on measureable criteria or indicators that can demonstrate incremental progress toward achieving the final numeric targets in the receiving waters and/or MS4 discharges; and

(3) Schedules must be adequate for measuring progress toward achieving the interim and final numeric targets required for Provisions B.2.d.(1) and B.2.d.(2). Schedules must incorporate the following:

(a) Interim dates for achieving the interim numeric targets,

(b) Compliance schedules for any applicable TMDLs in Attachment E to this Order,

(c) Compliance schedules for any ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-001**X** (see Attachment A),

(d) Achievement of the final numeric targets in the receiving waters and/or MS4 discharges for the highest water quality priorities must be as soon as possible, and

(e) Final dates for achieving the final numeric targets must not extend more than 10 years beyond the date this Order is adopted, unless the schedule includes an applicable TMDL in Attachment E to this Order.

After developing the numeric targets, the Copermittees must submit the proposed list to the Regional Board for a 30 day review and comment period for the public and Regional Board staff.

Each Copermittee will be jointly and severally responsible for achieving the numeric targets.

~~(e)~~

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3. Water Quality Improvement Strategies and Schedules

The Copermittees must develop specific water quality improvement strategies to address the highest water quality priorities identified within a Watershed Management Area. The water quality improvement strategies must address the highest water quality priorities by preventing or eliminating non-storm water discharges to and from the MS4, reducing pollutants in storm water discharges from the MS4 to the MEP, and restoring and/or protecting the water quality standards of receiving waters.

a. **WATER QUALITY IMPROVEMENT STRATEGIES**

The water quality improvement strategies must prioritize and implement the following measures to achieve the interim and final numeric targets in accordance with the schedules required for Provision B.2.c:

(1) Structural and/or non-structural BMPs that are designed to achieve the interim and final numeric targets in the receiving waters and/or MS4 discharges;

(2) Retrofitting projects for areas of existing development known or suspected to contribute to the highest water quality priorities, and where retrofitting will contribute to reducing or eliminating non-storm water discharges to the MS4 and/or reducing pollutants in storm water discharges from the MS4 to the MEP;

(3) Stream and/or habitat rehabilitation or restoration projects where stream and/or habitat rehabilitation or restoration are necessary for, or will contribute to demonstrable improvements in the physical, chemical, and biological receiving water conditions and restoration and/or protection of water quality standards in receiving waters; and

(4) Other water quality improvement strategies that will result in preventing or eliminating non-storm water discharges to and from the MS4, reducing pollutants in storm water discharges from the MS4 to the MEP, and restoring and/or protecting the water quality standards of receiving waters.

b. **IMPLEMENTATION SCHEDULES**

(1) The Copermittees must develop schedules for implementing the water quality improvement strategies identified under Provision B.3.a to achieve the interim and final numeric targets in the receiving waters and/or MS4 discharges for the highest water quality priorities in the Watershed Management Area. Schedules must be developed for both the water quality improvement strategies implemented by each Copermittee within its jurisdiction and for strategies that will be implemented by multiple Copermittees on a collaborative basis.

(2) The Copermittees must incorporate the implementation compliance schedules for any ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-001**X** (see Attachment A).

After developing the strategies and schedules, the Copermittees must submit the proposed list to the Regional Board for a 30 day review and comment period for

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the public and Regional Board staff.
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4. Water Quality Improvement Monitoring and Assessment

The Copermittees in each Watershed Management Area must develop an integrated program to assess the progress toward achieving the numeric targets and schedules, and the progress toward addressing the highest water quality priorities for each Watershed Management Area. The water quality improvement monitoring and assessment program must include the monitoring and assessment requirements of Provision D. For Watershed Management Areas with applicable TMDLs, the water quality monitoring and assessment program must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-001**X** (see Attachment A).

5. Adaptive Management Process

a. WATER QUALITY IMPROVEMENT PLAN ADAPTIVE MANAGEMENT PROCESS

(1) The Copermittees in each Watershed Management Area must implement the iterative process, at least once every 2~~3~~ years, adapting the Water Quality Improvement Plan to become more effective, based on, but not limited to the following considerations:

(a) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan;

(b) Progress toward achieving interim and final numeric targets in receiving waters and/or MS4 discharges for the highest water quality priorities in the Watershed Management Area,

(c) Appropriateness of the highest water quality priorities identified for the Watershed Management Area;

(d) Progress toward achieving outcomes according to established schedules;

(e) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality problems and implementation measures to address the highest water quality problems;

(f) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees;

(g) San Diego Water Board recommendations; and

(h) Recommendations for modifications to the Water Quality Improvement Plan solicited through a public participation process.

(2) Based on the results of the iterative process required pursuant to Provision B.5.a.(1), the Copermittees must report any modifications necessary to improve the effectiveness of the Water Quality Improvement Plan in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b.

(3) The Copermittees must implement any modifications to the Water Quality Improvement Plan in accordance with the schedules developed pursuant to Provisions B.2.d and B.3.b, unless directed otherwise by the San Diego Water Board.

b. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ADAPTIVE MANAGEMENT PROCESS

(1) Each Copermittee in the Watershed Management Area must implement the iterative process, at least annually, adapting its jurisdictional runoff management program to become more effective, based on, but not limited to the following:

(a) Measurable or demonstrable reductions of non-storm water discharges to and from each Copermittee's MS4;

(b) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;

(c) Efficiency in implementing the Water Quality Improvement Plan;

(d) San Diego Water Board recommendations; and

(e) Recommendations for modifications to each Copermittee's jurisdictional runoff management program solicited through a public participation process.

(2) Based on the results of the iterative process required pursuant to Provision B.5.b.(1), each Copermittee must report any modifications necessary to improve the effectiveness its jurisdictional runoff management program document in the Annual Report required pursuant to Provision F.3.b, or as part of the ROWD required pursuant to Provision F.5.b.

(3) Each Copermittee must implement any modifications to its jurisdictional runoff

management program in accordance with the schedules developed pursuant to Provisions B.2.d and B.3.b, unless directed otherwise by the San Diego Water Board.

6. Water Quality Improvement Plan Implementation

The Copermittees must commence with implementation of the Water Quality Improvement Plan ~~no later than 180 days~~immediately after approval by ~~after submission, unless otherwise directed in writing by~~ the San Diego Water Board after a public hearing.

C. ACTION LEVELS

The purpose of this provision is for the Copermittees to incorporate numeric non-storm water and storm water action levels in the Water Quality Improvement Plans. The action levels will be used to measure progress towards ~~attaining the reasonable~~best ~~protection~~protecting, ~~preservation~~preservating, enhanc~~emen~~ing~~t~~, and restoring ~~ation of~~ water quality and designated beneficial uses of waters of the state. This goal will be accomplished through monitoring and assessing the quality of the MS4 discharges during the implementation of the Water Quality Improvement Plans.

The Copermittees must incorporate numeric action levels in the Water Quality Improvement Plans to direct and focus the Copermittees' jurisdictional runoff management program implementation efforts for addressing MS4 discharges to receiving waters. The numeric action levels will be used as part of the MS4 discharges assessments required under Provision D.4.a, and each Copermittee's program to detect and eliminate non-storm water and illicit discharges to the MS4 required under Provision E.2. Numeric action levels must be developed for non-storm water and storm water MS4 discharges, as follows:

1. Non-Storm Water Action Levels

a. The following non-storm water action levels (NALs) must be incorporated in the Water Quality Improvement Plan:

(1) Non-Storm Water Discharges from MS4s to Ocean Surf Zone

Table C-1. Non-Storm Water Action Levels for Discharges from MS4s to Ocean Surf Zone

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Total Coliform	MPN/100 ml	1,000	-	10,000/1,000[1]	OP
Fecal Coliform	MPN/100 ml	200[2]	-	400	OP
Enterococci	MPN/100 ml	35	-	104[3]	OP

Abbreviations/Acronyms
AMAL – average monthly action level
MDAL – maximum daily action level
OP – Ocean Plan water quality objective
MPN/100 ml – most probable number per 100 milliliters

Notes:
1. Total coliform density shall not exceed 1,000 MPN/100 ml when the fecal/total coliform ratio exceeds 0.1
2. Fecal coliform density may not exceed 200 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas"

(2) Non-Storm Water Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Table C-2. Non-Storm Water Action Levels for Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Turbidity	NTU	75	-	225	OP
pH	Units	Within limit of 6.0 to 9.0 at all times			OP
Fecal Coliform	MPN/100 ml	200[1]	-	400[2]	BP
Enterococci	MPN/100 ml	35	-	104[3]	BP
Priority Pollutants	ug/L	See Table C-3			

Abbreviations/Acronyms:
AMAL – average monthly action level
MDAL – maximum daily action level
OP – Ocean Plan water quality objective
BP – Basin Plan water quality objective
NTU – Nephelometric Turbidity Units
MPN/100 ml – most probable number per 100 milliliters
ug/L – micrograms per liter

Notes:
1. Based on a minimum of not less than five samples for any 30-day period
2. No more than 10 percent of total samples may exceed 400 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for saltwater “designated beach areas”

Table C-3. Non-Storm Water Action Levels for Priority Pollutants

Parameter	Units	Freshwater (CTR) MDAL	Freshwater (CTR) AMAL	Saltwater (CTR) MDAL	Saltwater (CTR) AMAL
Cadmium	ug/L	**	**	16	8
Copper	ug/L	*	*	5.8	2.9
Chromium III	ug/L	**	**	-	-
Chromium VI	ug/L	16	8.1	83	41
Lead	ug/L	*	*	14	2.9
Nickel	ug/L	**	**	14	6.8
Silver	ug/L	*	*	2.2	1.1
Zinc	ug/L	*	*	95	47

Abbreviations/Acronyms:
CTR – California Toxic Rule
ug/L – micrograms per liter
AMAL – average monthly action level
MDAL – maximum daily action level

Notes:
* Action levels developed on a case-by-case basis (see below)
** Action levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels (MCLs) under the California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431

The Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc NALs for MS4 discharges to freshwater receiving waters will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

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(3) Non-Storm Water Discharges from MS4s to Inland Surface Waters

Table C-4. Non-Storm Water Action Levels for Discharges from MS4s to Inland Surface Waters

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BP
Turbidity	NTU	-	20	See MDAL	BP
pH	Units	Within limit of 6.5 to 8.5 at all times			BP
Fecal Coliform	MPN/100 ml	200[1]	-	400[2]	BP
Enterococci	MPN/100 ml	33	-	61[3]	BP
Total Nitrogen	mg/L	-	1.0	See MDAL	BP
Total Phosphorus	mg/L	-	0.1	See MDAL	BP
MBAS	mg/L	-	0.5	See MDAL	BP
Iron	mg/L	-	0.3	See MDAL	BP
Manganese	mg/L	-	0.05	See MDAL	BP
Priority Pollutants	ug/L	See Table C-3			

Abbreviations/Acronyms:
AMAL – average monthly action level
BP – Basin Plan water quality objective
COLD – cold freshwater habitat beneficial use
NTU – Nephelometric Turbidity Units
mg/L – milligrams per liter
MDAL – maximum daily action level
WARM – warm freshwater habitat beneficial use
MBAS – Methylene Blue Active Substances
MPN/100 ml – most probable number per 100 milliliters
ug/L – micrograms per liter

Notes:
1. Based on a minimum of not less than five samples for any 30-day period
2. No more than 10 percent of total samples may exceed 400 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for freshwater "designated beach areas"

b. If not identified in Provision C.1.a, NALs must be identified and incorporated in the Water Quality Improvement Plan for any pollutants or waste constituents causing or contributing, or threatening to cause or contribute to a condition of pollution or nuisance in waters of the state associated with the highest water quality priorities related to non-storm water discharges from the MS4s. NALs must be based on:

(1) Applicable water quality standards which may be dependent upon site-specific or receiving water-specific conditions or assumptions to be identified by the Copermittees; or

(2) Applicable numeric WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order.

2. Storm Water Action Levels

a. The following storm water action levels (SALs) for discharges of storm water from the MS4 must be incorporated in the Water Quality Improvement Plan:

Table C-5. Storm Water Action Levels for Discharges from MS4s to Receiving Waters

Parameter	Units	Action Level
Turbidity	NTU	126
Nitrate & Nitrite (Total)	mg/L	2.6
Phosphorus (Total P)	mg/L	1.46
Cadmium (Total Cd)*	µg/L	3.0
Copper (Total Cu)*	µg/L	127
Lead (Total Pb)*	µg/L	250
Zinc (Total Zn)*	µg/L	976

Abbreviations/Acronyms:
NTU – Nephelometric Turbidity Units
mg/L – milligrams per liter
ug/L – micrograms per liter

Notes:
* The sampling must include a measure of receiving water hardness at each MS4 outfall. If a total metal concentration exceeds the corresponding metals SAL in Table C-5, that concentration must be compared to the California Toxics Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific metal exceeds that SAL, but does not exceed the applicable USEPA 1-hour maximum concentration criterion for the measured level of hardness, then the sample result will not be considered as an excursion above the SAL for that measurement.

b. If not identified in Provision C.2.a, SALs must be identified and incorporated in the Water Quality Improvement Plan for pollutants or waste constituents causing or contributing, or threatening to cause or contribute to a condition of pollution or nuisance in waters of the state associated with the highest water quality priorities related to storm water discharges from the MS4s. SALs must be based on:

(1) Federal and State water quality guidance and/or water quality standards; and

(2) Site-specific or receiving water-specific conditions; or

(3) Applicable numeric WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order.

c. Wet weather monitoring and assessment data from MS4 outfalls collected in accordance with Provision D.1.b may be used to develop or revise SALs based upon watershed-specific data. Revision of SALs is subject to San Diego Water Board approval.

D. MONITORING AND ASSESSMENT REQUIREMENTS

The purpose of this provision is for the Copermittees to monitor and assess the chemical, physical, and biological impact on receiving waters caused by discharges from the Copermittees' MS4s under wet weather and dry weather conditions. The goal of this provision is to inform the Copermittees about the nexus between the health of receiving waters and the water quality condition of the discharges from their MS4s. This goal will be accomplished through implementing and complying with the monitoring and assessment requirements of this Order.

The Copermittees must implement the following minimum monitoring and assessment requirements:

1. Jurisdictional Monitoring Requirements

a. DRY WEATHER JURISDICTIONAL MONITORING [D.1.a]

For dry weather days,[6] each Copermittee must implement the following minimum monitoring requirements within its jurisdiction:

(1) Non-Storm Water MS4 Monitoring Program [D.1.a.(1)]

Each Copermittee must develop and conduct a program to monitor and characterize non-storm water flows and pollutant loads during dry weather conditions within its jurisdiction. The non-storm water MS4 monitoring program must be utilized to detect and eliminate non-storm water discharges and illicit discharges and connections to the Copermittee's MS4. Any available monitoring data not collected specifically to meet these requirements may be utilized by the Copermittee. The non-storm water MS4 monitoring program must meet the following minimum requirements:

(a) Non-Storm Water MS4 Monitoring Stations [D.1.a.(1)(a)]

Each Copermittee must identify the non-storm water MS4 monitoring stations within its jurisdiction that will be screened and monitored during dry weather days to identify non-storm water discharges and illicit discharges and connections to the MS4. Non-storm water MS4 monitoring stations must be selected in accordance with the following guidelines and criteria:

(i) A grid system consisting of perpendicular north-south and east-west lines spaced ¼ mile apart must be overlayed on a map of the Copermittee's MS4. All cells that contain a segment of the Copermittee's MS4 must be identified;

[6] Dry weather day is defined as any day with less than 0.1 inches of rain observed on each of the previous 3 days.

(ii) At least one non-storm water MS4 monitoring station must be selected in each cell containing a segment of the Copermittee's MS4, which must consist of one of the following:

[a] A major outfall,
[b] Other outfall point, or
[c] Other point of access (e.g., manhole);

(iii) Each non-storm water MS4 monitoring station should be located downstream of any areas that are known or suspected to be sources of non-storm water discharges and/or illicit discharges or connections to the MS4;

(iv) Each non-storm water MS4 monitoring station must be located to the degree practicable at the farthest outfall, manhole, or other accessible location downstream in the MS4, within each cell;

(v) In addition to the non-storm water MS4 monitoring stations identified in accordance with Provisions D.1.a.(1)(a)(i)-(iv) above, each Copermittee must identify stations that will be screened and monitored during dry weather days to identify non-storm water discharges from sources not directly under the jurisdiction of the Copermittee.[7] These stations must be selected in accordance with the following guidelines and criteria:

[a] Stations should be located at or prior to the point of discharge into the Copermittee's MS4, but may be located downstream of the source as long as the station remains appropriate for characterizing the discharge from the source not within the authority of the Copermittee to control,
[b] Any non-storm water MS4 monitoring station identified in accordance with Provisions D.1.a.(1)(a)(i)-(iv) and located at the point of discharge or directly downstream of a known or suspected source of non-storm water discharges not within the authority of the Copermittee to control may also be utilized as a station to monitor the source not within the authority of the Copermittee to control;

(vi) The following factors should be considered in determining the location of each non-storm water MS4 monitoring station:

[a] Safety of personnel and accessibility of the location,
[b] Total area draining to the location,
[c] Population density of the area draining to the location,
[d] Traffic density,
[e] Age of the structures or buildings in the area,

[7] Sources not directly under the jurisdiction of and subject to regulation by the Copermittee may include lands or areas under the jurisdiction of other Copermittees, owners or operators of federal and state lands or facilities, tribal lands, special districts, etc.

[f] History of the area,
[g] Land use types draining to the location,
[h] Hydrological conditions, and
[i] Recommendations from the San Diego Water Board; and

(vii) No more than 500 non-storm water MS4 monitoring stations need to be selected by each Copermittee within its jurisdiction for any given year.

(b) Non-Storm Water MS4 Station Prioritization [D.1.a.(1)(b)]

Based on the first year of non-storm water field observations collected consistent with the Provision D.1.a.(1)(c)(i), each Copermittee must identify the high priority non-storm water MS4 monitoring stations. The non-storm water MS4 monitoring stations that meet the following criteria must be identified as high priority:

(i) The Copermittee has not identified and eliminated the source of the non-storm water discharges; or

(ii) The Copermittee has not been able to eliminate the source of an identified illicit discharge, and

(iii) The non-storm water discharges and/or illicit discharges are known or suspected to contribute and/or contain pollutants that cause or contribute, or threaten to cause or contribute to a condition of pollution or nuisance associated with the highest water quality priorities related to discharges from the MS4s.

(iv) The Copermittee may also designate any non-storm water MS4 monitoring stations that do not meet the criteria above as high priority.

(c) Non-Storm Water Monitoring Procedures [D.1.a.(1)(c)]

Each Copermittee must monitor the non-storm water MS4 monitoring stations within its jurisdiction as follows:

(i) *Non-Storm Water Field Observations* [D.1.a.(1)(c)(i)]

[a] Monitoring events for each non-storm water MS4 monitoring station must be scheduled as follows:
[1] During the first year of enrollment under this Order, the Copermittee must record field observations consistent with Table D-1 at each non-storm water MS4 monitoring station within its jurisdiction at least one time per month;

Table D-1. Field Observations for Non-Storm Water MS4 Monitoring Stations

Field Observations
• Station identification and location. • Presence of flow, or pooled or ponded water. • If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate), - Flow characteristics (i.e. presence of floatables, surface scum, or sheens, odor, color), - Flow source(s) suspected or identified from non-storm water source investigation, and - Flow source(s) eliminated during non-storm water source identification. • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, or sheens, odor, color), and - Known or suspected source(s) of pooled or ponded water. • Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology). • Presence and assessment of trash in and around station. • Evidence or signs of illicit connections or illegal dumping.

[2] For any stations monitoring sources not within the authority of the Copermittee to control where flows are observed during the first year of enrollment under this Order, the Copermittee must develop a field screening and monitoring schedule that can characterize the monthly non-storm water discharges and pollutant loads from the sources in or discharging to the Copermittee's MS4;

[3] High priority non-storm water MS4 monitoring stations must be monitored in accordance with the following:

A. Each Copermittee must designate at least 5 high priority non-storm water MS4 monitoring stations that are representative of non-storm water discharges from areas consisting primarily of residential, commercial, and industrial land uses present within and directly under the Copermittee's jurisdiction. Where there are less than 5 non-storm water MS4 monitoring stations within a Copermittee's jurisdiction, all stations must be designated as high priority, and

B. Each Copermittee must develop a monitoring schedule that can characterize the monthly non-storm water discharges and pollutant loads in or discharging from the high priority non-storm water MS4 monitoring stations;

[4] At least 10 percent of the non-storm water MS4 monitoring stations not identified as high priority must be screened and monitored each month. In addition, each non-storm water MS4 monitoring station must be screened and monitored at least once per year. If non-storm water flows are observed at

any non-storm water MS4 monitoring stations not identified as high priority, then they must become high priority pursuant to Provision D.1.a.(1)(b).

[b] For each monitoring events required above, the narrative descriptions and observations in Table D-1 must be recorded at each non-storm water MS4 monitoring station.

(ii) *Non-Storm Water Field Monitoring* [D.1.a.(1)(c)(ii)]

If flows, or pooled or ponded water are present during the field observations required under Provision D.1.a.(1)(c)(i), the Copermittee must monitor and record the parameters in Table D-2:

Table D-2. Field Monitoring Parameters for Non-Storm Water MS4 Monitoring Stations

Parameters
• pH • Temperature • Specific conductivity • Dissolved oxygen • Turbidity • Total chlorine • Total copper* • Total phenol • Detergents (or surfactants)* • Total hardness* • Reactive phosphorus* • Nitrate* • Ammonia as nitrogen*

* Field measurement not required if flow is observed and collection of a sample for analysis is required.

(iii) *Non-Storm Water Analytical Monitoring* [D.1.a.(1)(c)(iii)]

If flows are present during the field observations required under Provision D.1.a.(1)(c)(i), samples must be collected and analyzed as follows:

[a] If the Copermittee identifies and eliminates the source of non-storm water discharge, analysis of the sample is not required, but encouraged;

[b] During the first year of enrollment under this Order, samples must be collected if flows are observed at non-storm water MS4 monitoring stations. Samples must be analyzed for the following constituents~~, unless the Copermittee has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary~~:

[1] Any pollutants identified as the highest priority for the Watershed Management Area in the Water Quality Improvement Plan,

[2] Any pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection,

[3] Constituents listed in Table D-3;

Table D-3. Analytical Monitoring Constituents for Non-Storm Water MS4 Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Total Phosphorus • Dissolved Phosphorus • Nitrite[1] • Nitrate[1] • Total Kjeldhal Nitrogen • Ammonia • Oil and Grease	• Diazinon • Chlorpyrifos • Pyrethroids	• Cadmium • Copper • Lead • Zinc	• Total Coliform • Fecal Coliform[2] • *Enterococcus*

Notes:
1. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
2. *E. Coli* may be substituted for Fecal Coliform.

[c] **After** the first year of enrollment under this Order, samples must be collected from all high priority non-storm water MS4 monitoring stations for analysis at least two times per year. Samples must be collected at least once during the dry season (May-September) and at least once after the first storm event of the wet season (October-April). Samples must be analyzed for the following constituents:
[1] Any pollutants identified as the highest priority for the Watershed Management Area in the Water Quality Improvement Plan,
[2] Any pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and
[3] Constituents listed in Table D-3 must be analyzed at least once per year;

[d] Samples must be collected from all non-storm water MS4 monitoring stations not identified as high priority for analysis if flows are observed during required field screening and monitoring events. Samples must be analyzed for the following constituents, unless the Copermittee has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary:
[1] Any pollutants identified as the highest priority for the Watershed Management Area in the Water Quality Improvement Plan,
[2] Any pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and
[3] Constituents listed in Table D-3.

(2) Dry Weather Ambient Receiving Water Monitoring Program [D.1.a.(2)]

Each Copermittee must develop and conduct a program to monitor and characterize the ambient conditions of the receiving waters utilized for conveying non-storm water within and through its jurisdiction. Any available monitoring data not collected specifically to meet these requirements may be utilized by the Copermittee. The dry weather ambient receiving water monitoring program must meet the following minimum requirements:

(a) Dry Weather Ambient Receiving Water Monitoring Stations [D.1.a.(2)(a)]

Each Copermittee must identify the dry weather ambient receiving water monitoring stations that will be screened and monitored. Any location in a receiving water that is already monitored by the Copermittee or another entity may also be utilized as a dry weather ambient receiving water monitoring station. The monitoring stations must be selected in accordance with the following criteria:

(i) The following factors should be considered in determining the location of each dry weather ambient receiving water monitoring station:

[a] Permission to cross private property and public land,
[b] Safety of personnel and accessibility of the location,
[c] Location can complement or supplement historical ambient receiving water data,
[d] Location should not be in close proximity to any MS4 outfalls or other point source discharges to the receiving water,
[e] Natural or relatively unaltered areas in receiving waters are preferred, and
[f] Recommendations from the San Diego Water Board;

(ii) Locate at least one monitoring station in the lowest part of the Watershed Management Area near the boundary of its jurisdiction;

(iii) Locate at least one monitoring station located in the uppermost part of the Watershed Management Area near the boundary of its jurisdiction; and

(iv) The monitoring stations identified in Provisions D.1.a.(2)(a)(ii) and D.1.a.(2)(a)(iii) must be hydraulically connected.

(b) Dry Weather Ambient Receiving Water Monitoring Procedures [D.1.a.(2)(b)]

Each Copermittee must monitor the dry weather ambient receiving water monitoring stations as follows:

(i) *Dry Weather Ambient Receiving Water Field Observations* [D.1.a.(2)(b)(i)]

Monitoring events for each monitoring station must be scheduled as follows:

[a] During the first year of enrollment under this Order, the Copermittee must record field observations consistent with Table D-4 at each dry weather ambient receiving water monitoring station at least one time per month; and

Table D-4. Field Observations for Dry Weather Ambient Receiving Water Monitoring Stations

Field Observations
• Station identification and location. • Presence of flow, or pooled or ponded water. • If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate), - Flow characteristics (i.e. presence of floatables, surface scum, or sheens, odor, color), • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, or sheens, odor, color),. • Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology). • Presence and assessment of trash in and around station.

[b] For any monitoring stations where flows are observed during the first year of enrollment under this Order, the Copermittee must develop a field screening and monitoring schedule that can characterize the monthly flows and pollutant loads in the receiving water.

(ii) *Dry Weather Ambient Receiving Water Field Monitoring* [D.1.a.(2)(b)(ii)]

If flow, or pooled or ponded water is present during the field observations required under Provision D.1.a.(2)(b)(i), the Copermittee must monitor and record the parameters in Table D-2.

(iii) *Dry Weather Ambient Receiving Water Analytical Monitoring* [D.1.a.(2)(b)(iii)]

If flows are present during the field observations required under Provision D.1.a.(2)(b)(i), samples of the ambient receiving water flows must be collected and analyzed as follows:

[a] During the first year of enrollment under this Order, samples must be collected for each observation of flow in the ambient receiving water monitoring stations for analysis. Samples must be analyzed for the following constituents:

[1] Any pollutants identified as the highest priority for the Watershed Management Area in the Water Quality Improvement Plan,

[2] Any non-storm water pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and

[3] Constituents listed in Table D-3; and

[b] **After** the first year of enrollment under this Order, samples of flows observed at ambient receiving water monitoring stations must be collected for analysis at least two times during the remaining term of this Order. Samples must be collected at least once during the dry season (May-September) and at least once after the first storm event of the wet season (October-April). Samples must be analyzed for the following constituents:

[1] Any pollutants identified as the highest priority for the Watershed Management Area in the Water Quality Improvement Plan,

[2] Any pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection,

[3] Constituents listed in Table D-3 must be analyzed at least once per year.

b. WET WEATHER JURISDICTIONAL MONITORING [D.1.b]

For wet weather days,[8] each Copermittee must implement the following minimum monitoring requirements within its jurisdiction:

(1) Storm Water MS4 Outfall Monitoring Program [D.1.b.(1)]

Each Copermittee must develop and conduct a program to monitor and characterize the storm water flows and pollutant loads from the MS4 outfalls within its jurisdiction during wet weather days. Any available monitoring data not collected specifically to meet these requirements may be utilized by the Copermittee. The monitoring program must meet the following minimum requirements:

(a) Storm Water MS4 Outfall Monitoring Stations [D.1.b.(1)(a)]

Each Copermittee must identify the wet weather MS4 outfall monitoring stations within its jurisdiction that will be monitored and sampled during wet weather days. Any non-storm water MS4 monitoring station identified under Provision D.1.a.(1)(a) may also be utilized as a storm water MS4 outfall monitoring station. Monitoring stations must be selected in accordance with the following guidelines and criteria:

(i) The following factors should be considered in determining the location of each wet weather MS4 outfall monitoring station:

[8] Wet weather day defined as any day with 0.1 inches of rain or greater and the following 3 days.

[a] Safety of personnel and accessibility of the location,
[b] Total area draining to the location,
[c] Population density of the area draining to the location,
[d] Traffic density,
[e] Age of the structures or buildings in the area,
[f] History of the area,
[g] Land use types draining to the location,
[h] Hydrological conditions, and
[i] Recommendations from the San Diego Water Board.

(ii) Each wet weather MS4 outfall monitoring station must consist of one of the following:

[a] A major outfall, or
[b] Other outfall point, or
[c] Other point of access (e.g., manhole), only as an alternate location if safety during wet weather discharge sampling at available outfall locations discharging to receiving waters is a significant concern and limits accessibility;

(iii) Each Copermittee must designate at least 5 monitoring stations that are representative of storm water flows from areas consisting primarily of residential, commercial, and industrial land uses present within the Copermittee's jurisdiction. Where there are less than 5 MS4 outfalls within a Copermittee's jurisdiction, all MS4 outfalls must be designated as wet weather MS4 outfall monitoring stations.

(iv) Any monitoring station that does not have any SAL exceedances for 3 successive years may be replaced with a different monitoring station.

(b) Storm Water MS4 Outfall Monitoring Procedures [D.1.b.(1)(b)]

Each Copermittee must develop monitoring procedures to be consistent with the following criteria:

(i) A narrative description must be provided of the station identification and location, date and duration of the storm event(s) sampled, rainfall estimates of the storm event which generated the sampled discharge and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(ii) Flow rates and volumes for each monitoring station must be measured or estimated during each monitoring event in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), sections 3.2.1 or 3.2.2, or other method proposed by the Copermittees that is acceptable to the San Diego Water Board;

(iii) Each Copermittee must develop and implement a monitoring frequency during the wet season to characterize pollutant discharges from the MS4 outfalls within its jurisdiction. At a minimum, storm water samples must be collected from two storm events occurring at least one month apart for each monitoring station. Samples must be collected as follows:

[a] Grab samples may be collected only for pH, temperature, specific conductivity, dissolved oxygen, hardness, oil and grease, and indicator bacteria,
[b] For all other constituents, one of the following methods must be used to collect the samples:
[1] A 24-hour composite sample, using a minimum of 4 grab samples, collected during the first 24 hours of the storm water discharge, or for the entire storm water discharge if the storm event is less than 24 hours. Results of the analyses of individual grab samples may be averaged to obtain the daily average,
[2] A flow-weighted composite sample for either the entire discharge or for the first 3 hours of the discharge. The flow-weighted composite sample for the storm water discharge may be taken with a continuous sampler or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire discharge or for the first three hours of the discharge, with each aliquot being separated by a minimum period of fifteen minutes. Only one analysis of the composite of aliquots is required, or
[3] A minimum of one grab sample may be collected for storm water discharges from holding ponds or other impoundments with a retention period greater than 24 hours;

(iv) Storm water MS4 outfall monitoring stations must be monitored and sampled during the first wet weather event of the wet season. Samples must be analyzed for the following constituents:

[a] Any pollutants contributing to the highest water quality priorities for the Watershed Management Area as identified in the Water Quality Improvement Plan,
[b] Any non-storm water pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and
[c] Constituents listed in Table D-5.

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Table D-5. Analytical Monitoring Constituents for Wet Weather MS4 Outfall Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Turbidity[1] • Total Hardness • pH • Specific Conductivity • Temperature • Dissolved Oxygen • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Sulfate • Methylene Blue Active Substances (MBAS) • Total Phosphorus[1] • Dissolved Phosphorus • Nitrite[1,2] • Nitrate[1,2] • Total Kjeldhal Nitrogen • Ammonia • Oil and Grease	• Diazinon • Chlorpyrifos • Pyrethroids	• Arsenic • Cadmium[1] • Chromium • Copper[1] • Iron • Lead[1] • Manganese • Mercury • Nickel • Selenium • Silver • Thallium • Zinc[1]	• Total Coliform • Fecal Coliform[3] • *Enterococcus*

Notes:
1. Constituent with a storm water action level (SAL) specified under Provision C.2.
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
3. *E. Coli* may be substituted for Fecal Coliform.

(v) Samples collected after the first wet weather monitoring event and during the remaining period of the wet season must be analyzed for the following constituents:

[a] Any pollutants contributing to the highest water quality priorities for the Watershed Management Area as identified in the Water Quality Improvement Plan.

[b] Any pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection.

(2) Storm Water Pollutant Source Identification Monitoring Program [D.1.b.(2)]

Each Copermittee must develop and conduct a program within its jurisdiction to identify the sources of pollutants in storm water discharged from the Copermittee's MS4 during wet weather conditions. Any available monitoring data not collected specifically to meet these requirements may be utilized by the Copermittee. The storm water pollutant source identification monitoring program must include focused monitoring which moves upstream into each MS4 outfall drainage area as necessary to identify sources of the highest water quality priorities in the receiving waters. The wet weather source identification monitoring program must begin no later than the wet season following the date the San Diego Water Board determines that the Water Quality Improvement Plan meets the requirements of this Order.

2. Watershed Monitoring Requirements

a. WATERSHED MONITORING STATIONS [D.2.a]

The Copermittees must identify watershed monitoring stations within the Watershed Management Area. The watershed monitoring stations must be selected in accordance with the following criteria:

(1) All mass loading stations (MLSs) previously established by the Copermittees in each Watershed Management Area must continue to be utilized as watershed monitoring stations;

(2) All temporary watershed assessment stations (TWASs), bioassessment stations, and stream assessment stations previously established by the Copermittees must be considered for continued use as watershed monitoring stations;

(3) Any dry weather ambient receiving water monitoring station identified pursuant to Provision D.1.a.(2)(a) may be considered for use as a watershed monitoring station;

(4) At least one reference watershed monitoring station must be selected for each Watershed Management Area; and

(5) At least one watershed monitoring station located between and hydrologically connected to each MLS and each reference station must be selected for each Watershed Management Area.

b. DRY WEATHER WATERSHED MONITORING [D.2.b]

The Copermittees must develop and conduct a program to monitor the condition of the receiving waters in each Watershed Management Area during dry weather conditions. Any available monitoring data not collected specifically to meet these requirements may be utilized by the Copermittees. For dry weather days, the Copermittees must develop and/or update its written dry weather watershed monitoring procedures to be consistent with the following criteria:

(1) Dry Weather Watershed Field Observations [D.2.b.(1)]

For each dry weather watershed monitoring event, the Copermittee must record field observations consistent with Table D-4 at each monitoring station. Dry weather watershed monitoring is required at least every two years for each monitoring station. At least two dry weather watershed monitoring events must be scheduled for each watershed monitoring station per monitoring year. One monitoring event is required during the dry season (May-September) and one monitoring event is required on a dry weather day during the wet season (October-April), after the first storm event.

(2) Dry Weather Watershed Field Monitoring [D.2.b.(2)]

If flow, or pooled or ponded water is present during the dry weather watershed monitoring event required pursuant to Provision D.2.b.(1), and conditions allow the collection of the data, the Copermittee must monitor and record the parameters in Table D-2.

(3) Dry Weather Watershed Analytical Monitoring [D.2.b.(3)]

Samples from each monitoring station must be collected for analysis at least every two years. At least two dry weather watershed analytical monitoring events must be scheduled for each watershed monitoring station per monitoring year. Samples must be collected once during the dry season (May-September) and once on a dry weather day during the wet season (October-April), after the first storm event. Analytical monitoring samples must be collected and analyzed as follows:

(a) Grab samples may be collected only for pH, temperature, specific conductivity, dissolved oxygen, hardness, oil and grease, and indicator bacteria;

(b) For all other constituents, time-weighted composites composed of 24 discrete hourly samples must be collected; and

(c) Analysis for the following constituents is required:

(i) Any other pollutants contributing to the highest water quality priorities for the Watershed Management Area as identified in the Water Quality Improvement Plan,

(ii) Any pollutants that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and

(iii) Constituents listed in Table D-5.

(4) Dry Weather Watershed Toxicity Monitoring [D.2.b.(4)]

Samples from each monitoring station must be collected for toxicity testing at least every two years. At least two dry weather watershed toxicity monitoring events must be scheduled for each watershed monitoring station per monitoring year. Samples must be collected once during the dry season (May-September) and once on a dry weather day during the wet season (October-April), after the first storm event. Toxicity testing must be conducted in accordance with the following table:

Table D-6. Toxicity Testing for Dry Weather Watershed Monitoring Station Flows

Dry Weather Watershed Monitoring Station	Freshwater Organisms	Estuarine and Marine Organisms
Mass Loading Stations[1]	3 acute[2] 3 chronic[2]	1 chronic[3]
Others Stations	3 acute[2] 3 chronic[2]	None

Notes:
1. Dry weather toxicity testing at a mass loading station may be omitted if the channel flows are diverted year-round during dry weather conditions to the sanitary sewer for treatment.
2. The presence of acute toxicity must be determined in accordance with USEPA protocol EPA-821-R-02-012. The presence of chronic toxicity must be determined in accordance with USEPA protocol EPA-821-R-02-013. Toxicity testing must include the use of *Pimephales promelas* (fathead minnow), *Hyalella azteca*, and *Psuedokirchneriella subcapitata* (formerly *Selenastrum capricornutum*, unicellular algae).
3. The presence of chronic marine toxicity must be determined in accordance with USEPA guidance EPA 600/R95/136, except for chronic mysid tests which must be conducted in accordance with USEPA protocol EPA-821-R-02-014. *Americamysis bahia* may be used as a marine test organism if *Holmesimysis costata* cannot be reasonably obtained. The use of, and justification for, *A. bahia* must be clearly reported in the Annual Report.

(5) Dry Weather Watershed Bioassessment Monitoring [D.2.b.(5)]

Bioassessment monitoring for each monitoring station is required at least every two years. Bioassessment monitoring is required to be conducted in May or June for each watershed monitoring station, and must be conducted as follows:

(a) The following bioassessment samples and measurements must be collected:

(i) Macroinvertebrate samples must be collected in accordance with the "Reachwide Benthos (Multihabitat) Procedure" in the most current Surface Water Ambient Monitoring Program (SWAMP) Bioassessment Standard Operating Procedures (SOP), and amendments, as applicable;[9]

[9] Ode, P.R.. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001. http://www.swrcb.ca.gov/water_issues/programs/swamp/tools.shtml#monitoring

(ii) The “Full” suite of physical habitat characterization measurements must be collected in accordance with the most current SWAMP Bioassessment SOP, and as summarized in the SWAMP Stream Habitat Characterization Form – Full Version;[10] and

(iii) Freshwater algae samples must be collected in accordance with the SWAMP Standard Operating Procedures for Collecting Algae Samples.[11] Analysis of samples must include algal taxonomic composition (diatoms and soft algae) and algal biomass.

(b) The bioassessment samples, measurements, and appropriate water chemistry data must be used to calculate the following:

(i) An Index of Biotic Integrity (IBI) for macroinvertebrates for each monitoring station where bioassessment monitoring was conducted, based on the most current calculation method;[12] and

(ii) An IBI for algae for each monitoring station where bioassessment monitoring was conducted, when a calculation method is developed.[13]

(6) <u>Dry Weather Watershed Hydromodification Monitoring</u> [D.2.b.(6)]

In addition to the hydromodification monitoring conducted as part of the Copermittees' Hydromodification Management Plans, for any year dry weather watershed monitoring is required, hydromodification monitoring is required to be conducted at least once during the dry weather season (May-September) for each monitoring station. The following hydromodification monitoring observations and measurements must be collected within an appropriate domain of analysis for the monitoring station:

(a) Channel conditions, including:

(i) Channel dimensions,

(ii) Hydrologic and geomorphic conditions, and

(iii) Presence and condition of vegetation and habitat;

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[10] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf
[11] Fetscher et al. 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California.
[12] The most current calculation method at the time the Order was adopted is outlined in “A Quantitative Tool for Assessing the Integrity of Southern California Coastal Streams” (Ode, et al. 2005. Environmental Management. Vol. 35, No. 1, pp. 1-13). If an updated or new calculation method is developed, either both (i.e. current and updated/new) methods must be used, or historical IBIs must be recalculated with the updated or new calculation method.
[13] When a calculation method is developed, IBIs must be calculated for all available and appropriate historical data.

(b) Location of discharge points;

(c) Habitat integrity;

(d) Photo documentation of existing erosion and habitat impacts, with location (i.e. latitude and longitude coordinates) where photos were taken;

(e) Measurement or estimate of dimensions of any existing channel bed or bank eroded areas, including length, width, and depth of any incisions; and

(f) Known or suspected cause(s) of existing downstream erosion or habitat impact, including flow, soil, slope, and vegetation conditions, as well as upstream land uses and contributing new and existing development.

(7) Dry Weather Watershed Sediment Quality Monitoring [D.2.b.(7)]

Sediment monitoring must be performed by the Copermittees to assess compliance with sediment quality receiving water limits applicable to MS4 discharges to enclosed bays and estuaries. The monitoring may be performed either by individual or multiple Copermittees to assess compliance with receiving water limits, or through participation in a water body monitoring coalition. The Copermittees must identify sediment sampling stations that are spatially representative of the sediment within the water body segment or region of interest. Sediment quality monitoring must be conducted at least once every two years between June and September. Sediment quality monitoring must be conducted in conformance with the monitoring requirements set forth in the State Water Board Sediment Quality Control Plan.

c. WET WEATHER WATERSHED MONITORING [D.2.c]

The Copermittees in each Watershed Management Area must develop and conduct a program to monitor the condition in receiving waters and characterize storm water flows during wet weather days of the wet season. Any available monitoring data not collected specifically for this Order that meet the monitoring requirements may be utilized by the Copermittee. For wet weather days, the Copermittees must develop and/or update its written wet weather watershed monitoring procedures to be consistent with the following criteria:

(1) Wet Weather Watershed Field Observations [D.2.c.(1)]

Wet weather watershed monitoring events are required at least once every two years for each dry weather watershed monitoring station. Each monitoring station must be monitored during at least two wet weather events in any period (July 1 to June 30) that monitoring is required, including the first wet weather event of the wet season beginning October 1 and ending April 30, and at least one wet weather event after February 1. For each wet weather watershed monitoring event, the following narrative descriptions and observations must be recorded at each monitoring station:

(a) A narrative description of the station that includes the location, date and duration of the storm event(s) sampled, rainfall estimates of the storm event, and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(b) The flow rates and volumes measured or estimated. Data from nearby USGS gauging stations may be utilized, or flow rates may be measured or estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), section 3.2.1, or other method proposed by the Copermittees that is acceptable to the San Diego Water Board;

(c) Station condition (i.e. deposits or stains, vegetation condition, structural condition, observable biology); and

(d) Presence and assessment of trash in and around station.

(2) Wet Weather Watershed Field Monitoring [D.2.c.(2)]

For each wet weather watershed monitoring event, the parameters in Table D-2 must be monitored and recorded.

(3) Wet Weather Watershed Analytical Monitoring [D.2.c.(3)]

Samples from each wet weather watershed monitoring station must be collected for analysis at least two times during the term of this Order, at least once for the first wet weather event of the wet season, and at least once for a wet weather event after February 1. Wet weather samples must be collected and analyzed as follows:

(a) Grab samples may be collected only for pH, temperature, specific conductivity, dissolved oxygen, hardness, oil and grease, and indicator bacteria;

(b) For all other constituents, one of the following methods must be used to collect the samples:

(i) A 24-hour composite sample, using a minimum of 4 grab samples, collected during the first 24 hours of the storm water discharge, or for the entire storm water discharge if the storm event is less than 24 hours. Results of the analyses of individual grab samples may be averaged to obtain the daily average, or

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(ii) A flow-weighted composite sample for either the entire discharge or for the first 3 hours of the discharge. The flow-weighted composite sample for the storm water discharge may be taken with a continuous sampler or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire discharge or for the first three hours of the discharge, with each aliquot being separated by a minimum period of fifteen minutes. Only one analysis of the composite of aliquots is required; and

(c) Analysis for the following constituents is required:

(i) Any other pollutants contributing to the highest water quality priorities for the Watershed Management Area as identified in the Water Quality Improvement Plan,

(ii) Any water pollutants or constituents that the Copermittee has identified as a potential concern to receiving waters requiring additional data collection, and

(iii) Constituents listed in Table D-5.

(4) Wet Weather Watershed Toxicity Monitoring [D.2.c.(4)]

Samples from each wet weather watershed monitoring station must be collected for toxicity testing at least two times during the term of this Order, at least once for the first wet weather event of the wet season, and at least once for a wet weather event after February 1. Toxicity testing must be conducted in accordance with the following table:

Table D-7. Toxicity Testing for Wet Weather Watershed Monitoring Station Flows

Wet Weather Watershed Monitoring Station	Freshwater Organisms	Estuarine and Marine Organisms
Mass Loading Stations	3 acute[1]	1 acute[2] 2 chronic[2]
Others Stations	None	None

Notes:
1. The presence of acute toxicity must be determined in accordance with USEPA protocol EPA-821-R-02-012. Toxicity testing must include the use of *Pimephales promelas* (fathead minnow), *Hyalella azteca*, and *Psuedokirchneriella subcapitata* (formerly *Selenastrum capricornutum*, unicellular algae).
2. The presence of acute toxicity must be determined in accordance with USEPA protocol EPA-821-R-02-012. The presence of chronic marine toxicity must be determined in accordance with USEPA guidance EPA 600/R95/136, except for chronic mysid tests which must be conducted in accordance with USEPA protocol EPA-821-R-02-014. *Americamysis bahia* may be used as a marine test organism if *Holmesimysis costata* cannot be reasonably obtained. The use of, and justification for, *A. bahia* must be clearly reported in the Annual Report.

d. ALTERNATIVE WATERSHED MONITORING REQUIREMENTS [D.2.d]

In lieu of implementing the watershed monitoring requirements under Provisions D.2.a-c, the San Diego Water Board may direct the Copermittees to participate with other regulated entities, other interested parties, and the San Diego Water Board in the development, refinement, implementation, and coordination of regional monitoring and assessment programs to determine the status and trends of water quality conditions in 1) coastal waters, 2) enclosed bays, harbors, estuaries, and lagoons, and 3) streams.

e. WATERSHED MANAGEMENT AREA SPECIAL STUDIES [D.2.e]

(1) Within the term of this Order, the Copermittees must implement at least three special studies in each Watershed Management Area. The Copermittees are to determine which special studies will be developed and implemented in the Watershed Management Area. The monitoring plans for the Watershed Management Area special studies must be submitted with the Water Quality Improvement Plan required pursuant to Provision F.1. The Watershed Management Area special studies must, at a minimum, be in conformance with the following criteria:

(a) The special studies must be related to the highest water quality priorities identified by the Copermittees within the Watershed Management Area;

(b) The special studies must be implemented within the Watershed Management Area;

(c) The special studies must require some form of participation by all Copermittees within the Watershed Management Area; ~~and~~

(d) One of the three required special studies may be implemented as part of a regional special study required pursuant to Provision D.3; and

~~(d)~~(e) The special studies shall include partnerships and cooperation with interested stakeholder groups whenever feasible.

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(2) The Copermittees must report the progress and findings of the Watershed Management Area Special Studies as part of the Annual Report for each Watershed Management Area, as required pursuant to Provision F.3.b.

3. Regional Special Studies

Within the term of this Order, the Copermittees must develop and implement at least two regional special studies for the San Diego Region. The Copermittees must determine which regional special studies will be developed and implemented. The regional special studies must be identified in the Water Quality Improvement Plans required pursuant to Provision F.1. The regional special studies must, at a minimum, be in conformance with the following criteria:

a. The special studies must be related to a water quality priority issue or potential water quality concern identified by the Copermittees for the entire San Diego Region;

b. The special studies must be implemented within the San Diego Region; ~~and~~

c. The special studies must require some form of participation by all Copermittees enrolled under this Order;

d. The special studies shall include partnerships and cooperation with interested stakeholder groups whenever feasible;

~~**c.**~~**e.** The County of San Diego shall be the lead Copermittee for the regional special studies.~~.~~

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4. Assessment Requirements

Each Copermittee must evaluate the data collected pursuant to Provisions D.1, D.2 and D.3 to identify causes of exceedances of action levels developed pursuant to Provision C, assess the quality of the discharges into and from the MS4s, and assess the quality of receiving waters. Each Copermittee must also assess the progress of the water quality improvement strategies required pursuant to Provision B.3 in restoring and protecting beneficial uses of receiving waters. Assessments must be performed as described in the following provisions:

a. MS4 Discharges Assessments [D.4.a]

(1) Jurisdictional Non-Storm Water Discharges Reduction Assessment [D.4.a.(1)]

(a) Non-Storm Water Action Levels [D.4.a.(1)(a)]

Each Copermittee must analyze the jurisdictional non-storm water monitoring data collected pursuant to Provision D.1.a and identify causes of NAL exceedances. The analysis must include, but not be limited to, all of the following considerations:

(i) For non-storm water discharges from the Copermittee's MS4 outfalls to receiving waters within the Copermittee's jurisdiction causing exceedances of NALs, the Copermittee must analyze its municipal, commercial, industrial, and residential inventories and activities, and other land use data, and identify sources or potential sources that may have caused or contributed to the NAL exceedances;

(ii) Each Copermittee must provide non-storm water monitoring and analytical data to demonstrate that NAL exceedances were caused by pollutants which are not anthropogenic in origin; and

(iii) Each Copermittee must provide non-storm water monitoring and analytical data to demonstrate that NAL exceedances were caused by pollutants which originate from sources or potential sources not within the authority of the Copermittee to control (e.g. Phase II dischargers or Caltrans).

(b) Calculate Jurisdictional Non-Storm Water Discharges and Pollutant Loads [D.4.a.(1)(b)]

Each Copermittee must analyze the jurisdictional non-storm water monitoring data collected pursuant to Provision D.1.a to calculate non-storm water discharges and pollutant loads from the MS4s and receiving waters in each jurisdiction. These calculations must be updated annually in the Annual Report required per Provision F.3.b. Each Copermittee must calculate:

(i) Monthly non-storm water discharges and pollutant loads from each known or potential source not within the authority of the Copermittee to control to an MS4 or receiving waters within the Copermittee's jurisdiction;

(ii) Monthly non-storm water discharges and pollutant loads from the Copermittee's MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each land use type within the drainage basin for each MS4 outfall;

(iii) Monthly non-storm water flows and pollutant loads in receiving waters at the downstream boundary of the Copermittee's jurisdiction; and

(iv) Monthly non-storm water flows and pollutant loads in receiving waters from areas or facilities subject to the Copermittee's legal authority that are discharged from the Copermittee's MS4 to downstream receiving waters.

(c) Review Progress and Evaluate Jurisdictional Actions [D.4.a.(1)(c)]

Each Copermittee must review the NAL exceedances, discharge and flow analyses, and pollutant load analyses required pursuant to Provisions D.4.a.(1)(a) and D.4.a.(1)(b) on an annual basis to:

(i) Identify reductions and progress in achieving reductions in non-storm water and illicit discharges and connections from different land uses and/or drainage areas to its MS4;

(ii) Assess the effectiveness of current actions being implemented by the Copermittee toward the reduction or elimination of non-storm water discharges from the MS4 within its jurisdiction; and

(iii) Identify modifications necessary to increase the effectiveness of the jurisdictional runoff management program toward reducing or eliminating non-storm water discharges to and from the MS4 within its jurisdiction.

(2) <u>Watershed Management Area Non-Storm Water Assessment</u> [D.4.a.(2)]

(a) Calculate Watershed Non-Storm Water Flows and Pollutant Loads [D.4.a.(2)(a)]

The Copermittees must analyze the jurisdictional non-storm water and watershed monitoring data collected per Provisions D.1.a and D.2.b to calculate non-storm water flows and pollutant loads in receiving waters for each Watershed Management Area. These calculations must be updated annually in the Annual Report required per Provision F.3.b. The Copermittees must develop or utilize appropriate methods or models to calculate:

(i) Monthly non-storm water runoff flows and pollutant loads at each watershed monitoring station from different land uses and drainage basins;

(ii) Monthly non-storm water flows and pollutant loads at each watershed monitoring station from all the Copermittees' MS4 outfalls to receiving waters, with an estimate of the percent contribution from different land uses; and

(iii) Monthly non-storm water flows and pollutant loads at each watershed monitoring station, with an estimate of the percent contribution from both areas or facilities subject to the Copermittees' legal authority and areas or facilities not subject to the Copermittees' legal authority.

(b) Evaluate Water Quality Improvement Strategies [D.4.a.(2)(b)]

The Copermittees in each Watershed Management Area must review the non-storm water flow and pollutant load analyses required pursuant to Provision D.4.a.(2)(a) on an annual basis to:

(i) Assess the effectiveness of the water quality improvement strategies being implemented within the Watershed Management Area toward reducing or eliminating non-storm water discharges and pollutant loads from entering and discharging from the MS4 to receiving waters; and

(ii) Identify modifications necessary to increase the effectiveness of the water quality improvement strategies toward reducing or eliminating non-storm water discharges and pollutant loads from entering and discharging from the MS4 to receiving waters.

(3) Jurisdictional Storm Water Pollutant Discharges Reduction Assessment [D.4.a.(3)]

(a) Storm Water Action Levels [D.4.a.(3)(a)]

(i) For storm water discharges from the Copermittee's storm water MS4 outfall monitoring stations with analytical monitoring data indicating exceedances of SALs, the Copermittee must analyze its municipal, commercial, industrial, and residential inventories and activities, and other land use data and identify sources or potential sources that may have caused or contributed to the SAL exceedances;

(ii) Each Copermittee must provide storm water monitoring and analytical data to demonstrate that SAL exceedances were caused by the constituents in storm water discharges from the MS4 which are not anthropogenic in origin; and

(iii) Each Copermittee must provide storm water monitoring and analytical data to demonstrate that SAL exceedances were caused by the constituents in storm water discharges from the MS4 which originate from sources or potential sources not within the authority of the Copermittee to control.

(b) Calculate Jurisdictional Storm Water Discharges and Pollutant Loads [D.4.a.(3)(b)]

Each Copermittee must analyze the jurisdictional storm water monitoring data collected pursuant to Provision D.1.b to calculate storm water discharges and pollutant loads from the MS4s in each jurisdiction. These calculations must be updated annually in the Annual Report required per Provision F.3.b. Each Copermittee must calculate or estimate:

(i) The monthly mean rainfall estimates (or summary of weather bureau data) and the monthly average number of storm events;

(ii) The average storm water runoff coefficient for each land use type within the Copermittee's jurisdiction;

(iii) The volume of storm water discharged from each of the Copermittee's MS4 outfalls to receiving waters within its jurisdiction for each storm event;

(iv) The pollutant loads from each of the Copermittee's MS4 outfalls to receiving waters within its jurisdiction for each storm event; and

(v) The percent contribution of pollutant loads from each land use type within the drainage basin to storm water discharges for each MS4 outfall within its jurisdiction, for each storm event.

(c) Review Progress and Evaluate Jurisdictional Actions [D.4.a.(3)(c)]

Each Copermittee must review the SAL exceedances, discharge analyses, and pollutant load analyses required pursuant to Provisions D.4.a.(3)(a) and D.4.a.(3)(b) on an annual basis to:

(i) Identify reductions and progress in achieving reductions in pollutant concentrations and/or pollutant loads from different land uses and/or drainage areas discharging from its MS4;

(ii) Assess the effectiveness of current actions being implemented by the Copermittee toward the reduction of pollutants in storm water discharges from the MS4 within its jurisdiction to the MEP; and

(iii) Identify modifications necessary to increase the effectiveness of the jurisdictional runoff management program toward reducing pollutants in storm water discharges from the MS4 within its jurisdiction to the MEP.

(4) <u>Watershed Management Area Storm Water Assessment</u> [D.4.a.(4)]

(a) Calculate Watershed Storm Water Flows and Pollutant Loads [D.4.a.(4)(a)]

The Copermittees must analyze the jurisdictional storm water and watershed monitoring data collected per Provisions D.1.b and D.2.c to calculate storm water flows and pollutant loads in receiving waters for each Watershed Management Area. These calculations must be updated annually in the Annual Report required per Provision F.3.b. The Copermittees must develop or utilize appropriate methods or models to calculate:

(i) Storm water runoff flows and pollutant loads at each watershed monitoring station from different land uses and drainage basins;

(ii) Storm water flows and pollutant loads at each watershed monitoring station from all the Copermittees' MS4 outfalls, with an estimate of the percent contribution from different land uses; and

(iii) Storm water pollutant loads in receiving waters at each watershed monitoring station, with an estimate of the percent contribution from both areas or facilities subject to the Copermittees' legal authority and areas or facilities not within the authority of the Copermittees to control.

(b) Evaluate Water Quality Improvement Strategies [D.4.a.(4)(b)]

The Copermittees in each Watershed Management Area must review the storm water flow and pollutant load analyses required pursuant to Provision D.4.a.(4)(a) on an annual basis to:

(i) Assess the effectiveness of the water quality improvement strategies being implemented in each Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to the MEP; and

(ii) Identify modifications necessary to increase the effectiveness of the water quality improvement strategies toward reducing pollutants in storm water discharges from the MS4s to the MEP.

b. RECEIVING WATERS ASSESSMENTS [D.4.b]

The Copermittees must annually perform assessments of receiving waters based on data collected pursuant to Provision D.2 and any appropriate receiving water monitoring data available from other sources. The receiving waters assessments must analyze the status and trends of water quality conditions in 1) coastal waters, 2) enclosed bays, harbors, estuaries, and lagoons, and 3) streams under dry weather and wet weather conditions. For each of the three types of receiving waters, the Copermittees in each Watershed Management Area must:

(1) Identify the most critical beneficial uses that must be protected or restored to ensure overall health of the receiving water;

(2) Determine whether or not those critical beneficial uses are being protected or must be restored; and

(3) Identify short-term and/or long-term improvements or degradation of those critical beneficial uses.

c. WATER QUALITY IMPROVEMENT ASSESSMENTS [D.4.c]

The Copermittees in each Watershed Management Area must review the numeric targets in the Water Quality Improvement Plan, the data collected pursuant to Provisions D.1 and D.2, and the findings from the assessments required pursuant to Provisions D.4.a and D.4.b to assess the following:

(1) Beneficial uses of the receiving waters that are protected or must be restored;

(2) Appropriateness of final dry weather and wet weather numeric targets for the highest water quality priorities that will restore the impacted beneficial uses in the receiving waters;

(3) Non-storm water and storm water pollutant load reductions, or other improvements to receiving water or water quality conditions, that are necessary to attain the final numeric targets for restoring impacted beneficial uses in the receiving waters;

(4) Non-storm water and storm water pollutant load reductions necessary for the Copermittees to demonstrate that non-storm water and storm water discharges from their MS4s are not causing or contributing to exceedances of water quality objectives or impacts to beneficial uses in receiving waters;

(5) Non-storm water and storm water pollutant loads from their MS4s and/or receiving water flows that may be attributed to sources or potential sources not within the authority of the Copermittee to control and other non-anthropogenic sources identified by the Copermittees;

(6) Progress of the water quality improvement strategies toward attaining non-storm water and storm water pollutant load reductions or improvements to water quality conditions; and

(7) Progress toward achieving the interim and final numeric targets for restoring impacted beneficial uses in the receiving waters.

5. Monitoring Provisions

Each Copermittee must comply with all the monitoring, reporting, and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

E. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAMS

The purpose of this provision is for each Copermittee to implement a program to control the contribution of pollutants to and the discharges from the MS4 with its jurisdiction. The goal of this provision is to reduce the discharge of pollutants in storm water to the MEP and effectively prohibit non-storm water discharges to provide the reasonable protection, preservation, enhancement, and restoration of water quality and designated beneficial uses of waters of the state**.** This goal will be accomplished through compliance with the jurisdictional runoff management program requirements.

Each Copermittee must implement all the requirements of Provision E no later than 12 months after the adoption of this Order, or in accordance with Provision F.5.a. Each Copermittee must update its jurisdictional runoff management program document, in accordance with Provision F.2.a, to include all the requirements of Provision E. The jurisdictional runoff management programs implemented by each Copermittee must be consistent with the Water Quality Improvement Plan for the applicable Watershed Management Area required by Provision B. Until the Copermittee has updated its jurisdictional runoff management program document with the requirements of Provision E, the Copermittee must continue implementing its current jurisdictional runoff management program.

1. Legal Authority Establishment and Enforcement

a. Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through statute, ordinance, permit, contract, order, or similar means. This legal authority must, at a minimum, authorize the Copermittee to:

(1) Prohibit and eliminate all illicit discharges and illicit connections to its MS4;

(2) Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites, including industrial and construction sites which have coverage under the statewide General Permit for Discharges of Storm Water Associated with Industrial Activities (Industrial General Permit) or General Permit for Discharges of Storm Water Associated with Construction Activities (Construction General Permit), as well as to those sites which do not;

(3) Control the contribution of pollutants in discharges of runoff associated with commercial and residential activity to its MS4 and control the quality of runoff from commercial and residential sites.

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~~(3)~~(4) Control the discharge of spills, dumping, or disposal of materials other than storm water into its MS4;

~~(4)~~(5) Control through interagency agreements among Copermittees the contribution of pollutants from one portion MS4 to another portion of the MS4;

~~(5)~~(6) Control through interagency agreements with other owners of the MS4 such as Caltrans, the U.S. federal government, or sovereign Native American Tribes, where possible, the contribution of pollutants from one portion of the MS4 to another portion of the MS4;

~~(6)~~(7) Require compliance with conditions in its statutes, ordinances, permits, contracts, orders, or similar means to hold dischargers to its MS4 accountable for their contributions of pollutants and flows;

~~(7)~~(8) Require the use of BMPs to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;

~~(8)~~(9) Require documentation on the effectiveness of BMPs implemented to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;

~~(9)~~(10) Utilize enforcement mechanisms to require compliance with its statutes, ordinances, permits, contracts, orders, or similar means; and

~~(10)~~(11) Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with its statutes, ordinances, permits, contracts, orders, or similar means and with the requirements of this Order, including the prohibition of illicit discharges and connections to its MS4; the Copermittee must also have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities, including construction sites, discharging into its MS4.

b. With the first Annual Report required by Provision F.3.b, each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in this Order.

2. Illicit Discharge Detection and Elimination

Each Copermittee must implement a program to actively detect and eliminate illicit discharges and improper disposal into the MS4, or otherwise require the discharger to apply for and obtain a separate NPDES permit. The illicit discharge detection and elimination program must include, at a minimum, the following requirements:

a. NON-STORM WATER DISCHARGES

Each Copermittee must address all non-storm water discharges as illicit discharges, unless a non-storm water discharge is either identified as a discharge authorized by a separate NPDES permit, or identified as a category of non-storm water discharges or flows that must be addressed pursuant to the following requirements:

(1) Discharges of non-storm water to the MS4 from the following categories must be addressed as illicit discharges unless the discharge has coverage under NPDES Permit No. CAG919001 (Order No. R9-2007-0034, or subsequent order) for discharges to San Diego Bay, or NPDES Permit No. CAG919002 (Order No. R9-2008-0002, or subsequent order) for discharges to surface waters ~~other than San Diego Bay~~:

(a) Uncontaminated pumped ground water;

(b) Discharges from foundation drains;

(c) Water from crawl space pumps; and

(d) Water from footing drains.

(2) Discharges of non-storm water from water line flushing and water main breaks to the MS4 must be addressed as illicit discharges unless the discharge has coverage under NPDES Permit No. CAG 679001 (Order No. R9-2010-0003, or subsequent order). This includes water line flushing and water main break discharges from water purveyors issued a water supply permit by the California Department of Public Health or federal military installations. Discharges from recycled or reclaimed water lines to the MS4 must be addressed as illicit discharges, unless the discharges have coverage under a separate NPDES permit.

(3) Discharges of non-storm water to the MS4 from the following categories must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a source of pollutants to receiving waters:

(a) Diverted stream flows;

(b) Rising ground waters;

(c) Uncontaminated ground water infiltration to MS4s;

(d) Springs;

(e) Flows from riparian habitats and wetlands; and

(f) Discharges from potable water sources.

(4) Discharges of non-storm water to the MS4 from the following categories must be controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means. Discharges of non-storm water to the MS4 from the following categories not controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means must be addressed by the Copermittee as illicit discharges.

(a) Air conditioning condensation

The discharge of air conditioning condensation must be directed to landscaped areas or other pervious surfaces where feasible;

(b) Individual residential vehicle washing and group or fundraising car washes:

(i) The discharge of wash water must be directed to landscaped areas or other pervious surfaces ~~where feasible~~so that no wash water leaves the property and enters the MS4, and

(ii) ~~Minimize the use of water for vehicle washing, use as little washing detergent and other vehicle wash products as possible,~~ wash vehicles at commercial wash facilities if it is infeasible to direct wash water to landscaped areas or other pervious surfaces so that no wash water leaves the residential property~~,~~ ~~and implement other practices or behaviors that will prevent the discharge of pollutants associated with individual residential vehicle washing from entering the MS4~~; and

(c) Dechlorinated swimming pool discharges

(i) Eliminate residual chlorine, algaecide, filter backwash, or other pollutants from swimming pools prior to discharging to the sanitary sewer, ~~the MS4~~landscaped areas, or other pervious surfaces that can accommodate the volume of water, and

(ii) The discharge of saline swimming pool water to the MS4 must be directed to the sanitary sewer, landscaped areas, or other pervious surfaces that can accommodate the volume of water.

(5) Firefighting discharges to the MS4 must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a significant source of pollutants to receiving waters. Firefighting discharges to the MS4 not identified as a significant source of pollutants to receiving waters, must be addressed, at a minimum, as follows:

(a) Non-emergency firefighting discharges

(i) Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) to the MS4 must be addressed as illicit discharges.

(ii) Non-emergency firefighting discharges (i.e., discharges from controlled or practice blazes, firefighting training, and maintenance activities not associated with building fire suppression systems) must be addressed by a program, to be developed and implemented by the Copermittee, to reduce or eliminate pollutants in such discharges from entering the MS4.

(b) Emergency firefighting discharges

Each Copermittee must develop and encourage implementation of BMPs to reduce or eliminate pollutants in emergency firefighting discharges to the MS4s and receiving waters within its jurisdiction. During emergency situations, priority of efforts should be directed toward life, property, and the environment (in descending order). BMPs should not interfere with immediate emergency response operations or impact public health and safety.

(6) All non-stormwater discharges must be reduced, where feasible, whether or not they are otherwise exempted under Provisions E.2.a (1)- (5).

(7) If the Copermittee or San Diego Water Board identifies any category of non-storm water discharges listed under Provisions E.2.a.(1)-(4) as a source of pollutants to receiving waters, the category must be prohibited through ordinance, order, or similar means and addressed as an illicit discharge.
~~(6)~~

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b. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must include the following measures within its program to prevent and detect illicit discharges to the MS4:

(1) Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas. The accuracy of the MS4 map must be confirmed during non-storm water MS4 monitoring events. The MS4 map must be included as part of the jurisdictional runoff management program document. Any geographic information system (GIS) layers or files used by the Copermittee to maintain the MS4 map must be made available to the San Diego Water Board upon request. The MS4 map must identify the following:

(a) All segments of the MS4 owned, operated, and maintained by the Copermittee,

(b) All known locations of inlets that discharge and/or collect runoff into the

Copermittee's MS4,

(c) All known locations of connections with other MS4s not owned or operated by the Copermittee (e.g. Caltrans MS4s),

(d) All known locations of MS4 outfalls and private outfalls that discharge runoff collected from areas within the Copermittee's jurisdiction,

(e) All segments of receiving waters within the Copermittee's jurisdiction that receive and convey runoff discharged from the Copermittee's MS4 outfalls (i.e., receiving water segments that are both a receiving water and part of the MS4), and

(f) Locations of the non-storm water MS4 monitoring stations, identified pursuant to Provision D.1.a.(1)(a), within its jurisdiction;

(2) Each Copermittee must use Copermittee personnel and contractors to assist in identifying and reporting illicit discharges and connections during their daily activities;

(3) Each Copermittee must promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges to or from the MS4. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by the Copermittees. All public hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week;

(a) Each Copermittee must designate an e-mail address for receiving e-mail pollution reports. The e-mail address must be prominently displayed on the Regional Clearinghouse and on the Copermittee's webpage.

(b) Each Copermittee must provide follow-up information regarding any public report submitted when the reporting individual specifically requests for follow-up information.

~~(3)~~(c) All Copermittees must make their hotline reporting database information available at least monthly on the regional clearinghouse. Minimum information to be provided shall include date of report, nature of complaint, follow up steps taken, and whether or not the complaint was resolved.

(4) Each Copermittee must implement practices and procedures (including a notification mechanism) to prevent, respond to, contain, and clean up any spills that may discharge into the MS4 from any source. The Copermittee must coordinate with spill response teams to prevent entry of spills into the MS4, and prevent contamination of surface water, ground water, and soil. The Copermittee must coordinate spill prevention, containment, and response activities throughout all appropriate Copermittee departments, programs, and

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agencies; and

(5) Each Copermittee must implement practices and procedures to prevent and limit infiltration of seepage from sanitary sewers (including private laterals and failing septic systems) to the MS4.

c. FIELD SCREENING AND MONITORING

Each Copermittee must conduct field screening and monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect non-storm water and illicit discharges and connections to the MS4 in accordance with the jurisdictional non-storm water MS4 monitoring program requirements in Provision D.1.a.(1).

In lieu of field screening and monitoring, Copermittees may elect to install a network of flow meters to detect illicit flows.

d. INVESTIGATE AND ELIMINATE ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must include the following measures within its program to investigate and eliminate illicit discharges to the MS4:

(1) Each Copermittee must prioritize and determine when follow-up investigations will be performed in response to water quality monitoring data collected during an investigation of a detected non-storm water or illicit discharge to or from the MS4. The criteria for follow-up investigations must include the following:

(a) Pollutants identified as causing or contributing to the highest water quality priorities identified in the Water Quality Improvement Plan;

(b) Pollutants identified as causing or contributing, or threatening to cause or contribute to impairments in water bodies on the 303(d) List and/or in environmentally sensitive areas (ESAs), located within its jurisdiction;

(c) Pollutants identified from sources or land uses known to exist within the area, drainage basin, or watershed that discharges to the portion of the MS4 within its jurisdiction included in the investigation;

(d) Pollutants identified as causing or contributing to and exceedance of an NAL described in Provision C.1; and

(e) Pollutants identified as a threat to human health or the environment.

(2) Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on reports or notifications, field screening and monitoring, or other appropriate information, indicate a reasonable potential of receiving, containing, or discharging pollutants due to illicit discharges, illicit connections, or other sources of non-storm water. The procedures must include the following:

(a) Each Copermittee must respond to each report or notification (e.g., public hotline reports, staff or contractor reports and notifications, etc.) of an incident in a timely manner. The Copermittee may develop criteria to assess the validity of, and prioritize the response to, each report or notification received;

(b) Each Copermittee must immediately investigate and seek to identify the source(s) of discharges of non-storm water where flows are observed in and from the MS4 during the field screening and monitoring required pursuant to Provision D.1.a.(1). The investigation must include field investigations to identify sources or potential sources for the discharge, unless the source or potential source has already been identified during previous investigations;

(c) Each Copermittee must investigate and seek to identify the source(s) of non-storm water discharges from the MS4 where there is evidence of non-storm water having been discharged into or from the MS4 (e.g., pooled

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water). The investigation may include field investigations, reviewing Copermittee inventories, and other land use data to identify potential sources of the discharge; and

(d) Each Copermittee must maintain records and a database of the investigations, including the following information:

(i) Location of incident, including hydrologic subarea, portion of MS4 receiving the non-storm water or illicit discharge, and point of discharge or potential discharge from MS4 to receiving water,

(ii) Source of information initiating the investigation (e.g., public hotline reports, staff or contractor reports and notifications, monitoring data, etc.),

(iii) Date the information used to initiate the investigation was received,

(iv) Date the investigation was initiated,

(v) Dates of follow-up investigations,

(vi) Identified or suspected source of the illicit discharge or connection, if determined,

(vii) Known or suspected related incidents, if any,

(viii) Result of the investigation, and

(ix) If a source cannot be identified and the investigation is not continued, a rationale for why a discharge does not pose a threat to water quality and/or does not require additional investigation.

(3) Each Copermittee must initiate the implementation of procedures, in a timely manner, to eliminate all detected and identified illicit discharges and connections within its jurisdiction. The procedures must include the following:

(a) Each Copermittee must enforce its legal authority, as required under Provision E.1, to eliminate illicit discharges and connections to its MS4. If the Copermittee identifies the source as a controllable source of non-storm water or illicit discharge or connection, the Copermittee must implement its Enforcement Response Plan pursuant to Provision E.6 and enforce its legal authority to prohibit and eliminate illicit discharges and connections to its MS4;

(b) If the Copermittee identifies the source of the discharge as a category of non-storm water discharges in Provision E.2.a, and the discharge to or from the MS4 is in exceedance of NALs developed under Provision C.1, then the Copermittees must determine if this is an isolated incident or set of circumstances, or if the category of discharge must be addressed through the prohibition of that category of discharge as an illicit discharge pursuant to Provision E.2.a.(6);

(c) If the Copermittee suspects the source of the non-storm water discharge as natural in origin (i.e. non-anthropogenically influenced) and in conveyance into the MS4, then the Copermittee must collect the data and evidence necessary to demonstrate to the San Diego Water Board that it is natural in origin; and

(d) If the Copermittee is unable to identify and document the source of a recurring non-storm water discharge to or from the MS4, then the Copermittee must address the discharge as an illicit discharge and update its jurisdictional runoff management program to address the common and suspected sources of the non-storm water discharge within its jurisdiction in accordance with the Copermittee's priorities.

(4) Each Copermittee must submit a summary of the non-storm water discharges and illicit discharges and connections investigated and eliminated within its jurisdiction with each Annual Report required under Provision F.3.b of this Order.

3. Development Planning

Each Copermittee must use their land use/planning authorities to implement a development planning program that includes, at a minimum, the following requirements.

a. Permanent BMP Requirements for All Development Projects

Each Copermittee must prescribe the following BMP requirements during the planning process (i.e. prior to project approval and issuance of grading or building permits) for all development projects (regardless of project type or size), where local permits are issued, including unpaved roads and flood management projects:

(1) General Requirements

(a) All BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters, and as close to the source as possible;

(b) Multiple development projects may use shared permanent BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any development project from which the BMP will receive runoff; and

(c) Permanent BMPs must not be constructed within a waters of the U.S. or waters of the state.

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(2) Source Control BMP Requirements

The following source control BMPs must be implemented at all development projects where applicable and feasible:

(a) Prevention of illicit discharges into the MS4;

(b) Storm drain system stenciling or signage;

(c) Properly designed outdoor material storage areas;

(d) Properly designed outdoor work areas;

(e) Properly designed trash storage areas; and

(f) Any additional BMPs necessary to minimize pollutant generation at each project.

(3) Low Impact Development (LID) BMP Requirements

The following LID BMPs must be implemented at all development projects where applicable and feasible:

(a) Maintenance or restoration of natural storage reservoirs and drainage corridors (including topographic depressions, areas of permeable soils, natural swales, and ephemeral and intermittent streams);[14]

(b) Buffer zones for natural water bodies (where buffer zones are technically infeasible, require project applicant to include other buffers such as trees, access restrictions, etc.);

(c) Conservation of natural areas within the project footprint including existing trees, other vegetation, and soils;

(d) Construction of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided public safety is not compromised;

(e) Minimization of the impervious footprint of the project;

(f) Minimization of soil compaction to landscaped areas;

(g) Disconnection of impervious surfaces through distributed pervious areas;

[14] Development projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. Projects proposing to dredge or fill waters of the State must obtain Waste Discharge Requirements.

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(h) Landscaped or other pervious areas designed and constructed to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4;

(i) Small collection strategies located at, or as close as possible to, the source (i.e. the point where storm water initially meets the ground) to minimize the transport of runoff and pollutants to receiving waters;

(j) Use of permeable materials for projects with low traffic areas and appropriate soil conditions;

(k) Landscaping with native or drought tolerant species; and

(l) Harvesting and using precipitation.

(4) Long-Term Permanent BMP Maintenance

Each Copermittee must require the project applicant to submit proof of the mechanism under which ongoing long-term maintenance of all permanent BMPs will be conducted.

(5) Infiltration and Groundwater Protection

(a) Infiltration and treatment control BMPs designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins) must not cause or contribute to an exceedance of an applicable groundwater quality objective. At a minimum, such infiltration and treatment control BMPs must be in conformance with the design criteria listed below, unless the development project applicant demonstrates to the Copermittee that one or more of the specific design criteria listed below are not necessary to protect groundwater quality. The design criteria listed below do not apply to small infiltration systems dispersed throughout a development project.

(i) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(ii) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(iii) Infiltration treatment control BMPs must be adequately maintained to remove pollutants in storm water to the MEP;

(iv) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(v) The soil through which infiltration is to occur must have physical and chemical characteristics (e.g., appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(vi) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities as designated by each Copermittee, unless first treated or filtered to remove pollutants prior to infiltration; and

(vii) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(b) The Copermittees may collectively or individually develop alternative mandatory design criteria to that listed above for infiltration and treatment control BMPs which are designed to primarily function as centralized infiltration devices. Before implementing the alternative design criteria in the development planning process the Copermitee(s) must:

(i) Notify the San Diego Water Board of the intent to implement the alternative design criteria submitted; and

(ii) Comply with any conditions set by the San Diego Water Board.

b. PRIORITY DEVELOPMENT PROJECTS

(1) Definition of Priority Development Project

Priority Development Projects include the following:

(a) All new development projects that fall under the Priority Development Project categories listed under Provision E.3.b.(2). Where a new development project feature, such as a parking lot, falls into a Priority Development Project category, the entire project footprint is subject to Priority Development Project requirements; and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site, or the redevelopment project is a Priority Development Project category listed under Provision E.3.b.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to Priority Development Project requirements, the performance and sizing requirements discussed in Provisions E.3.c.(2) and E.3.c.(3) apply only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the performance and sizing requirements apply to the entire development.

(2) Priority Development Project Categories

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This category includes commercial, industrial, residential, mixed-use, and public development projects on public or private land which fall under the planning and building authority of the Copermittee.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is 5,000 square feet or more.

(d) Hillside development projects. This category includes any development which creates 5,000 square feet or more of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally sensitive areas (ESAs). This category includes any development located within, directly adjacent to, or discharging directly to an ESA, which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent to” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that collects runoff from the subject development or redevelopment site and terminates at or in receiving waters within the ESA.

(f) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce that has 5,000 square feet or more of impervious surface.

(g) Streets, roads, highways, freeways, and residential driveways. This category is defined as any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(i) Large development projects. This category includes any post-construction pollutant-generating new development projects that result in the disturbance of one acre or more of land.

(3) Priority Development Project Exemptions

Each Copermittee has the discretion to exempt the following projects from being defined as Priority Development Projects:

(a) Sidewalks constructed as part of new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(b) Bicycle lanes that are constructed as part of new streets or roads but are not hydraulically connected to the new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(c) Impervious trails constructed and designed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas;

(d) Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.

c. PRIORITY DEVELOPMENT PROJECT PERMANENT BMP PERFORMANCE AND SIZING REQUIREMENTS

In addition to the BMP requirements listed for all development projects under Provision E.3.a, Priority Development Projects must also implement permanent BMPs that conform to performance and sizing requirements.

(1) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs listed under Provision E.3.a.(2).

(2) Retention and Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement BMPs to retain and treat pollutants onsite in the following order:

(a) Each Priority Development Project must be required to implement LID BMPs as described in Provision E.3.a.(3);

(b) Each Priority Development Project must be required to implement LID BMPs that are sized and designed to retain the volume equivalent to runoff produced from a 24-hour 85th percentile storm event[15] ("design capture volume");

(c) If onsite retention using LID BMPs is technically infeasible per Provision E.3.c.(4), flow-thru LID and/or conventional treatment control BMPs must be implemented to treat the portion of the design capture volume that is not retained onsite. Flow-thru LID treatment control BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. Additionally, project applicants must perform mitigation for the portion of the pollutant load in the design capture volume that is not retained onsite, as described in Provision E.3.c.(4)(c).

(d) All onsite treatment control BMPs must:

(i) Be correctly sized and designed so as to remove pollutants from storm water to the MEP;

(ii) Be sized to comply with the following numeric sizing criteria:

[a] Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained onsite; or

[b] Flow-based treatment control BMPs must be designed to mitigate (filter or treat) either: 1) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or 2) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(iii) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted

[15] This volume is not a single volume to be applied to all areas covered by this Order. The size of the 85th percentile storm event is different for various parts of the San Diego Region. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its BMP Design Manuals.

which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(3) Hydromodification Management BMP Requirements

Each Copermittee must require each Priority Development Project to implement hydromodification management BMPs so that:

(a) Post-project runoff flow rates and durations do not exceed pre-development (naturally occurring) runoff flow rates and durations ~~by more than 10 percent~~ (for the range of flows that result in increased potential for erosion ~~or~~, degraded channel conditions, impaired stream habitat, or negatively impacted beneficial uses downstream of Priority Development Projects).

~~(i) In evaluating the range of flows that results in increased potential for erosion of natural (non-hardened) channels, the lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks.~~

~~(ii) For artificially hardened channels, analysis to identify the lower boundary must use characteristics of a natural stream segment similar to that found in the watershed. The lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or erodes the toe of the channel banks.~~

~~(iii) The Copermittees may use monitoring results pursuant to Provision D.2.b.(6) to re-define the range of flows resulting in increased potential for erosion or degraded channel conditions, as warranted by the data.~~

(b) Post-project runoff flow rates and durations must compensate for the loss of sediment supply due to the development project, should loss of sediment supply occur as a result of the development project.

(c) If hydromodification management BMPs are technically infeasible per Provision E.3.c.(4), project applicants must perform mitigation for the portion of the runoff volume that is not controlled and will cause or contribute to increased potential for erosion of receiving waters downstream of the Priority Development Project, as described in Provision E.3.c.(4)(c).

(d) Exemptions

Each Copermittee has the discretion to exempt a Priority Development Project from the hydromodification management BMP requirements where the project:

(i) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean;

(ii) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean; or

(iii) Discharges storm water runoff into other areas identified by the San Diego Water Board as exempt from the requirements of Provisions E.3.c.(3)(a)-(c).

(4) Alternative Compliance for Technical Infeasibility

At the discretion of each Copermittee, alternative compliance may be allowed for certain Priority Development Projects to comply with Provisions E.3.c.(2) and E.3.c.(3), subject to the following requirements:

(a) Applicability

Priority Development Projects may be allowed alternative compliance if:

(i) The Copermittee reviews and approves site-specific hydrologic and/or design analysis performed by a registered professional engineer, geologist, architect, or landscape architect;

(ii) The project applicant demonstrates, and the Copermittee determines and documents, that retention LID and/or hydromodification management BMPs per Provisions E.3.c.(2) and E.3.c.(3) were incorporated into the project design to the maximum extent technically feasible given the project site conditions;

(iii) The project applicant is required to perform mitigation described in Provision E.3.c.(4)(c) with a net result of at least the same level of water quality protection as would have been achieved if the Priority Development Project had fully implemented the retention LID and hydromodification management BMP requirements under Provisions E.3.c.(2) and E.3.c.(3) onsite.

(b) Criteria For Technical Infeasibility

Each Copermittee must develop, or develop in collaboration with the other Copermittees, criteria to determine technical infeasibility for fully implementing the retention LID and hydromodification management BMP requirements under Provisions E.3.c.(2) and E.3.c.(3) and include these requirements in the Permanent BMP Sizing Criteria Design Manual pursuant to Provision E.3.d. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in Provision E.3.a.(5) due to the presence of shallow bedrock, contaminated soils, near surface groundwater, underground facilities, or utilities;

(ii) Brownfield development sites or other locations where pollutant mobilization is a documented concern;

(iii) The design of the site precludes the use of soil amendments, plantings of vegetation, or other designs that can be used to infiltrate and evapotranspirate runoff;

(iv) Soils cannot be sufficiently amended to provide for the requisite infiltration rates;

(v) Locations with geotechnical hazards;

(vi) Insufficient onsite and/or offsite demand for storm water use;

(vii) Modifications to an existing building to manage storm water are not feasible due to structural or plumbing constraints; and

(viii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with Provisions E.3.c.(2) and E.3.c.(3) onsite.

(c) Mitigation

Priority Development Projects that meet the Copermittee's technical infeasibility criteria developed pursuant to Provision E.3.c.(4)(b) must be required to mitigate for the increased flow rates, increased flow durations, and/or increased pollutant loads expected to be discharged from the site. For the pollutant load in the volume of storm water not retained onsite with retention LID BMPs, or increased potential erosion of downstream receiving waters not fully controlled onsite with hydromodification management BMPs, the Copermittee must require the project applicant to either 1) implement an offsite mitigation project, and/or 2) provide sufficient funding for a public or private offsite mitigation project via a mitigation fund.

(i) *Mitigation Project Locations*

Offsite mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project, and preferably within the same hydrologic subarea. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project applicant demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar potential impacts expected from the Priority Development Project.

(ii) *Mitigation Project Types*

Offsite mitigation projects must include, where applicable and feasible, retrofitting opportunities and stream and/or habitat rehabilitation or restoration opportunities identified in the Water Quality Improvement Plans, identified pursuant to Provision B.3.a. Other offsite mitigation projects may include green streets or infrastructure projects, or regional BMPs upstream of receiving waters. In-stream rehabilitation or restoration measures to protect or prevent adverse physical changes to creek bed and banks must not include the use of non-naturally occurring hardscape material such as concrete, riprap, or gabions. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of Provision E.3.c.(4)(a).

(iii) *Mitigation Project Timing*

The Copermittee and/or project applicant must develop a schedule for the completion of offsite mitigation projects, including milestone dates to identify, fund, design, and construct the projects. Offsite mitigation projects must be completed upon the granting of occupancy for the first project that contributed funds toward the offsite mitigation project, unless a longer period is authorized by the San Diego Water Board.

(iv) *Mitigation Fund*

A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as a means for developing and implementing offsite mitigation projects, provided the projects conform to the requirements for project locations, types, and timing described above.

d. UPDATE PERMANENT BMP SIZING CRITERIA DESIGN MANUAL (BMP DESIGN MANUAL)

Each Copermittee must update its Permanent BMP Sizing Criteria Design Manual (BMP Design Manual)[16] pursuant to Provision F.2.b or Provision F.5.a. Until the Copermittee has updated its BMP Design Manual with the requirements of Provision E.3.c, the Copermittee must continue implementing its current BMP Design Manual. Unless directed otherwise by the San Diego Water Board, the

[16] The Permanent BMP Sizing Criteria Design Manual was formerly known as the Standard Storm Water Mitigation Plan under Order Nos. R9-2007-0001, R9-2009-0002, and R9-2010-0016.

Copermittee must implement the BMP Design Manual within 180 days of completing the update. The update of the BMP Design Manual must include the following:

(1) Updated procedures to determine the nature and extent of storm water requirements applicable to a potential development or redevelopment project. These procedures must inform project applicants of the storm water management requirements applicable to their project including, but not limited to, general requirements for all development projects, LID and conventional BMP design procedures and requirements, hydromodification management requirements, requirements specific to phased projects, and procedures specific to private developments and public improvement projects;

(2) Updated procedures to identify pollutants and conditions of concern for selecting the most appropriate permanent BMPs that consider, at a minimum, the following:

(a) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d));

(b) Priority pollutants or receiving water conditions contributing to the highest water quality priorities identified in the Water Quality Improvement Plan;

(c) Land use type of the project and pollutants associated with that land use type; and

(d) Pollutants expected to be present onsite.

(3) Updated procedures for designing permanent BMPs, including any updated performance and sizing requirements to be consistent with the requirements of Provision E.3.c for all BMPs listed in the BMP Design Manual;

(4) Long-term maintenance criteria for each BMP listed in the BMP Design Manual; and

(5) Criteria and mitigation requirements, in accordance with the requirements under Provision E.3.c.(4), if the Copermittee elects to allow alternative compliance for technical infeasibility within its jurisdiction.

e. PRIORITY DEVELOPMENT PROJECT BMP IMPLEMENTATION AND OVERSIGHT

Each Copermittee must implement a program to ensure permanent BMPs on all Priority Development Projects are designed, constructed, and maintained to remove pollutants in storm water to the MEP.

ADMINISTRATIVE DRAFT

(1) Permanent BMP Approval and Verification Process

(a) Each Copermittee must ensure that for all Priority Development Project applications that have not received prior lawful approval by the Copermittee by 12 months after the adoption of this Order, or pursuant to Provision F.5.a, the requirements of Provision E.3 are implemented. For project applications that have received prior lawful approval by 12 months after the adoption of this Order, or pursuant to Provision F.5.a, the Copermittee may allow previous land development requirements to apply.

(b) Each Copermittee must identify the roles and responsibilities of various municipal departments in implementing the permanent BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections.

(c) Each Copermittee must ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(d) Each Copermittee must ensure that prior to occupancy and/or intended use of any portion of the Priority Development Project, each permanent BMP must be inspected to verify that they have been constructed and are operating in compliance with all of its specifications, plans, permits, ordinances, and the requirements of this Order.

(2) Priority Development Project Inventory and Prioritization

(a) Each Copermittee must develop and continuously maintain a watershed-based database to track and inventory all Priority Development Projects and associated permanent BMPs. Inventories must be accurate and complete beginning from January 2002 for the San Diego County Copermittees, February 2003 for the Orange County Copermittees, and July 2005 for the Riverside County Copermittees. The database must include, at a minimum, the following information:

(i) Priority Development Project location (address and hydrologic subarea);

(ii) Descriptions of BMP type(s);

(iii) Date(s) of construction;

(iv) Party responsible for permanent BMP maintenance;

(v) Dates and findings of permanent BMP maintenance verifications; and

(vi) Corrective actions and/or resolutions.

(b) Each Copermittee must prioritize the Priority Development Projects with permanent BMPs within its jurisdiction. The designation of Priority Development Projects as high priority must consider the following:

(i) The highest water quality priorities identified in the Water Quality Improvement Plan;

(ii) Receiving water quality;

(iii) Number and sizes of permanent BMPs;

(iv) Recommended maintenance frequency of permanent BMPs;

(v) Likelihood of operation and maintenance issues of permanent BMPs;

(vi) Land use and expected pollutants generated; and

(vii) Compliance record.

(3) Permanent BMP Maintenance Verifications and Inspections

Each Copermittee is required to verify that permanent BMPs on each Priority Development Project are adequately maintained, and continue to operate effectively to remove pollutants in storm water to the MEP through inspections, self-certifications, surveys, or other equally effective approaches.

(a) All (100 percent) of the permanent BMPs at Priority Development Projects that are designated as high priority must be inspected directly by the Copermittee annually prior to each rainy season;

(b) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be required by the Copermittee to provide assurance that the required maintenance of permanent BMPs at each Priority Development Project has been completed; and

(c) Appropriate follow-up measures (including re-inspections, enforcement, etc.) must be conducted to ensure that permanent BMPs at each Priority Development Project continue to reduce pollutants in storm water to the MEP as originally designed.

f. DEVELOPMENT PROJECT ENFORCEMENT

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all development projects, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

4. Construction Management

Each Copermittee must implement a construction management program that includes, at a minimum, the following requirements:

a. Project Approval Process

Prior to approval and issuance of any construction, grading, or building permits for a project each Copermittee must:

(1) Require a project-specific storm water pollution prevention plan (SWPPP), or equivalent construction BMP or erosion control plan, to be submitted by the project applicant for the Copermittee's approval;

(2) Ensure the SWPPP, or equivalent construction BMP or erosion control plan, complies with the local grading ordinance, other applicable local ordinances, and the requirements of this Order;

(3) Ensure the SWPPP, or equivalent construction BMP or erosion control plan, includes seasonally appropriate and effective BMPs and management measures described in Provision E.4.c, as applicable to the project; and

(4) Verify that the project applicant has obtained coverage under applicable permits, including, but not limited to the Construction General Permit, Clean Water Act Section 401 Water Quality Certification and Section 404 Permit, and California Department of Fish and Game Streambed Alteration Agreement.

b. Construction Site Inventory and Tracking

(1) Each Copermittee must maintain, and update at least monthly, a watershed-based inventory of all construction sites requiring construction, grading, or building permits within its jurisdiction. The inventory must include:

(a) Relevant contact information for each site (e.g., name, address, phone, and email for the owner and contractor);

(b) The basic site information including location (address and hydrologic subarea), Waste Discharge Identification (WDID) number (if applicable), size of the site, and approximate area of disturbance;

(c) Whether or not the site is considered a high threat to water quality, as defined in Provision E.4.b.(2) below;

(d) The project start and anticipated completion dates;

(e) Current construction phase;

(f) The required inspection frequency, as defined in the Copermittee's jurisdictional runoff management program document;

(g) The date the Copermittee approved the project-specific SWPPP, or equivalent construction BMP or erosion control plan; and

(h) Whether or not there are ongoing enforcement actions administered to the site.

(2) Each Copermittee must identify all construction sites within its jurisdiction that represent a high threat to downstream surface water quality. At a minimum, high threat to water quality sites must include:

(a) Sites located within a hydrologic subarea where sediment is known or suspected to contribute to the highest water quality priorities identified in the Water Quality Improvement Plan;

(b) Sites located within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment;

(c) Sites located within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(d) Other sites determined by the Copermittees or the San Diego Water Board as a high threat to water quality.

c. CONSTRUCTION SITE BMP AND MANAGEMENT MEASURE IMPLEMENTATION

Each Copermittee must implement, or require the implementation of effective BMPs to reduce discharges of pollutants in storm water from construction sites to the MEP, and prevent non-storm water discharges into the MS4. These BMPs must be site specific, seasonally appropriate, and construction phase appropriate. BMPs and management measures must be implemented at each construction site year round. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30). Copermittees must implement, or require the implementation of, BMPs and management measures in the following categories:

(1) Project Planning;

(2) Good Site Management "Housekeeping", including waste management;

(3) Non-storm Water Management;

(4) Erosion Control;

(5) Sediment Control;

(6) Run-on and Run-off Control; and

(7) Active/Passive Sediment Treatment Systems, where applicable.

d. Construction Site Inspections

Each Copermittee must conduct construction site inspections to ensure compliance with its permits and applicable local ordinances, and the requirements of this Order. Priority for site inspections must consider threat to water quality pursuant to Provision E.4.b as well as the nature of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) Inspection Frequency

(a) Each Copermittee must conduct inspections at all inventoried sites, including high threat to water quality sites, at an appropriate frequency for each phase of construction to ensure the site reduces the discharge of pollutants in storm water from construction sites to the MEP, and prevents non-storm water discharges from entering the MS4.

(b) Each Copermittee must establish appropriate inspection frequencies for high threat to water quality sites, and all other sites, for each phase of construction. Inspection frequencies appropriate for addressing the highest water quality priorities identified in the Water Quality Improvement Plan, and for complying with the requirements of this Order must be identified in each Copermittee's jurisdictional runoff management program document.

(c) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to ensure site compliance with its permits and applicable local ordinances, and the requirements of this Order.

(2) Inspection Content

Inspections of construction sites by the Copermittee must include, at a minimum:

(a) Verification of coverage under the Construction General Permit (Notice of Intent (NOI) and/or WDID number) during initial inspections, when applicable;

(b) Assessment of compliance with its permits and applicable local ordinances related to pollution prevention, including the implementation and maintenance of applicable BMPs;

(c) Assessment of BMP adequacy and effectiveness;

(d) Visual observations of actual non-storm water discharges;

(e) Visual observations of actual or potential discharge of sediment and/or construction related materials from the site;

(f) Visual observations of actual or potential illicit connections; and

(g) If any violations are found and BMP enhancements are needed, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.

(3) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried construction sites. The Copermittee must retain all inspection records in an electronic database or tabular format, which must be made available to the San Diego Water Board upon request. Inspection records must include, at a minimum:

(a) Site name, location (address and hydrologic subarea), and WDID number (if applicable);

(b) Inspection date;

(c) Weather conditions during inspection;

(d) Approximate amount of rainfall since last inspection;

(e) Description and photo documentation of problems observed with BMPs and indication of need for BMP addition/repair/replacement and any scheduled re-inspection, and date of re-inspection;

(f) Descriptions of any other specific inspection comments which must, at a minimum, include rationales for longer compliance time.;

(g) Description of enforcement actions issued in accordance with the Enforcement Response Plan pursuant to Provision E.6; and

(h) Resolution of problems noted and date problems fixed.

e. CONSTRUCTION SITE ENFORCEMENT

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried construction sites, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

5. Existing Development Management

Each Copermittee must implement an existing development management program that includes, at a minimum, the following requirements:

a. EXISTING DEVELOPMENT INVENTORY AND TRACKING

Each Copermittee must maintain an updated watershed-based inventory of all its existing development that may potentially generate a pollutant load to and from the MS4. The use of an automated database system, such as GIS, is highly recommended. The inventory must, at a minimum, include:

(1) Name, location (address and hydrological subarea) of each facility, area, and/or activity;

(2) A description of the facility, area, and/or activity, including classification as municipal, commercial, industrial, or residential;

(3) The following municipal facilities:

(a) Flood management and flood control devices and structures,

(b) Operating or closed municipal landfills,

(c) Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewer collection systems,

(d) Corporate yards, including maintenance and storage yards for materials, waste, equipment, and vehicles,

(e) Hazardous waste collection facilities, and

(f) Other treatment, storage or disposal facilities for municipal waste;

(4) Identification if a business is a mobile business;

(5) SIC Code, if applicable;

(6) Industrial General Permit NOI and/or WDID number, if applicable;

(7) Identification if an area is a Common Interest Area (CIA) / Home Owner Association (HOA), or mobile home park;

(8) Identification of pollutants generated and potentially generated by the facility, area, and/or activity;

(9) Status of facility, area, and/or activity as active or inactive;

(10) Whether the facility, area, and/or activity is adjacent to an ESA;

(11) Whether the facility, area, and/or activity is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired;

(12) Whether the facility, area, and/or activity contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan; and

(13) A continually updated map showing the location of inventoried existing development, watershed boundaries, water bodies, and pollutants generated at the inventoried existing development.

b. RETROFITTING AND CHANNEL REHABILITATION IN AREAS OF EXISTING DEVELOPMENT

Each Copermittee must develop and implement a program to retrofit areas of existing development to reduce the discharge of pollutants in storm water from the MS4 to the MEP and effectively prohibit non-storm water discharges into its MS4, and rehabilitate channels to restore impaired beneficial uses of streams within its jurisdiction.

(1) Each Copermittee must identify areas of existing development as candidates for retrofitting, and channels in areas of existing development as candidates for rehabilitation within its jurisdiction. Areas of existing development must be selected based on a likelihood that retrofitting and channel rehabilitation will address the highest water quality priorities identified in the Water Quality Improvement Plan prepared pursuant to Provision B.

(2) Each Copermittee must evaluate and rank the areas of existing development identified pursuant to Provisions E.5.a and E.5.b.(1) for retrofitting and channel rehabilitation. The evaluation must include an assessment of those areas where pollutant removal from storm water and effective prohibition of non-storm water discharges through retrofitting existing development will provide the most benefit to water quality. The evaluation must also include an assessment of the channels within its jurisdiction where channel rehabilitation will improve beneficial uses of streams within the Copermittee's jurisdiction. Data collected during the implementation of the Water Quality Improvement Plan must be used to inform each area assessment and rank determination.

(3) Each Copermittee must implement retrofit and channel rehabilitation projects that address the highest water quality priorities identified in the Water Quality Improvement Plan pursuant to Provision B.3.a. The Copermittee must encourage private landowners to implement retrofit and channel rehabilitation projects whenever practical. Private landowners should be encouraged through the Copermittee's use of subsidies, penalties, or other incentives.

(4) Each Copermittee must evaluate the flood management and flood control devices and structures in its inventory to determine if it is feasible to retrofit the device or structure, to provide additional pollutant removal from storm water. A Copermittee must consider the highest water quality priorities identified in their Water Quality Improvement Plan as part of each assessment.

(5) Where retrofitting and channel rehabilitation within specific areas of existing development are determined to be infeasible to restore and protect receiving waters from the highest water quality priorities identified in the Water Quality Improvement Plan, each Copermittee must identify, develop, and implement regional retrofitting and channel rehabilitation projects (i.e. projects that can receive and/or treat storm water from one or more areas of existing development and will result in a net benefit to water quality and the environment) adjacent to and/or downstream of the areas of existing development. The Copermittees may collaborate and cooperate with each other to develop regional retrofitting and channel rehabilitation projects. The Copermittees are also encouraged to partner with existing efforts in other Watershed Management Areas, and the Integrated Regional Water Management (IRWM) Groups in San Diego County, South Orange County, and Southwest Riverside County.

c. EXISTING DEVELOPMENT BMP IMPLEMENTATION AND MAINTENANCE

(1) Pollution Prevention

Each Copermittee must require the use of pollution prevention methods by the inventoried existing development.

(2) Designate BMPs

Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development, including special event venues, that have the potential to generate pollutants. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(3) BMP Implementation

Each Copermittee must implement, or require the implementation of, designated BMPs at inventoried existing development that have the potential to generate pollutants. A Copermittee must require additional pollution prevention measures and enhanced BMPs at inventoried existing development that discharges pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(4) BMP Operation and Maintenance

Each Copermittee must operate and maintain, or require the operation and maintenance of designated BMPs at all inventoried existing development.

(a) Each Copermittee must implement a schedule of operation and maintenance activities for its MS4 and related structures (including but not limited to catch basins, storm drain inlets, detention basins, etc.), and verify proper operation of all its municipal structural treatment controls designed to reduce pollutants (including floatables) in storm water discharges to or from its MS4s and related drainage structures.

(b) Each Copermittee must implement procedures during the operation and maintenance of public streets, unpaved roads, paved roads, and paved highways and freeways that will reduce the contribution of storm water pollutants to the MEP and effectively prohibit non-storm water pollutants from the MS4 to receiving water bodies. During maintenance of unpaved roads, each Copermittee must examine the feasibility of replacing existing culverts or designing new culverts/bridge crossings to maintain natural stream geomorphology.

(c) Each Copermittee must implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers. Copermittees that operate both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate seeping sewage from infiltrating the MS4. Copermittees that do not operate both a municipal sanitary sewer system and a MS4 must keep themselves informed of relevant and appropriate maintenance activities and sanitary sewage projects in their jurisdiction that may cause or contribute to seepage of sewage into the MS4.

(5) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must implement procedures, or require the implementation of procedures, to reduce the contribution of pollutants in storm water to the MEP and effectively prohibit non-storm water discharges associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from inventoried existing development into and from the MS4s. The Copermittee must require additional pollution prevention measures and enhanced BMPs at inventoried existing development that discharges pesticides, herbicides, or fertilizers identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. Such BMPs must include, as appropriate educational activities, permits, certifications and other measures for applicators and distributors.

d. EXISTING DEVELOPMENT INSPECTIONS

Each Copermittee must conduct inspections of inventoried existing development to ensure compliance with applicable local ordinances and permits, and the requirements of this Order.

(1) Inspection Frequency

(a) Each Copermittee must establish appropriate inspection frequencies for inventoried existing development based on the priorities set forth in the Water Quality Improvement Plan, and the potential for discharging pollutants via storm water and non-storm water runoff. At a minimum, inventoried existing development must be inspected once every five years. Inventoried existing development must also be inspected within six months of any change in property ownership or change in pollutant generating activity. The frequency of inspection at inventoried existing development must be appropriate to ensure that applied BMPs are sufficient to reduce the discharge of pollutants in storm water from the MS4 to the MEP and effectively prohibit non-storm water discharges to the MS4.

(b) Inventoried existing development must be inspected, as needed, in response to valid public complaints and findings from the Copermittee's municipal and contract staff inspections.

(c) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e. re-inspection, enforcement) necessary to ensure compliance with its applicable local ordinances and permits, the most current jurisdictional runoff management program document, the Water Quality Improvement Plan, and the requirements of this Order.

(2) Inspection Content

Inspections of existing development by the Copermittee must include, at a minimum:

(a) Assessment of compliance with its applicable local ordinances and permits related to non-storm water and storm water discharges and runoff;

(b) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

(c) Verification of coverage under the Industrial General Permit (NOI and/or WDID number), when applicable;

(d) Visual observations of actual non-storm water discharges;

(e) Visual observations of actual or potential discharge of pollutants;

(f) Visual observations of actual or potential illicit connections; and

(g) If any violations are found and BMP enhancements are needed, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.

(3) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried existing development. The Copermittee must retain all inspection records in an electronic database or tabular format, which must be made available to the San Diego Water Board upon request. Inspection records must be sufficiently detailed in order to determine compliance with the requirements of this Order and any progress made towards addressing the highest water quality priorities identified in the Water Quality Improvement Plan. Inspection records must include, at a minimum:

(a) Existing development name and location (address and hydrologic subarea);

(b) Inspection and re-inspection date(s);

(c) Weather conditions during inspection;

(d) Description and photo documentation of problems observed with BMPs and indication of need for BMP addition/repair/replacement and any scheduled re-inspection, and date of re-inspection;

(e) Description of actions to reduce pollutants in storm water runoff to the MEP and actions to effectively prohibit non-storm discharges into the MS4 at the inventoried existing development;

(f) Photo documentation of observed actions or BMPs to reduce pollutants in storm water runoff to the MEP and actions to effectively prohibit non-storm discharges into the storm drain;

(g) If the facility, area, and/or activity has been designated or identified as a contributor to the highest water quality priorities identified in the Water Quality Improvement Plan, then the inspection report must include a description of any specific or additional actions taken to reduce or eliminate the contribution of the facility, area, and/or activity to the highest water quality priorities;

(h) Descriptions of any other specific inspection comments which must, at a minimum, include rationales for longer compliance time;

(i) Description of enforcement actions issued in accordance with the Enforcement Response Plan pursuant to Provision E.6; and

(j) Resolution of problems noted and date problems fixed.

e. EXISTING DEVELOPMENT ENFORCEMENT

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried existing development, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

6. Enforcement Response Plans

Each Copermittee must develop and implement an Enforcement Response Plan as part of its jurisdictional runoff management program document. The Enforcement Response Plan must include the protocols for progressively stricter responses, including timeframes allowed for corrections of problems, and for various field violation scenarios. The Enforcement Response Plan must include, at a minimum, the following requirements:

a. ILLICIT DISCHARGE DETECTION AND ELIMINATION ENFORCEMENT COMPONENT

The Enforcement Response Plan must describe required enforcement actions to eliminate non-storm water discharges and illicit discharges or connections to the Copermittee's MS4.

(1) The Enforcement Response Plan must include a definition of "high level enforcement" for non-storm water discharges and illicit discharges or connections. "High level enforcement" for non-storm water discharges and illicit discharges or connections may be defined differently for construction sites, municipal, commercial, industrial, and residential areas of existing development.

(2) Non-storm water discharges and illicit discharges or connections must be addressed with an escalating series of enforcement actions as follows:

(a) If the non-storm water discharge and illicit discharge or connection is a source of pollutants contributing to the highest water quality priorities identified in the Water Quality Improvement Plan, then high level enforcement actions must be immediately issued, and subsequent high level enforcement actions must continue to escalate, as necessary, to compel the elimination of the discharge or connection as soon as possible; or

(b) If the non-storm water discharge and illicit discharge or connection is not a source of pollutants contributing to the highest water quality priorities identified in the Water Quality Improvement Plan, then escalating enforcement actions must be issued, and enforcement actions must result in the elimination of the discharge or connection as quickly as the Copermittee's available resources allow.

(3) If the Copermittee identifies the source, and the source is a controllable non-storm water discharge (i.e. anthropogenically influenced) or a controllable illicit discharge or connection, then the Copermittee must implement the following:

(a) Immediately enforce its legal authority to eliminate controllable sources of non-storm water and illicit discharges or connections upon identifying the source; and

(b) For controllable sources of non-storm water discharges and illicit discharges or connections that cannot be eliminated immediately upon identification, the discharge or connection must be eliminated in a timely manner with the goal of eliminating the discharge or connection within 10 business days after the source is identified. If more than 10 business days are required to eliminate the discharge or connection, a rationale must be recorded in the electronic database or equivalent tabular system used to track the investigations of non-storm water and illicit discharges and connections.

(4) If the Copermittee identifies the source as a non-storm water discharge to or from the MS4 that is in exceedance of NALs developed pursuant to Provision C.1, and in violation or threatened violation of an existing separate NPDES permit (e.g. the groundwater dewatering NPDES permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

b. DEVELOPMENT PROJECTS ENFORCEMENT COMPONENT

The Enforcement Response Plan must describe required enforcement actions to compel compliance with the Copermittee's BMP Design Manual requirements for development projects.

(1) The Enforcement Response Plan must include a definition of "high level enforcement" for development projects.

(2) The enforcement process must include appropriate sanctions to compel compliance with requirements of the Copermittee's BMP Design Manual or this Order. Sanctions must include, at a minimum, the following tools or their equivalent:

(a) Non-monetary penalties;

(b) Fines;

(c) Bonding requirements;

(d) Administrative and criminal penalties;

(e) Liens; and

(f) Permit or occupancy denials.

(3) Occupancy must be denied until a development project is in full compliance with the Copermittee's BMP Design Manual requirements. Documentation of full compliance with the Copermittee's BMP Design Manual requirements must be recorded in the electronic database or equivalent tabular system used to track development projects.

(4) Violations or other non-compliance that contribute or potentially contribute to the highest water quality priorities identified in the Water Quality Improvement Plan must be issued high level enforcement actions. High level enforcement actions must continue to escalate, as necessary, to compel compliance as soon as possible.

(5) For violations of permanent BMP maintenance requirements, all violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale must be recorded in the electronic database or equivalent tabular system used to track permanent BMP inspections.

c. Construction / Existing Development Enforcement Component

The Enforcement Response Plan must describe required enforcement actions to compel compliance with its permits and applicable local ordinances, and the requirements of this Order, at construction sites and areas of existing development.

(1) The Enforcement Response Plan must include a definition of "high level enforcement" for construction sites and areas of existing development. "High level enforcement" may be defined differently for construction sites, municipal, commercial, industrial, and residential areas of existing development.

(2) The enforcement process must include, at a minimum, appropriate sanctions to compel compliance, such as:

(a) Verbal and written notices of violation;

(b) Cleanup requirements;

(c) Fines;

(d) Bonding requirements;

(e) Administrative and criminal penalties;

(f) Liens;

(g) Stop work orders; and

(h) Permit and occupancy denials.

(3) Violations or other non-compliance that contribute or potentially contribute to the highest water quality priorities identified in the Water Quality Improvement Plan must be issued high level enforcement actions. High level enforcement actions must continue to escalate, as necessary, to compel compliance as soon as possible.

(4) All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, then a rationale must be recorded in the electronic database or equivalent tabular system used to track construction site and existing development inspections.

d. REPORTING OF NON-COMPLIANT SITES

(1) Each Copermittee must notify the San Diego Water Board in writing within 48 hours of issuing high level enforcement (as defined in the Copermittee's Enforcement Response Plan) to an ~~construction~~industrial, commercial, construction, or residential site that poses a significant threat to water quality or poses a threat to the Highest Water Quality Prirorites (as identified in the Water Quality Improvement Plan) as a result of violations or other non-compliance with its permits and applicable local ordinances, and the requirements of this Order.

(2) Each Copermittee must notify the San Diego Water Board in writing within 48 hours of issuing low level enforcement (those enforcement actions not defined as high level in the Copermittee's Enforcement Response Plan) to an industrial, commercial, construction, or residential site that has received at least 5 prior low level enforcement actions within the past 2 years.

~~(2)~~(3) Each Copermittee must notify the San Diego Water Board of non-filers

Formatted: List Paragraph, No bullets or numbering, Widow/Orphan control, Tab stops: Not at 0.83" under the Industrial General Permit and Construction General Permit by email to Nonfilers_R9@waterboards.ca.gov.

7. Public Education and Participation

a. Each Copermittee must implement a public education program, as appropriate, to promote and encourage management practices, control techniques and systems, design and engineering methods, and behaviors that reduce the discharge of pollutants in storm water to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving waters. The public education program must include, at a minimum, the following:

(1) Educational activities, public information activities, and other appropriate outreach activities to reduce pollutants associated with the application of pesticides, herbicides and fertilizer in storm water discharges to and from its MS4 to the MEP;

(2) Educational activities, public information activities, and other appropriate outreach activities to facilitate the proper management and disposal of used oil and toxic materials; and

(3) Appropriate education and training measures for construction site operators and other target audiences, as determined by the Copermittee(s).

b. Each Copermittee must incorporate a mechanism for public participation and where necessary intergovernmental coordination in updating, developing, and implementing its jurisdictional runoff management program.

8. Fiscal Analysis

a. Each Copermittee must secure the resources necessary to meet all the requirements of this Order.

b. Each Copermittee must conduct an annual fiscal analysis of the following:

(1) The capital and operation and maintenance expenditures necessary to implement the requirements of this Order;

(2) The staff resources needed and allocated to meet the requirements of this Order, including any development, implementation, and enforcement activities required;

(3) The estimated expenditures for Provisions E.8.b.(1) and E.8.b.(2) during the reporting period, the preceding reporting period, and the next reporting period; and

(4) The source of funds that are proposed to meet the necessary expenditures described in Provisions E.8.b.(1) and E.8.b.(2), including legal restrictions on the use of such funds.

c. Each Copermittee must submit a summary of the annual fiscal analysis with each Annual Report required pursuant to Provision F.3.b.

d. Each Copermittee must provide the documentation used to develop the summary of the annual fiscal analysis upon request by the San Diego Water Board.

F. REPORTING

The purpose of this provision is to determine and document compliance with the requirements set forth in this Order. The goal of this provision is to communicate to the San Diego Water Board and the people of the State of California the implementation status of each jurisdictional runoff management program and compliance with the requirements of this Order. This goal is to be accomplished through the submittal of specific deliverables to the San Diego Water Board by the Copermittees.

1. Water Quality Improvement Plans

The Copermittees for each Watershed Management Area must develop and submit a complete Water Quality Improvement Plan in accordance with the requirements of Provision B, no later than 12 months after the adoption of this Order for a 30 day public review and comment period. The San Diego Water Board will issue a public notice and solicit public comments on the Water Quality Improvement Plan for a minimum of 30 days. Based on the comments received, the San Diego Water Board will determine whether to hold a public hearing or to limit public input to submittal of written comments. If no hearing is held the San Diego Water Board will notify the Copermittees that the Water Quality Improvement Plan has been accepted as complete following its review and determination that the Water Quality Improvement Plan meets the requirements of this Order. Water Quality Improvement Plans must be made available on the Regional Clearinghouse required pursuant to Provision F.4.

2. Updates

a. Jurisdictional Runoff Management Program Document Updates

Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E. The update must be completed no later than 12 months after the adoption of this Order. Updated jurisdictional runoff management program documents must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Subsequent updates may be submitted as part of the Annual Reports, and updated jurisdictional runoff management program documents must be made available on the Regional Clearinghouse.

b. Permanent BMP Sizing Criteria Design Manual Updates

Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provision E.3.d. The update must be completed no later than 12 months after the adoption of this Order. Updated BMP Design Manuals must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Subsequent updates may be submitted as part of the Annual Reports. Updated BMP Design Manuals must be made available on the Regional Clearinghouse.

c. Water Quality Improvement Plan Updates

The Copermittees for each Watershed Management Area must submit updates to the Water Quality Improvement Plan as part of the Annual Reports. Updated Water Quality Improvement Plans must be made available on the Regional Clearinghouse required pursuant to Provision F.4.

3. Progress Reporting

a. Progress Report Presentations

The Copermittees for each Watershed Management Area must appear before the San Diego Water Board, as requested by the San Diego Water Board, to provide progress reports on the implementation of the Water Quality Improvement Plan and jurisdictional runoff management programs.

b. Annual Reports

(1) The Copermittees for each Watershed Management Area must submit an Annual Report for each reporting period, which begins July 1 and ends June 30 in the following year, no later than October 31 following the end of the reporting period. The first Annual Report must be prepared for the reporting period beginning from the date the San Diego Water Board determines that the Water Quality Improvement Plan meets the requirements of this Order to June 30 in the following year. Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each Annual Report must include the following:

(a) The jurisdictional and watershed monitoring data collected pursuant to Provisions D.1 and D.2, summarized and presented in tabular and graphical form;

(b) Progress of the special studies required pursuant to Provisions D.2 and D.3, and the results or findings when a special study, or each phase of a special study, is completed;

(c) The findings from the assessments required pursuant to Provision D.4;

(d) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following:

(i) The progress toward achieving the interim and final numeric targets for the highest water quality priorities for the Watershed Management Area,

(ii) The water quality improvement strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods, and are planned to be implemented during the next reporting period,

(iii) Previously proposed modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area, and

(iv) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;

(e) A completed Jurisdictional Runoff Management Program Annual Report Form (Attachment D) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative.

(2) Each Copermittee must complete and submit a Jurisdictional Runoff Management Program Annual Report Form (Attachment D) no later than October 31 of each year until the first Annual Report is required to be submitted.

(3) Each Copermittee must provide any data or documentation utilized in developing the Annual Report upon request by the San Diego Water Board. Any monitoring data utilized in developing the Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN).[17] Any monitoring and assessment data utilized in developing the Annual Report must be provided on the Regional Clearinghouse required pursuant to Provision F.4.

c. Regional Monitoring and Assessment Report

(1) The Copermittees must submit a Regional Monitoring and Assessment Report no later than 180 days in advance of the expiration date of this Order. The Regional Monitoring and Assessment Report may be submitted as part of the ROWD required pursuant to Provision F.5.b. The Copermittees must review the jurisdictional and watershed monitoring data, data analyses, and assessments required pursuant to Provision D.4, to assess the following:

(a) The beneficial uses of the receiving waters within the San Diego Region that are protected or must be restored;

[17] Data must be uploaded to CEDEN Southern California Regional Data Center (http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx) using the templates provided on the CEDEN website.

(b) The progress toward restoring impacted beneficial uses in the receiving waters within the San Diego Region; and

(c) Pollutants or conditions of emerging concern that may impact beneficial uses in the receiving waters within the San Diego Region.

(2) The Regional Monitoring and Assessment Report must include recommendations for improving the implementation and assessment of the Water Quality Improvement Plans and jurisdictional runoff management programs.

(3) Each Copermittee must provide any data or documentation utilized in developing the Regional Monitoring and Assessment Report upon request by the San Diego Water Board. Any monitoring and assessment data utilized in developing the Regional Monitoring and Assessment Report must be provided on the Regional Clearinghouse required pursuant to Provision F.4.

4. Regional Clearinghouse

The Copermittees must develop, update, and maintain an internet-based Regional Clearinghouse that can be used to store, disseminate, and share the Copermittees' Water Quality Improvement Plans, Annual Reports, jurisdictional runoff management program documents, monitoring data, special studies, and any other data or information generated by the Copermittees during the implementation of this Order. Monitoring data collected pursuant to Provision D must be uploaded to CEDEN,[18] with links to the uploaded data available on the Regional Clearinghouse. The Regional Clearinghouse may be linked to other internet-based data portals and databases where the original documents and data are stored. The Regional Clearinghouse must be available and accessible to members of the public. The Regional Clearinghouse must be developed and made available to the public no later than 12 months after the adoption of this Order.

5. Report of Waste Discharge

a. The Orange County Copermittees and the Riverside County Copermittees, are required to submit a complete ROWD pursuant to the requirements of their current Orders and are enrolled under this Order upon expiration of their current Orders. Upon expiration of their current Orders, the Copermittees in each county must comply with the requirements of this Order by July 1 after enrollment under this Order, unless early enrollment is granted pursuant to Provision F.6 of this

[18] Data must be uploaded to CEDEN Southern California Regional Data Center (http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx) using the templates provided on the CEDEN website.

Order. The current Orders for the Orange County Copermittees and Riverside County Copermittees are rescinded upon their expiration date except for enforcement purposes.

b. The Copermittees must submit to the San Diego Water Board a complete ROWD as an application for the re-issuance of this NPDES permit. The ROWD must be submitted no later than 180 days in advance of the expiration date of this Order. The ROWD must contain the following minimum information:

(1) Names and addresses of the Copermittees;

(2) Names and titles of the primary contacts of the Copermittees;

(3) Proposed changes to the Copermittees' Water Quality Improvement Plans and the supporting justification;

(4) Proposed changes to the Copermittees' jurisdictional runoff management programs and the supporting justification;

(5) Any other information necessary for the re-issuance of this Order; and

(6) Any other information required by federal regulations for NPDES permit reissuance.

6. Application for Early Enrollment

a. The Orange County Copermittees, collectively, or Riverside County Copermittees, collectively, may apply for early enrollment under this Order by submitting a Report of Waste Discharge Form 200 for each individual Copermittee in the respective county, with a written request for early enrollment under this Order that certifies the following conditions have been met:

(1) A Water Quality Improvement Plan has been developed in accordance with the requirements of Provision B, which can and will be implemented immediately upon enrollment under this Order;

(2) Each Copermittee in the county has updated its jurisdictional runoff management program document to incorporate the requirements of Provision E, which can and will be implemented immediately upon enrollment under this Order; and

(3) Each Copermittee in the county has updated its BMP Design Manual to incorporate the requirements of Provision E.3.d, which can and will be implemented immediately upon enrollment under this Order.

b. The San Diego Water Board will review the application for early enrollment and associated documents for completeness. A Notice of Enrollment (NOE) under this Order will be issued to the Copermittees in the respective county by the San Diego Water Board upon completion of the early enrollment application requirements. The effective enrollment date will be specified in the NOE and the Copermittees in the respective county are authorized to have MS4 discharges pursuant to the requirements of this Order starting on the date specified in the NOE. The existing Order for that county is rescinded upon the effective enrollment date specified in the NOE except for enforcement purposes.

7. Reporting Provisions

Each Copermittee must comply with all the reporting and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

G. PRINCIPAL WATERSHED COPERMITTEE RESPONSIBILITIES

1. The Copermittees within each Watershed Management Area must designate a Principal Watershed Copermittee and notify the San Diego Water Board of the name of the Principal Watershed Copermittee. An individual Copermittee should not be designated a Principal Watershed Copermittee for more than two Watershed Management Areas. The notification may be submitted with the Water Quality Improvement Plan required pursuant to Provision F.1 of this Order.

2. The Principal Watershed Copermittee is responsible for, at a minimum, the following:

a. Serving as liaison between the Copermittees in the Watershed Management Area and the San Diego Water Board on general permit issues, and when necessary and appropriate, representing the Copermittees in the Watershed Management Area before the San Diego Water Board.

b. Facilitating the development of the Water Quality Improvement Plan in accordance with the requirements of Provision B of this Order

c. Coordinating the submittal of the deliverables required by Provisions F.1, F.2, F.3.a, and F.3.b of this Order.

d. Coordinating and developing, with the other Principal Watershed Copermittees, the requirements of Provisions F.3.c, F.4, and F.5.b of this Order.

H. MODIFICATION OF PROGRAMS

1. Modifications of the Order may be initiated by the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the San Diego Water Board.

2. Minor modifications to the Order may be made by the San Diego Water Board where the proposed modification complies with all the prohibitions and limitations, and other requirements of this Order.

3. Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

I. STANDARD PERMIT PROVISIONS AND GENERAL PROVISIONS

Each Copermittee must comply with all the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

ADMINISTRATIVE DRAFT

ATTACHMENT A

DISCHARGE PROHIBITIONS

1. Basin Plan Waste Discharge Prohibitions

California Water Code Section 13243 provides that a Regional Water Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste or certain types of waste is not permitted. The following waste discharge prohibitions in the Water Quality Control Plan for the San Diego Basin (Basin Plan) are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by a National Pollutant Discharge Elimination System (NPDES) permit or a dredged or fill material permit (subject to the exemption described in California Water Code Section 13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this San Diego Water Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services (DHS) and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the San Diego Water Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the San Diego Water Board.

ADMINISTRATIVE DRAFT

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the San Diego Water Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "*storm water*" is prohibited unless authorized by the San Diego Water Board. [The federal regulations, 40 CFR 122.26(b)(13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities.] [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the San Diego Water Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

16. The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

17. The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

18. The discharge of treated sewage from vessels, which do not have a properly functioning US Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at mean lower low water (MLLW) is prohibited.

2. Attachment B to State Water Board Resolution 2012-001X

Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges

I. PROVISIONS FOR POINT SOURCE DISCHARGES OF STORM WATER AND NONPOINT SOURCE WASTE DISCHARGES

The following terms, prohibitions, and special conditions (hereafter collectively referred to as special conditions) are established as limitations on point source storm water and nonpoint source discharges. These special conditions provide Special Protections for marine aquatic life and natural water quality in Areas of Special Biological Significance (ASBS), as required for State Water Quality Protection Areas pursuant to California Public Resources Code Sections 36700(f) and 36710(f). These Special Protections are adopted by the State Water Board as part of the California Ocean Plan (Ocean Plan) General Exception.

The special conditions are organized by category of discharge. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) will determine categories and the means of regulation for those categories [e.g., Point Source Storm Water National Pollutant Discharge Elimination System (NPDES) or Nonpoint Source].

A. PERMITTED POINT SOURCE DISCHARGES OF STORM WATER

1. General Provisions for Permitted Point Source Discharges of Storm Water

   a. Existing storm water discharges into an ASBS are allowed only under the following conditions:

      (1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;

      (2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in these Special Protections; and

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

   b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

   c. The discharge of trash is prohibited.

d. Only discharges from existing storm water outfalls are allowed. Any proposed or new storm water runoff discharge shall be routed to existing storm water discharge outfalls and shall not result in any new contribution of waste to an ASBS (i.e., no additional pollutant loading). “Existing storm water outfalls” are those that were constructed or under construction prior to January 1, 2005. “New contribution of waste” is defined as any addition of waste beyond what would have occurred as of January 1, 2005. A change to an existing storm water outfall, in terms of re-location or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges are prohibited except as provided below:

(1) The term “non-storm water discharges” means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.

(2) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:

(i) Discharges associated with emergency fire fighting operations.

(ii) Foundation and footing drains.

(iii) Water from crawl space or basement pumps.

(iv) Hillside dewatering.

(v) Naturally occurring groundwater seepage via a storm drain.

(vi) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

2. Compliance Plans for Inclusion in Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP).

The discharger shall specifically address the prohibition of non-storm water runoff and the requirement to maintain natural water quality for storm water discharges to an ASBS in an ASBS Compliance Plan to be included in its SWMP or a SWPPP, as appropriate to permit type. If a statewide permit includes a SWMP, then the discharger shall prepare a stand-alone compliance plan for ASBS discharges . The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (for permits issued by Regional Water Boards).

a. The Compliance Plan shall include a map of surface drainage of storm water runoff, showing areas of sheet runoff, prioritize discharges, and describe any structural Best Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat and which are identified to require installation of structural BMPs. The map shall also show the storm water conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion, and waste and hazardous material storage areas, if applicable. The SWMP or SWPPP shall also include a procedure for updating the map and plan when changes are made to the storm water conveyance facilities.

b. The ASBS Compliance Plan shall describe the measures by which all non-authorized non-storm water runoff (e.g., dry weather flows) has been eliminated, how these measures will be maintained over time, and how these measures are monitored and documented.

c. For Municipal Separate Storm Sewer System (MS4s), the ASBS Compliance Plan shall require minimum inspection frequencies as follows:

(1) The minimum inspection frequency for construction sites shall be weekly during rainy season;

(2) The minimum inspection frequency for industrial facilities shall be monthly during the rainy season;

(3) The minimum inspection frequency for commercial facilities (e.g., restaurants) shall be twice during the rainy season; and

(4) Storm water outfall drains equal to or greater than 18 inches (457 mm) in diameter or width shall be inspected once prior to the beginning of the rainy season and once during the rainy season and maintained to remove trash and other anthropogenic debris.

d. The ASBS Compliance Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that such installation would pose a threat to health or safety. BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:

(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges. The baseline for the reduction is the effective date of the Exception. The baseline for these determinations is the effective date of the Exception, and the reductions must be achieved and documented within four (4) years of the effective date.

e. The ASBS Compliance Plan shall address erosion control and the prevention of anthropogenic sedimentation in ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.

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f. The ASBS Compliance Plan shall describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule. The ASBS Compliance Plan shall include non-structural BMPs that address public education and outreach. Education and outreach efforts must adequately inform the public that direct discharges of pollutants from private property not entering an MS4 are prohibited. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development (LID) measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control storm water runoff discharges (at the end-of-pipe) during a design storm, permittees must first consider using LID practices to infiltrate, use, or evapotranspirate storm water runoff on-site.

g. The BMPs and implementation schedule shall be designed to ensure that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.

h. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents in storm water runoff that alter natural ocean water quality and the sources of these constituents.

(2) The report shall describe BMPs that are currently being implemented, BMPs that are identified in the SWMP or SWPPP for future implementation, and any additional BMPs that may be added to the SWMP or SWPPP to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits), the discharger shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised SWMP or SWPPP, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent.

(5) Compliance with this section does not excuse violations of any term, prohibition, or condition contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within one year from the effective date of the Exception, the discharger shall submit a written ASBS Compliance Plan to the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that describes its strategy to comply with these special conditions, including the requirement to maintain natural water quality in the affected ASBS. The ASBS Compliance Plan shall include a time schedule to implement appropriate non-structural and structural controls (implementation schedule) to comply with these special conditions for inclusion in the discharger's SWMP or SWPPP, as appropriate to permit type.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these special conditions shall be implemented.

d. Within four (4) years of the effective date of the Exception, any structural controls identified in the ASBS Compliance Plan that are necessary to comply with these special conditions shall be operational.

e. Within four (4) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85^{th} percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water, pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85^{th} percentile threshold of reference water quality data, and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

(1) for municipalities, a demonstration of significant hardship to discharger ratepayers, by showing the relationship of storm water fees to annual household income for residents within the discharger's jurisdictional area, and the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

(2) for other governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process.

B. NONPOINT SOURCE DISCHARGES

[NOT INCLUDED]
[PROVISIONS FOR NONPOINT SOURCE DISCHARGES NOT APPLICABLE]

II. ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES

[NOT INCLUDED]
[ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES NOT APPLICABLE]

III. ADDITIONAL REQUIREMENTS – WATERFRONT AND MARINE OPERATIONS

[NOT INCLUDED]
[ADDITIONAL REQUIREMENTS FOR WATERFRONT AND MARINE OPERATIONS NOT APPLICABLE]

IV. MONITORING REQUIREMENTS

Monitoring is mandatory for all dischargers to assure compliance with the Ocean Plan. Monitoring requirements include both: (A) core discharge monitoring, and (B) ocean receiving water monitoring. The State and Regional Water Boards must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).

Safety concerns: Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notification to the State and Regional Water Boards if hazardous conditions prevail.

Analytical Chemistry Methods: All constituents must be analyzed using the lowest minimum detection limits comparable to the Ocean Plan water quality objectives. For metal analysis, all samples, including storm water effluent, reference samples, and ocean receiving water samples, must be analyzed by the approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the Ocean Plan.

A. CORE DISCHARGE MONITORING PROGRAM

1. General sampling requirements for timing and storm size:

   Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected when post-storm receiving water is sampled, and analyzed for the same constituents as receiving water and reference site samples (see section IV B) as described below.

2. Runoff flow measurements

   a. For municipal/industrial storm water outfalls in existence as of December 31, 2007, 18 inches (457mm) or greater in diameter/width (including multiple outfall pipes in combination having a width of 18 inches, runoff flows must be measured or calculated, using a method acceptable to and approved by the State and Regional Water Boards.
   b. This will be reported annually for each precipitation season to the State and Regional Water Boards.

3. Runoff samples – storm events

   a. For outfalls equal to or greater than 18 inches (0.46m) in diameter or width:

      (1) samples of storm water runoff shall be analyzed during the same storm as receiving water samples for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination, ; and

      (2) samples of storm water runoff shall be analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS

      (3) If an applicant has no outfall greater than 36 inches, then storm water runoff from the applicant's largest outfall shall be further analyzed during the same storm as receiving water samples for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates).

   b. For outfalls equal to or greater than 36 inches (0.91m) in diameter or width:

      (1) samples of storm water runoff shall be analyzed during the same storm as receiving water samples for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be further analyzed during the same storm as receiving water samples for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates) and

      (3) samples of storm water runoff shall be analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

   c. For an applicant not participating in a regional monitoring program [see below in Section IV (B)] in addition to (a.) and (b.) above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Ocean Plan Table A constituents, Table B constituents for marine aquatic life protection (except for toxicity, only chronic toxicity for three species shall be required), DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, and Ocean Plan indicator bacteria. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each Region.

4. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

B. OCEAN RECEIVING WATER AND REFERENCE AREA MONITORING PROGRAM

In addition to performing the Core Discharge Monitoring Program in Section II.A above, all applicants having authorized discharges must perform ocean receiving water monitoring. In order to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS, dischargers may choose either (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program.

1. Individual Monitoring Program: The requirements listed below are for those dischargers who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met:

   a. Three times annually, during wet weather (storm events), the receiving water at the point of discharge from the outfalls described in section (IV)(A)(3)(c) above shall be sampled and analyzed for Ocean Plan Table A constituents, Table B constituents for marine aquatic life, DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and Ocean Plan indicator bacteria.

      The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where storm water runoff is sampled. Receiving water shall be sampled at approximately the same time prior to (pre-storm) and during (or immediately after) the same storm (post storm). Reference water quality shall also be sampled and analyzed for the same constituents pre-storm and post-storm, during the same storms when receiving water is sampled. Reference stations will be determined by the State Water Board's Division of Water Quality and the applicable Regional Water Board(s).

   b. Sediment sampling shall occur at least three times during every five (5) year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Ocean Plan Table B constituents for marine aquatic life, DDT, PCBs, PAHs, pyrethroids, and OP pesticides. For sediment toxicity testing, only an acute toxicity test using the amphipod Eohaustorius estuarius must be performed.

c. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and at a reference site. The survey shall be performed at least once every five (5) year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.

d. Once during each five (5) year period, a bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge sites and at representative reference sites. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (Mytilus californianus) and/or sand crabs (Emerita analoga or Blepharipoda occidentalis). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, or add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.

e. Marine Debris: Representative quantitative observations for trash by type and source shall be performed along the coast of the ASBS within the influence of the discharger's outfalls. The design, including locations and frequency, of the marine debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.

f. The monitoring requirements of the Individual Monitoring Program in this section are minimum requirements. After a minimum of one (1) year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board (statewide permits) or Executive officer of the Regional Water Board (Regional Water Board permits) may require additional monitoring, or adjust, reduce or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

2. Regional Integrated Monitoring Program: Dischargers may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise prescribed individual monitoring approach (in Section IV.B.1) if approved by the State Water Board's Division of Water Quality and the Regional Water Boards.

   a. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10% development), and shall not be located in CWA Section 303(d) listed waterbodies or have tributaries that are 303(d) listed. Reference areas shall be free of wastewater discharges and anthropogenic non-storm water runoff. A minimum of low threat storm runoff discharges (e.g. stream highway overpasses and campgrounds) may be allowed on a case-by-case basis.

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Reference areas shall be located in the same region as the ASBS receiving water monitoring occurs. The reference areas for each Region are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

b. ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e. at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e. co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

c. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected when annual storm water runoff is sampled. Sampling shall occur in a minimum of two storm seasons. For those ASBS dischargers that have already participated in the Southern California Bight 2008 ASBS regional monitoring effort, sampling may be limited to only one storm season.

d. Receiving water and reference samples shall be analyzed for the same constituents as storm water runoff samples. At a minimum, constituents to be sampled and analyzed in reference and discharge receiving waters must include oil and grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, Ocean Plan PAHs, pyrethroids, OP pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed.

3. Waterfront and Marine Operations: In addition to the above requirements for ocean receiving water monitoring, additional monitoring must be performed for marinas and boat launch and pier facilities:

   a. For all marina or mooring field operators, in mooring fields with 10 or more occupied moorings, the ocean receiving water must be sampled for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.

      (1) For mooring field operators opting for an individual monitoring program (Section IV.B.1 above), this sampling must occur weekly (on the weekend) from May through October.

(2) For mooring field operators opting to participate in a regional integrated monitoring program (Section IV.B.2 above), this sampling must occur monthly from May through October on a high use weekend in each month. The Water Boards may allow a reduction in the frequency of sampling, through the regional monitoring program, after the first year of monitoring.

b. For all mooring field operators, the subtidal sediment (sand or finer, if present) within mooring fields and below piers shall be sampled and analyzed for Ocean Plan Table B metals (for marine aquatic life beneficial use), acute toxicity, PAHs, and tributyltin. For sediment toxicity testing, only an acute toxicity test using the amphipod Eohaustorius estuarius must be performed. This sampling shall occur at least three times during a five (5) year period. For mooring field operators opting to participate in a regional integrated monitoring program, the Water Boards may allow a reduction in the frequency of sampling after the first sampling effort's results are assessed.

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ATTACHMENT B

STANDARD PERMIT PROVISIONS AND GENERAL PROVISIONS

1. Standard Permit Provisions

Code of Federal Regulations Title 40 Section 122.41 (40 CFR 122.41) includes conditions, or provisions, that apply to all National Pollutant Discharge Elimination System (NPDES) permits. Additional provisions applicable to NPDES permits are in 40 CFR 122.42. All applicable provisions in 40 CFR 122.41 and 40 CFR 122.42 must be incorporated into this Order and NPDES permit. The applicable 40 CFR 122.41 and 40 CFR 122.42 provisions are as follows:

a. DUTY TO COMPLY [40 CFR 122.41(a)]

The Copermittee must comply with all of the provisions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

(1) The Copermittee must comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement. [40 CFR 122.41(a)(1)]

(2) The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the CWA, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who *negligently* violates Section 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the CWA, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of

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not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.
[40 CFR 122.41(a)(2)]

(3) Any person may be assessed an administrative penalty by the San Diego Regional Water Quality Control Board (San Diego Water Board), State Water Resources Control Board (State Water Board), or United States Environmental Protection Agency (USEPA) for violating Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.
[40 CFR 122.41(a)(3)]

b. DUTY TO REAPPLY [40 CFR 122.41(b)]

If a Copermittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Copermittee must apply for and obtain a new permit.

c. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE [40 CFR 122.41(c)]

It shall not be a defense for a Copermittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

d. DUTY TO MITIGATE [40 CFR 122.41(d)]

The Copermittee must take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

e. PROPER OPERATION AND MAINTENANCE [40 CFR 122.41(e)]

The Copermittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Copermittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a Copermittee only when the operation is necessary to achieve compliance with the conditions of this permit.

f. PERMIT ACTIONS [40 CFR 122.41(f)]

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Copermittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

g. PROPERTY RIGHTS [40 CFR 122.41(g)]

This permit does not convey any property rights of any sort, or any exclusive privilege.

h. DUTY TO PROVIDE INFORMATION [40 CFR 122.41(h)]

The Copermittee must furnish to the San Diego Water Board, State Water Board, or USEPA within a reasonable time, any information which the San Diego Water Board, State Water Board, or USPEA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Copermittee must also furnish to the San Diego Water Board, State Water Board, or USPEA upon request, copies of records required to be kept by this permit.

i. INSPECTION AND ENTRY [40 CFR 122.41(i)]

The Copermittee must allow the San Diego Water Board, State Water Board, USEPA, and/or their authorized representative (including an authorized contractor acting as their representative), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the Copermittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit; [40 CFR 122.41(i)(1)]

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit; [40 CFR 122.41(i)(2)]

(3) Inspect and photograph at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; [40 CFR 122.41(i)(3)] and

(4) Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location. [40 CFR 122.41(i)(4)]

j. MONITORING AND RECORDS [40 CFR 122.41(j)]

(1) Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity. [40 CFR 122.41(j)(1)]

(2) Except for records of monitoring information required by this permit related to the Copermittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR Part 503), the

Copermittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board at any time. [40 CFR 122.41(j)(2)]

(3) Records for monitoring information must include: [40 CFR 122.41(j)(3)]

(a) The date, exact place, and time of sampling or measurements; [40 CFR 122.41(j)(3)(i)]
(b) The individual(s) who performed the sampling or measurements; [40 CFR 122.41(j)(3)(ii)]
(c) The date(s) analyses were performed; [40 CFR 122.41(j)(3)(iii)]
(d) The individual(s) who performed the analyses; [40 CFR 122.41(j)(3)(iv)]
(e) The analytical techniques or methods used; [40 CFR 122.41(j)(3)(v)] and
(f) The results of such analyses. [40 CFR 122.41(j)(3)(vi)]

(4) Monitoring must be conducted according to test procedures under 40 CFR Part 136 unless another method is required under 40 CFR Subchapters N or O. [40 CFR 122.41(j)(4)]

In the case of pollutants for which there are no approved methods under 40 CFR Part 136 or otherwise required under 40 CFR Subchapters N and O, monitoring must be conducted according to a test procedure specified in the permit for such pollutants. [40 CFR 122.44(i)(1)(iv)]

(5) The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. [40 CFR 122.41(j)(5)]

k. SIGNATORY REQUIREMENT [40 CFR 122.41(k)]

(1) All applications, reports, or information submitted to the San Diego Water Board, State Water Board, or USEPA must be signed and certified. (See 40 CFR 122.22) [40 CFR 122.41(k)(1)]

(a) *For a municipality, State, Federal, or other public agency.* [All applications must be signed] [b]y either a principal executive officer or ranking elected official. [40 CFR 122.22(a)(3)]

(b) All reports required by permits, and other information requested by the San Diego Water Board, State Water Board, or USEPA must be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if: [40 CFR 122.22(b)]

(i) The authorization is made in writing by a person described in paragraph (a) of this section; [40 CFR 122.22(b)(1)]

(ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company, (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) [40 CFR 122.22(b)(2)] and,

(iii) The written authorization is submitted to the San Diego Water Board and State Water Board. [40 CFR 122.22(b)(3)]

(c) *Changes to authorization.* If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the San Diego Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative. [40 CFR 122.22(c)]

(d) *Certification.* Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." [40 CFR 122.22(d)]

(2) The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both. [40 CFR 122.41(k)(2)]

I. REPORTING REQUIREMENTS [40 CFR 122.41(l)]

(1) *Planned changes.* The Copermittee must give notice to the San Diego Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when: [40 CFR 122.41(l)(1)]

(a) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); [40 CFR 122.41(l)(1)(i)] or

(b) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which

are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).
[40 CFR 122.41(l)(1)(ii)]

(c) The alteration or addition results in a significant change in the Copermittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. [40 CFR 122.41(l)(1)(iii)]

(2) *Anticipated noncompliance*. The Copermittee must give advance notice to the San Diego Water Board or State Water Board of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
[40 CFR 122.41(l)(2)]

(3) *Transfers*. This permit is not transferable to any person except after notice to the San Diego Water Board. The San Diego Water Board may require modification or revocation and reissuance of the permit to change the name of the Copermittee and incorporate such other requirements as may be necessary under the CWA.
[40 CFR 122.41(l)(3)]

(4) *Monitoring reports.* Monitoring results must be reported at the intervals specified elsewhere in this permit. [40 CFR 122.41(l)(4)]

(a) Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the San Diego Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. [40 CFR 122.41(l)(4)(i)]

(b) If the Copermittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or another method required for an industry-specific waste stream under 40 CFR Subchapters N or O, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the San Diego Water Board or State Water Board.
[40 CFR 122.41(l)(4)(ii)]

(c) Calculations for all limitations which require averaging of measurements must utilize an arithmetic mean unless otherwise specified in the permit.
[40 CFR 122.41(l)(4)(iii)]

(5) *Compliance schedules*. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date. [40 CFR 122.41(l)(5)]

(6) *Twenty-four hour reporting.*

(a) The Copermittee must report any noncompliance that may endanger health or the environment. Any information must be provided orally within 24 hours from the time the Copermittee becomes aware of the circumstances. A written submission must also be provided within five (5) days of the time the Copermittee becomes aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6)(i)]

(b) The following must be included as information which must be reported within 24 hours under this paragraph: [40 CFR 122.41(l)(6)(ii)]

(i) Any unanticipated bypass that exceeds any effluent limitation in the permit (See 40 CFR 122.41(g)). [40 CFR 122.41(l)(6)(ii)(A)]
(ii) Any upset which exceeds any effluent limitation in the permit. [40 CFR 122.41(l)(6)(ii)(B)] and,
(iii) Violation of a maximum daily discharge limitation for any of the pollutants listed by the San Diego Water Board in the permit to be reported within 24 hours. (See 40 CFR 122.44(g)) [40 CFR 122.41(l)(6)(ii)(C)]

(c) The San Diego Water Board may waive the above-required written report on a case-by-case basis if the oral report has been received within 24 hours. [40 CFR 122.41(l)(6)(iii)]

(7) *Other noncompliance.* The Copermittee must report all instances of noncompliance not reported in accordance with the standard provisions required under 40 CFR 122.41(l)(4), (5), and (6), at the time monitoring reports are submitted. The reports must contain the information listed in the standard provisions required under 40 CFR 122.41(l)(6). [40 CFR 122.41(l)(7))]

(8) *Other information.* When the Copermittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the San Diego Water Board, State Water Board, or USEPA, the Copermittee must promptly submit such facts or information. [40 CFR 122.41(l)(8)]

m. BYPASS [40 CFR 122.41(m)]

(1) *Definitions.*

(a) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. [40 CFR 122.41(m)(1)(i)] or

(b) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. [40 CFR 122.41(m)(1)(ii)]

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(2) *Bypass not exceeding limitations*. The Copermittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the standard provisions required under 40 CFR 122.41(m)(3) and (4).
[40 CFR 122.41(m)(2)]

(3) *Notice.*

(a) *Anticipated bypass*. If the Copermittee knows in advance of the need for a bypass, it must submit a notice, if possible at least ten days before the date of the bypass. [40 CFR 122.41(m)(3)(i)] or

(b) *Unanticipated bypass*. The Copermittee must submit notice of an unanticipated bypass in accordance with the standard provisions required under 40 CFR 122.41(l)(6) (24-hour notice).
[40 CFR 122.41(m)(3)(ii)]

(4) *Prohibition of Bypass.*

(a) Bypass is prohibited, and the San Diego Water Board may take enforcement action against a Copermittee for bypass, unless:
[40 CFR 122.41(m)(4)(i)]

(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; [40 CFR 122.41(m)(4)(i)(A)]
(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance;
[40 CFR 122.41(m)(4)(i)(B)] and,
(iii) The Copermittee submitted notice in accordance with the standard provisions required under 40 CFR 122.41(m)(3).
[40 CFR 122.41(m)(4)(i)(C)]

(b) The San Diego Water Board may approve an anticipated bypass, after considering its adverse effects, if the San Diego Water Board determines that it will meet the three conditions listed above.
[40 CFR 122.41(m)(4)(ii)]

n. UPSET [40 CFR 122.41(n)]

(1) *Definition.* "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Copermittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. [40 CFR 122.41(n)(1)]

(2) *Effect of an upset*. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the standard provisions required under 40 CFR 122.41(n)(3) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. [40 CFR 122.41(n)(2)]

(3) *Conditions necessary for a demonstration of upset*. A Copermittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that: [40 CFR 122.41(n)(3)]

(a) An upset occurred and that the Copermittee can identify the cause(s) of the upset; [40 CFR 122.41(n)(3)(i)]
(b) The permitted facility was at the time being properly operated; [40 CFR 122.41(n)(3)(ii)] and
(c) The Copermittee submitted notice of the upset in accordance with the standard provisions required under 40 CFR 122.41(l)(6)(ii)(B) (24-hour notice). [40 CFR 122.41(n)(3)(iii)]
(d) The Copermittee complied with any remedial measures pursuant to the standard provisions required under 40 CFR 122.41(d). [40 CFR 122.41(n)(3)(iii)]

(4) *Burden of proof*. In any enforcement proceeding, the Copermittee seeking to establish the occurrence of an upset has the burden of proof. [40 CFR 122.41(n)(4)]

o. STANDARD PERMIT PROVISIONS FOR MUNICIPAL SEPARATE STORM SEWER SYSTEMS [40 CFR 122.42(c)]

The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the San Diego Water Board or State Water Board under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report must include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions; [40 CFR 122.42(c)(1)]

(2) Proposed changes to the storm water management programs that are established as permit conditions. Such proposed changes must be consistent with 40 CFR 122.26(d)(2)(iii); [40 CFR 122.42(c)(2)] and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under 40 CFR 122.26(d)(2)(iv) and (v); [40 CFR 122.42(c)(3)]

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; [40 CFR 122.42(c)(4)]

(5) Annual expenditures and budget for year following each annual report; [40 CFR 122.42(c)(5)]

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(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; [40 CFR 122.42(c)(6)]

(7) Identification of water quality improvements or degradation. [40 CFR 122.42(c)(7)]

p. STANDARD PERMIT PROVISIONS FOR STORM WATER DISCHARGES [40 CFR 122.42(d)]

The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) must require compliance with the conditions of the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

2. General Provisions

In addition to the standard provisions required to be incorporated into the Order and NPDES permit pursuant to 40 CFR 122.41 and 40 CFR 122.42, several other general provisions apply to this Order. The general provisions applicable to this Order and NPDES permit are as follows:

a. DISCHARGE OF WASTE IS A PRIVILEGE

No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights. [CWC Section 13263(g)]

b. DURATION OF ORDER AND NPDES PERMIT

(1) *Effective date*. This Order and NPDES permit becomes effective on the date of its adoption provided the USEPA has no objection. If the USEPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. R9-2007-0001 upon the effective date of this Order, and supercedes Order Nos. R9-2009-0002 and R9-2010-0016 upon their expiration.

(2) *Expiration*. This Order and NPDES permit expires five years after adoption. [40 CFR 122.46(a)]

(3) *Continuation of expired order*. After this Order and NPDES permit expires, the terms and conditions of this Order and NPDES permit are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

c. AVAILABILITY

A copy of this Order must be kept at a readily accessible location and must be available to on-site personnel at all times.

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d. CONFIDENTIALITY OF INFORMATION

Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the San Diego Water Board office.

Claims of confidentiality for the following information will be denied: [40 CFR 122.7(b)]

(1) The name and address of any permit applicant or Copermittee; [40 CFR 122.7(b)(1)] and

(2) Permit applications and attachments, permits, and effluent data. [40 CFR 122.7(b)(2)]

e. EFFLUENT LIMITATIONS

(1) *Interim effluent limitations*. The Copermittee must comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by the San Diego Water Board.

(2) *Other effluent limitations and standards*. If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in the permit, the San Diego Water Board shall institute proceedings under these regulations to modify or revoke and reissue the permit to conform to the toxic effluent standard or prohibition. [40 CFR 122.44(b)(1)]

f. DUTY TO MINIMIZE OR CORRECT ADVERSE IMPACTS

The Copermittee must take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

g. PERMIT ACTIONS

The filing of a request by the Copermittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order. (See 40 CFR 122.41(f)) In addition, the following provisions apply to this Order:

(1) Upon application by any affected person, or on its own motion, the San Diego Water Board may review and revise the requirements in this Order. All requirements must be reviewed periodically. [CWC Section 13263(e)]

(2) This Order may be terminated or modified for cause, including, but not limited to, all of the following: [CWC Section 13381]

(a) Violation of any condition contained in the requirements of this Order. [CWC Section 13381(a)]

(b) Obtaining the requirements in this Order by misrepresentation, or failure to disclose fully all relevant facts. [CWC Section 13381(b)]

(c) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. [CWC Section 13381(c)]

(3) When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

h. NPDES PERMITTED NON-STORM WATER DISCHARGES

The San Diego Water Board has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The San Diego Water Board or State Water Board may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to an MS4.

i. MONITORING

In addition to the standard provisions required under 40 CFR 122.41(j) and (l)(4), the following general monitoring provisions apply to this Order:

(1) Where procedures are not otherwise specified in Order, sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's Surface Water Ambient Monitoring Program (SWAMP), adopted by the State Water Resources Control Board (State Water Board).

(2) Pursuant to 40 CFR 122.41(j)(2) and CWC Section 13383(a), each Copermittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least five (5) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board at any time.

(3) All chemical, bacteriological, and toxicity analyses must be conducted at a laboratory certified for such analyses by the California Department of Public Health or a laboratory approved by the San Diego Water Board.

(4) For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Copermittees must instruct their laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Copermittee can demonstrate that a particular ML is not attainable, in accordance

with procedures set forth in 40 CFR Part 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Copermittee must submit documentation from the laboratory to the San Diego Water Board for approval prior to raising the ML for any priority toxic pollutant.

j. ENFORCEMENT

(1) The San Diego Water Board is authorized to enforce the terms of this Order under several provisions of the CWC, including, but not limited to, CWC Sections 13385, 13386, and 13387.

(2) Nothing in this Order shall be construed to protect the Copermittee from its liabilities under federal, state, or local laws.

(3) The CWC provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

(4) Except as provided in the standard conditions required under 40 CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the Copermittee from civil or criminal penalties for noncompliance.

(5) Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties to which the Copermittee is or may be subject to under Section 311 of the CWA.

(6) Nothing in this Order shall be construed to preclude institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

k. SEVERABILITY

The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

l. APPLICATIONS

Any application submitted by a Copermittee for reissuance or modification of this Order must satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the California Code of Regulations.

m. IMPLEMENTATION

All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

n. REPORT SUBMITTALS

(1) All report submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

(2) Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal.

(3) The Principal Watershed Copermittee(s) must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

(4) Unless otherwise directed, the Copermittees must submit one hard copy and one electronic copy of each report required under this Order to the San Diego Water Board, and one electronic copy to the USEPA.

(5) The Copermittees must submit reports and provide notifications as required by this Order to the following:

EXECUTIVE OFFICER
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

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ATTACHMENT C

ACRONYMS AND ABBREVIATIONS

AMAL	Average Monthly Action Level
ASBS	Area(s) of Special Biological Significance
BMP	Best Management Practice
BMP Design Manual	Permanent BMP Sizing Criteria Design Manual
Basin Plan	Water Quality Control Plan for the San Diego Basin
CEQA	California Environmental Quality Act
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
ERP	Enforcement Response Plan
ESAs	Environmentally Sensitive Areas
GIS	Geographic Information System
IBI	Index of Biotic Integrity
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
ML	Minimum Level
MS4	Municipal Separate Storm Sewer System
NAL	Non-Storm Water Action Level
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
ROWD	Report of Waste Discharge (application for NPDES reissuance)
SAL	Storm Water Action Level
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SIC	Standard Industrial Classification Code
State Water Board	State Water Resources Control Board
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
WDID	Waste Discharge Identification Number
WLA	Waste Load Allocation
WQBEL	Water Quality Based Effluent Limitation

DEFINITIONS

Active/Passive Sediment Treatment - Using mechanical, electrical or chemical means to flocculate or coagulate suspended sediment for removal from runoff from construction sites prior to discharge.

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Average Monthly Action Level – The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote tangible and intangible economic, social, and environmental goals. "Beneficial Uses" of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs may be used in place of numeric effluent limits.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biotic integrity) of a water body.

Biocriteria - Under the CWA, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The USEPA defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use… (that)…describe the characteristics of water body segments least impaired by human activities."

Biofiltration - Practices that use vegetation and amended soils to detain and treat runoff from impervious areas. Treatment is through filtration, infiltration, adsorption, ion exchange, and biological uptake of pollutants.

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. *Environmental Management* 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

Clean Water Act Section 303(d) Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Construction Site – Any project, including projects requiring coverage under the Construction General Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, disturbances to ground such as stockpiling, and excavation.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

Copermittee – An incorporated city within the County of Orange, County of Riverside, or County of San Diego in the San Diego Region, the County of Orange, the County of Riverside, the County of San Diego, the Orange County Flood Control District, the Riverside County Water Conservation and Flood Control District, the San Diego Regional Airport Authority, or the Unified Port District of San Diego.

Copermittees – All of the individual Copermittees, collectively.

Critical Channel Flow (Qc) – The channel flow that produces the critical shear stress that initiates bed movement or that erodes the toe of channel banks. When measuring Qc, it should be based on the weakest boundary material – either bed or bank.

Daily Discharge – Defined as either: (1) the total mass of the constituent discharged over the calendar day or any 24 hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g. concentration.)

The Daily Discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day, or other 24 hour period other than a day), or by the arithmetic mean of analytical results from one or more grab samples taken over the course of a day.

Development Projects - Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project, industrial, commercial, or any other projects.

Dry Season – The period of time from May 1 to September 30 when rainfall is not expected to occur the San Diego.

Dry Weather – Weather is considered dry if the preceding 72 hours has been without precipitation.

Enclosed Bays – Enclosed bays are indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost bay works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Environmentally Sensitive Areas (ESAs) - Areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Orange; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees.

Estuaries – Waters, including coastal lagoons, located at the mouth of streams that serve as areas of mixing fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and ocean water. Estuaries do not include inland surface waters or ocean waters.

Existing Development – Any area that has been developed and exists for municipal, commercial, industrial, or residential purposes, uses, or activities. May include areas that are not actively used for its originally developed purpose, but may be re-purposed or redeveloped for another use or activity.

Flow Duration – The long-term period of time that flows occur above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams (not a single storm event duration). The simplest way to visualize this is to consider a histogram of pre- and post-project flows using long-term records of hourly data. To maintain pre-development flow duration means that the total number of hours (counts) within each range of flows in a flow-duration histogram cannot increase between the pre- and post-development condition. Flow duration within the range of geomorphologically significant flows is important for managing erosion.

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical reactivity. These also include materials named by the USEPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code" [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Hydromodification – The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport. In addition, alteration of stream and river channels, such as stream channelization, concrete lining, installation of dams and water impoundments, and excessive streambank and shoreline erosion are also considered hydromodification, due to their disruption of natural watershed hydrologic processes.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Inactive Areas – Areas of construction activity that are not active and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

Infiltration – Water other than wastewater that enters a sewer system (including sewer service connections and foundation drains) from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow [40 CFR 35.2005(20)].

Inland Surface Waters – Includes all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Jurisdictional Runoff Management Program Document – A written description of the specific jurisdictional runoff management measures and programs that each Copermittee will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

Low Impact Development (LID) – A storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions.

Low Impact Development Best Management Practices (LID BMPs) – LID BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States through storm water management and land development strategies that emphasize conservation sand the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. LID BMPs include retention practices that do not allow runoff, such as infiltration, rain water harvesting and reuse, and evapotranspiration. LID BMPs also include flow-through practices such as biofiltration that may have some discharge of storm water following pollutant reduction.

Major Outfall – As defined in the Code of Federal Regulations, a major outfall is a MS4 outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (i.e. discharge from a single conveyance other than a circular pipe which is associated with a drainage are of more than 50 acres); or, for MS4s that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or equivalent), a MS4 outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (i.e. discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

Maximum Daily Action Level (MDAL) –The highest allowable daily discharge of a pollutant, over a calendar day (or 24 hour period). For pollutants with action levels expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with action levels expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Maximum Extent Practicable (MEP) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) for storm water that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their runoff management programs. Their total collective and individual activities conducted pursuant to the runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the San Diego Water Board, the San Diego Water Board defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

"*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:*

a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
c. Public Acceptance: Does the BMP have public support?
d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc.?

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those *where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."*

Monitoring Year – The monitoring year begins annually on July 1st and ends on June 30th.

Municipal Separate Storm Sewer System (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

National Pollutant Discharge Elimination System (NPDES) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges and NPDES permitted discharges.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act, a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of wastes."

Ocean Waters – the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Board's California Ocean Plan.

Order – Unless otherwise specified, refers to this Order, Order No. R9-2012-0011 (NPDES No. CAS0109266)

Permanent BMP Sizing Criteria Design Manual – A plan developed to eliminate, reduce, or mitigate the impacts of runoff from development projects, including Priority Development

Projects.

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act, pollution is “the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses.” Pollution may include contamination.

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Permanent BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, remove, or educate to prevent the release of pollutants to surface waters from development projects in perpetuity, after construction of a project is completed.

Pre-Development Runoff Conditions (Discharge Rates, Durations, Etc.) – Runoff conditions that existed onsite before the existing development was constructed, or exists onsite before planned development activities occur. This definition includes natural watershed hydrology before any human induced land alterations.

Priority Development Projects - New development and redevelopment projects defined under Provision E.3.b of Order No. R9-2012-0011.

Rainy Season (aka Wet Season) – The period of time from October 1 to April 30 when the San Diego Region experiences the most rainfall.

Receiving Waters – Waters of the United States.

Receiving Water Limitations - Waste discharge requirements issued by the San Diego Water Board typically include both: (1) “Effluent Limitations” (or “Discharge Limitations”) that specify the technology-based or water-quality-based effluent limitations; and (2) “Receiving Water Limitations” that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the “Receiving Water Limitations” provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair.

Retain –Keep or hold in a particular place, condition, or position without discharge to surface waters.

Runoff - All flows in a storm water conveyance system that consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water including dry weather flows.

San Diego Water Board – As used in this document the term "San Diego Water Board" is synonymous with the term "Regional Board" as defined in Water Code section 13050(b) and is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment Control BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and runoff.

State Water Quality Protection Area – A nonterrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration in natural water quality, including, but not limited to, areas of special biological significance that have been designated by the State Water Board through its water quality control planning process. Areas of special biological significance are a subset of State Water Quality Protection Areas, and require special protection as determined by the State Water Resources Control Board pursuant to the California Ocean Plan adopted and reviewed pursuant to Article 4 (commencing with Section 13160) of Chapter 3 of Division 7 of the California Water Code and pursuant to the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (California Thermal Plan) adopted by the State Water Board.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage. Surface runoff and drainage pertains to runoff and drainage resulting from precipitation events.

Total Maximum Daily Load (TMDL) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Basin Plan, state in part…"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge".

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Unpaved Road – Any long, narrow stretch without pavement used for traveling by motor passenger vehicles between two or more points. Unpaved roads are generally constructed of dirt, gravel, aggregate or macadam and may be improved or unimproved.

Waste - As defined in CWC Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans. Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

Water Quality Standards - Water quality standards, as defined in Clean Water Act section 303(c) consist of the beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of a water body and criteria (referred to as water quality objectives in the California Water Code) necessary to protect those uses. Under the Water Code, the water boards establish beneficial uses and water quality objectives in water quality control or basin plans. Together with an anti-degradation policy, these beneficial uses and water quality objectives serve as water quality standards under the Clean Water Act. In Clean Water Act parlance, state beneficial uses are called "designated uses" and state water quality objectives are called "criteria." Throughout this Order, the relevant term is used depending on the statutory scheme.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a MS4 is always considered to be a Waters of the State.

Waters of the United States - As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: "(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Wet Season (aka Rainy Season) – The period of time from October 1 to April 30 when the San Diego Region experiences the most rainfall.

Wet Weather – Weather is considered wet if there is a storm event of 0.1 inches and greater and the following 72 hours.

ATTACHMENT D

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY ______________

I. COPERMITTEE INFORMATION		
Copermittee Name:		
Copermittee Primary Contact Name:		
Copermittee Primary Contact Information: Address: City: County: State: Zip: Telephone: Fax: Email:		
II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2012-0011?	**YES** **NO**	☐ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	**YES** **NO**	☐ ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	**YES** **NO**	☐ ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	**YES** **NO**	☐ ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2012-0011?	**YES** **NO**	☐ ☐
Number of non-storm water discharges reported by the public		
Number of non-storm water discharges detected by Copermittee staff or contractors		
Number of non-storm water discharges investigated by the Copermittee		
Number of sources of non-storm water discharges identified		
Number of non-storm water discharges eliminated		
Number of sources of illicit discharges or connections identified		
Number of illicit discharges or connections eliminated		
Number of enforcement actions issued		
Number of high level enforcement actions issued		
V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2012-0011?	**YES** **NO**	☐ ☐
Was an update to the Permanent BMP Sizing Criteria Design Manual required or recommended by the San Diego Water Board?	**YES** **NO**	☐ ☐
If YES to the question above, did the Copermittee update its Permanent BMP Sizing Criteria Design Manual and make it available on the Regional Clearinghouse?	**YES** **NO**	☐ ☐
Number of proposed development projects in review		
Number of Priority Development Projects in review		
Number of Priority Development Projects approved		
Number of approved Priority Development Projects exempt from any BMP requirements		
Number of approved Priority Development Projects requiring mitigation		
Number of Priority Development Projects granted occupancy		
Number of completed Priority Development Projects in inventory		
Number of high priority Priority Development Project permanent BMP inspections		
Number of Priority Development Project permanent BMP violations		
Number of enforcement actions issued		
Number of high level enforcement actions issued		

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY ______________

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2012-0011?	YES ☐ NO ☐
Number of construction sites in inventory	
Number of active construction sites in inventory	
Number of inactive construction sites in inventory	
Number of construction sites closed/completed during reporting period	
Number of construction site inspections	
Number of construction site violations	
Number of enforcement actions issued	
Number of high level enforcement actions issued	

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2012-0011? YES ☐ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of existing developments in inventory				
Number of existing development inspections				
Number of follow-up inspections				
Number of existing development violations				
Number of enforcement actions issued				
Number of high level enforcement actions issued				

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program that complies with Order No. R9-2012-0011?	YES ☐ NO ☐
Has the Copermittee implemented a mechanism for public participation and where necessary intergovernmental coordination that complies with Order No. R9-2012-0011?	YES ☐ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2012-0011?	YES ☐ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☐ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

____________________ Signature	____________________ Date
____________________ Print Name	____________________ Title
____________________ Telephone Number	____________________ Email

ADMINISTRATIVE DRAFT

ATTACHMENT E

SPECIFIC PROVISIONS FOR TOTAL MAXIMUM DAILY LOADS APPLICABLE TO ORDER NO. R9-2012-0011

These provisions implement Total Maximum Daily Loads (TMDLs), adopted by the San Diego Water Board and approved by USEPA under Clean Water Act section 303(c), which are applicable to discharges regulated under this Order. The provisions and schedules for implementation of the TMDLs described below must be incorporated into the Water Quality Improvement Plans, required pursuant to Provision B of this Order, for the specified Watershed Management Areas.

1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed
2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin
3. Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed
4. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek
5. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay
6. Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)

ADMINISTRATIVE DRAFT

1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed

a. Applicability

(1) TMDL Basin Plan Amendment: Resolution No. R9-2002-0123

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	August 14, 2002
State Water Board Approval Date:	July 16, 2003
Office of Administrative Law Approval Date:	September 11, 2003
US EPA Approval Date:	November 3, 2003

(3) TMDL Effective Date: September 11, 2003

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Chollas Creek

(6) Responsible Copermittees: City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, Unified Port District of San Diego

b. Water Quality Based Effluent Limitations

The WQBELs for Chollas Creek consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 1.c:

Table 1.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Receiving Water Limitation	Averaging Period
Diazinon	Acute	0.08 µg/L	1 hour
	Chronic	0.05 µg/L	4 days

(2) Effluent Limitations

Discharges from the MS4s must not contain concentrations that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 1.c:

Table 1.2
Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Constituent	Exposure Duration	Effluent Limitation	Averaging Period
Diazinon	Acute	0.072 µg/L	1 hour
	Chronic	0.045 µg/L	4 days

(3) Best Management Practices

The following BMPs for Chollas Creek must be incorporated into the Water Quality Improvement Plan for the San Diego Bay Watershed Management Area and implemented by the Responsible Copermittees:

(a) The Responsible Copermittees must implement BMPs capable of achieving the WQBELs under Specific Provision 1.b for Chollas Creek.

(b) The Responsible Copermittees must implement the Diazinon Toxicity Control Plan and Diazinon Public Outreach/Education Program as described in the report titled, *Technical Report for Total Maximum Daily Load for Diazinon in Chollas Creek Watershed, San Diego County*, dated August 14, 2002, including subsequent modifications, in order to achieve the WQBELs under Specific Provision 1.b.

(c) The Responsible Copermittees should coordinate the BMPs to address this TMDL with Caltrans wherever and whenever possible.

c. Compliance Schedule

The Responsible Copermittees were required to achieve their WLA by December 31, 2010. The Responsible Copermittees must be in compliance with the WQBELs under Specific Provision 1.b.

d. Specific Monitoring and Assessment Requirements

(a) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Investigation Order No. R9-2004-0277, *California Department of Transportation and San Diego Municipal Separate Storm Sewer System Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed*. The monitoring reports required under Investigation Order No. R9-2004-0277 must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

(b) The Responsible Copermittees must monitor the effluent of the MS4 outfalls for diazinon within the Chollas Creek watershed, and calculate or estimate the monthly and annual diazinon loads, in accordance with the requirements of Provisions D.1, D.4.a.(1)(b), and D.4.a.(3)(b) of this Order. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2005-0019

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	February 9, 2005
State Water Board Approval Date:	September 22, 2005
Office of Administrative Law Approval Date:	December 2, 2005
US EPA Approval Date:	February 8, 2006

(3) TMDL Effective Date: December 2, 2005

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Shelter Island Yacht Basin

(6) Responsible Copermittee: City of San Diego

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for Shelter Island Shoreline Park consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 2.c:

Table 2.1
Receiving Water Limitations as Concentrations in Shelter Island Yacht Basin

Constituent	Exposure Duration	Effluent Limitation	Averaging Period
Dissolved Copper	Acute	4.8 µg/L	1 hour
	Chronic	3.1 µg/L	4 days

(2) Effluent Limitations

Discharges from the MS4s must not contain pollutant loads that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 2.c:

Table 2.2
Effluent Limitations as Annual Loads in MS4 Discharges to Shelter Island Yacht Basin

Constituent	Effluent Limitation
Dissolved Copper	30 kg/yr

(3) Best Management Practices

The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 2.b for Shelter Island Yacht Basin

c. COMPLIANCE SCHEDULE

The Responsible Copermittee was required to achieve its WLA upon the effective date of the TMDL, December 2, 2005. The Responsible Copermittee must be in compliance with the WQBELs under Specific Provision 2.b.

d. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

The Responsible Copermittee must monitor the effluent of its MS4 outfalls for dissolved copper, and calculate or estimate the monthly and annual dissolved copper loads, in accordance with the requirements of Provisions D.1, D.4.a.(1)(b), and D.4.a.(3)(b) of this Order. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

3. Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2005-0036

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	February 9, 2005
State Water Board Approval Date:	November 16, 2005
Office of Administrative Law Approval Date:	February 1, 2006
US EPA Approval Date:	March 22, 2006

(3) TMDL Effective Date: February 1, 2006

(4) Watershed Management Area: Santa Margarita River

(5) Water Body: Rainbow Creek

(6) Responsible Copermittee: County of San Diego

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for Rainbow Creek consist of the following

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 3.c.(1):

Table 3.1
Receiving Water Limitations as Concentrations in Rainbow Creek

Constituent	Receiving Water Limitation
Nitrate (as N)	10 mg/L
Total Nitrogen	1 mg/L
Total Phosphorus	0.1 mg/L

(2) Effluent Limitations

(a) Discharges from the MS4s must not contain concentrations that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 3.c.(1):

Table 3.2
Effluent Limitations as Concentrations in MS4 Discharges to Rainbow Creek

Constituent	Effluent Limitation
Nitrate (as N)	10 mg/L
Total Nitrogen	1 mg/L
Total Phosphorus	0.1 mg/L

(b) Pollutant loads from given land uses discharging to and from the MS4s must not exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 3.c.(1):

Table 3.3
Effluent Limitations as Annual Loads in MS4 Discharges to Rainbow Creek

Land Use	Total N	Total P
Commercial nurseries	116 kg/yr	3 kg/yr
Park	3 kg/yr	0.1 kg/yr
Residential areas	149 kg/yr	12 kg/yr
Urban areas	27 kg/yr	6 kg/yr

Interim effluent limitations expressed as pollutant loads are given in the compliance schedule under Specific Provision 3.0.

(3) Best Management Practices

(a) The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 3.b for Rainbow Creek.

(b) The Responsible Copermittee should coordinate the BMPs to address this TMDL with Caltrans and other sources wherever and whenever possible.

c. COMPLIANCE SCHEDULE

(1) WLA Compliance Date

The Responsible Copermittee is required to achieve its WLAs, thus must be in compliance with the WQBELs under Specific Provision 3.b, by December 31, 2021.

(2) Interim Compliance Requirements

Table 3.4
Interim Effluent Limitations as Annual Loads in MS4 Discharges from Specific Land Uses to Rainbow Creek

	Total N Interim Effluent Limitations (kg/yr)			Total P Interim Effluent Limitations (kg/yr)		
	Interim Compliance Date			Interim Compliance Date		
Land Use	**2009**	**2013**	**2017**	**2009**	**2013**	**2017**
Commercial nurseries	390~~9~~	299	196	20	16	10
Park	5	3	3	0.15	0.10	0.10
Residential areas	507	390	260	99	74	47
Urban areas	40	27	27	9	6	6

d. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

The Responsible Copermittee must implement the Sampling and Analysis Plan for Rainbow Creek Nutrient Reduction TMDL Implementation Water Quality Monitoring, dated January 2010. The results of any monitoring conducted during the reporting period, and assessment of whether the interim and final WQBELs have been achieved must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

4. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek

a. Applicability

(1) TMDL Basin Plan Amendment: Resolution No. R9-2007-0043

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	June 13, 2007
State Water Board Approval Date:	July 15, 2008
Office of Administrative Law Approval Date:	October 22, 2008
US EPA Approval Date:	December 18, 2008

(3) TMDL Effective Date: October 22, 2008

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Chollas Creek

(6) Responsible Copermittees: City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, Unified Port District of San Diego

b. Water Quality Based Effluent Limitations

The WQBELsfor Chollas Creek consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 4.c.(1):

Table 4.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
Dissolved Copper	Acute	$(0.96) \times e^{[0.9422 \times \ln(\text{hardness}) - 1.700]} \times WER^*$	1 hour
	Chronic	$(0.96) \times e^{[0.8545 \times \ln(\text{hardness}) - 1.702]} \times WER^*$	4 days
Dissolved Lead	Acute	$[1.46203 - 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 1.460]} \times WER^*$	1 hour
	Chronic	$[1.46203 - 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 4.705]} \times WER^*$	4 days
Dissolved Zinc	Acute	$(0.978) \times e^{[0.8473 \times \ln(\text{hardness}) + 0.884]} \times WER^*$	1 hour
	Chronic	$(0.986) \times e^{[0.8473 \times \ln (\text{hardness}) + 0.884]} \times WER^*$	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

(2) Effluent Limitations

Discharges from the MS4s must not contain pollutant loads that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 4.c.(1):

Table 4.2
Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
Dissolved Copper	Acute	90% x (0.96) x $e^{[0.9422 \times \ln(\text{hardness}) - 1.700]}$ x WER*	1 hour
	Chronic	90% x (0.96) x $e^{[0.8545 \times \ln(\text{hardness}) - 1.702]}$ x WER*	4 days
Dissolved Lead	Acute	90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(\text{hardness}) - 1.460]}$ x WER*	1 hour
	Chronic	90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(\text{hardness}) - 4.705]}$ x WER*	4 days
Dissolved Zinc	Acute	90% x (0.978) x $e^{[0.8473 \times \ln(\text{hardness}) + 0.884]}$ x WER*	1 hour
	Chronic	90% x (0.986) x $e^{[0.8473 \times \ln (\text{hardness}) + 0.884]}$ x WER*	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

(3) Best Management Practices

(a) The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 4.b for Chollas Creek.

(b) The Responsible Copermittees should coordinate the BMPs to address this TMDL with Caltrans and the U.S. Navy wherever and whenever possible.

c. COMPLIANCE SCHEDULE

(1) WLA Compliance Date

The Responsible Copermittee is required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 4.b, by October 22, 2028.

(2) Interim Compliance Requirements

The Responsible Copermittee must comply with the following interim WQBELs by the interim compliance date:

Table 4.3
Interim Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Interim Compliance Date	Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
October 22, 2018	Dissolved Copper	Acute	1.2 x 90% x (0.96) x $e^{[0.9422 \times \ln(\text{hardness}) - 1.700]}$ x WER*	1 hour
		Chronic	1.2 x 90% x (0.96) x $e^{[0.8545 \times \ln(\text{hardness}) - 1.702]}$ x WER*	4 days
	Dissolved Lead	Acute	1.2 x 90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(\text{hardness}) - 1.460]}$ x WER*	1 hour
		Chronic	1.2 x 90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(\text{hardness}) - 4.705]}$ x WER*	4 days
	Dissolved Zinc	Acute	1.2 x 90% x (0.978) x $e^{[0.8473 \times \ln(\text{hardness}) + 0.884]}$ x WER*	1 hour
		Chronic	1.2 x 90% x (0.986) x $e^{[0.8473 \times \ln(\text{hardness}) + 0.884]}$ x WER*	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

d. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

(a) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Investigation Order No. R9-2004-0277, *California Department of Transportation and San Diego Municipal Separate Storm Sewer System Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed*, when it is amended to include monitoring requirements for the Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek. The monitoring reports required under Investigation Order No. R9-2004-0277 must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

(b) The Responsible Copermittees must monitor the effluent of the MS4 outfalls discharging to Chollas Creek for dissolved copper, lead, and zinc, and calculate or estimate the monthly and annual dissolved copper, lead, and zinc loads, in accordance with the requirements of Provisions D.1, D.4.a.(1)(b), and D.4.a.(3)(b) of this Order. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

5. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2008-0027

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date: June 11, 2008
State Water Board Approval Date: June 16, 2009
Office of Administrative Law Approval Date: September 15, 2009
US EPA Approval Date: October 26, 2009

(3) TMDL Effective Date: September 15, 2009

(4) Watershed Management Areas: See Table 5.0

(5) Water Bodies: See Table 5.0

(6) Responsible Copermittees: See Table 5.0

Table 5.0
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County	Dana Point Harbor	Baby Beach	-City of Dana Point -County of Orange
San Diego Bay	San Diego Bay	Shelter Island Shoreline Park	-Unified Port of San Diego

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for segments or areas of the water bodies listed in Table 5.0 consist of the following:

(1) Receiving Water Limitations

(a) Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedules under Specific Provisions 5.c.(1)(a) and 5.c.(2):

Table 5.1
Receiving Water Limitations as Bacteria Densities in the Water Body

	Receiving Water Limitations	
Constituent	**Single Sample Maximum[1,2]**	**30-Day Geometric Mean[2]**
Total Coliform	10,000 MPN/100mL	1,000 MPN/100mL
Fecal Coliform	400 MPN/100mL	200 MPN/100mL
Enterococcus	104 MPN/100mL	35 MPN/100mL

Notes:
1. During wet weather days, only the single sample maximum receiving water limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved.

(b) If the above receiving water limitations are not met in the receiving water, the Responsible Copermittees must demonstrate that the discharges from the MS4s are not causing or contributing to the violation of receiving water limitations. The Copermittee must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 5.b.(2).

(2) Effluent Limitations

Discharges from the MS4s must not contain densities that exceed the following effluent limitations by the end of the compliance schedules under Specific Provisions 5.c.(1)(a) and 5.c.(2) to demonstrate the discharge is not causing or contributing to a violation of receiving water quality standards:

Table 5.2
Effluent Limitations as Bacteria Densities in MS4 Discharges to the Water Body

	Effluent Limitations	
Constituent	**Single Sample Maximum[1,2]**	**30-Day Geometric Mean[2]**
Total Coliform	10,000 MPN/100mL	1,000 MPN/100mL
Fecal Coliform	400 MPN/100mL	200 MPN/100mL
Enterococcus	104 MPN/100mL	35 MPN/100mL

Notes:
1. During wet weather days, only the single sample maximum effluent limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean effluent limitations are required to be achieved.

Interim effluent limitations expressed as pollutant loads are given in the compliance schedule under Specific Provision 5.c.

(3) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 5.0 fulfill the Bacteria Load Reduction Plan (BLRP) requirements in Resolution No. R9-2008-0027.

(b) The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 5.0 for the segments or areas of the water bodies listed in Table 5.0

c. COMPLIANCE SCHEDULE

(1) Baby Beach in Dana Point Harbor

(a) WLA Compliance Dates

The Responsible Copermittees for MS4 discharges to Baby Beach are required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 5.0, according to the following compliance schedule:

Table 5.3
Compliance Schedule Dates to Achieve Baby Beach WLAs

Constituent	Dry Weather WLA Compliance Date	Wet Weather WLA Compliance Date
Total Coliform	September 15, 2014	September 15, 2009
Fecal Coliform		September 15, 2009
Enterococcus		September 15, 2019

(b) Interim Compliance Requirements

The Responsible Copermittees for MS4 discharges to Baby Beach must comply with the following interim WQBELs by the interim compliance date:

Table 5.4
Interim Effluent Limitations as Loads in MS4 Discharges to Baby Beach

Constituent	Interim Compliance Date	Dry Weather Interim Effluent Limitation	Wet Weather Interim Effluent Limitation
Total Coliform	September 15, 2012	4~~5~~.93~~32~~x10^9 MPN/day	NA*
Fecal Coliform	September 15, 2012	0.59x10^9 MPN/day	NA*
Enterococcus	September 15, 2012	0.42x10^9 MPN/day	NA**
	September 15, 2016	NA*	207x10^9 MPN/30days

Notes:
* The WQBELs under Specific Provision 5.b must already be achieved by the given interim compliance date.
** There is no corresponding interim WQBEL for the given interim compliance date.

(2) Shelter Island Shoreline Park in San Diego Bay

The Responsible Copermittee for MS4 discharges to Shelter Island Shoreline Park is required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 5.0, by December 31, 2012.

d. Specific Monitoring and Assessment Requirements

(1) Monitoring Stations

(a) The Responsible Copermittees must designate the MS4 outfalls within their jurisdiction discharging to the segments or areas of the water bodies listed in Table 5.0 as high priority non-storm water MS4 monitoring stations, in accordance with the requirements of Provision D.1.

(b) The Responsible Copermittees must establish at least one monitoring station within the receiving water body.

(2) Monitoring Procedures

(a) The Responsible Copermittees must monitor the effluent of the designated MS4 outfalls within their jurisdiction discharging during dry weather conditions to the segments or areas of the water bodies listed in Table 5.0 in accordance with the dry weather jurisdictional monitoring requirements of Provision D.1.a.(1)(b). Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(b) The Responsible Copermittees must monitor, within the first 24 hours of each storm event,[19] the effluent of the designated MS4 outfalls within their jurisdiction discharging to the segments or areas of the water bodies listed in Table 5.0 in accordance with the wet weather jurisdictional monitoring requirements of Provision D.1.b.(1)(b) of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(c) The Responsible Copermittees must collect samples from the monitoring stations within the receiving water body for each dry weather and wet weather MS4 outfall monitoring event. Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(3) Assessment and Reporting Requirements

(a) The Responsible Copermittees must analyze the dry weather and wet weather monitoring data to assess whether the interim and final WQBELs have been achieved.

(b) The monitoring and assessment results must be submitted as part of the

[19] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

Annual Reports required under Provision F.3.b of this Order.

6. Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2010-0001

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	February 10, 2010
State Water Board Approval Date:	December 14, 2010
Office of Administrative Law Approval Date:	April 4, 2011
US EPA Approval Date:	June 22, 2011

(3) TMDL Effective Date: April 4, 2011

(4) Watershed Management Areas: See Table 6.0

(5) Water Bodies: See Table 6.0

(6) Responsible Copermittees: See Table 6.0

Table 6.0
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County	Pacific Ocean Shoreline	Cameo Cove at Irvine Cove Drive – Riviera Way	-City of Laguna Beach -County of Orange -Orange County Flood Control District
		at Heisler Park - North	
	Pacific Ocean Shoreline	at Main Laguna Beach	-City of Aliso Viejo -City of Laguna Beach -City of Laguna Woods -County of Orange -Orange County Flood Control District
		Laguna Beach at Ocean Avenue	
		Laguna Beach at Cleo Street	
		Arch Cove at Bluebird Canyon Road	
		Laguna Beach at Dumond Drive	
	Pacific Ocean Shoreline	Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach	-City of Aliso Viejo -City of Laguna Beach -City of Laguna Hills -City of Laguna Niguel -City of Laguna Woods -City of Lake Forest -City of Mission Viejo -County of Orange -Orange County Flood Control District
	Aliso Creek	Entire reach (7.2 miles) and associated tributaries: - Aliso Hills Channel - English Canyon Creek - Dairy Fork Creek - Sulfur Creek - Wood Canyon Creek	
	Aliso Creek Mouth	at mouth	

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Table 6.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County (cont'd)	Pacific Ocean Shoreline	Aliso Beach at West Street	-City of Dana Point -City of Laguna Beach -City of Laguna Niguel -County of Orange -Orange County Flood Control District
		Aliso Beach at Table Rock Drive	
		100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)	
		at Salt Creek (large outlet)	
		Salt Creek Beach at Salt Creek service road	
		Salt Creek Beach at Strand Road	
	Pacific Ocean Shoreline	at San Juan Creek	-City of Dana Point -City of Laguna Hills -City of Laguna Niguel -City of Mission Viejo -City of Rancho Santa Margarita -City of San Juan Capistrano -County of Orange -Orange County Flood Control District
	San Juan Creek	lower 1 mile	
	San Juan Creek Mouth	at mouth	
	Pacific Ocean Shoreline	at Poche Beach	-City of San Clemente -County of Orange -Orange County Flood Control District
		Ole Hanson Beach Club Beach at Pico Drain	
		San Clemente City Beach at El Portal Street Stairs	
		San Clemente City Beach at Mariposa Street	
		San Clemente City Beach at Linda Lane	
		San Clemente City Beach at South Linda Lane	
		San Clemente City Beach at Lifeguard Headquarters	
		under San Clemente Municipal Pier	
		San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane)	
		San Clemente State Beach at Riviera Beach	
		Can Clemente State Beach at Cypress Shores	
San Luis Rey River	Pacific Ocean Shoreline	at San Luis Rey River mouth	-City of Oceanside -City of Vista -County of San Diego

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Table 6.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
Carlsbad	Pacific Ocean Shoreline	at Moonlight State Beach	-City of Carlsbad -City of Encinitas -City of Escondido -City of Oceanside -City of San Marcos -City of Solana Beach -City of Vista -County of San Diego
San Dieguito River	Pacific Ocean Shoreline	at San Dieguito Lagoon mouth	-City of Del Mar -City of Escondido -City of Poway -City of San Diego -City of Solana Beach -County of San Diego
Penasquitos	Pacific Ocean Shoreline	Torrey Pines State Beach at Del Mar (Anderson Canyon)	-City of Del Mar -City of Poway -City of San Diego -County of San Diego
	Pacific Ocean Shoreline	La Jolla Shores Beach at El Paseo Grande	-City of San Diego
		La Jolla Shores Beach at Caminito del Oro	
		La Jolla Shores Beach at Vallecitos	
		La Jolla Shores Beach at Avenida de la Playa	
		at Casa Beach, Children's Pool	
		South Casa Beach at Coast Boulevard	
		Whispering Sands Beach at Ravina Street	
		Windansea Beach at Vista de la Playa	
		Windansea Beach at Bonair Street	
		Windansea Beach at Playa del Norte	
		Windansea Beach at Palomar Avenue	
		at Tourmaline Surf Park	
		Pacific Beach at Grand Avenue	
	Tecolote Creek	Entire reach and tributaries	-City of San Diego

Table 6.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I- Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
San Diego River	Forrester Creek	lower 1 mile	-City of El Cajon -City of La Mesa -City of Santee -County of San Diego
	San Diego River	lower 6 miles	-City of El Cajon -City of La Mesa -City of San Diego -City of Santee -County of San Diego
	Pacific Ocean Shoreline	at San Diego River mouth at Dog Beach	
San Diego Bay	Chollas Creek	lower 1.2 miles	-City of La Mesa -City of Lemon Grove -City of San Diego -County of San Diego

b. Water Quality Based Effluent Limitations

The WQBELs for segments or areas of the water bodies listed in Table 6.0 consist of the following:

(1) Receiving Water Limitations

(a) Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedules under Specific Provision 6.c.(1):

Table 6.1
Receiving Water Limitations as Bacteria Densities and Allowable Exceedance Frequencies in the Water Body

	Receiving Water Limitations				
Constituent	Single Sample Maximum[1,2] (MPN/100mL)	Single Sample Maximum Allowable Exceedance Frequency[3]	30-Day Geometric Mean[2] (MPN/100mL)	30-Day Geometric Mean Allowable Exceedance Frequency	
Total Coliform	10,000	22% / 0%	1,000	0%	
Fecal Coliform	400	22% / 0%	200	0%	
Enterococcus	104[4] / 61[5]	22% / 0%	35[4] / 33[5]	0%	

Notes:
1. During wet weather days, only the single sample maximum receiving water limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved.
3. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days. The 0% single sample maximum allowable exceedance frequency applies to dry weather days.
4. This *Enterococcus* receiving water limitation applies to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.
5. This *Enterococcus* receiving water limitations applies to segments or areas of creeks or creek mouths listed in Table 6.0.

Interim receiving water limitations expressed as allowable exceedance frequencies are given in the compliance schedule under Specific Provision 6.c.

(b) If the above receiving water limitations are not met in the receiving water, the Responsible Copermittees must demonstrate that the discharges from the MS4s are not causing or contributing to the violation of receiving water limitations. The Copermittee must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 6.b.(2).

(2) Effluent Limitations

Discharges from the MS4s must not contain densities that exceed the following effluent limitations by the end of the compliance schedules under Specific Provision 6.c.(1) to demonstrate the discharge is not causing or contributing to a violation of receiving water quality standards:

Table 6.2
Effluent Limitations as Bacteria Densities and Allowable Exceedance Frequencies in MS4 Discharges to the Water Body

	Effluent Limitations			
Constituent	Single Sample Maximum[1,2] (MPN/100mL)	Single Sample Maximum Allowable Exceedance Frequency[3]	30-Day Geometric Mean[2] (MPN/100mL)	30-Day Geometric Mean Allowable Exceedance Frequency
Total Coliform	10,000	22% / 0%	1,000	0%
Fecal Coliform	400	22% / 0%	200	0%
Enterococcus	104[4] / 61[5]	22% / 0%	35[4] / 33[5]	0%

Notes:
1. During wet weather days, only the single sample maximum effluent limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean effluent limitations are required to be achieved.
3. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days. The 0% single sample maximum allowable exceedance frequency applies to dry weather days
4. This *Enterococcus* effluent limitation applies to MS4 discharges to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.
5. This *Enterococcus* effluent limitation applies to MS4 discharges to segments or areas of creeks or creek mouths listed in Table 6.0.

Interim effluent limitations expressed as allowable exceedance frequencies are given in the compliance schedule under Specific Provision 6.c.

(3) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 6.0 fulfill the Comprehensive Load Reduction Plan (CLRP) requirements in Resolution No. R9-2010-0001.

(b) The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 6.b for the segments or areas of the water bodies listed in Table 6.0.

(c) The Responsible Copermittees should coordinate the BMPs to address this TMDL with Caltrans and owners/operators of small MS4s wherever and whenever possible.

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c. COMPLIANCE SCHEDULE

(1) WLA Compliance Dates

The Responsible Copermittees for MS4 discharges to a segment or area of the water bodies listed in Table 6.0 are required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 6.b, according to the following compliance schedule:

Table 6.3
Compliance Schedule Dates to Achieve Indicator Bacteria WLAs

Constituent	Dry Weather WLA Compliance Date	Wet Weather WLA Compliance Date
Total Coliform	April 4, 2021	April 4, 2031
Fecal Coliform		
Enterococcus		

(2) Interim Compliance Requirements

The Responsible Copermittees must comply with the following interim WQBELs by the interim compliance dates:

(a) Interim Dry Weather WQBELs

The Responsible Copermittee must calculate the "existing" exceedance frequencies of the 30-day geometric mean water quality objectives for each of the indicator bacteria by analyzing the monitoring data collected between January 1, 2002 and April 4, 2011. "Existing" exceedance frequencies may be calculated by segment or area of a water body, or by water body, and/or by Watershed Management Area listed in Table 6.0. Separate "existing" exceedance frequencies must be calculated for beaches and creeks/creek mouths.

The Responsible Copermittees must achieve a 50 percent reduction in the "existing" exceedance frequency of the 30-day geometric mean WQBELs for the segments or areas of the water bodies listed in Table 6.0 by the interim compliance dates for achieving the interim dry weather WQBELs given in Table 6.5. A 50 percent reduction in the "existing" exceedance frequency is equivalent to half of the "existing" exceedance frequency of the 30-day geometric mean WQBELs.

The "existing" exceedance frequencies and the interim dry weather allowable exceedance frequencies (i.e. interim dry weather WQBELs) calculated by the Responsible Copermittees must be included in the Water Quality Improvement Plans for the applicable Watershed Management Areas.

(b) Interim Wet Weather WQBELs

The Responsible Copermittees must achieve the interim wet weather WQBELs in Table 6.4, expressed as interim allowable exceedance frequencies, by the interim compliance dates for achieving the interim wet weather WQBELs given in Table 6.5.

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Table 6.4
Interim Wet Weather WQBELs Expressed as
Interim Wet Weather Allowable Exceedance Frequencies

<table>
<tr><th rowspan="2">Watershed Management Area</th><th rowspan="2">Water Body</th><th rowspan="2">Segment or Area</th><th colspan="3">Interim Wet Weather Allowable Exceedance Frequencies</th></tr>
<tr><th>Total Coliform</th><th>Fecal Coliform</th><th>Entero-coccus</th></tr>
<tr><td rowspan="16">South Orange County</td><td rowspan="2">Pacific Ocean Shoreline</td><td>Cameo Cove at Irvine Cove Drive – Riviera Way</td><td rowspan="7">38%</td><td rowspan="7">37%</td><td rowspan="7">39%</td></tr>
<tr><td>at Heisler Park - North</td></tr>
<tr><td rowspan="5">Pacific Ocean Shoreline</td><td>at Main Laguna Beach</td></tr>
<tr><td>Laguna Beach at Ocean Avenue</td></tr>
<tr><td>Laguna Beach at Cleo Street</td></tr>
<tr><td>Arch Cove at Bluebird Canyon Road</td></tr>
<tr><td>Laguna Beach at Dumond Drive</td></tr>
<tr><td>Pacific Ocean Shoreline</td><td>Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach</td><td>41%</td><td>41%</td><td>42%</td></tr>
<tr><td>Aliso Creek</td><td>Entire reach (7.2 miles) and associated tributaries:
- Aliso Hills Channel
- English Canyon Creek
- Dairy Fork Creek
- Sulfur Creek
- Wood Canyon Creek</td><td>41%</td><td>41%</td><td>42%</td></tr>
<tr><td>Aliso Creek Mouth</td><td>at mouth</td><td>41%</td><td>41%</td><td>42%</td></tr>
<tr><td rowspan="6">Pacific Ocean Shoreline</td><td>Aliso Beach at West Street</td><td rowspan="6">36%</td><td rowspan="6">36%</td><td rowspan="6">36%</td></tr>
<tr><td>Aliso Beach at Table Rock Drive</td></tr>
<tr><td>100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)</td></tr>
<tr><td>at Salt Creek (large outlet)</td></tr>
<tr><td>Salt Creek Beach at Salt Creek service road</td></tr>
<tr><td>Salt Creek Beach at Strand Road</td></tr>
</table>

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Table 6.4 (Cont'd)
Interim Wet Weather WQBELs Expressed as
Interim Wet Weather Allowable Exceedance Frequencies

Watershed Management Area	Water Body	Segment or Area	Interim Wet Weather Allowable Exceedance Frequencies		
			Total Coliform	Fecal Coliform	*Entero-coccus*
South Orange County (cont'd)	Pacific Ocean Shoreline	at San Juan Creek	44%	44%	48%
	San Juan Creek	lower 1 mile	44%	44%	47%
	San Juan Creek Mouth	at mouth	44%	44%	47%
	Pacific Ocean Shoreline	at Poche Beach Ole Hanson Beach Club Beach at Pico Drain San Clemente City Beach at El Portal Street Stairs San Clemente City Beach at Mariposa Street San Clemente City Beach at Linda Lane San Clemente City Beach at South Linda Lane San Clemente City Beach at Lifeguard Headquarters under San Clemente Municipal Pier San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane) San Clemente State Beach at Riviera Beach Can Clemente State Beach at Cypress Shores	35%	35%	36%
San Luis Rey River	Pacific Ocean Shoreline	at San Luis Rey River mouth	45%	44%	47%
Carlsbad	Pacific Ocean Shoreline	at Moonlight State Beach	40%	40%	41%
San Dieguito River	Pacific Ocean Shoreline	at San Dieguito Lagoon mouth	33%	33%	36%

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Table 6.4 (Cont'd)
Interim Wet Weather WQBELs Expressed as
Interim Wet Weather Allowable Exceedance Frequencies

Watershed Management Area	Water Body	Segment or Area	Interim Wet Weather Allowable Exceedance Frequencies		
			Total Coliform	Fecal Coliform	*Entero-coccus*
Penasquitos	Pacific Ocean Shoreline	Torrey Pines State Beach at Del Mar (Anderson Canyon)	26%	26%	26%
	Pacific Ocean Shoreline	La Jolla Shores Beach at El Paseo Grande	37%	37%	37%
		La Jolla Shores Beach at Caminito del Oro			
		La Jolla Shores Beach at Vallecitos			
		La Jolla Shores Beach at Avenida de la Playa			
		at Casa Beach, Children's Pool			
		South Casa Beach at Coast Boulevard			
		Whispering Sands Beach at Ravina Street			
		Windansea Beach at Vista de la Playa			
		Windansea Beach at Bonair Street			
		Windansea Beach at Playa del Norte			
		Windansea Beach at Palomar Avenue			
		at Tourmaline Surf Park			
		Pacific Beach at Grand Avenue			
	Tecolote Creek	Entire reach and tributaries	49%	49%	51%
San Diego River	Forrester Creek	lower 1 mile	46%	43%	49%
	San Diego River	lower 6 miles	46%	43%	49%
	Pacific Ocean Shoreline	at San Diego River mouth at Dog Beach	46%	43%	51%
San Diego Bay	Chollas Creek	lower 1.2 miles	41%	41%	43%

(c) Interim WQBEL Compliance Dates

The Responsible Copermittees must achieve the interim WQBELs under Specific Provisions 6.c.(2)(a) and 6.c.(2)(b) by the interim compliance dates given in Table 6.5.

Table 6.5
Interim Compliance Dates to Achieve Interim WQBELs

Watershed Management Area	Water Body	Segment or Area	Interim Compliance Dates: Interim Dry Weather WQBELs	Interim Compliance Dates: Interim Wet Weather WQBELs
South Orange County	Pacific Ocean Shoreline	Cameo Cove at Irvine Cove Drive – Riviera Way	April 4, 2016	April 4, 2021
		at Heisler Park - North		
	Pacific Ocean Shoreline	at Main Laguna Beach	April 4, 2016	April 4, 2021
		Laguna Beach at Ocean Avenue		
		Laguna Beach at Cleo Street		
		Arch Cove at Bluebird Canyon Road		
		Laguna Beach at Dumond Drive		
	Pacific Ocean Shoreline	Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach	April 4, 2016	April 4, 2021
	Aliso Creek	Entire reach (7.2 miles) and associated tributaries: - Aliso Hills Channel - English Canyon Creek - Dairy Fork Creek - Sulfur Creek - Wood Canyon Creek	April 4, 2018	April 4, 2021
	Aliso Creek Mouth	at mouth	April 4, 2018	April 4, 2021
	Pacific Ocean Shoreline	Aliso Beach at West Street	April 4, 2016	April 4, 2021
		Aliso Beach at Table Rock Drive		
		100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)		
		at Salt Creek (large outlet)		
		Salt Creek Beach at Salt Creek service road	April 4, 2017	April 4, 2021
		Salt Creek Beach at Strand Road	April 4, 2017	April 4, 2021

Table 6.5 (Cont'd)
Interim Compliance Dates to Achieve Interim WQBELs

Watershed Management Area	Water Body	Segment or Area	Interim Compliance Dates: Interim Dry Weather WQBELs	Interim Compliance Dates: Interim Wet Weather WQBELs
South Orange County (cont'd)	Pacific Ocean Shoreline	at San Juan Creek	April 4, 2016	April 4, 2021
	San Juan Creek	lower 1 mile	April 4, 2018	April 4, 2021
	San Juan Creek Mouth	at mouth	April 4, 2016	April 4, 2021
	Pacific Ocean Shoreline	at Poche Beach	April 4, 2016	April 4, 2021
		Ole Hanson Beach Club Beach at Pico Drain	April 4, 2016	April 4, 2021
		San Clemente City Beach at El Portal Street Stairs	April 4, 2017	April 4, 2021
		San Clemente City Beach at Mariposa Street		
		San Clemente City Beach at Linda Lane	April 4, 2016	April 4, 2021
		San Clemente City Beach at South Linda Lane	April 4, 2018	April 4, 2021
		San Clemente City Beach at Lifeguard Headquarters	April 4, 2017	April 4, 2021
		under San Clemente Municipal Pier		
		San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane)	April 4, 2018	April 4, 2021
		San Clemente State Beach at Riviera Beach	April 4, 2016	April 4, 2021
		Can Clemente State Beach at Cypress Shores	April 4, 2017	April 4, 2021
San Luis Rey River	Pacific Ocean Shoreline	at San Luis Rey River mouth	April 4, 2017	April 4, 2021
Carlsbad	Pacific Ocean Shoreline	at Moonlight State Beach	April 4, 2016	April 4, 2021
San Dieguito River	Pacific Ocean Shoreline	at San Dieguito Lagoon mouth	April 4, 2016	April 4, 2021

Table 6.5 (Cont'd)
Interim Compliance Dates to Achieve Interim WQBELs

Watershed Management Area	Water Body	Segment or Area	Interim Compliance Dates: Interim Dry Weather WQBELs	Interim Compliance Dates: Interim Wet Weather WQBELs
Penasquitos	Pacific Ocean Shoreline	Torrey Pines State Beach at Del Mar (Anderson Canyon)	April 4, 2016	April 4, 2021
	Pacific Ocean Shoreline	La Jolla Shores Beach at El Paseo Grande		
		La Jolla Shores Beach at Caminito del Oro		
		La Jolla Shores Beach at Vallecitos		
		La Jolla Shores Beach at Avenida de la Playa		
		at Casa Beach, Children's Pool		
		South Casa Beach at Coast Boulevard		
		Whispering Sands Beach at Ravina Street		
		Windansea Beach at Vista de la Playa		
		Windansea Beach at Bonair Street		
		Windansea Beach at Playa del Norte		
		Windansea Beach at Palomar Avenue		
		at Tourmaline Surf Park		
		Pacific Beach at Grand Avenue		
	Tecolote Creek	Entire reach and tributaries		
San Diego River	Forrester Creek	lower 1 mile	April 4, 2018	April 4, 2021
	San Diego River	lower 6 miles		
	Pacific Ocean Shoreline	at San Diego River mouth at Dog Beach		
San Diego Bay	Chollas Creek	lower 1.2 miles	April 4, 2018	April 4, 2021

d. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

(1) Monitoring and Assessment Requirements for Beaches

(a) Monitoring Stations

(i) The Responsible Copermittees must designate the MS4 outfalls within their jurisdiction discharging to the Pacific Ocean Shoreline segments or areas listed in Table 6.0 as high priority non-storm water MS4 monitoring stations, in accordance with the requirements of Provision D.1 of this Order.

(ii) For the Pacific Ocean Shoreline segments or areas listed in Table 6.0 with MS4 outfalls, the Responsible Copermittees must establish at least one monitoring station within the receiving water.

(b) Monitoring Procedures

(i) The Responsible Copermittees must monitor the effluent of the designated MS4 outfalls within their jurisdiction discharging during dry weather to the Pacific Ocean Shoreline segments or areas listed in Table 6.0 in accordance with the dry weather jurisdictional monitoring requirements of Provision D.1.a.(1)(b) of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(ii) The Responsible Copermittees must monitor, within the first 24 hours of each storm event,[20] the effluent of the designated MS4 outfalls within their jurisdiction discharging to the Pacific Ocean Shoreline segments or areas listed in Table 6.0 in accordance with the wet weather jurisdictional monitoring requirements of Provision D.1.b.(1)(b) of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(iii) The Responsible Copermittees must collect samples from the monitoring stations within the receiving water body for each dry weather and wet weather MS4 outfall monitoring event. Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(c) Assessment and Reporting Requirements

(i) The Responsible Copermittees must analyze the dry weather and wet weather monitoring data to assess whether the interim and final WQBELs for the Pacific Ocean Shoreline segments or areas listed in Table 6.0 have been achieved.

(ii) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

[20] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

(2) Monitoring and Assessment Requirements for Creeks and Creek Mouths

(a) Monitoring Stations

(i) The Responsible Copermittees must establish at least one receiving water monitoring station at or near the mouth of the creeks listed in Table 6.0.

(ii) The Responsible Copermittees must establish at least one receiving water monitoring station upstream of the station established for Specific Provision 6.d.(2)(a)(i). At least one monitoring station must be established for each Responsible Copermittee at the most downstream location within its jurisdiction, and one monitoring station at the most upstream location within its jurisdiction.

(iii) The Responsible Copermittees must identify the MS4 outfalls discharging to the segments or areas of the creeks and creek mouths listed in Table 6.0. The Responsible Copermittees must identify the MS4 outfalls that are monitored in accordance with the dry weather jurisdictional monitoring requirements of Provision D.1.a.(1)(b) of this Order and the wet weather jurisdictional monitoring requirements of Provision D.1.b.(1)(a) of this Order.

(b) Monitoring Procedures

(i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly.

(ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations within the first 24 hours of each storm event.[21]

(iii) Samples collected from receiving water monitoring stations must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(c) Assessment and Reporting Requirements

(i) The Responsible Copermittees must analyze the receiving water monitoring data to assess whether the interim and final receiving water WQBELs for the creeks and creek mouths listed in Table 6.0 have been achieved.

[21] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

(ii) If the receiving water WQBELs for the creeks and creek mouths listed in Table 6.0 have not been achieved, the Responsible Copermittees must review the MS4 outfall monitoring data to assess whether the interim and final effluent WQBELs have been achieved.

(iii) The Responsible Copermittee must identify and incorporate additional MS4 outfall and receiving water monitoring stations and/or adjust monitoring frequencies to identify sources causing exceedances of the receiving water WQBELs.

(iv) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

Walsh, Laurie@Waterboards

From: Jack Monger <Jack.Monger@IEA-sd.com>
Sent: Friday, September 14, 2012 4:04 PM
To: Walsh, Laurie@Waterboards
Subject: Comments for Draft MS4 Permit
Attachments: IEA Comments_Regional MS4 Permit_FINAL.docx

Hello Laurie,

Please find our comment letter attached.

Feel free to contact me if you have any questions.

Best regards,

Jack

JACK MONGER
EXECUTIVE DIRECTOR
INDUSTRIAL ENVIRONMENTAL ASSOCIATION
110 West C Street, Suite 900 l San Diego, CA 92101
Telephone: 619-544-9684 l Facsimile: 619-544-9514
www.IEA-sd.com

INDUSTRIAL ENVIRONMENTAL ASSOCIATION

September12, 2012

VIA E-MAIL AND HAND DELIVERY

Ms. Laurie Walsh
WRC Engineer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4340

RE: NPDES Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region (Regional MS4 Permit) (Order No. R9-2012-0011)

Dear Ms. Walsh,

Please accept the following comments on behalf of the The Industrial Environmental Association (IEA) with regard to the draft language for the new Regional MS4 Permit.

IEA was formed in 1983 to promote responsible, cost-effective environmental laws and regulations, facilitate environmental compliance among member companies and provide related education activities for the community at large. IEA actively insists on strong environmental compliance efforts among member companies as a matter of written policy. Further, IEA urges reliance on scientific, analytical data to evaluate the regulations necessary to protect the public and the environment. Accordingly, IEA has reviewed the administrative draft Regional MS4 Permit and presents the following comments.

1. **Overall Methodology**- In general, IEA supports a Regional MS4 Permit promoting an adaptive planning and management process that allows implementation of appropriate strategies, control measures, and best management practices (BMPs) to protect and preserve water quality and suitable beneficial uses of waters of the state.

2. **Water Quality Improvement Plan Approach-** IEA recognizes the general intent of the Water Quality Improvement Plans (Section II. B.) is for Copermittees to develop focused watershed-based plans to identify water quality conditions and issues, develop priorities, establish strategies and schedules, and implement adaptive processes to carry out prioritized actions to improve water quality. IEA welcomes the opportunity to participate in the Water Quality Improvement Plan development process and

collaborate with Copermittees to develop targeted and cost-efficient strategies and assessment metrics aimed at water quality improvement.

3. **Monitoring and Assessment**- IEA recognizes a key goal of an effective Monitoring and Assessment framework (Section II. D.) is the collection of precise and useful data to inform stakeholders about water quality conditions in discharges and receiving waters. It is presumed that this data will allow for focused implementation actions and water quality improvement strategies. IEA is concerned that the current monitoring framework, although extensive, may not provide cost-effective informed data to guide future actions. Accordingly, IEA supports stakeholder involvement in developing a more strategic, cost-effective, question-driven monitoring approach. The approach should incorporate short-, medium-, and long-term goals and outline procedures to collect comparable data across watersheds/jurisdictions that allows for future statistical assessments. Short-term goals can include discharge and receiving water characterization to understand current conditions and track progress. Medium-term goals can include planning for Clean Water Act Section 303(d) listings/delistings and best available science-based TMDL development. Long-term goals can include collecting data appropriate for development of site-specific water quality objectives and potential revisions to Basin Plan objectives.

4. **Non-Storm Water Discharges**- IEA recognizes the Regional MS4 Permit intent to reduce transport of pollutants through elimination of non-storm water discharges (Section II. E. 2.). IEA supports the Regional MS4 Permit implementation approach for certain categories of non-storm water discharges. Specifically, the Regional MS4 Permit currently specifies that air conditioner condensation is a non-storm water discharge that must be directed to landscaped areas or other pervious surfaces *where feasible* (emphasis added). IEA members have previously independently evaluated this potential action and have identified potentially significant costs for compliance. A case study in the Los Penasquitos watershed estimated that due to current system configuration, re-routing the condensation line at one building facility would require ~$12,000 investment. For these reasons, it is suggested that these designs are limited to development/re-development, unless otherwise required by the Water Quality Improvement Plans. Also, non-emergency firefighting flows from controlled or practice blazes and fire suppression equipment maintenance activities can be treated with BMPs and in such cases should not be considered an illicit discharge.

   The Regional MS4 Permit appears to use the terms “illicit discharges” and “non-storm water discharges” interchangeably throughout the draft Permit. These terms have different meanings and cannot be used interchangeably. The Regional MS4 Permit definition of illicit discharges excludes discharges subject to NPDES permits and discharges resulting from firefighting activities. Therefore, these non-storm water discharges are not illicit discharges and are authorized discharges to MS4s. However, Finding 7 of the Regional MS4 Permit states: “The federal regulations [40 CFR 122.26(d)(2)(iv)(b)] require the Copermittees to have a program to prevent all types of non-storm water discharges, or illicit discharges, from entering the MS4”. This finding incorrectly equates non-storm water discharges and illicit discharges and is inconsistent with federal regulations [40 CFR 122.26(d)(2)(iv)(b)]. Whereas under federal regulation, the Copermittees’ program must address illicit discharges (which do not include discharges made pursuant to NPDES permits and discharges resulting from firefighting activities), the Regional MS4 Permit would incorrectly expand this “all types of non-storm water discharges”. Further, the Regional MS4 Permit definition of “non-storm water discharges” states: All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges and NPDES permitted discharges". Including "NPDES permitted discharges" in the definition of "non-storm water" could lead to the incorrect conclusion that, because the permit states that discharges of non-storm water to MS4s need to be prohibited, NPDES permitted discharges must be prohibited. IEA urges the RWQCB to revise the Regional MS4 Permit to eliminate this confusion and to clarify that discharges made pursuant to NPDES permits and discharges resulting from firefighting activities are not required to be prevented.

Further, the discharges need to be authorized to areas of the MS4 that discharge to ASBS as provided for in the SWRCB ASBS exception. Attachment A Section 2. A. 1. e. (non-storm water discharges to MS4s that discharge to ASBS), is missing the final language adopted into the ASBS exception that allows non-storm water discharges that do not affect natural water quality. The Regional MS4 Permit needs to find that these permitted discharges are authorized.

5. **Development Planning**- IEA supports the implementation of cost-effective methods to: "reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP) and effectively prohibit non-storm water discharges to provide the *reasonable* protection, preservation, enhancement, and restoration of water quality and designated beneficial uses of waters of the state" (emphasis added). IEA supports the business and development community in requesting the Development Planning (Section II. E. 3.) criteria for technical infeasibility and mitigation requirements for projects deemed technically infeasible be carefully examined. Given the poor soil infiltration rates in much of San Diego County, many development projects will likely demonstrate technical infeasibility in implementing cost-effective Low Impact Development (LID) and hydromodification controls. The process currently identified in the Regional MS4 Permit does not provide sufficient detail for consistency among Copermittees in evaluating technical infeasibility conditions and implementation of feasible mitigation alternatives. IEA supports development of a stakeholder-lead Technical Advisory Committee to assist in the revision of Section II. E. 3. to meet multiple objectives for both improved water quality and consideration of site-specific conditions and economic constraints.

   Further, linear underground/overhead projects, as defined in the State Water Resources Control Board (SWRCB) Construction General Permit, are exempt from post-construction BMPs. The Regional MS4 Permit needs to maintain consistency with the Construction General Permit on this issue.

6. **Existing Development Management-Inspections-** In general, IEA recognizes the importance of Copermittee inspection activities at inventoried existing development to ensure compliance with applicable local ordinances and permits and the Regional MS4 Permit. However, the draft Regional MS4 Permit currently states that inventoried existing development must be inspected within six months of any change in property ownership or change in pollutant generating activity [Section II. E. 5.d.(1).(a)]. Through the course of normal business operations, many IEA members make periodic adjustments to industrial processes, materials and handling procedures. Accordingly, in accordance with the state Industrial General Permit and local Copermittee ordinances, the facility Storm Water Pollution Prevention Plan is amended to reflect operations and other changes with potential to impact storm water quality discharging from the site.

   As written, the Regional MS4 Permit requires that Copermittees re-inspect facilities after these relatively minor changes that would potentially be considered a "change in pollutant generating activity". The potential increase in inspection frequency is an undue burden on both the Copermittees and the inspected facility. Accordingly, IEA recommends that Section II. E. 5.d.(1).(a) be revised to remove the provision that re-inspection be required after changes in pollutant generating activity at an existing development facility.

Thank you for the opportunity to comment regarding the draft language for the MS4 Permit. On behalf of IEA's 61 member companies, I appreciate your consideration.

Sincerely,

Jack Monger

Jack Monger
Executive Director

Walsh, Laurie@Waterboards

From:	Garrison, Noah <ngarrison@nrdc.org>
Sent:	Friday, September 14, 2012 3:19 PM
To:	Walsh, Laurie@Waterboards; Chiu, Wayne@Waterboards
Cc:	Kheyfets, Anna; Colin Kelly; jill@sdcoastkeeper.org
Subject:	NRDC Comment on Draft San Diego Regional MS4 Permit
Attachments:	NRDC SD Regional MS4 Comment (9-14-12 FINAL).pdf; EPA - Reducing Stormwater Costs through LID Strategies and Practices.pdf; LA County Mun Stormwater BS 080548.pdf; EPA - 2011 Fact Sheet NPDES MS4 Permit No DC0000221.pdf; State of West Virginia DEP - General NPDES Permit No WV0116025.pdf; Horner Gretz - 12-2011 Investigation of Feasibility and Benefits of LID.pdf; Horner - Investigation of Feasibility and Benefits of LID for Ventura County.pdf; Horner - 2007 Initial Investigation of the Feasibility and Benefits of LID for the SF Bay Area.pdf; Horner - 2007 Supplementary Investigation of the Feasibility and Benefits of LID for the SF Bay Area.pdf; ECONorthwest - Economics of LID-A Literature Review.pdf; American Society of Landscape Architects - Advocacy-Stormwater Overview Webpage.pdf; ECONorthwest - Managing Stormwater in Redevelopment and Greenfield using GI.pdf; BASMAA - 12-1-2010 Model Bioretention Soil Media Specifications-MRP Provision.pdf

Dear Ms. Walsh,

Attached, please find a comment letter from the NRDC on the April 9, 2012 Administrative Draft of the San Diego Region MS4 Permit and supporting documents. Two emails with additional supporting documents will follow this message. Please do not hesitate to contact me with any questions you may have,

Sincerely,

Noah Garrison

Noah Garrison
Project Attorney - Water Program
Natural Resources Defense Council
1314 Second Street
Santa Monica, CA 90401
Tel. 310.434.2300
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September 14, 2012

Via electronic mail

Mr. David Gibson
Executive Officer and Members of the Board
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123
Email: lwalsh@waterboards.ca.gov

Re: Comments on Tentative Order R9-2012-0011, San Diego Region MS4 Permit, April 9, 2012 Draft

Dear Mr. Gibson:

On behalf of the Natural Resources Defense Council ("NRDC"), we are writing with regard to the April 9, 2012, Draft National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds Within the San Diego Region, Draft permit R9-2012-0011, NPDES Permit No. CAS0109266 ("Draft Permit"). We appreciate the opportunity to submit these comments to the San Diego Regional Water Quality Control Board ("Regional Board") on the Draft permit.

I. Stormwater Runoff is a Leading Source of Water Pollution in the San Diego Region

The U.S. Environmental Protection Agency ("U.S. EPA") considers urban runoff to be "one of the most significant reasons that water quality standards are not being met nationwide."[1] As the U.S. EPA has stated:

> Most stormwater runoff is the result of the man-made hydrologic modifications that normally accompany development. The addition of impervious surfaces, soil compaction, and tree and vegetation removal result in alterations to the movement of water through the environment. As interception, evapotranspiration, and infiltration are reduced and precipitation is converted to overland flow, these modifications affect not only the characteristics of the developed site but also the watershed in

[1] U.S. General Accounting Office (June 2001) *Water Quality: Urban Runoff Programs*, Report No. GAO-01-679.

> which the development is located. Stormwater has been identified as one of the leading sources of pollution for all waterbody types in the United States. Furthermore, the impacts of stormwater pollution are not static; they usually increase with more development and urbanization.[2]

In the San Diego Region, the Regional Board has found that:

- Land development has created and continues to create new sources of non-storm water discharges and pollutants in storm water discharges as human population density increases. This brings higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, and trash. Pollutants from these sources are dumped or washed off the surface by non-storm water or storm water flows into and from the MS4s (Draft Permit, at Finding 11);

- [C]ommon pollutants in runoff discharged from the MS4s include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., cadmium, copper, lead, and zinc), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash (Draft Permit, at Finding 13); and,

- Copermittees' water quality monitoring data submitted to date documents persistent exceedances of Basin Plan water quality objectives for runoff-related pollutants at various watershed monitoring stations. Persistent toxicity has also been observed at several watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity (IBI) ratings. These findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in the San Diego Region. (Draft Permit, at Finding 15.)

The Draft Permit establishes requirements critical to addressing this pollution.

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[2] U.S. Environmental Protection Agency (December 2007) *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, at v.

II. Pollutants in Stormwater Must be Reduced to the Maximum Extent Practicable

Consistent with the federal Clean Water Act, a fundamental goal of all municipal stormwater permits is to ensure that discharges from storm sewers do not cause or contribute to a violation of water quality standards. (33 U.S.C. § 1341.) In addition, for MS4s covered under the National Pollutant Discharge Elimination System program, permits for discharges from municipal storm sewers:

> shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.

(33 U.S.C. § 1342(p)(3)(B)(iii).) The maximum extent practicable ("MEP") standard serves effectively as a floor to performance for regulated parties. This standard does not grant unbridled leeway to Permittees in developing controls to reduce the discharge of pollution. "[W]hat the discharger will do to reduce discharges to the 'maximum extent practicable' . . . crosses the threshold from being an item of procedural correspondence to being a substantive requirement of a regulatory regime." (*Environmental Defense Center, Inc. v. U.S. E.P.A* (9th Cir. 2003) 344 F.3d 832, 853.) The MEP standard "imposes a clear duty on the agency to fulfill the statutory command to the extent that it is feasible or possible." (*Defenders of Wildlife v. Babbitt*, 130 F. Supp. 2d 121, 131 (D.D.C. 2001); *Friends of Boundary Waters Wilderness v. Thomas*, 53 F.3d 881, 885 (8th Cir. 1995) ("feasible" means "physically possible").

As one state hearing board held:

> [MEP] means to the fullest degree technologically feasible for the protection of water quality, except where costs are wholly disproportionate to the potential benefits…. This standard requires more of Permittees than mere compliance with water quality standards or numeric effluent limitations designed to meet such standards…. The term "maximum extent practicable" in the stormwater context implies that the mitigation measures in a stormwater permit must be more than simply adopting standard practices. This definition applies particularly in areas where standard practices are already failing to protect water quality….

(*North Carolina Wildlife Fed. Central Piedmont Group of the NC Sierra Club v. N.C. Division of Water Quality* (N.C.O.A.H. October 13, 2006) 2006 WL 3890348, Conclusions of Law 21-22 (internal citations omitted).) The North Carolina board further found that the permits in question violated the MEP standard both because commenters highlighted measures that would reduce pollution more effectively than the permits' requirements and because other controls, such as infiltration measures, "would [also] reduce discharges more than the measures contained in the permits." (*Id.* at Conclusions of Law 19.)

Nor is MEP a static requirement—the standard anticipates and in fact requires new and additional controls to be included with each successive permit. As U.S. EPA has explained, NPDES permits, including the MEP standard, will "evolve and mature over time" and must be flexible "to reflect changing conditions." (55 Fed. Reg. 47990, 48052.) "EPA envisions application of the MEP standard as an iterative process. MEP should continually adapt to current conditions and BMP effectiveness and should strive to attain water quality standards. Successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards." (64 Fed. Reg. 68722, 68754.) In other words, successive iterations of permits for a given jurisdiction will necessarily evolve, and contain new, and more stringent requirements for controlling the discharge of pollutants in runoff.

Requiring compliance with MEP is often synonymous with achieving water quality standards and other common permit terms. Nonetheless, permits also require "such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." This language in section 1342(p) has been held by California courts to grant "the EPA (and/or a state approved to issue the NPDES permit) . . . the discretion to impose 'appropriate' water pollution controls in addition to those that come within the definition of 'maximum extent practicable.'" (*Building Industry Ass'n of San Diego County v. State Water Resources Control Bd.* (2004) 124 Cal.App.4th 866, 883 (citing *Defenders of Wildlife v. Browner* (1999) 191 F.3d 1159, at 1165–1167).) As a result, while the MEP standard represents a statutory floor, rather than limit, for permit requirements, the Regional Board and EPA maintain the authority to impose additional restrictions over and above MEP as they determine appropriate. Both California and EPA maintain that MS4 permits must include provisions to ensure that discharges do not cause or contribute to exceedances of water quality standards.

III. Permit Provisions

A. The Draft Permit's Receiving Water Limitations Appropriately Prohibit Discharges that Cause or Contribute to the Violation of Water Quality Standards.

Consistent with the 2007 San Diego County MS4 Permit and federal authority,[3] the Draft Permit requires that "Discharges from MS4s must not cause or contribute to the violation of water quality standards in any receiving waters." (Draft Permit, at § II.A.2.a.)[4] Multiple California and federal courts have upheld such provisions, including in prior

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[3] Order No. R9-2007-0001 ("2007 San Diego Permit").
[4] See, 2007 San Diego Permit, at § A.3; see also, South Orange County MS4 Permit, Order No. R9-2009-0002, at § A.3.

iterations of the San Diego MS4 Permit.[5] As such, the prohibition against discharges that cause or contribute to violations of water quality standards is appropriately incorporated into the Draft Permit's receiving water limitations here. Moreover, any weakening of the receiving water limitations language would constitute a violation of the Clean Water Act's anti-backsliding provisions.[6] The adopted permit must require compliance with water quality standards, without restriction.

B. The Draft Permit's Development Planning Requirements Must Require On-Site Retention of the 85th Percentile Storm

We strongly support that the Draft Permit establishes requirements for new development and redevelopment projects to retain, on-site, the runoff from the 85th percentile, 24-hour rain event.[7] This requirement, resulting in retention of stormwater runoff with no off-site discharge in the vast majority of storms, is consistent with on-site retention requirements of other permits throughout California, as well as in permits and ordinances found in all corners of the United States. Similar or more stringent requirements are included in the following permits:

Ventura County: MS4 permit requires on-site retention of ninety-five percent of rainfall from the 85th percentile storm; off-site mitigation allowed if on-site retention is technically infeasible;[8]

South Orange County: MS4 permit requires on-site retention of the 85th percentile storm, off-site mitigation allowed if on-site retention is technically infeasible;[9]

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[5] *See, e.g., Building Industry Ass'n of San Diego County*, 124 Cal.App.4th at 883; *In re L.A. County Mun. Storm Water Permit Litigation.*, No. BS 080548 at 4-7 (L.A. Super. Ct. Mar. 24, 2005) ("*L.A. County Mun. Stormwater*"); *County of Los Angeles v. Cal. State Water Res. Control Bd.* (2006) 143 Cal.App.4th 985, 989; *Natural Resources Defense Council v. County of Los Angeles* (2011) 673 F.3d 880, 897. The court in *In re L.A. County Mun. Stormwater* noted that, "the Regional Board acted within its authority when it included Parts 2.1 and 2.2 in the Permit without a 'safe harbor,' whether or not compliance therewith requires efforts that exceed the 'MEP' standard." (*In re L.A. County Mun. Stormwater*, at 7.) But regardless of this authority, the Court found that "the terms of the Permit taken, as a whole [including the Permit's receiving water limitations], constitute the Regional Board's definition of MEP." (*Id*. at 7-8.)

[6] 40 C.F.R. 122.44(l)(1) provides that except for a narrow set of enumerated circumstances, "when a permit is renewed or reissued, interim effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit."

[7] We note, however, that the evidence presented below, including reports from Dr. Richard Horner and examples of permits and ordinances from other jurisdictions, would support requirements for projects to retain runoff from up to and including the 95th percentile storm event.

[8] Los Angeles Regional Water Quality Control Board (July 8, 2010) Ventura County Municipal Separate Stormwater National Pollutant Discharge Elimination System (NPDES) Permit; Order No. R4-2009-0057; NPDES Permit No. CAS004002.

[9] San Diego Regional Water Quality Control Board (December 16, 2009) South Orange County MS4 Permit, Order No. R9-2009-0002, NPDES Permit No. CAS0108740.

Washington D.C.: MS4 permit requires retention of the first 1.2 inches of stormwater (which represents the 90th percentile storm) for all new development and redevelopment over 5,000 square feet.[10]

West Virginia: Statewide Phase II MS4 permit requires on-site retention of "the first one inch of rainfall from a 24-hour storm" event unless infeasible;[11] and,

Philadelphia, PA: Infiltrate the first one inch of rainfall from all impervious surfaces; if on-site infiltration is infeasible, the same performance must be achieved off-site.[12]

These jurisdictions have recognized the paramount importance of mandating onsite retention of a certain quantity of stormwater since, in contrast to retention practices, which ensure that 100 percent of the pollutant load in the retained volume of runoff does not reach receiving waters, biofiltration (or other LID flow-through) practices that treat and then discharge runoff through an underdrain result in the release of pollutants to receiving waters. Indeed, in order to achieve equivalent pollutant load reduction benefits to the use of on-site retention, biofiltration practices would have to be 100 percent effective at filtering pollutants from runoff, which they are invariably not. As a result, while biofiltration practices (or conventional flow-through) practices may be appropriate for on-site treatment when coupled with an offsite mitigation requirement in cases of technical infeasibility (discussed further below), they are not a proper substitute for LID practices that retain water on-site.

This conclusion is borne out by data presented in the Draft Ventura County Technical Guidance Manual, which estimates pollutant removal efficiency for total suspended solids to be 54-89 percent, and for total zinc to be 48-96 percent.[13] Biofiltration has additionally been shown to be a particularly ineffective method of pollutant removal for addressing nitrogen or phosphorous, two common contaminants found in stormwater.[14] The Draft Ventura Technical Guidance, for example, indicates that biofiltration achieves

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[10] U. S. EPA (2011) Fact Sheet, National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. DC0000221 (Government of the District of Columbia).

[11] State of West Virginia Department of Environmental Protection, Division of Water and Waste Management, General National Pollution Discharge Elimination System Water Pollution Control Permit, NPDES Permit No. WV0116025 at 13-14 (June 22, 2009).

[12] City of Philadelphia (Jan. 29, 2008) Stormwater Management Guidance Manual 2.0, at 1.1, available at.

[13] Ventura County Low Impact Development Technical Guidance Manual, July 13, 2011, at D-7.

[14] Lawn irrigation has been identified as a "hot spot" for nutrient contamination in urban watersheds—lawns "contribute greater concentrations of Total N, Total P and dissolved phosphorus than other urban source areas . . . source research suggests that nutrient concentrations in lawn runoff can be as much as four times greater than other urban sources such as streets, rooftops or driveways." Center for Watershed Protection (March 2003) *Impacts of Impervious Cover on Aquatic Systems* at 69; see also H.S. Garn (2002) *Effects of lawn fertilizer on nutrient concentration in runoff from lakeshore lawns, Lauderdale Lakes, Wisconsin*. U.S. Geological Survey Water- Resources Investigations Report 02-4130 (In an investigation of runoff from lawns in Wisconsin, runoff from fertilized lawns contained elevated concentrations of phosphorous and dissolved phosphorous).

pollutant removal efficiency for total nitrogen at between only 21-54 percent,[15] as compared with 100 percent for runoff retained on-site.

The retention requirement in the Draft Permit is additionally supported by recent technical analysis by national stormwater expert Dr. Richard Horner. Dr. Horner's analysis demonstrates that, for five different types of land use development or redevelopment projects in Southern California, the full 85th percentile, or even the full 95th percentile, 24-hour precipitation event could be retained on-site using *only* infiltration practices on sites overlying soils classified as Group C (typically containing 20 to 40 percent clay) under the Natural Resources Conservation Service (NRCS) major soil orders classification scheme.[16] Even for sites overlying Group D soils (typically 40 percent or more clay with substantially restricted water transmissivity) and assuming no infiltration was feasible, greater than 50 percent of the 85th percentile storm could be retained at each development type using only rooftop runoff dispersion or harvest and reuse techniques.[17] Additional retention under these scenarios could be achieved through use of evaporation practices, or, in cases where some infiltration is feasible, use of infiltration BMPs.

Additional analysis by Dr. Horner has amply demonstrated both the viability of, and need for, such a retention standard. A principal reason to adopt such an approach is the superior pollutant load reduction capacity of LID practices that retain runoff on-site, for a variety of climatic scenarios, including for the San Diego region.[18] With particular regard to the feasibility of the type of retention standard proposed by the Draft Permit, Dr. Horner has found that, in nearly all case studies, "all storm water discharges could be eliminated at least under most meteorological conditions by dispersing runoff from impervious surfaces to pervious areas."[19]

[15] Ventura County Low Impact Development Technical Guidance Manual, July 13, 2011, at D-7. See also, BASMAA (December 1, 2010) *Draft Model Bioretention Soil Media Specifications-MRP Provision C.3.c.iii*, at Annotated Bibliography section 3.0 (noting nutrient removal from synthetic stormwater runoff demonstrated only 55 to 65 percent of total Kjeldahl nitrogen removal and that only 20 percent of nitrate is removed from the runoff).
[16] Dr. Richard Horner and Jocelyn Gretz (November 2011) Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices Applied to Meet Various Potential Stormwater Runoff Regulatory Standards; Natural Resources Conservation Service, Distribution Maps of Dominant Soil Orders (http://soils.usda.gov/technical/classification/orders/, last accessed December 16, 2011).
[17] Id. We note as well that even in areas characterized regionally as underlain by D soils, site specific investigation may establish substantial potential for infiltration of runoff.
[18] Id.; see also, Horner, Richard. Report for Ventura County; Horner, Richard. Initial Investigation for San Francisco Bay Area; Horner, Richard. Supplementary Investigation for San Francisco Bay Area; Horner, Richard. Report for San Diego Region.
[19] Horner, Ventura Report, at 15.

1. LID Is Cost-Effective and Provides Significant Economic Benefits

LID "provides ecosystem services and associated economic benefits that conventional stormwater controls do not."[20] Because traditional stormwater management approaches involve the construction of complex systems of infrastructure, they can entail substantial costs. Since LID attempts to mimic the predevelopment hydrology of a site, emphasizing storage and use, infiltration, and use of a site's existing drainage conditions, "[c]ost savings are typically seen in reduced infrastructure because the total volume of runoff to be managed is minimized."[21] A 2007 U.S. EPA study found that "in the vast majority of cases . . . implementing well-chosen LID practices saves money for developers, property owners, and communities while protecting and restoring water quality."[22] With only "a few exceptions," the EPA study found that "[t]otal capital cost savings ranged from 15 to 80 percent when LID methods were used" instead of conventional stormwater management techniques.[23] The savings identified in documented studies are noteworthy considering they do not reflect the additional economically beneficial attributes LID provides, including reduced costs of municipal infrastructure, reduced costs of municipal stormwater management, and increased value of real estate.[24]

Nor is the EPA study alone in reaching this conclusion. A survey released by the American Society of Landscape Architects in 2011 found that green infrastructure reduced or did not influence project costs 75 percent of the time.[25] A joint project by the University of New Hampshire Stormwater Center and Virginia Commonwealth University found that use of LID provided stormwater management cost savings of 6 percent for residential development and 26 percent for commercial developments as compared with conventional stormwater management.[26] And while the economics of integrating LID into redevelopment projects vary slightly from new development, there is little evidence it typically raises project costs. An analysis of three communities by ECONorthwest found that while complying with stormwater standards, including strict

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[20] ECONorthwest, The Economics of Low-Impact Development: A Literature Review, at iii. (2007) ("ECONorthwest") (Exh. 61).
[21] U.S. EPA Cost Study, at 2; U.S. Department of Housing and Urban Development, The Practice of Low Impact Development, at 33 (2003) (Exh. 62).
[22] U.S. EPA Cost Study, at iii.
[23] *Id.* at iv.
[24] See ECONorthwest, at 5; *Id*. at 15 (disconnecting downspouts to allow for natural infiltration in the Beecher Water District near Flint, Michigan cost the district about $15,000, but decreased the mean volume of sewer flows by 26 percent, and saved the district more than $8,000 per month in stormwater fees); U.S. EPA Cost Study, at 7.
[25] American Society of Landscape Architects (2011) Advocacy: Stormwater Case Studies.
[26] Roseen, R., T. Janeski, J. Houle, M. Simpson, and J. Gunderson (2011) *Forging the Link: Linking the Economic Benefits of Low Impact Development and Community Decisions*. University of New Hampshire Stormwater Center, the Virginia Commonwealth University, and Antioch University New England; see generally, NRDC (2011) Rooftops to Rivers II: Green Strategies for Controlling Stormwater and Combined Sewer Overflows, at 19-30.

runoff volume reduction requirements, is a cost consideration, it is rarely, if ever, a driving factor in decisions to undertake redevelopment projects.[27]

Further, LID can provide substantial benefits for the San Diego region in terms of increased local supply of water and reduced energy usage, in addition to the stormwater runoff and pollution benefits it can provide.[28]

2. The Draft Permit Properly Requires a Determination that it is Technically Infeasible to Retain the Design Storm On-Site.

Although we support the inclusion of strong retention standards for stormwater runoff, and the Draft Permit's requirement to incorporate on-site treatment in addition to performance of offsite mitigation in the event of technical infeasibility for on-site retention, we are concerned by statements of Regional Board staff that they "would like to make a shift away from determining what is infeasible onsite to determining what is feasible onsite. . . ." (Regional MS4 Permit RWQCB Workshop Notes, September 5, 2012, at 4.) Retention of the 85th Percentile Storm event has been established as MEP in California Permits;[29] responsibility is properly placed on the project proponent to establish, given site specific conditions, that this standard cannot be met.

3. The Draft Permit's Mitigation Requirements for Offsite Projects Must Prioritize Projects that Retain Runoff With no Discharge to Receiving Waters.

While we support the Draft Permit's requirement that a Priority Development Project meeting the technical infeasibility criteria for on-site retention must perform on-site treatment of runoff and additionally implement an offsite mitigation project (or provide sufficient funding for an offsite mitigation project), we note that in order to ensure that equivalent pollutant load is reduced as would have been achieved through on-site retention, the Mitigation program should prioritize implementation of offsite projects that retain runoff with no discharge. These may include, as identified in the Draft Permit, retrofitting opportunities, green streets, infrastructure projects, or regional BMPs that

[27] ECONorthwest (2011) "Managing Stormwater in Redevelopment and Greenfield Development Projects Using Green Infrastructure: Economic Factors that Influence Developers Decisions,"prepared by S. Reich et al, accessed at http://www.americanrivers.org/assets/pdfs/reports-andpublications/stormwater-green-report.pdf, p. 2.

[28] See, NRDC and University of California at Santa Barbara (2009) A Clear Blue Future: How Greening California Cities Can Address Water Resources and Climate Challenges in the 21st Century; See also, NRDC (2011) Capturing Rainwater from Rooftops: An Efficient Water Resource Management Strategy that Increases Supply and Reduces Pollution; NRDC and University of California at Los Angeles (2012) Looking Up: How Green Roofs and Cool Roofs Can Reduce Energy Use, Address Climate Change, and Protect Water Resources in Southern California.

[29] See, e.g., Ventura County MS4 Permit, Order No. R4-2009-0057; San Francisco Bay Area MS4 Permit, Order No. R2-2009-0074; North Orange County MS4 Permit, Order No. R8-2009-0030; South Orange County MS4 Permit, Order No. R9-2009-0002.

receive runoff from multiple sites. However, as demonstrated above, retention BMPs, including infiltration, harvest and re-use, and evaporation, result in a greater reduction in pollutant load than do projects that treat and discharge runoff to receiving waters, while simultaneously reducing flooding that treat and discharge projects may do little to abate. Further, LID retention projects can be designed to capture water through infiltration or rainwater harvesting to increase local water supplies, a critical concern for the region. As a result, the Draft Permit's Mitigation program should focus on retention of stormwater runoff, and not solely on a range of projects identified as broadly beneficial in Permittee Water Quality Improvement Plans.

IV. <u>Conclusion</u>

We appreciate this opportunity to comment on the Draft Permit. Please feel free to contact us with any questions or concerns you may have.

Sincerely,

Noah Garrison
Project Attorney
Natural Resources Defense Council

Walsh, Laurie@Waterboards

From:	Garrison, Noah <ngarrison@nrdc.org>
Sent:	Friday, September 14, 2012 3:19 PM
To:	Walsh, Laurie@Waterboards; Chiu, Wayne@Waterboards
Cc:	Kheyfets, Anna; Colin Kelly; jill@sdcoastkeeper.org
Subject:	Additional supporting documents for NRDC comment on Draft San Diego Regional MS4 Permit 1/2
Attachments:	NRDC - Clear Blue Future 2009.pdf; NRDC - Capturing Rainwater 2011.pdf; NRDC - Green Roofs 2012.pdf; NRDC - Rooftops to Rivers II 2011 Green Strategies for Controlling Stormwater.pdf

Supporting email 1 of 2.

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Walsh, Laurie@Waterboards

From:	Garrison, Noah <ngarrison@nrdc.org>
Sent:	Friday, September 14, 2012 3:19 PM
To:	Walsh, Laurie@Waterboards; Chiu, Wayne@Waterboards
Cc:	Kheyfets, Anna; Colin Kelly; jill@sdcoastkeeper.org
Subject:	Additional supporting documents for NRDC comment on Draft San Diego Regional MS4 Permit 2/2
Attachments:	Ventura County Low Impact Development Technical Guidance Manual -07-13-2011.pdf

Supporting email 2 of 2.

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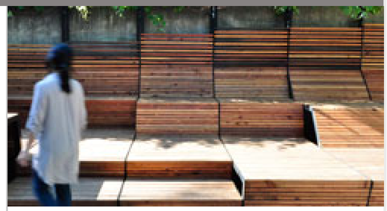
Advocacy



STORMWATER OVERVIEW

The Environmental Protection Agency (E.P.A.) recently initiated a national rulemaking to establish a comprehensive program to reduce stormwater runoff from new development and re-development projects, and make other improvements to strengthen its stormwater program. The E.P.A. announced that during this rulemaking process it will evaluate sustainable green infrastructure design techniques that mimic natural processes to evapo-transpire, infiltrate and recharge, and harvest and reuse stormwater.

The EPA asked ASLA to collect case studies on projects that successfully and sustainably manage stormwater. ASLA members responded with 479 case studies from 43 states, the District of Columbia, and Canada. Not only do these projects showcase landscape architecture, they also demonstrate to policymakers the value of promoting green infrastructure policies. Green infrastructure and low-impact development (LID) approaches, which are less costly than traditional grey infrastructure projects, can save communities millions of dollars each year and improve the quality of our nation's water supply.

An analysis of the case studies:

Project type:
Institutional/Education — 21.5%
Open Space/Park — 21.3%
Other — 17.6%
Transportation Corridor/Streetscape — 11.9%
Commercial —8.6%
Single Family Residential — 5.5%
Government Complex — 4.2%
Multifamily Residential — 3.7%
Open Space-Garden/Arboretum —2.9%
Mixed Use — 1.8%
Industrial — 1.1%

Estimated cost of green infrastructure:
$100,000–$500,000 — 29.2%
$1,000,000–$5,000,000 — 22.1%
$500,000–$1,000,000 — 13.2%
$50,000–$100,000 — 12.9%
$10,000–$50,000 — 12.1%
<$5,000,000 — 7.0%
>$10,000 — 3.5%

Green infrastructure type:
Retrofit of existing property — 50.7%
New development — 30.7%
Redevelopment project — 18.6%

How much impervious area was managed?
1 acre to 5 acres — 34.5%
5,000 sq/ft to 1 acre — 31.3%
greater than 5 acres — 24.8%
less than 5,000 sq/ft — 9.5%

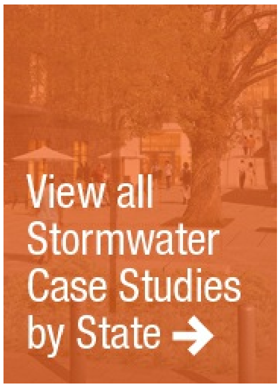
Did use of green infrastructure increase costs?
Reduced costs — 44.1%
Did not influence costs — 31.4.7%
Increased costs — 24.5%

Green infrastructure design approaches used:
Bioswale — 62.1%
Rain garden — 53.2%
Bioretention facility — 50.8%
Permeable pavement systems — 47.3%
Curb cuts — 37.9%
Cistern — 21.2%
Downspout removal — 18.1%
Green roof — 16.5%
Rain barrels — 5.7%

EPA I Office of Water

ASLA Water and Stormwater

CAMPAIGN FOR GREEN INFRASTRUCTURE



Partners:
American Rivers
NRDC

ANALYSIS

- Over 300 ASLA members and other practitioners responded with 465 case studies
- Case studies were submitted from 43 states, the District of Columbia, and Canada.
- 55 percent of the projects were designed to meet a local ordinance.
- 88 percent of local regulators were supportive of the green infrastructure projects submitted.
- 68 percent of the projects received local public funding.

ADVOCACY
Economic Recovery
Transportation
Sustainable Design
Livable Communities
Water & Stormwater
Historic Landscapes

contact

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BASMAA

Alameda Countywide Clean Water Program

Contra Costa Clean Water Program

Fairfield-Suisun Urban Runoff Management Program

Marin County Stormwater Pollution Prevention Program

Napa County Stormwater Pollution Prevention Program

San Mateo Countywide Water Pollution Prevention Program

Santa Clara Valley Urban Runoff Pollution Prevention Program

Sonoma County Water Agency

Vallejo Sanitation and Flood Control District

Bay Area

Stormwater Management

Agencies Association

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December 1, 2010

Bruce Wolfe, Executive Officer
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: Model Bioretention Soil Media Specifications–MRP Provision C.3.c.iii.(3)

Dear Mr. Wolfe:

This letter and attachments are submitted on behalf of all 76 permittees subject to the requirements of the Municipal Regional Stormwater NPDES Permit (MRP).

Provision C.3.c.iii.(3) requires the permittees, collaboratively or individually, to submit a report containing the following information:

- Proposed soil media specifications for biotreatment systems;
- Proposed soil testing methods to verify a long-term infiltration rate of 5-10 inches/hour;
- Relevant literature and field data showing the feasibility of the minimum design specifications;
- Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria; and
- Guidance for the permittees to apply the minimum specifications in a consistent and appropriate manner.

The permittees have worked diligently since the MRP was adopted in October 2009 to develop this information. The work has been carried out collaboratively among the permittees and in cooperation with your staff.

In April 2010 the permittees sponsored a roundtable discussion of bioretention soils. The roundtable included members of your staff, consultants, permittee staff, and representatives of the building industry. This diverse group included soil scientists and soils engineers with expertise in soil testing and construction of bioretention facilities. The meeting was facilitated by Sandi Potter of your staff.

Based on that discussion, BASMAA retained WRA, Inc., to develop regional guidance for bioretention soil. WRA was directed to use as a starting point guidance they had previously developed for the Contra Costa Clean Water Program (CCCWP). The CCCWP published its guidance in February 2009 as Appendix B to their *Stormwater C.3 Guidebook*. Contra Costa permittees have overseen construction of many bioretention facilities using this guidance and have had the opportunity to see the facilities perform through at least one full rainy season. The “soil” is a mix of 60-70% sand meeting a size gradation consistent with ASTM C33 for fine aggregate and

30-40% compost meeting the standards developed by the US Composting Council. The sand and compost are readily available from Bay Area suppliers, and at least two companies currently provide and advertise their own versions of the bioretention "soil" mix. For the regional guidance, WRA has recommended some minor improvements and clarifications to the Contra Costa guidance.

The permittees are pleased to make this guidance available to permittee staff and the land development community. However, we believe the MRP should continue to allow, as it does now, room for experimentation and innovation with bioretention soils, as long as that experimentation and innovation is within the bounds of the minimum requirements needed to achieve effective stormwater treatment.

MRP Provision C.3.c.i.(2)(b)(vi) currently provides that: "Bioretention systems shall be designed to have a surface area no smaller than what is required to accommodate a 5-inch-per-hour stormwater runoff surface loading rate." This existing permit requirement sets the minimum square footage of the bioretention facility. For a facility this size to successfully treat the design runoff flow, the soil media must infiltrate runoff at a rate of at least 5 inches per hour. Thus, the essential characteristic of the bioretention soil is already established within the permit.

Accordingly, we recommend that the Regional Water Board take no action with regard to bioretention soil specifications, as the current MRP language is already adequate to the purpose. However, if the permit is to be amended to explicitly incorporate a bioretention soil objective, we recommend the following:

> "Soils for bioretention facilities must be sufficiently permeable to infiltrate runoff at a minimum rate of 5 inches per hour during the life of the facility, and must provide sufficient retention of moisture and nutrients to support healthy vegetation."

The guidance developed by WRA on behalf of the permittees meets this objective, and the guidance is clearly feasible to implement, but it would be incorrect (and counterproductive) to suggest this guidance is the only means and method by which the objective can be achieved.

Similarly, WRA's report includes proposed testing methods for verification of alternative bioretention soil mixes. Although this information will be useful to permittee staff, some permittees have already indicated a preference for fewer or different tests to estimate the long-term infiltration rate.

WRA's report also includes guidance on soil installation, the use of mulch, water conservation, and other topics of interest to designers and operators of bioretention facilities. This information is outside the scope of permit requirements, but will be useful to permittee staff and land development professionals.

We thank your staff for their helpful and attentive participation in the April roundtable and other discussions leading to this submittal.

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James Scanlin, Alameda Countywide Clean Water Program

Tom Dalziel, Contra Costa Clean Water Program

Kevin Cullen, Fairfield-Suisun Urban Runoff Management Program

Matt Fabry, San Mateo Countywide Water Pollution Prevention Program

Adam Olivieri, Santa Clara Valley Urban Runoff Pollution Prevention Program

Lance Barnett, Vallejo Sanitation and Flood Control District

Attachments:
Technical Memorandum, "Regional Bioretention Soil Guidance and Model Specification," by WRA, Inc.
Technical Memorandum, "Regional Bioretention Installation Guidance," by WRA, Inc.
Annotated Bibliography, "Regional Biotreatment Soil Guidance," by WRA, Inc.

cc: Tom Mumley, Regional Water Board
Shin-Roei Lee, Regional Water Board
Dale Bowyer, Regional Water Board
Sue Ma, Regional Water Board
BASMAA Board of Directors

TECHNICAL MEMORANDUM

Regional Bioretention Soil Guidance & Model Specification
Bay Area Stormwater Management Agencies Association

Prepared For:

Bay Area Stormwater Management Agencies
Association (BASMAA)

Contact:

Megan Stromberg
stromberg@wra-ca.com

Date:

November 12, 2010

ENVIRONMENTAL CONSULTANTS

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TABLE OF CONTENTS

INTRODUCTION

Recently the San Francisco Bay Regional Water Quality Control Board issued the Municipal Regional Stormwater Permit. The Bay Area Stormwater Management Agencies Association (BASMAA) engaged WRA to provide guidance and specification for bioretention soils to assist stormwater agencies at the associated municipalities in meeting the requirements of the permit.

This report provides model soil guidance and specification with the goal of providing a long-term infiltration rate of 5 to 10 inches per hour, providing stormwater treatment and supporting plant health. The guidance and specification is provided such that Permittees can apply the minimum specifications in a consistent and appropriate manner.

This report is organized into two parts. Part 1 provides the justification for recommendations made for the Regional Bioretention Soil Mix Guidance to better meet the requirements of the Municipal Regional Stormwater Permit. Part 2 provides guidance and a draft Model Specification for Bioretention Soil.

PART 1 - JUSTIFICATION

1.0 COMPOST

Compost has been a focus of many bioretention soil mixes because it has been shown to increase water holding capacity and attenuate pollutants from stormwater.

1.1 Compost Particle Size

Fines play an important role in bioretention facilities. Cation exchange capacity (CEC) is known to improve the removal of metals in bioretention soils (Jurries 2003). CEC refers to the quantity of negative charges in soil. The negative charges attract positively charged ions, or cations, hence the name 'cation exchange capacity'. In addition to metals, many essential plant nutrients exist in the soil as cations. The primary factor determining CEC is the clay and organic matter content of the soil. Fines will raise the CEC of a soil and thus the pollutant removal capacity as well as the nutrient availability for plant health.

However, there is mixed information on how fines relate to permeability. In part this is due to the different ways the fine fraction of a soil may be characterized. Some research indicates that hydraulic conductivity of bioretention soil mixes is correlated to percent passing the 200 sieve (0.003"), i.e. fines. Curtis Hinman's bioretention soil mix review and recommendations for Western Washington states that fines passing the 200 sieve should ideally be between 2 and 4 percent to produce a bioretention soil mix with a long-term infiltration rate of between 1 and 12 inches per hour (Hinman 2009). In contrast, Scott Wikstrom of the City of Walnut Creek states that the mineralogy and particle size of the fines is critical to the degree of impact they will have on permeability. Although both silt and clay pass the 200 sieve, his experience is that silt will have minimal impact while highly plastic clay will have a significant effect on permeability. In practice, he has observed that the bioretention soils formulated using Contra Costa County's specification are more likely to easily meet the minimum standard 5 inches per hour than they are to fail (Personal Communication 2010). Current Contra Costa guidance only specifies 0 - 5% passing the 200 sieve size for the fine aggregate and has no specification for compost particle gradation.

A third hypothesis is proposed by Frank Shields of Soil Control Lab. He points to particle size gradation, not particle size distribution, as determining a soil's infiltration rate (Personal

Communication 2010). He has implied that to limit the risk of compost plugging the bioretention soil mix, we should target the correct gradation. Perhaps both size and gradation are important to consider. Screening compost to remove fines effectively creates an 'open graded' compost. 'Open graded' refers to a gradation that contains only a small percentage of aggregate particles in the small range relative to the overall mix. This results in more air voids because there are not enough small particles to fill in the voids between the larger particles. Open graded aggregate is used to create pervious concrete, for example.

Anecdotally, in mixing soils to meet the Contra Costa County performance specification for infiltration rate, Rob Hawkins of LH Voss Landscape Materials in Dublin and Stockton, California has experienced problems when using whole compost that was not screened to remove some fines. His company uses a blend of different compost types to create a custom coarse compost. He provided analytical testing results for his bioretention soil mix conducted from earlier this year. Particle size distribution test results show that his bioretention mix contains over 12% passing the 200 sieve size. Yet, the percolation rate using the 'dirt bong' method developed by Contra Costa County, was between 14 and 72 inches per hour. More recently, his compost blend has been the following blend: 1/3 BFI 'whole compost,' 1/3 Zanker wood fines (screened compost with particle sizes between ¼" to ½") and 1/3 recycled redwood fencing in its bioretention soil mix. He will provide particle size analysis and infiltration rate testing of his new blend as soon as it becomes available in the next few weeks.

Screening whole compost will reduce percentages of fine particles in the compost but this screened 'coarse' compost is only available from some suppliers. Adding to the lack of clear information on this topic, compost is not routinely tested for particle size distribution to below the size 10 sieve (0.079"). Earl Boyd of Lyngso Garden Materials in Redwood City, California stocks 'Verma Green' compost that is a coarser blend than their premium compost. Boyd stated that Verma Green compost has less than 10% passing the 200 sieve (Personal communication 2010). If used with ASTM C33 fine aggregate which has a maximum of 5% passing the 200 sieve, the overall bioretention soil mix would therefore have more than 5% passing the 200 sieve size. However, without comprehensive testing of compost and ASTM C33 blends, we may not have a clear answer about how the permeability relates to fines.

In summary, existing literature suggests that fines in the overall mix should include fines in the range 2 – 4% but even within this range, the permeability will vary from 1 to 12 inches per hour. Scott Wikstrom suggests that fines in the range of 6-12% may produce an acceptable infiltration rate. This hypothesis is confirmed by the analytical testing provided by LH Voss Materials. Compost is widely available with fines in the range of 8 - 12%. Municipalities have observed that previously constructed biofiltration basins are meeting the minimum infiltration rate specification without limiting the fines in compost.

1.2 Nutrient Leaching from Compost

Compost amended soils are generally good or very good at retaining metals, hydrocarbon, organics, and bacteria (Davis 2006, Hinman 2009). Total phosphorous and total nitrogen removal in bioretention is good compared to other stormwater treatment practices; however, phosphate and nitrate reduction is variable in bioretention basins with underdrains (Davis 2006, Chi-hsu 2005, Hunt 2003, Hunt 2006). Until recently, loadings of nitrogen and phosphorous to San Francisco Bay have not been a high-priority regulatory concern; however, the State Water Resources Control Board, supported by USEPA Region IX is implementing an Estuarine Nutrient Numeric Endpoint Project.

Hinman (2009) and Hunt (2006) suggest that the design of bioretention facilities is at the heart of the issue of nutrient export rather than compost or media design.Hinman suggests that depth of media should be 24" to 36" to minimize export of phosphorous (2009). Current specification requires a minimum depth of 18". Recent research by Hunt (2006) also suggests that a laboratory analysis for bio-available phosphorous may correlate with phosphorous export from bioretention areas. Biosolids and manure composts can be higher in bio-available phosphorous than compost derived from yard or plant waste. Accordingly, biosolids or manure compost in bioretention areas are not recommended to reduce the possibility of exporting bio-available phosphorous in effluent.

Hunt's studies (2006) indicate that bioretention designs with underdrains do not reduce nitrate-nitrogen levels sufficiently, as such bioretention facilities are constructed without any zone designed to be saturated and anaerobic. For nitrate-nitrogen to be converted to nitrogen gas, thus enhancing total nitrogen removal, an anaerobic zone is necessary (Hunt 2003, Hunt 2006). An elevated underdrain, allowing for a saturated zone beneath the drain, may improve nitrate removal more consistently than changing the bioretention soil mix.

Because design changes are beyond the scope of this report, we researched ways to minimize nitrate export from bioretention soils. Compost is intermediate between soil organic matter and fertilizers in its release rates of nitrate in the first season of application (Claassen and Young 2010). However, diversity in the types and sources of raw organic solid waste combined with the various processing procedures used to produce composted materials results in different physical and chemical properties in the composted products (Frank Shields, personal communication 2010). It is therefore difficult to generalize nutrient leaching from compost with the variety of sources of composted materials.

However, one recent study by CalTrans has identified some trends in compost and leaching. They propose that organic carbon, phosphorous and metal leaching losses steadily decline as compost ages; but that losses of nitrogen-rich compounds peak with mature compost (4 weeks old) and then decline with curing (except nitrate, which remains at very low levels). In addition, potassium increases with compost age, as does nitrate slightly. (Claassen and Young 2010).

In contrast, Frank Shields of Soil Control Lab states that while compost age and texture may generally relate to nutrient leaching, he hypothesizes that these factors will not always predict leaching potential. He explains that it is possible to estimate nitrate leaching potential by evaluating compost for its stability. He therefore provides some background on how nitrate is released from compost: Young compost that has not been cured contains many different forms of organic matter. Many of these types are readily available to soil organisms (fats, oils, polysaccharides, etc) and some are not (lignin, cellulose, proteins). As organisms consume carbon they must also consume nitrogen. The bio-available forms of carbon are consumed first and nitrogen is not released. As the consumption of carbon slows the compost may then begin to leach nitrates. With cured or aged compost, all the bio-available forms of carbon have already been consumed. Such compost is therefore said to be 'stable.' Stable composts will release nitrogen at a slow and steady rate (Shields, personal communication, 2010). Current specification already requires that compost be stable because this is a basic requirement for certification by the US Composting Council.

Shields further recommends that the Carbon to Nitrogen (C:N) ratio should be evaluated. Some composts are stable but are high in nitrogen (such as those from grass clippings or chicken manure). A C:N ratio below 10:1 can supply nitrogen even if it is stable. Hinman (2009) recommends a C:N ratio of between 20:1 and 25:1 for compost used in bioretention basins.

Soil and Compost Lab states that a compost with a C:N ratio above 20:1 can deplete nitrogen from the soil (Broadmoor 2010). Therefore, a compost with a C:N ratio of between 15:1 and 25:1 may balance the need for nitrogen for plant health with the desire to limit nitrate leaching.

Claassen and Young state that compost only boosts nutrient export temporarily. In the long-term (perhaps three or four years), most plant-based composts appear to develop similar rates of nitrogen release that are generally similar to soil organic matter (Claassen and Young 2010). By specifying compost that is stable, peaks in nitrogen export should be minimized. The specification should therefore balance the need for added nutrients for plants while they are getting established and the need to limit exporting nutrients.

In summary, nutrient export from bioretention soil media appears to be an issue related more to the design of the bioretention areas rather than the media itself. Greater depths of treatment media and anaerobic areas appear to be promising developments in the design of bioretention facilities that could limit nutrient export more predictably than in changing the compost specification.

1.3 Inert Materials in Compost

Current specifications for inert materials in compost range from a maximum of 0.1% by weight in Alameda County to 1% by weight in Contra Costa County. Frank Shields of Soil Control Lab suggests that his visual assessment test is more appropriate because the inert materials are an aesthetic issue (for example, glass, plastics and paper) more than one of function. Dan Cloak, in working with Contra Costa County, comments that he has not encountered problems with trash in bioretention soils (Personal communication 2010). This suggests that the current specifications are already stringent enough to eliminate composts from green waste sources which tend to have high percentage of inert materials.

1.4 Recommendations for Guidance

Particle Size: Fines in compost may cause clogging of the bioretention soil mix. In contrast, fines offer enhanced metals retention, fertility, and water-holding capacity. Current specifications require that the aggregate component to have between 0-5% fines. Contra Costa County has not experienced problems with the infiltration rate of bioretention soils as currently specified but there may be some risk of low infiltration rate if compost with a high percentage of fines is used.

We recommend one of three options:

- No change to the specification OR
- Provide a required particle size gradation for the compost component including a maximum of 10% passing the 200 sieve OR
- Require the overall mix to have between 2% and 5% passing the 200 sieve as recommended in Western Washington.

Nutrient Leaching: Nutrient leaching may be unavoidable without changes to the design of bioretention facilities such as increased media depth and raising the underdrain. However, we identified some guidance to limit leaching of nutrients from compost. We recommend that guidance continue to specify compost certified by the US Composting Council certified to ensure stability. In addition, we recommend that the C:N ratio of compost be specified between 15:1 and 25:1.

Inert Materials: We recommend specifying a performance level of "no visual impact" from inert materials. Each municipality can interpret the specification as desired to avoid high content of inert materials in compost.

2.0 SOIL ADDITIVES

2.1 Water Retention and Cationic Exchange Capacity in Bioretention Soils

Cation exchange capacity (CEC) is known to improve the removal of metals in bioretention soils (Jurries 2003). CEC refers to the quantity of negative charges in soil existing on the surfaces of clay and organic matter. The negative charges attract positively charges ions, or cations, hence the name 'cation exchange capacity'. In addition to metals, many essential plant nutrients exist in the soil as cations. A high CEC can indicate a more fertile soil. As discussed earlier, the primary factor determining CEC is the clay and organic matter content of the soil.

Water-holding capacity helps to improve plant survival during dry periods and reduce irrigation needs. Water is held in soil in two ways: as a thin coating on the outside of soil particles and in the pore spaces. Soil water in the pore spaces can be divided into two different forms: gravitational water and capillary water. Gravitational water generally moves quickly downward in the soil due to the force of gravity. Capillary water is the most important for plant growth because it is held by soil particles against the force of gravity. Soil texture is related to water-holding capacity with loams and silt loams having the greatest available water for plants. Clays hold water very tightly so less is available to plants and sands hold very little water so even less is available to plants. Composted organic material is the most common soil amendment because it offers improved water holding capacity and supplies nutrients for soil.

2.2 Perlite and Vermiculite Blends

Vermiculite and perlite are both mined materials that are quickly heated to expand the mineral. Recently, perlite and vermiculite have been utilized in stormwater treatment facilities. Perlite improves drainage and wicks water well. Vermiculite has a tremendous water holding capacity but can drown roots when used alone. Perlite dries out quickly between rain events or waterings. Vermiculite and perlite are often used together in horticultural applications because of these complimentary attributes.

Granular perlite is sometimes used as a filter media for stormwater treatment. El Dorado County Department of Transportation is currently researching the effectiveness of perlite filters for stormwater as compared to fine sand filters for areas where infiltration is not feasible (Kooyman and Wigart 2009). Perlite is used in proprietary stormwater treatment systems including Aqua Filter. Preliminary small scale tests with perlite show effectiveness of reducing turbidity in stormwater between 40% and 90% (Kooyman and Wigart 2009). It is unclear if perlite, when included in a soil mix would have the same effectiveness. It seems that it would perform similarly to the sand component of the bioretention soil mix.

Additionally, vermiculite is commonly used to treat waste waters from mining activities to remove waterborne heavy metals. Vermiculite may be attractive for use in watersheds that are known to have a problem with heavy metals. Research is not available regarding the benefits vermiculite offers in reducing heavy metals within watersheds that have lower levels of heavy metals typical of runoff from urban areas as compared to runoff from areas with contaminated soils or mining areas.

In summary, perlite appears to be equivalent to the sand component in the engineered bioretention soil mix. Vermiculite may improve water-holding capacity of a soil, but without further study it is difficult to prescribe the proper amount to include in the mix. Furthermore, the drawbacks of perlite and vermiculite are that these minerals do not contain nutrients needed for plant growth. Costs may also exceed that of compost.

2.3 Calcined Clay

Eliminating fines from the soil mix is likely to increase the infiltration rate as discussed under Section 1.1. On the other hand fine particles increase the cation exchange capacity of a soil which in turn increases metals retention. Fines also improve fertility and water-holding capacity by slowing the drainage through the media. Further study on the use of calcined clay was therefore suggested during the April 2010 roundtable discussion as a way to ensure that fines are not eliminated from the bioretention soil mix.

Calcined clay is clay that has been heated to drive out volatile materials. It is commonly used in potting soil mixes and as a garden bed amendment. In heavy clay soils and compacted soils, it can improve aeration, as well as water and nutrient holding capacity. Calcined clay has high levels of calcium and sulfur but doesn't have additional nutrient value for plants.

As discussed earlier, the primary factor determining CEC is the clay and organic matter content of the soil. Higher quantities of clay and organic matter beget higher CEC. Calcined clay is sometimes added to sand-based fields to increases CEC. No research exists on the use of calcined clay in bioretention soils. .

2.4 Recommendations for Guidance

Limited research exists on these soil amendments for use in bioretention soil mixes. It is also unclear that they provide greater benefits than compost alone, and they will have an unpredictable effect on the infiltration rate of the bioretention soil mix. Compost is proven to improve water holding capacity, increase CEC, and to support plant health, and has been studied to provide some measure of predictability in infiltration. At this time, the existing research does not warrant adding vermiculite, perlite or calcined clay to the bioretention soil mix.

3.0 NON-FLOATING MULCH MATERIAL

Generally, soft woods like fir and pine trees are less dense than water. Wood chip mulch made from softwoods will float because the specific gravity is less than that of water. Some hardwood trees are very dense and will float less or even sink. Locally, only Mountain mahogany (Cercocarpus betuloides) will sink in water, but not likely to be available commercially (Armstrong 2010). Some oaks and acacias are also very dense and only barely float, but these materials are also unlikely to be commercially available as mulch. The most common material for commercially available wood chip mulch is pine and fir.

Shredded redwood bark mulch does not float because the fibrous strands tend to stick together and to the soil surface. Unfortunately, some fire departments will not allow shredded bark mulches due to the perceived fire hazard.

Some success has been noted in surface mulching with compost. The City of Seattle recommends mulching with compost because it is less likely to float than wood chips. The University of Maine Cooperative extension recommends two types of mulch: Super Humus brand of compost and Erosion Control mulch. Super Humus is commercially available from local soil products suppliers.

In-organic mulches such as pea gravel, are also non-floating. However, they only provide some of the benefits of mulch. Organic mulches add organic matter and nutrients for plant health.

We therefore recommend that the guidance specify applying non-floating mulch, such as compost, or other non-floating mulch as specified by the landscape-architect and approved by the local jurisdiction, as mulch within bioretention basins and wood chips adjacent to basins (above the maximum water line).

4.0 METHODS FOR EVALUATION OF ALTERNATE MIXES

Alternative mixes should be required to meet performance criteria if they do not fulfill the prescriptive 'recipe' for bioretention soil. We recommend that municipalities be discouraged from using alternative mixes because the specifications are fine tuned to produce a bioretention soil that achieves the desired performance in infiltration rate and fertility. However, if it is necessary to include alternative options we recommend that alternate mixes are evaluated for infiltration rate and certified for appropriate fertility.

Infiltration tests should be conducted by a qualified geotechnical soil testing laboratory. Field infiltration rates will differ from permeability rates measured in the laboratory. Variables during construction can have a significant influence on as-constructed and long-term infiltration rates. However, laboratory permeability testing is a relative indicator of the overall drainage performance of a particular aggregate compost mix. As discussed at the April 14, 2010, soil specifications roundtable meeting, the objectives of onsite infiltration testing can be met alternatively by reviewing the soil mix, overseeing installation, and observing the functioning of the facility. The soil should be required to have a percolation rate between 5 and 12 inches per hour to provide adequate drainage but not be too fast draining to support plants.

The following tests are suggested:

- Moisture – density relationships (compaction tests) should be conducted on a minimum of two samples of bioretention soil. We recommend compacting the bioretention soil to 85 to 90 percent of the maximum dry density (ASTM D1557). This level of relative compaction of bioretention soil mixes should be similar to field conditions.

- Constant head permeability – testing in accordance with ASTM D2434 should be conducted with a 6-inch mold and vacuum saturation. Municipalities should require at least two samples be tested.

- Particle size analysis – particle size analysis on the mixed bioretention soil should be provided.

Due to the expense associated with laboratory testing, the suggested testing may discourage developers from using alternative mixes. The above tests cost about $900. If the alternative mix fails, retesting will be required.

Fertility is also an important aspect of the bioretention soil. Rather than specifying performance benchmarks for all the various elements that contribute to soil fertility (pH, salinity, nitrate, ammonium nitrogen, phosphate phosphorous, potassium, calcium, magnesium, sodium, copper, zinc, manganese, iron, sulfate, and boron, etc), we recommend that alternative soil mixes should be certified as appropriate for plants by a qualified soil analysis laboratory or landscape architect. The qualified expert should submit a signed letter certifying that the bioretention soil will support the selected species of plants.

PART 2 – GUIDANCE AND SPECIFICATIONS

The following text is based on the guidance found in Appendix B of Contra Costa County Clean Water Program's Stormwater C.3 Guidebook, 4th Edition. **Bold and underlined text** indicates additions to the specifications.

SOILS FOR BIORETENTION FACILITIES

Soils for bioretention areas must meet two objectives:

- Be sufficiently permeable to infiltrate runoff at a minimum rate of 5" per hour during the life of the facility, and
- Have sufficient moisture retention to support healthy vegetation.

Achieving both objectives with an engineered soil mix requires careful specification of soil gradations and a substantial component of organic material (typically compost).

The San Francisco Regional Water Board has developed specifications for a bioretention soil mix. Local soil products suppliers have expressed interest in developing 'brand-name' mixes that meet these specifications. At their sole discretion, municipal construction inspectors may choose to accept test results and certification for a 'brand-name' mix from a soil supplier. Updated soil and compost test results may be required; tests must be **conducted** within 120 days prior to the delivery date of the bioretention soil to the project site.

Typically, batch-specific test results and certification will be required for projects installing more that 100 cubic yards of bioretention soil.

SOIL SPECIFICATION

Bioretention soils should meet the following criteria.

1. General Requirements
   Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth.

   Bioretention Soil shall be a mixture of fine sand, and compost, measured on a volume basis:

   60%-70% Sand
   30%-40% Compost

1.1. Submittals
The applicant must submit to the municipality for approval:

A. A sample of mixed bioretention soil.

B. Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.

C. Grain size analysis results of the fine sand component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.

D. Quality analysis results for compost performed in accordance with Seal of Testing Assurance (STA) standards, as specified in Section 1.4.

E. Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".

F. Grain size analysis results of compost component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.

G. A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.

H. Provide the following information about the testing laboratory(ies) name of laboratory(ies) including

1) contact person(s)

2) address(es)

3) phone contact(s)

4) e-mail address(es)

5) qualifications of laboratory(ies), and personnel including date of current certification by STA, ASTM, or approved equal

1.2. Sand for Bioretention Soil

A. General

Sand shall be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size shall be non-plastic.

B. Sand for Bioretention Soil Texture

Sand for Bioretention Soils shall be analyzed by an accredited lab using #200, #100, #40, #30, #16. #8, #4, and 3/8 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	Percent Passing (by weight)	
	Min	*Max*
3/8 inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40	5	55
No. 100	0	15
No. 200	0	5

Note: all sands complying with ASTM C33 for fine aggregate comply with the above gradation requirements.

1.3. Composted Material

Compost shall be a well decomposed, stable, weed free organic matter source **derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids** meeting the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program).

A. Compost Quality Analysis

Before delivery of the soil, the supplier shall submit a copy of lab analysis performed by a laboratory that is enrolled in the US Composting Council's Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Evaluation of Composting and Compost (TMECC). The lab report shall verify:

1) Feedstock Materials shall be specified and include one or more of the following: landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.

2) Organic Matter Content: 35% - 75% by dry wt.

3) Carbon and Nitrogen Ratio: C:N < 25:1 **and C:N >15:1**

4) Maturity/Stability: shall have a dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120F) upon delivery or rewetting is not acceptable. In addition any one of the following is required to indicate stability:

a. Oxygen Test < 1.3 O2 /unit TS /hr

b. Specific oxy. Test < 1.5 O2 / unit BVS /

c. Respiration test < 8 C / unit VS / day

d. Dewar test < 20 Temp. rise (°C) e.

e. Solvita® > 5 Index value

5) Toxicity: any one of the following measures is sufficient to indicate non-toxicity.

a. NH4- : NO3-N < 3

b. Ammonium < 500 ppm, dry basis

c. Seed Germination > 80 % of control

d. Plant Trials > 80% of control

e. e. Solvita® > 5 Index value

6) Nutrient Content: provide analysis detailing nutrient content including N-P-K, Ca, Na, Mg, S, and B.

a. Total Nitrogen content 0.9% or above preferred.

b. Boron: Total shall be <80 ppm; Soluble shall be <2.5 ppm

7) Salinity: Must be reported; < 6.0 mmhos/cm

8) pH shall be between 6.5 and 8. May vary with plant species.

B. Compost for Bioretention Soil Texture

Compost for Bioretention Soils shall be analyzed by an accredited lab using #200, 1/4 inch, 1/2 inch, and 1 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***
1 inch	**99**	**100**
1/2 inch	**90**	**100**
1/4 inch	**40**	**90**
No. 200	**2**	**10**

C. Bulk density: shall be between 500 and 1100 dry lbs/cubic yard

D. Moisture Content shall be between 30% - 55% of dry solids.

E. Inerts: compost shall be relatively free of inert ingredients, including glass, plastic and paper, < 1 % by weight or volume.

F. Weed seed/pathogen destruction: provide proof of process to further reduce pathogens (PFRP). For example, turned windrows must reach min. 55C for 15 days with at least 5 turnings during that period.

G. Select Pathogens: Salmonella <3 MPN/4grams of TS, or Coliform Bacteria <10000 MPN/gram.

H. Trace Contaminants Metals (Lead, Mercury, Etc.) Product must meet US EPA, 40 CFR 503 regulations.

I. Compost Testing

The compost supplier will test all compost products within 120 calendar days prior to application. Samples will be taken using the STA sample collection protocol. (The sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: 631-737-4931, www.compostingcouncil.org). The sample shall be sent to an independent STA Program approved lab. The compost supplier will pay for the test.

VERIFICATION OF ALTERNATIVE BIORETENTION SOIL MIXES

Bioretention soils not meeting the above criteria may be evaluated on a case by case basis. Alternative bioretention soil must meet the following specification: "Soils for bioretention facilities must be sufficiently permeable to infiltrate runoff at a minimum rate of 5 inches per hour during the life of the facility, and must provide sufficient retention of moisture and nutrients to support healthy vegetation."

The following guidance is offered to assist municipalities with verifying that alternative soil mixes meet the specification:

1. General Requirements

Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth.

1.1. Submittals

The applicant must submit to the municipality for approval:

A. A sample of mixed bioretention soil.

B. Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.

C. Certification from an accredited geotechnical testing laboratory that the Bioretention Soil has an infiltration rate between 5 and 12 inches per hour as tested according to Section 1.2.

E. Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".

F. Grain size analysis results of mixed bioretention soil performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.

G. A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.

H. Provide the following information about the testing laboratory(ies) name of laboratory(ies) including

1) contact person(s)

2) address(es)

3) phone contact(s)

4) e-mail address(es)

5) qualifications of laboratory(ies), and personnel including date of current certification by STA, ASTM, or approved equal

1.2. Bioretention Soil

A. Bioretention Soil Texture

Bioretention Soils shall be analyzed by an accredited lab using #200, and 1/2" inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	Percent Passing (by weight)	
	Min	*Max*
1/2 inch	97	100
No. 200	2	5

B. Bioretention Soil Permeability testing

Bioretention Soils shall be analyzed by an accredited geotechnical lab for the following tests:

1. Moisture – density relationships (compaction tests) shall be conducted on bioretention soil. Bioretention soil for the permeability test shall be compacted to 85 to 90 percent of the maximum dry density (ASTM D1557).

2. Constant head permeability testing in accordance with ASTM D2434 shall be conducted on a minimum of two samples with a 6-inch mold and vacuum saturation.

MULCH FOR BIORETENTION FACILITIES

Mulch is not required by this guidance but is recommended for the purpose of retaining moisture, preventing erosion and minimizing weed growth. It should be noted that projects subject to the State's Model Water Efficiency Landscaping Ordinance (or comparable local ordinance) will be required to provide at least two inches of mulch. Aged mulch, also called compost mulch, reduces the ability of weeds to establish, keeps soil moist, and replenishes soil nutrients. Aged mulch can be obtained through soil suppliers or directly from commercial recycling yards. Apply 1" to 2" of composted mulch, once a year, preferably in June following weeding.

Compared to green wood chip or bark mulch, aged mulch has somewhat less of a tendency to float into overflow inlets during intense storms. Bark or wood chip mulch may be used on the side slopes of basins above the maximum water line. The project landscape architect may also specify another type of non-floating mulch, subject to approval by the local jurisdiction.

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TECHNICAL MEMORANDUM

Regional Bioretention Installation Guidance
Bay Area Stormwater Management Agencies Association

Prepared For:

Bay Area Stormwater Management Agencies
Association (BASMAA)

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Date:

November 12, 2010

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INTRODUCTION

Recently the San Francisco Bay Regional Water Quality Control Board issued the Municipal Regional Stormwater Permit. The Bay Area Stormwater Management Agencies Association (BASMAA) engaged WRA to provide guidance and specification for bioretention soils to assist stormwater agencies at the associated municipalities in meeting the requirements of the permit.

This report provides guidance for the installation of bioretention soils with the goal of preserving the integrity of the soil media to support a long-term infiltration rate of 5 to 10 inches per hour, provide stormwater treatment and support plant health.

INSTALLATION OF BIORETENTION SOILS

The following section provides considerations for proper bioretention soil installation.

Prior to Installing Bioretention Soil:

- Is the contractor familiar with constructing bioretention systems?
- Plan how inspections will be handled as part of the construction process.
- Verify soil meets specification prior to delivering and or placing in the facility.
- Prevent over-compaction of native soils in the area of the basin. Delineate the facility area and keep construction traffic off. Protect soils with fencing, plywood, etc.
- Provide erosion control in the contributing drainage areas of the facility. Stabilize upslope areas.
- Facilities should not be used as sediment control facilities.
- Drainage should be directed away from bioretention facilities until upslope areas are stabilized, if possible. The concentration of fines could prevent post-construction infiltration.
- If drainage is to be allowed through the facility during construction, leave or backfill at least 6” above the final grade. Temporarily cover the underdrain with plastic or fabric. Line or mulch the facility.
- Ideally, bioretention facilities should remain outside the limit of disturbance until construction of the bioretention begins to prevent soil compaction by heavy equipment. Protect bioretention areas with silt fence or construction fencing.
- Verify installation of underdrain is correct prior to placing soil.

Soil Mixing and Placement:

- Do not excavate, place soils, or amend soils during wet or saturated conditions.
- Operate equipment adjacent to (not in) the facility.
- If machinery must operate in the facility, use light weight, low ground-contact pressure equipment.

- It may be necessary to rip or scarify the bottom soils to promote greater infiltration or excavate any sediment that may have built up during construction.

- Consider the time of year and site working area when determining whether to mix bioretention soil on-site or to import pre-mixed soil.

- If mixing bioretention media onsite, use an adjacent impervious area or on plastic sheeting.

- Place soil in 12” lifts with machinery adjacent to the facility. If working within the facility, to avoid over-compacting, place first lifts at far end from entrance and place backwards toward entrance.

- Do not place or work bioretention soil if it is saturated or raining

- Allow bioretention soil lifts to settle naturally, boot pack (walk around to firm) lifts to achieve 85% compaction effort. After all lifts are placed, wait a few days to check for settlement, and add additional media as needed.

- An alternative to boot compaction is to settle bioretention soils by lightly watering until soils are just saturated. Allow soil to dry between lifts. It may take a day or more to dry adequately between lifts. Soil cannot be worked when saturated so this method should be used with caution. Allow for extra time to let soils dry between each lift. After all lifts are placed, wait a few days to check for settlement, and add additional media as needed.

- Verify bioretention soil elevations before applying mulch or installing plants.

<u>Other Considerations</u>:

- Protect adjacent trees.

- Protect adjacent infiltration systems including swales, soils and porous pavement from sediment.

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Regional Biotreatment Soil Guidance
Bay Area Stormwater Management Agencies Association

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The following bibliography provides a summary of existing literature, field and analytical data prepared in conjunction with the preparation of Regional Bioretention Soil Guidance.

1.0 COMPOST

Claassen, V. and Young, T. 2010. Model Guided Specification for Using Compost to Promote Establishment of Vegetation and Improvement in Stormwater Quality. California Department of Transportation (CalTrans). Available online: http://www.dot.ca.gov/hq/LandArch/research/erosion_control.htm

This study establishes parameters for compost use on slopes based on performance criteria including soil type, climate, slope length and steepness, aspect, and location. The research addresses how compost affects water quality and erosion, and if compost improves the establishment of permanent vegetation cover. Results indicate that in many cases, degraded, nutrient-poor soils can be regenerated with yard waste compost amendment with minimal risk of nutrient loss, especially if the composts are incorporated into the slope surface and covered with a mulch layer. Finer and more aged composts leach nitrogen at slightly higher rates than non-aged composts. However, more aged composts are more likely to retain heavy metals. Surface application of compost decreases nutrient loss.

Faucette, L.B. et. al. 2005. “Evaluation of stormwater from compost and conventional erosion control practices in construction activities.” Soil and Water Conservation Society. November 2005 vol. 60 no. 6 288-297.

The use of surface applied organic amendments has been shown to reduce runoff and erosion, however, with the exception of animal manure, little research has focused on nutrient loss from these amendments. Four types of compost blankets, hydroseed, silt fence, and a bare soil (control) were applied in field test plots. Treatments were seeded with common bermuda grass. A rainfall simulator applied rainfall at an average rate equivalent to a 50 yr^{-1} hr storm event (7.75 cm hr^{-1}). After three months, the compost generated five times less runoff than hydroseed with silt fence, and after one year, generated 24 percent less runoff. All treatments proved better than the control at reducing solids loss. Materials high in inorganic nitrogen (N) released greater amounts of nitrogen in storm runoff; however, these materials showed reduced N loss over time. Hydroseeding generated significantly higher total phosphorus (P) and dissolved reactive P loads compared to compost in storm runoff during the first storm event.

Stenn, H. 2010. Building Soil: Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington. Seattle Public Utilities: Seattle. Available at: http://www.buildingsoil.org/tools/Soil_BMP_Manual.pdf

The guide describes techniques for construction site soil handling, reducing soil compaction, and amending site soils with compost to meet BMP T5.13 “Post Construction Soil Quality and

Depth" in the WA Dept. of Ecology's Stormwater Management Manual for Western Washington. This guide also includes field inspection techniques, WA suppliers of compost and soil testing laboratories, and specification language in APWA and CSI formats.

2.0 SOIL AMENDMENTS

Kooyman, Steve and Wigart, Russ, 2009. Urban Stormwater fine sediment filtration using granular perlite. El Dorado County Department of Transportation.

Perlite can be used as an alternative to fine sand for stormwater filtration to reduce turbidity.

Paul, J. L. et. al. 1971. "Effects of Organic and Inorganic Amendments on the Hydraulic Conductivity of Three Sands Used for Turfgrass Soils" *California Turfgrass Culture*. Volume 21, No. 2. p.9-13. Accessed from University of California Riverside Turf Research Facility: http://ucrturf.ucr.edu/publications/CTC/ctc21_2.pdf

Calcined clay-l (CC-l) : montmorillonite clay is calcined at high temperatures to make porous, mechanically strong particles of mainly very coarse sand-fine gravel texture. Calcined clay-2 (CC-2) : an unspecified mineral is calcined to produce a porous, more or less spherical particle which falls mostly in the textural class of medium sand. Vermiculite (V) : the material was an industrial chemical grade (No. 1) of expanded mineral. While the particle size consisted mainly of very coarse and coarse sand sizes, particles were readily deformed and compressed by compacting forces. In this study, calcined clay acted in the same way as sand. Depending on the gradation of the sand and the particle size of the calcined clay, hydraulic conductivity was either increased or decreased. Vermiculite decreased hydraulic conductivity the most of the amendments studied. In addition, appreciable changes in hydraulic conductivity were not observed until 30-40% of the amendment was added to the sand.

3.0 POLLUTANT REMOVAL

Davis et. al. 2006. "Water Quality Improvement through Bioretention Media: Nitrogen and Phosphorous Removal." *Water Environment Research.* Vol. 78, No. 3: pp.284-293.

High nutrient inputs and eutrophication continue to be one of the highest priority water quality problems. This work provides an in-depth analysis on removal of nutrients from a synthetic stormwater runoff by bioretention. Results have indicated good removal of phosphorus (70 to 85%) and total Kjeldahl nitrogen (55 to 65%). Nitrate reduction was poor (,20%) and, in several cases, nitrate production was noted. Variations in flowrate (intensity) and duration had a moderate affect on nutrient removal. Mass balances demonstrate the importance of water attenuation in the facility in reducing mass nutrient loads. Captured nitrogen can be converted to nitrate between storm events and subsequently washed from the system. Analysis on the fate of nutrients in bioretention suggests that accumulation of phosphorus and nitrogen may be controlled by carefully managing growing and harvesting of vegetation. Water Environ. Res., 78, 284 (2006).

Hsieh, Chi-hsu and Davis, Allen P., 2005. "Evaluation and Optimization of Bioretention Media for Treatment of Urban Storm Water Runoff." *Journal of Environmental Engineering*. November: pp. 1521-1531.

The objective of this study is to provide insight on media characteristics that control bioretention water management behavior. Eighteen bioretention columns and six existing bioretention facilities were evaluated employing synthetic runoff. In columns, the runoff infiltration rate through different media mixtures ranged from 0.28 to 8.15 cm/min at a fixed 15 cm head. For pollutant removals, the results showed excellent removal for oil/grease __96%_. Total lead removal _from 66 to _98%_ decreased when the total suspended solids level in the effluent increased _removed from 29 to _96%_. The removal efficiency of total phosphorus ranged widely _4–99%_, apparently due to preferential flow patterns, and both nitrate and ammonium were moderate to poorly removed, with removals ranging from 1 to 43% and from 2 to 49%, respectively. Two more on-site experiments were conducted during a rainfall event to compare with laboratory investigation. For bioretention design, two media design profiles are proposed; _96% TSS, _96% O/G, _98% lead, _70% TP, _9% nitrate, and _20% ammonium removals are expected with these designs.

Hunt, William F. III, 2003. *Pollutant Removal Evaluation and Hydraulic Characterization for Bioretention Stormwater Treatment Devices.* Pennsylvania State University. Available online: http://www.psparchives.com/publications/our_work/stormwater/lid/bio_docs/bio_docs.htm

Current bioretention designs do not reduce nitrate-nitrogen levels sufficiently, as bioretention is constructed without any zone designed to be saturated. For nitrate-nitrogen to be converted to nitrogen gas, thus enhancing total nitrogen (TN) removal, an anaerobic zone may be necessary. This research determined the effect of an anaerobic layer within bioretention devices on the concentrations and loadings of TN, nitrate-nitrogen (NO3-N), and other nutrient and pollutant species in stormwater runoff including ammonia-nitrogen (NH3-N), total kjeldahl nitrogen (TKN), total phosphorus (TP), ortho-phosphate (Ortho-P), zinc (Zn), iron (Fe), copper (Cu), lead (Pb), and total suspended solids (TSS). Results from the laboratory experiment showed high removal rates for TN (mean efficiencies ranging from 70% to 85%) and NO3-N (over 90%). The presence of an intentional anaerobic zone and the anaerobic zone's thickness did not have a significant impact ($p<0.10$) on the microcosm's nutrient removal abilities. There was a significant impact ($p<0.10$) when comparing hydraulic retention times of 2 and 4 days. The longer retention time had significantly lower TN and NO3-N concentrations.

Hunt, W.F. et al. 2006. "Evaluating Bioretention Hydrology and Nutrient Removal at Three Field Sites in North Carolina." *Journal of Irrigation and Drainage Engineering*. November/December: 600-608.

Three bioretention field sites in North Carolina were examined for pollutant removal abilities and hydrologic performance. The cells varied by fill media type or drainage configuration. The field studies confirmed high annual total nitrogen mass removal rates at two conventionally drained bioretention cells _40% reduction each_. Nitrate-nitrogen mass removal rates varied between 75 and 13%, and calculated annual mass removal of zinc, copper, and lead from one Greensboro cell were 98, 99, and 81%, respectively. All high mass removal rates were due to a substantial decrease in outflow volume. The ratio of volume of water leaving the bioretention cell versus that which entered the cell varied from 0.07 _summer_ to 0.54 _winter_. There was a significant _p_0.05_ change in the ratio of outflow volume to inflow volume when comparing warm seasons to winter. Cells using a fill soil media with a lower phosphorus index _P-index_, Chapel Hill cell C1 and Greensboro cell G1, had much higher phosphorus removal than Greensboro cell G2, which used a high P-index fill media. Fill media selection is critical for total phosphorus removal, as fill media with a low P-index and relatively high CEC appear to remove phosphorus much more readily.

4.0 BIOFILTER MEDIA DESIGN & SPECIFICATIONS

Burge, K. et. al. 2007. “Finding the Right Bioretention Soil Media” 13th International Conference on Rainwater Cathcment Systems. Available at: http://www.hidro.ufcg.edu.br/twiki/pub/ChuvaNet/13thInternationalConferenceonRainwaterCatchmentSystems/Burge.pdf

This paper describes the soil media characteristics that are critical to the successful functioning of a bioretention system and outlines the methodology behind the development of the Guideline Specifications for Soil Media in Bioretention Systems (FAWB, 2006).

Hinman, Curtis, 2009. Bioretention Soil Mix Review and Recommendations for Western Washington. Puget Sound Partnership. Available online: http://www.psparchives.com/publications/our_work/stormwater/BSMResults-Guidelines%20Final.pdf

The soil mix used in bioretention systems is central for determining flow control and water quality treatment performance. The purpose of this study is to provide bioretention soil mix (BSM) guidelines that: 1) meet performance objectives; 2) include materials readily available in the Puget Sound region; 3) include materials that aggregate and compost suppliers can provide with adequate quality control and consistency; and 4) are affordable. The focus of this study is on the aggregate component of the BSM. Four candidate aggregate samples were collected from various suppliers and locations around Puget Sound. Laboratory analysis was conducted to determine aggregate gradation, as well as the organic matter content, hydraulic conductivity, cation exchange capacity, and available phosphorus of a specified aggregate compost bioretention soil mix. Hydraulic conductivity of bioretention soil mixes is strongly correlated to percent mineral aggregate passing the 200 sieve and that the fines should be less than five and ideally between two and four percent. Organic matter content and associated available phosphorus and nitrogen cycling in these mixes may lead to phosphate and nitrate exported in under-drain effluent. Current research shows variable nitrate and phosphate retention and additional work is needed to study methods to optimize bioretention soil mixes for phosphate and nitrate retention and removal capability.

Jurries, Dennis, 2003. Biofilters (Bioswales, Vegetative Buffers, & Constructed Wetlands) for Storm Water Discharge Pollution Removal. State of Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/wq/stormwater/docs/nwr/biofilters.pdf

Compilation of available information on the design and use of biofilters. Clays and organic matter have highest cation exchange capacities. Organic matter has twice the rate of cation exchange capacity as clay.

5.0 HYDRAULIC SIZING CRITERIA

Colwell, S. and Fowler J. 2009. Technical Memorandum re: Updated SPU Bioretention Soil – Modeling Inputs and Water Quality Treatment. Seattle Public Utilities. Available at: http://www.seattle.gov/util/groups/public/@spu/@usm/documents/webcontent/spu02_019972.pdf

This memorandum provides SPU's recommendations and justifications for modeling inputs for the bioretention soil and discusses how it meets Washington State Department of Ecology's (Ecology) requirements for treatment. Infiltration rate is highly variable for designed bioretention soils. A long-term correction factor of infiltration rate is recommended to be 2 for catchment areas containing less than 5000 sf of pollution generating surface or less than 10,000 sf impervious surface.

Herrera Environmental Consultants, 2007 "First Controlled Infiltration Test for High Point Phase I Block-Scale Monitoring Project" Seattle Public Utilities. Courtesy of Tracy Tackett (SPU NDS Program Manager)

Results of field study of infiltration and treatment performance of large-scale bioretention system project in Seattle. Design infiltration rate for the bioretention soil mix was 2" per hour and field tested rate was 4.2" per hour.

Herrera Environmental Consultants, 2007 "Results from Second Controlled Infiltration Test for High Point Phase I Block-Scale Monitoring Project" Seattle Public Utilities. Courtesy of Tracy Tackett (SPU NDS Program Manager)

Results of field study of infiltration and treatment performance of large-scale bioretention system project in Seattle. Design infiltration rate for the bioretention soil mix was 2" per hour and field tested rate was 6.1" per hour. Differences from the first and second test are attributed to rainfall event occurring just prior to test 1.

Mcmullen, Chad, 2007. Technical Memorandum: Bioretention Specification Development. Seattle Public Utilites. Provided courtesy Tracy Tackett of Seattle Public Utilites.

This memorandum provides grain size analysis for hydraulic capacity of several available aggregates in Western Washington. Compaction, organic content and permeability testing was performed on aggregate-compost mixtures. Provides draft bioretention soil specification for SPU.

6.0 BIOFILTER SOIL SPECIFICATIONS

Alameda Countywide Clean Water Program, 2007. "Soil Specifications for Stormwater Treatment Measures," Alameda County.

Alameda's soil specification to help applicants specify soils that will provide suitable growing conditions for appropriate plantings and meet the percolation requirements. Target percolation rate is 5 to 10 inches per hour.

Seattle Public Utilites 2008. "SPU Bioretention Soil Specification" courtesy of Tracy Tackett (SPU NDS Program Manager)

Specification for bioretention soil with infiltration rate of 5 in/hour (to be confirmed with Tracy). Specification geared towards locally available materials to Seattle that can be installed by contractors or homeowners.

7.0 LAB SOIL TEST RESULTS

To be provided with final draft.

8.0 PLANTS

Bornstein, C., Fross, D., and O'Brien, B. 2005. *California Native Plants for the Garden* Cachuma Press: Solvang.

Plant recommendations, plant care, nursery resources.

CalTrans 2001. "Advisory Guide to Plant Species Selection for Erosion Control." Cal Trans, District 5.

Hardcopy format of a geographic information system (GIS) that combines state and district-level climatalogical, geological, topographical, and plant biogeographical data to define ecologically meaningful subdistrict Plant climate Zones. These climate zones form the foundation for rapid access to lists of plant species for revegetation that are both ecologically appropriate for a project site and useful in minimizing erosion, primarily on slopes up to 2:1 H:V.

Harlow, Nora 2004. *Plants and Landscapes for Summer-Dry Climates*. East Bay Municipal Utility District.

Plant recommendations for the Bay Area.

Los Angeles County Public Works 2004. "LA River Masterplan: Landscaping Guidelines and Plant Palettes." County of Los Angeles.

Landscape design guidelines for the LA River corridor. Includes plant list of plants that should never be planted along the river and suggested plant lists, plants by plant communities and info about each plant such as estimated water needs, height, spread, and frequency of occurrence.

San Mateo County 2007. "Appendix B: Plant List and Planting Guidance for Landscape-Based Stormwater Measures" *San Mateo Countywide Water Pollution Prevention Program: C.3 Technical Guidance*. Accessed from: http://www.flowstobay.org/bs_new_development.php

Summary: Guidance for planting techniques and selection of appropriate plant materials for stormwater measures.

SVR Design Company 2006. "High Point Community Site Drainage Technical Standards" Prepared for Seattle Public Utilities. Accessed from: http://www.svrdesign.com/high_pt.html

Suggested plant list for various BMPs.

9.0 BIORETENTION SOILS INSTALLATION

SVR Design Company 2006. "High Point Community Right of Way and Open Space Landscape Maintenance Guidelines" Prepared for Seattle Public Utilities. Accessed from: http://www.svrdesign.com/high_pt.html

Materials recommendations and trouble shooting.

Lancaster, Alice, 2009. "Bioretention: Design and Construction" Presentation at Low Impact Development Workshop. City of San Francisco.

Construction sequencing, prevention of compaction, erosion control, contractor training, and public relations.

Hinman, Curtis, 2009. "Low Impact Development Technical Workshop Series: Bioretention Soil Mixes." Presentation at Low Impact Development Workshop. City of San Francisco.

Construction recommendations specific to installing bioretention soils.

The Economics of Low-Impact Development: A Literature Review

November 2007

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ECONorthwest specializes in the economic and financial analysis of public policy. ECO has analyzed the economics of resource-management, land-use development, and growth-management issues for municipalities, state and federal agencies, and private clients for more than 30 years.

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This work was supported in part by funding provided by the Waterkeeper Alliance.

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EXECUTIVE SUMMARY

Low-impact development (LID) methods can cost less to install, have lower operations and maintenance (O&M) costs, and provide more cost-effective stormwater management and water-quality services than conventional stormwater controls. LID also provides ecosystem services and associated economic benefits that conventional stormwater controls do not.

The available economic research on some of these conclusions is preliminary or limited in scope. For example, most economic studies of LID describe the costs of installing LID, or compare the costs of installing LID with the costs of installing conventional controls. Few reports quantify the economic benefits that LID can provide in addition to managing stormwater. Fewer researchers report results of studies that measure at least some costs *and* at least some benefits of LID vs. conventional controls.

The costs and benefits of LID controls can be site specific and will vary depending on the LID technology (e.g., green roof vs. bioswale), and local biophysical conditions such as topography, soil types, and precipitation. Including developers, engineers, architects and landscape architects early in the design process can help minimize the LID-specific construction costs.

Despite the fact the LID technologies have been promoted and studied since the early 1990s, for many stormwater managers and developers, LID is still a new and emerging technology. As with most new technologies, installation and other costs of LID are highest during the early phases of development and adoption. Over time, as practitioners learn more about the technology, as the number of suppliers of inputs expands, and as regulations adapt to the new technology, costs will likely decline.

Combined sewer overflows (CSO), and the resulting biophysical and economic consequences, are major concerns for municipal stormwater managers. LID can help minimize the number of CSO events and the volume of contaminated flows by managing more stormwater on site and keeping flows out of combined sewer pipes. Some preliminary evidence exists that LID can help control CSO volumes at lower cost than conventional controls.

Many municipalities have zoning and building-inspection standards in place that were adopted many years ago, long before LID was an option. Municipalities with outdated stormwater regulations typically require that builders file variances if they want to use LID controls. This can increase a builder's design and regulatory costs, which delays construction and can increase a builder's financing costs. Updating building regulations to accommodate LID can help reduce the regulatory risk and expense that builders face.

The large majority of the economic studies on LID focus on the costs of including LID in new construction. Replacing curbs, gutters and stormwater pipes with bioswales, pervious pavers and other LID controls can reduce construction costs. Protecting a site's existing drainage patterns can reduce the need for pipe infrastructure and a developer may be able to do away with surface stormwater ponds, which also increases the number of developable lots. Some researchers report that developments that emphasize LID controls and protected natural grass and forest drainage areas cost less to develop and sell for more than traditionally-developed lots with conventional stormwater controls.

Few studies considered the economic outcomes of including LID in urban redevelopment projects. Some evidence exists that LID controls cost more than conventional controls under these conditions, however, these studies excluded O&M costs of the two alternatives and the economic benefits that the LID controls can provide.

I. INTRODUCTION

Conventional stormwater controls collect stormwater from impervious surfaces, including roads, parking lots and rooftops, and transport the flow off site through buried pipes to treatment facilities or directly to receiving bodies of water. This approach efficiently collects and transports stormwater, but also can create high-velocity flows polluted with urban contaminants, including sediment, oil, fertilizers, heavy metals, and pet wastes. Such flows can erode stream banks and natural channels, and deposit pollutants that pose ecosystem and public health risks (Kloss and Calarusse 2006).The resulting ecosystem and public health consequences can create significant economic costs.

A study of the biophysical and public health damages and associated economic costs of stormwater runoff in the Puget Sound estimates these costs at over $1 billion during the next decade (Booth et al. 2006). These costs include flood-related property damage and financial losses, capital costs of new stormwater infrastructure, cleaning up stormwater-polluted water resources, and habitat restoration and protection efforts. The Natural Resources Defense Council (Kloss and Calarusse 2006) describes similar impacts attributed to conventional controls across the U.S.: stormwater sewers collect and discharge untreated stormwater to water bodies, while combined sewer and stormwater systems overflow during heavy rains, discharging both untreated sewage and stormwater into the nation's rivers and lakes. Both contribute to impaired water quality, flooding, habitat degradation, and stream bank erosion. The U.S. Environmental Protection Agency (EPA) estimates the costs of controlling combined sewer overflows (CSO) throughout the U.S. at approximately $56 billion. Developing and implementing stormwater-management programs and urban-runoff controls will cost an additional $11 to $22 billion (Kloss and Calarusse 2006).

In contrast to conventional stormwater controls, low-impact development (LID) techniques emphasize on-site treatment and infiltration of stormwater. The term low-impact development encompasses a variety of stormwater-management techniques. Examples include bioswales, rain gardens, green streets, and pervious pavers (U.S. EPA 2000). The name LID came into use around the late 1990s, however stormwater managers employed LID techniques prior to this. Technicians in Prince George's County, Maryland were some of the first to install what eventually became known as LID techniques in the early 1990s as an alternative to conventional stormwater controls. Soon after, a few communities in the Chesapeake Bay area followed, experimenting with a number of LID demonstration projects. Over time, interest in LID as an alternative or complement to conventional controls grew, and so did the number of LID demonstration projects and case studies across the United States. The EPA reviewed the early literature on LID and described their assessment of this literature in a report released in 2000 (U.S. EPA and Low Impact Development Center 2000). Their review assessed the availability and reliability of data on LID projects and the effectiveness of LID at managing stormwater. While this report focused primarily on the potential stormwater-management benefits of LID, it concluded that LID controls can be more cost effective and have lower maintenance costs than conventional stormwater controls. In December of the following year, the Center for Watershed Protection published one of the earliest studies that focused primarily on the economic aspects of "better site design," which included many LID principles (Center for Watershed Protection 2001).

The amount of information available on the economics of managing stormwater using LID has grown since the publication of these first reports. Most studies describe the costs of installing LID, or compare the costs of installing LID with the costs of installing conventional controls. Other reports focus on the economic benefits that LID can provide in addition to managing stormwater. These benefits include mitigating flooding, improving water-quality, and providing amenity values for properties adjacent to LID, such as green streets. A few—very few—researchers report results of studies that attempt to characterize at least some costs *and* at least some benefits of LID vs. conventional controls in a *single* study. In this report we summarize our review of the literature on the economic costs and benefits of managing stormwater by LID.

This literature review has three objectives. First, to describe briefly, and in plain language, the methods economists use when measuring the costs and benefits of LID and conventional stormwater controls. This information provides the reader with a context for the economic descriptions of costs and benefits that follow. Second, to summarize the literature that identifies and measures the economic costs and benefits of managing stormwater using LID, or that compares costs or benefits, or both, between LID and conventional controls. Third, to organize and present this information in a way that non-economist municipal officials, stormwater managers, ratepayer stakeholders and others can use as they consider and deliberate stormwater-management plans.

This literature review differs from literature reviews that accompany academic studies. Typically, academic literature reviews provide an introduction and a context for an analysis of a specific economic issue, e.g., a new analytical technique that measures economic benefits. In this case, the literature review is a stand-alone document that summarizes information on the broad issue of economic costs and benefits of LID. Academic literature reviews also target academic and professional economists. This literature review targets non-economist readers.

The technical effectiveness of LID stormwater controls is outside the scope of our review. Our analysis assumes that the LID techniques described in the economic studies that we reviewed provide the necessary or expected stormwater controls. As we understand, there is a growing body of literature on LID effectiveness, and we include some of these references in the Appendix to this report. Also, the more general topic of the economic values of ecosystem services, while somewhat related, was outside the scope of our review. Our analysis focused on the values of ecosystem services as affected by LID techniques.

We began our search for relevant literature by developing a list of key words with which to find reports or articles that contained relevant information. After a cursory search of LID literature, we identified LID- and economics-related key words that researchers and practitioners use when describing LID projects and analyses. The list includes words often used synonymously with LID (i.e., source control, natural drainage systems, sustainable stormwater management), or that describe a set of conservation-design strategies that include LID techniques (i.e., green infrastructure and conservation development). We also searched the literature using economics-related terms (i.e., costs, benefits, and savings). Table 1-1 lists the LID- and economics-related search terms we used in our search of the literature.

Using the terms listed in Table 1-1, we searched databases that contained the widest-possible range of sources including academic literature, reports produced by government agencies and non-profit organizations, news coverage, and articles in the popular press. These databases include information published in peer-reviewed articles, books, reports, conference papers and presentations, and web pages. Table 1-2 lists the databases included in our search.

Table 1-1: Search Terms

LID-Related Search Terms	Economics-Related Search Terms
Low-impact development	Economics
Source control	Benefits, economic benefits
Green infrastructure	Costs, economic costs
Natural drainage systems	Cost comparison
Sustainable stormwater management	Savings
Conservation development	Benefit cost analysis, cost benefit analysis
Alternative stormwater management	Cost effectiveness
Better site design	
Low-impact urban design and development	

Source: ECONorthwest

Table 1-2: Databases

Database	Description
Academic Search Premier	Index of 8,000 academic journals in the social sciences, humanities, and general science, back to 1965.
Article First	Index of 16,000 journal titles in business, humanities, popular culture, science, social science, and technology, back to 1990.
Econlit	American Economic Association's index of economic research, back to 1969.
Environmental Protection Agency (EPA) website	Database of studies, reports, educational material, and newsletters authored or supported by the EPA.
Environmental Valuation Reference Inventory (EVRI)	Database of empirical studies conducted internationally on the economic values of ecosystem services.
Google	Source for non-peer reviewed reports, articles, websites and other publications.
Journal Storage (JSTOR)	Index of over 100 major research journals in a variety of academic disciplines, some back to 1870.
Web of Science	Index of science and social science journals, back to 1975.
WorldCat	Index of bibliographic records of books, journals, manuscripts, etc. archived in university, public and private library catalogs around the world.

Source: ECONorthwest

We reviewed potential sources for relevance. If a source contained LID-related cost or benefit information, we indexed it in our own database, summarized the information on costs or benefits, and reviewed its bibliography for additional sources of information.

This report of our review of the literature is organized as follows. The next two sections provide background information to the discussion of the economic costs and benefits of managing stormwater. This background information provides a context or economic frame-of-reference that will help the reader consider the descriptions of costs and benefits that follow.

In **Section II** we list the range of benefits associated with LID, as identified in the LID literature, along with illustrations of the values of these benefits as reported in the economic literature. We found that many more reports simply list these benefits rather than quantify them.

In **Section III** we describe two of the more common methods of measuring the economic costs and benefits of stormwater controls: the cost-effectiveness and benefit-cost methods. As the names imply, cost-effectiveness studies compare alternatives looking exclusively at the alternatives' costs. This method assumes away benefits or holds them constant across alternatives. A benefit-cost analysis considers the range of costs and benefits for each alternative. The benefit-cost method has greater data demands and can be more expensive than the cost-effectiveness approach—primarily because it adds benefits into the analysis—but it can also yield a more accurate economic picture of the full range of economic consequences of implementing the alternatives.

In **Section IV** we summarize the literature that considers the costs and benefits of LID. The large majority of these studies focus exclusively on the costs of installing LID, or compare the costs of installing LID with the costs of installing conventional controls. Some studies look beyond installation costs to include operations and maintenance costs. Few studies consider both the costs and benefits of LID or compare costs and benefits of LID with conventional controls.[1] When the literature allowed, we described the economic aspects of adopting LID from the perspective of municipal decisionmakers, ratepayer stakeholders, and private developers.

In **Section V** we describe LID from the perspective of property developers. As with other new technologies, adopting LID includes opportunities and risks. We describe the risks and challenges that developers face when they include LID controls in their projects and the successes developers have had adopting LID.

In **Section VI** we discuss areas of future research that would increase our understanding of the economics of LID. For example, limited information exists on the life-cycle costs of LID, the economic benefits of LID beyond stormwater control, and the economic impacts of installing LID in urban-redevelopment settings.

The **Bibliography** lists the references we cite in this report. During our search for information on the economic aspects of LID, we encountered non-economic information that supports the use of LID. We list this information in the **Appendix** to this report.

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[1] We list the reported dollar amounts of costs and benefits without converting to current, 2007-year, dollars because in most cases, the available information prevented such a conversion.

II. ECOSYSTEM SERVICES PROVIDED OR ENHANCED BY LOW-IMPACT DEVELOPMENT

Conventional controls and LID techniques both manage stormwater flows. By promoting stormwater management on site using a variety of techniques, LID controls can provide a range of ecosystem services beyond stormwater management. Braden and Johnston (2004), Coffman (2002), and the Natural Resources Defense Council (Lehner et al. 2001) list and describe the kinds of ecosystem services that LID can provide or enhance. Taken together, these researchers describe the following ecosystem services: reduced flooding, improved water quality, increased groundwater recharge, reduced public expenditures on stormwater infrastructure, reduced ambient air temperatures and reduced energy demand, improved air quality, and enhanced aesthetics and property values. We briefly describe each of these services below.

Reduced Flooding

Braden and Johnston (2004) studied the flood-mitigation benefits of managing stormwater on site, including reduced frequency, area, and impact of flooding events. In a follow-up study, Johnston, Braden, and Price (2006) focus on the downstream benefits accrued from flood reduction accomplished by greater upstream on-site retention of stormwater. These benefits include reduce expenditures on bridges, culverts and other water-related infrastructure.

Improved Water Quality

Brown and Schueler (1997), Center for Watershed Protection (1998), U.S. EPA and Low Impact Development Center (2000), and Braden and Johnston (2004) describe the water-quality benefits that LID stormwater controls can provide. These benefits include effectively capturing oil and sediment, animal waste, landscaping chemicals, and other common urban pollutants that typically wash into sewers and receiving water bodies during storm events. Plumb and Seggos (2007) report that LID controls that include vegetation and soil infiltration, e.g., bioswales, can prevent more stormwater pollutants from entering New York City’s harbor than conventional controls.

Increased Ground Water Recharge

On-site infiltration of stormwater helps recharge groundwater aquifers. According to a report by American Rivers, the Natural Resources Defense Council, and Smart Growth America (Otto et al. 2002), areas of impervious cover can significantly reduce ground water recharge and associated water supplies. The study found that impervious surfaces in Atlanta reduced groundwater infiltration by up to 132 billion gallons each year—enough water to serve the household needs of up to 3.6 million people per year.

Braden and Johnston (2004) distinguish between two services associated with increased groundwater recharge: the increased volume of water available for withdrawal and consumption, and maintaining a higher water table, which reduces pumping costs and increases well pressure.

Reduced Public Expenditures on Stormwater Infrastructure

The Center for Watershed Protection (1998), Lehner et al. (2001), and U.S. EPA (2005) report that LID techniques, such as bioswales, rain gardens, and permeable surfaces, can help reduce the demand for conventional stormwater controls, such as curb-and-gutter, and pipe-and-pond infrastructure. Braden and Johnston (2004) report that retaining stormwater runoff on site reduces the size requirements for downstream pipes and culverts, and reduces the need to protect stream channels against erosion.

Two recent studies by the Natural Resources Defense Council (Kloss and Calarusse 2006) and Riverkeeper (Plumb and Seggos 2007) report that by managing stormwater on site, LID techniques can help reduce combined sewer overflows. Combined sewer systems transport both sewage and stormwater flows. Depending on the capacity of the pipes and the amount of rainfall, the volume of combined sewer and stormwater flows can exceed the capacity of the pipes when it rains. When this happens, overflows of sewage and stormwater go directly to receiving bodies of water untreated. LID helps to keep stormwater out of the combined system, which reduces CSO events. Thurston (2003) found that decentralized stormwater controls, such as LID, can control CSO events at a lower cost than conventional controls.

Reduced Energy Use

LID techniques, such as green roofs and shade trees incorporated into bioswales and other controls can provide natural temperature regulation, which can help reduce energy demand and costs in urban areas. Plumb and Seggos (2007) estimate that covering a significant amount of the roof area in New York City with green roofs could lower ambient air temperatures in summer by an estimated 1.4 degrees Fahrenheit. The U.S. EPA and Low Impact Development Center (2000) report that the insulation properties of vegetated roof covers can help reduce a building's energy demand, and notes that green roofs in Europe have successfully reduced energy use in buildings.

Improved Air Quality

Trees and vegetation incorporated into LID help improve air quality by sequestering pollutants from the air, including nitrogen dioxide, sulfur dioxide, ozone, carbon monoxide, and particulate matter (American Forests 2000-2006). In a study by Trees New York and Trees New Jersey, Bisco Werner et al. (2001) report similar air-quality benefits of trees and vegetation in urban areas. Plumb and Seggos (2007) cite one study that found that a single tree can remove 0.44 pounds of air pollution per year.

Enhanced Aesthetics and Property Values

Several studies including Lacy (1990), Mohamed (2006), U.S. Department of Defense (2004), and Bisco Werner et al. (2001) report that the natural features and vegetative cover of LID can enhance an area's aesthetics, and increase adjacent property values. The U.S. Department of Defense (2004) highlights how LID can improve the aesthetics of the landscape and increase adjacent property values by providing architectural interest to otherwise open spaces. On commercial sites, Bisco Werner et al. (2001) found that LID on commercial sites provided amenities for people living and working in the area and complemented the site's economic vitality, which improved its competitive advantage over similar establishments for customers and tenants.

III. Economic Framework: Measuring Costs and Benefits of Low-Impact Development

Researchers and practitioners assess the economic aspects of LID using several methodologies. These methodologies range from rough cost evaluations, that compare a subset of costs of LID against the same costs for conventional management techniques, to benefit-cost analyses, that compare a range of costs and benefits of LID to the same for conventional stormwater controls. This section examines the differences in these methodologies.

Most economic evaluations of LID reported in the literature emphasize costs. The overwhelming majority of these studies confined their analyses to measuring installation costs. Evaluators prefer this method perhaps because from a developer's perspective, installation cost is one of the most important considerations when choosing between LID or conventional controls. LID can compare favorably with conventional controls in a side-by-side analysis of installation costs (*see for example* Foss 2005; Conservation Research Institute 2005; U.S. EPA 2005; Zickler 2004), however, focusing on installation costs misses other relevant economic information. For example, such a focus excludes operation and maintenance (O & M) costs, differences in the effectiveness of LID versus conventional systems, and the environmental and economic benefits that LID can provide, but which conventional controls cannot.

Evaluating projects based on installation costs has advantages of costing less than studies that include other economic factors, e.g., O & M costs, taking less time than more extensive analyses, and relying on readily available construction-cost data. The tradeoff for stormwater managers is an incomplete and possibly biased description of economic consequences, especially over the long term.

Some researchers look beyond comparisons of installation costs and evaluate LID and conventional controls using a method know as a life-cycle cost analysis (LCCA) (Powell et al. 2005; Sample et al. 2003; Vesely et al. 2005). This approach considers a comprehensive range of stormwater-management costs including planning and design costs, installation costs, O & M costs, and end-of-life decommissioning costs. An LCCA method requires more data than a comparison of installation costs, and this data, particularly data on lifetime O & M costs, may not exist or is difficult and costly to obtain. The tradeoff for policy makers is more accurate information on the cost implications of alternative stormwater-management options. However, LCCA, like more limited cost comparisons, excludes measures of economic benefits.

Another limitation of cost comparisons is that they ignore differences in effectiveness between LID and conventional controls. For this reason, researchers recommend that LCCA should compare projects that provide the similar levels of services (Powell et al. 2005). Brewer and Fisher (2004), Horner, Lim, and Burges (2004), and Zielinski (2000) found, however, that LID approaches can manage stormwater quantity and quality more effectively than the conventional approaches, either controlling more flow, or filtering more pollutants, or both. In these cases, an LCCA study could conclude that an LID option costs more than the conventional control, without accounting for the fact that the LID option can manage a larger volume of stormwater.

The benefit-cost approach overcomes the limitations of simple cost comparisons or LCCA by considering the full range of costs and benefits of alternative management options. The tradeoff is that the benefit-cost approach requires more data than cost comparison, which increases the time and costs of conducting the economic analysis.

The benefit-cost approach evaluates the net economic benefits of a project, or compares outcomes among projects, by comparing relevant costs with relevant economic benefits (Boardman et al. 2005; Field and Field 2006; Gramlich 1990; Kolstad 2000). Economic researchers in academic, business, and public-policy sectors have for many years conducted benefit-cost analyses in a wide variety of applications. Since at least the middle of the twentieth century, economic evaluations of large-scale public projects included some type of benefit-cost analysis, and since 1981, the federal government required that new programs and regulations include a benefit cost analysis (Freeman 2003). The U.S. Office of Management and Budget (OMB) considers the benefit-cost method the "recommended" technique when conducting formal economic analyses of government programs or projects (U.S. OMB 1992). Over the years, the technique has grown more sophisticated, especially with respect to measuring and incorporating non-market goods and services, such as the values of ecosystem services (Croote 1999).

The economic literature on benefit-cost analysis is voluminous and growing, but the basic process can be broken into four steps (Field and Field 2006).[2]

1. The first step defines the scope of the analysis, including the population that will experience the benefits and costs, and the elements of the project, including location, timing, and characteristics of the work to be done.

2. The second step determines a project's full range of inputs and effects, from the planning and design phase through the end of the project's lifespan.

3. The third step identifies and, where possible, quantifies the costs and benefits resulting from the project's inputs and effects. Where quantification is not possible, qualitatively describe the cost or benefit in as much detail as possible, including degree of uncertainty and expected timing of impacts (long-term or short-term).

4. The final step compares the benefits and costs of the project, either in terms of net benefits (the total benefits minus the total costs) or in terms of a benefit-cost ratio (the amount of benefits produced per unit of cost). If relevant, compare results among alternative projects.

We found few benefit-cost evaluations of LID projects. The large majority of studies estimate installation costs, a few consider additional costs, such as O & M costs, and a handful compared some measures of costs against some measures of benefits. The reported benefit-cost studies of LID include Bachand (2002) and Fine (2002),[3] Devinny

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[2] For a more complete discussion of benefit-cost analysis, see Field and Field (2006), Gramlich (1990) and Harberger and Jenkins (2002).

[3] We reviewed summaries of Bachand (2002) and Fine (2002) because we were unable to acquire copies of the full articles.

et al. (2005), and Doran and Cannon (2006). Data limitations may explain part of the reason for the limited number of benefit-cost analyses of LID. This is especially true for lifetime O & M costs and the economic importance of LID benefits. Sample et al. (2003), Powell et al. (2005), Johnston, Braden, and Price (2006), and Conservation Research Institute (2005), among others, describe the need for more research quantifying the benefits of LID practices.

Another reason may be that economic benefits or lifetime O & M costs have no relevance to a given economic study. For example, property developers pay installation costs of stormwater controls, but not lifetime O & M costs. Nor do they benefit directly from the ecosystem services that LID can enhance or provide. Economic results reported by developers will therefore likely focus exclusively on installation costs of LID or compare installation costs for LID and conventional controls.

Using the benefit-cost approach has challenges that the other analytical methods do not. However, benefit-cost analysis has advantages in that it can provide decisionmakers, ratepayers and other stakeholders with a more complete picture of the economic consequences of stormwater-management alternatives than other analytical methods. This is especially true for costs and benefits of alternatives over the long term. In situations in which time, budget, or other information constraints limit quantifying economic benefits or costs, the next best alternative is identifying the range of costs and benefits, quantifying what can be measured and describing the remaining impacts qualitatively. The federal government takes this approach in that the OMB recommends that when benefits and costs cannot be quantified, agencies should provide qualitative descriptions of the benefits and costs. These qualitative descriptions should include the nature, timing, likelihood, location, and distribution of the unquantified benefits and costs (U.S. OMB 2000).

IV. Costs and Benefits of Low-Impact Development

The large majority of literature that describe economic assessments of LID focus on the costs of installing the technology. Most studies report the costs of building LID stormwater controls, or compare the costs of installing LID to the costs of conventional controls. The organization of this section reflects this emphasis in the literature. We begin by summarizing studies that list the costs of installing various LID techniques. Most of these reports describe the outcomes of case studies of LID installed as new or developing stormwater-management technologies. We then discuss studies that compare the costs of building LID controls with the costs of building conventional controls.

A number of researchers looked beyond installation costs and considered the impacts that operations and maintenance costs can have on economic evaluations of LID. Analysts sometimes refer to these as life-cycle studies because they consider the relevant costs throughout the useful life of a technology. We summarize three studies that took this approach with LID evaluations.

Combined sewer overflows, and the resulting biophysical and economic consequences, are major concerns for municipal stormwater managers. LID can help minimize the number of CSO events and the volume of contaminated flows by managing more stormwater on site and keeping flows out of combined sewer pipes. We summarize five studies that evaluated the costs of managing CSO events using LID.

A relatively small percentage of the economic evaluations of LID reported in the literature include assessments of the economic benefits of the technology. We summarize a number of these reports at the end of this section.

A. Cost of Low-Impact Development

Brown and Schueler (1997) surveyed construction costs for different methods of managing stormwater in urban areas. Their survey emphasized conventional controls but also included a number of LID techniques. At the time of their study, LID techniques were considered "next generation" best-management practices (BMPs). The report lists construction costs for sixty-four BMPs including wet and dry stormwater ponds, bioretention areas, sand filters and infiltration trenches. The authors' major conclusion is that a BMP's construction cost increases with the volume of stormwater the BMP stores. The report's construction costs may be out-of-date, however they provide insights into relative cost differences between LID and other controls listed in the report.

In a more recent study, Tilley (2003) reports construction costs for LID case studies implemented in Puget Sound and Vancouver, B.C. The report describes a range of case studies from small-scale projects implemented by homeowners to large installations completed by universities, developers and municipal governments. The LID techniques studied include rain gardens, permeable pavement and green roofs. The amount of cost information varies by case study. In some cases the report lists per-unit costs to install an LID, e.g., a pervious concrete project cost $1.50 per square foot for materials (excluding labor). Other descriptions report costs generally, but not costs specific to the case study described, e.g., the cost for pervious concrete is typically $6 to $9 per square foot. Some descriptions have no cost information, and others list total construction costs without a detailed breakdown of cost components.

The U.S. Department of Defense (DoD) (2004) developed a manual of design guidelines to incorporate LID into DoD facilities. The manual describes 13 stormwater-management techniques and their most appropriate uses, maintenance issues, and cost information. The list of LID techniques includes bioretention, grassed swales, and permeable pavers. The manual describes costs in some detail but also notes the site-specific nature of construction costs and factors that can influence construction costs for certain LIDs.

Liptan and Brown (1996) describe one of the earliest comparisons of construction costs for LID with that for conventional controls.[4] They focus on two projects in Portland, Oregon, which they refer to as the OMSI and FlexAlloy projects, and the Village Homes development in Davis, California. In all cases, the LID option cost less. The LID design implemented at the OMSI project saved the developer $78,000 in construction costs by reducing manholes, piping, trenching, and catch basins. At the FlexAlloy site, the City of Portland conducted a retrospective study of LID vs. conventional development, after the builder installed conventional controls. The City calculated that the developer could have saved $10,000 by implementing the LID option. The description of the FlexAlloy case study includes a detailed comparison of construction costs for the two options. The Village Homes case study concluded that by using vegetated swales, narrow streets, and a cluster layout of building lots, the developer saved $800 per lot, or $192,000 for the development. The Village Homes description includes no additional details on construction costs for the two options. The report also includes brief descriptions of other LID case studies, some with cost comparisons for LID vs. conventional controls. The authors conclude that involving developers, engineers, architects and landscape architects early in the design of a development that includes LID can help minimizing the LID-specific construction costs.

Hume and Comfort (2004) compared the costs of constructing conventional roads and stormwater controls with the costs of building LID options, such as bioretention cells and pervious pavement. The researchers added complexity to some of their comparisons by paring the same conventional and LID controls, e.g., infiltration trench (conventional) vs. bioretention cell (LID) on a different soil types and with different sources of stormwater runoff (e.g., driveway vs. roof top) to see how this affected construction costs. In some comparisons the LID option cost more than the conventional option, in other cases the results were opposite. These comparisons illustrate the site-specific nature of LID construction costs. Local conditions, e.g., less pervious soils, can influence the costs of LID controls.

In some cases, LID can help lower construction costs by making use of a site's existing or undisturbed drainage conditions in ways that conventional controls cannot. Planners of a 44-acre, 80-lot residential development in Florida took advantage of the site's natural drainage patters to help lower stormwater-management costs (PATH 2005). The site's low-lying areas convey the large majority of stormwater runoff to forested basins. The developer minimized disturbing natural drainage patterns by clustering building sites and connecting sites with narrow roads. Relying on natural infiltration and drainage patterns help the developer save $40,000 in construction costs by avoiding the costs of constructing stormwater ponds.

[4] In this Section we describe some of the developments associated with costs comparisons reported in the LID literature. The next Section focuses on LID from the perspective of property developers and contractors. In that Section we list results for a larger number of cost comparisons

Comparing construction costs between LID and conventional options, while informative, provides no information on the relationship between the cost and effectiveness. For example, in cases where the LID option costs more to build, it may also control a larger volume of stormwater relative to the conventional option. LID that keeps stormwater out of pipes and treatment facilities help lower operations and maintenance (O & M) costs, and help extend the useful life of the infrastructure, which can reduce future construction costs. The relative importance of construction or O & M costs depends on who pays for them. Builders likely focus exclusively on construction costs, however, cost and effectiveness information would help stormwater managers better evaluate control options and plan for future demands on stormwater infrastructure.

Brewer and Fisher (2004) report the results of four case studies that compared the cost and effectiveness of LID to that of conventional controls. The case studies modeled stormwater costs and conditions on four developments: high- and medium-density residential, an elementary school, and a commercial development. In both residential developments LID controls cost less than conventional controls. LID cost more for the school and commercial development. However, in all four cases, the LID option managed a larger volume of stormwater than the conventional option. We reproduce Brewer and Fisher's results in Table 4-1.

Table 4-1: Comparison of Runoff Controlled and Cost Savings for Conventional and LID Design.

Site Example	Runoff Storage (acre-feet)		LID Net Cost or Savings
	Conventional	LID	
Medium Density Residential	1.3	2.5	$476,406
Elementary School	0.6	1.6	$(48,478)
High Density Residential	0.25	0.45	$25,094
Commercial	0.98	2.9	$(9,772)

Source: Brewer and Fisher 2004

We calculated the economic value of the additional storage provided by the LID designs reported in Brewer and Fisher (2004), using data on the national average of construction costs as reported by American Forests. American Forests' CITYgreen analyses calculate the national-average cost of storing 1 acre-foot of runoff at $87,120.[5] American Forests uses a value of $2.00 per cubic foot of storage, obtained from national estimates of stormwater construction costs. This amount represents the avoided costs of not building stormwater detention ponds. This value may vary, depending on a project's location. In some of its analyses, American Forests uses local estimates of construction costs, which can be lower or higher than the national average. For example, American Forests uses

[5] *See, for example,* American Forests. 2003. *Urban Ecosystem Analysis: San Diego, California*. July. Retrieved August 2, 2007, from http://www.americanforests.org/downloads/rea/AF_SanDiego.pdf, American Forests. 2003. *Urban Ecosystem Analysis: Buffalo-Lackawanna Area, Erie County, New York*. June. Retrieved August 2, 2007, from http://www.americanforests.org/downloads/rea/AF_Buffalo.pdf.

$0.66 per cubic foot of storage in Houston, TX,[6] $5.00 per cubic foot of storage in Washington D.C.,[7] and $6.00 per cubic foot of storage in Portland, OR.[8] Table 4-2 shows the results of our calculation.

Table 4-2: Value of the Difference in Runoff Storage Provided by LID Designs.

Site Example	Runoff Storage (acre-feet)			Runoff Storage Difference (cubic-feet)[a]	Value of Difference in Runoff Storage ($2/cf)
	Conventional	LID	Difference		
Medium Density Residential	1.3	2.5	1.2	52,272	$104,544
Elementary School	0.6	1.6	1	43,560	$87,120
High Density Residential	0.25	0.45	0.2	8,712	$17,424
Commercial	0.98	2.9	1.92	83,635	$167,270

Source: ECONorthwest
Notes: [a] To convert from an acre foot to cubic feet, multiply by 43,560 (the number of cubic feet in an acre-foot).

Based on the results reported in Table 4-1, and taking the perspective of a builder, LID is the higher-cost alternative for the school and commercial development. Including the results from Table 4-2, and taking the perspective of a municipal stormwater manager—that is, considering construction costs and the cost savings associated with reductions in stormwater volume in our example calculation above—the LID option dominates the conventional choice in all four cases. The LID options control a larger volume of stormwater, which helps avoid municipal expenditures on stormwater management.

Doran and Cannon (2006) studied the relationship between construction costs of LID and conventional controls and effectiveness as measured by improvements in water quality. They studied the impacts of incorporating LID into a downtown redevelopment project in Caldwell, Idaho. The analysis modeled construction costs and improvements to water quality as measured by reduced concentrations of sediment and phosphorus in stormwater runoff. The LID techniques used in the project included permeable pavers, bioretention swales, riparian wetlands, and plantings of restored native vegetation. The study evaluated the LID and conventional controls using the cost of a 1-percent reduction in sediment and phosphorus concentrations. Conventional stormwater controls had lower

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[6] American Forests. 2000. *Urban Ecosystem Analysis for the Houston Gulf Coast Region*. December. Retrieved August 2, 2007, from http://www.americanforests.org/downloads/rea/AF_Houston.pdf.

[7] American Forests. 2002. *Urban Ecosystem Analysis: The District of Columbia*. February. Retrieved August 2, 2007, from http://www.americanforests.org/downloads/rea/AF_WashingtonDC2.pdf.

[8] American Forests. 2001. *Regional Ecosystem Analysis for the Willamette/Lower Columbia Region of Northwestern Oregon and Southwestern Washington State*. October. Retrieved August 2, 2007, from http://www.americanforests.org/downloads/rea/AF_Portland.pdf.

installation costs, but also had a lesser impact on water quality. Conventional controls cost $8,500 and reduced sediment and phosphorus concentrations by 5 percent, or $1,700 per percent reduction. LID stormwater controls cost more, $20,648, but had a greater impact on water quality, reducing sediment by 32 percent and phosphorus by 30 percent. The authors calculated a cost of $645 per percent reduction for the LID option. The LID option produced a better return on initial investment, as measured by improvements to water quality, than did investments in conventional controls.

As the previous two studies illustrate, comparing LID and conventional controls based on costs may bias the assessment against the most effective management option, and the option that yields the greatest return on investment. LID may cost more to build, but from an investment perspective, it may also control more stormwater and better improve water quality. The studies above considered separately LID effectiveness as measured by volume of stormwater managed and improvements in water quality of stormwater runoff. A more complete and accurate assessment of effectiveness and costs would consider the impacts on both in a single study. That is, compare LID and conventional controls based on costs and effectiveness as measured by volume of stormwater *and* water quality. We found no such studies in the literature.

Looking beyond construction costs to O & M and other costs gives a more complete description of the economic consequences of adopting LID or conventional controls. Sample et al. (2003) promotes evaluating stormwater BMPs using life-cycle-cost (LCC) analysis. LCC analysis includes the initial capital expenditures for construction, planning, etc., and the present value of lifetime O & M costs, and the salvage value at the end of the BMP's useful life. In addition, the authors suggest including the opportunity cost of land in the cost analysis. BMPs that occupy more land area have a higher opportunity cost valued at the next-best use for the land, e.g., residential value.

Vesely et al. (2005) compared the LCC for LID controls in the Glencourt Place residential development in Auckland, New Zealand with LCC results for conventional controls. The LID option had the added benefit of reusing stormwater collected on site as grey water for laundry, flushing toilets and irrigation. The LID option had LCCs that were 4 to 8 percent higher than the conventional option, depending on the discount rate and number of years in the analysis. These results do not account for the value of recycled stormwater. Including the avoided cost associated with water saved by recycling stormwater as household gray water, the LCC for the LID option were 0 to 6 percent higher, again, depending on the discount rate and number of future years in the analysis. The authors conclude that accounting for the value of water saved, the LID option was cost competitive with the conventional approach, as measured by the LCC method.

Data constraints on this study included difficulty estimating current and future maintenance costs and future decommissioning costs. Accounting for the opportunity cost of land also proved challenging give the available data. Data limitations also prevented the authors from considering the economic aspects of environmental externalities associated with the LID and conventional options.

LCC evaluations are an improvement over comparisons of construction costs in that they provide a more comprehensive assessment of relevant costs. On the other hand, LCC analyses require more data and results are sensitive to the discount rate applied to future values and the number of years of the analysis. Powell et al. (2005) underscore these advantages and challenges associated with LCC analysis. They recommend a checklist of factors to consider when conducting a LCC for LID and conventional controls. The checklist includes *quantitative* assessments of the components of LCC costs including acquisition, construction, O & M, and salvage value. Also included are *qualitative* assessments of the effectiveness of managing stormwater and the benefits attributed to the management option. The authors note that effectively and accurately implementing LCC analyses for LID will require more research into the costs of LID design, construction and O & M. Further research is also need in assessing the monetary benefits of LID controls.

Despite the fact that LID technologies have been promoted and studied since the early 1990s, in many ways, and to many stormwater managers, LID is still a new and emerging technology (Coffman 2002). As with most new technologies, installation and other costs for LID are highest during the early phases of development and adoption. Over time, as practitioners learn more about the technology, as the number of suppliers of inputs increases, and as regulations adapt to the new technology, costs will likely decline.

Foss (2005) describes this relationship between a learning curve and construction costs for greenstreet technology in Seattle. The city spent $850,000 implementing a greenstreet pilot project, known as the “Street Edge Alternative” (SEA) street. The City’s street planners expect that based on their experience with the pilot project, building greenstreets in the future will cost substantially less. Foss quotes the manager of the City’s surface water program on this point:

> *“You could take $200,000 off the price just from what we didn’t know. … The pilot phases that we are currently in are more expensive, but as the project becomes institutionalized, all the costs will come down. Even still, these projects are less expensive than standard projects.” (p. 7)*

B. Costs of Managing Combined Sewer Overflows By Low-Impact Development

One of the earliest studies of the economic aspects of managing combined sewer overflows by LID evaluated a project that disconnected downspouts as a means of reducing the number of CSO events and costs (Kaufman and Wurtz 1997). In 1994, the Beecher Water District (BWD) near Flint, Michigan, provided free downspout diversions from home sites to sanitary-sewer pipes for the 6,020 residential customers in their service area. The purpose of the program was to reduce the volume of sewer flows from the BWD to the City of Flint’s stormwater facility—and reduce the fees that BWD paid the city to manage these flows—and reduce the number and volume of CSO events in the BWD.

The program was a success on many levels and is an example of a small-scale and inexpensive approach that effectively managed CSO events. Disconnecting downspouts cost the BWD just over $15,000. After the diversions, the mean volume of sewer flows measured across all precipitation events decreased 26 percent. The program saved the BWD over $8,000 per month in reduced fees to the City of Flint’s stormwater facility, and in reduced costs of managing CSO events. The program paid for itself in two months. Other benefits included reduced CSO-related customer complaints, improved recharge of groundwater and reduced pollution of the Great Lakes, the receiving waters for CSO from the District.

In another study looking at controlling CSO events on a smaller scale, Thurston et al. (2003) modeled the costs of CSO controls for a small watershed in Cincinnati, Ohio. The modeling exercise was part of a study that evaluated the theoretical considerations of developing a market for tradable stormwater credits as a means of reducing CSO events and costs. One part of the study compared the construction costs of controlling CSO events by building tunnels and storage vaults with the costs of building LID controls on each of the 420 mostly-residential lots in the study area.

They calculated that building the tunnel and vault option would cost between $8.93 to $11.90 per cubic foot of storage capacity. Building LID controls on individual lots would cost $5.40 per cubic foot of capacity. Based on these results the researchers suggest that the costs of managing CSOs by implementing LID throughout the watershed would cost less than building a large centralized tunnel and vault system to store excess flows. They also note, however that their analysis does not include the opportunity cost of land that the LID controls would occupy, and so the cost of the LID option would be higher than they report. Their analysis also excludes O & M costs for both options, as well as the costs of education and outreach to property owners, and managing the construction of a large number of dispersed LID projects as components of the LID option. The project also excludes the economic benefits of the LID option.

Kloss and Calarusse (2006) developed a set of policy guidelines for decisionmakers interested in implement LID controls as a means of reducing CSO events in their jurisdictions. Regarding the costs of LID controls, the authors distinguish between new and retrofit construction projects. In new developments, they conclude, LID typically cost less than conventional stormwater controls. They note, however, that retrofit developments in urban areas that include LID typically cost more than conventional controls. This is especially true for individual, small-scale retrofit projects. The relative costs of LID controls can be reduced when they are incorporated into larger-scale redevelopment projects. The report provides conclusions with limited details on cost information. The report also describes the experiences of nine municipalities across the country that include LID in their policies to control CSO events and related costs.

Montalto et al. (2007) described the relationship between public agencies tasked with controlling CSO events, and private land owners on whose property the large majority of LID controls would be sited. The public agencies benefit from the reduced stormwater flows and CSO events that LID provides. The land owner, however, pays the LID installation and O & M costs, but may see little benefit beyond reduced stormwater fees or increased property values from LID such as greenstreets. These benefits may not outweigh the costs to the land owner, and so they may choose not to install LID controls. Given this disconnect, the authors note the benefits of public policies, incentives and subsidies to promote LID adoptions by private-property owners.

In an effort, in part, to measure the amount of subsidy that may be required, the authors developed a model to assess the cost-effectiveness of mitigating CSO events in urban areas using LID. They applied their model to a case study in the Gowanus Canal area of Brooklyn, NY. The case study compared the costs of installing porous pavement, green roofs, wetland developments and other LID throughout the study area to the costs of installing storage tanks to catch excess stormwater flows. As part of their analysis they collected and report installation and O & M costs for a range of LID techniques.

They conclude that under a range of cost and performance assumptions, LID installed throughout the study area could potentially reduce the number of CSO events and volume at a cost that would be competitive or less than the costs of the conventional storage-tank option. They note that they could improve the performance of their model if more data were available on LID performance, costs and public acceptance.

Plumb and Seggos (2007) studied the impacts of diverting monies currently designated to building storage tanks and other conventional CSO controls for New York City to building LID controls throughout the city. They compared the effectiveness of storage tanks and LID controls based on gallons of stormwater managed per $1,000 invested. We reproduce their results in Table 4-3 below. Except for greenroofs, the LID options control more stormwater per $1,000 invested than the conventional storage-tank option.

Table 4-3: Gallons of Stormwater Managed per $1,000 Invested.

Stormwater Control	Gallons per $1,000 Invested
Conventional Storage Tanks	2,400
Greenstreet	14,800
Street Trees	13,170
Greenroof	810
Rain Barrel	9,000

Source: Plumb and Seggos 2007

They describe their analysis as a simple and preliminary cost comparison and conclude that their results demonstrate that LID controls can be cost competitive with conventional controls, if not more so. The authors recommended further detailed study of the issue. Their analysis focused on the costs of LID vs. conventional controls and did not consider economic benefits of the LID techniques.

C. Economic Benefits of Low-Impact Development

Many reports and articles describe the potential benefits that LID stormwater controls can provide—benefits that conventional controls can not offer.[9] Very few studies, however, quantify these benefits, either in biophysical measures or in dollar amounts. A study by CH2MHill (2001) is a typical example. The analysis compared the costs and benefits of managing stormwater in two residential developments using LID or conventional controls. The cost analysis included detailed information for the LID and conventional controls. In this case, results of the cost analysis were mixed. In one development the LID option cost less to build and in the other development the conventional control cost less. In both cases the LID option had higher maintenance costs but homeowners would benefit from lower stormwater and water fees.

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[9] We list a number of these sources in Section II of this report.

The analysis of benefits included much less detailed information. The study lists the benefits that the LID option would provide, benefits that the conventional approach would not. These benefits include reduced auto traffic, increased open space, improved downstream water quality, and increased groundwater recharge. However, the benefits were not quantified in dollar amounts.

In another example, Bachand (2002) studied the costs and benefits of developing wetlands as a stormwater management option. The analysis described the construction and O & M costs associated with the wetlands option, and the benefits including adding new recreational opportunities, increased wildlife habitat and increase property values for near-by homeowners. However, they did not measure the benefits in economic terms. An accompanying study by Fine (2002) quantified some of the recreational benefits that derive from wildlife watching in the wetlands, but left unquantified the benefits of other direct uses of the wetlands, as well as the value of habitat improvements and other non-use benefits.[10]

When researchers cite the needs for further research into LID-related topics, quantifying benefits and measuring their economic importance invariably makes the list. For example, Sample et al. (2003) cites the need for more research into measuring the technical and economic benefits of LID, including benefits to downstream receiving waters. Powell et al. (2005) note the need for more research into monetary measures of the benefits of LID, e.g., the impact that a greenstreet can have on adjacent property values. Vesely et al. (2005) state that future studies should include not only the economic benefits of LID but also the negative economic impacts of conventional controls. Failing to do so will continue biasing management decisions in favor of conventional controls:

> *"Exclusive reliance on profitability and market value will favour [sic] the conventional approach to stormwater management by disregarding both the negative environmental externalities associated with this approach, and the positive environmental externalities associated with the low impact approach." (page 12)*

A number of studies do measure some of the economic benefits of on-site stormwater controls. For example, Braden and Johnson (2004) studied the economic benefits that on-site stormwater management could have on properties downstream. The researchers first estimated the impacts that on-site stormwater controls could have on the frequency and extent of downstream flooding. Using information reported in the literature on the extent to which property markets discount the value of properties in a floodplain, they approximated the economic value of reduced flooding attributed to on-site management of stormwater. They then calculated the value of avoided flood damage as a percentage of property values. They estimate that a marginal reduction in flooding would increase property values 0 to 5 percent for properties in a floodplain, depending on the extent to which the on-site controls reduce stormwater runoff.

They then took a similar approach to valuing improvements in water quality. Based on values reported in the literature, they estimate that the benefits of improved water quality could reach 15 percent of market value for properties that border the water body at issue

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[10] We were unable to obtain a copy of the full report. We base our description on a summary of the analysis.

if water quality improves significantly. The increase is much less for smaller improvements in water quality, for undeveloped properties, and for properties not adjacent to the water body.

They conclude with a best-guess estimate of a 2 to 5 percent increase in property values for properties in a floodplain from on-site management of stormwater. Other benefits that could not be quantified or valued given available information include reduced infrastructure expenditures for culverts, bridges and other drainage infrastructure.

In a follow-up case study, Johnston, Braden, and Price (2006) applied the analytical method developed in the previous study to properties in the one-hundred-year floodplain portion of a watershed in the Chicago area. They estimate the economic benefit of avoided flooding two ways and extend the analysis to approximate reduced municipal expenditures on culverts.

Applying the 0 to 5 percent impact on property values calculated in the previous study to properties in the case study, the researchers estimated an economic benefit of $0 to $7,800 per acre of increased property value attributed to reduced flooding. They also calculated the economic benefit of reduced flooding based on the avoided flood damage to structures and contents for properties in the floodplain. This analytical method included data compiled by the U.S. Army Corps of Engineers on the relationship between flooding and damages to properties in floodplains. This approach yields an economic benefit of avoided flooding of $6,700 to $9,700 per acre for properties in the floodplain.

The researchers approximate that for the case-study portion of the watershed, conservation-design practices such as LID techniques that retain more stormwater on site and reduce flooding could generate $3.3 million in avoided costs for road culverts.

The estimated economic benefit of increased on-site management of stormwater for properties in the case study for both avoided flooding and reduced municipal expenditures on culverts is $380 to $590 per acre.

A series of analyses by American Forests (2000-2006) report the economic benefits of stormwater services provided by trees in various cities and regions throughout the United States. These reports describe results from American Forests' CITYgreen model, which calculates the volume of stormwater absorbed by existing tree canopies and estimates the avoided costs in stormwater management that the trees provide. The model includes city-specific per-unit stormwater-management costs when available. The model substitutes national per-unit costs when city-specific data are not available. In Table 4-4 below we report the results for some of American Forests' city and regional analyses. The dollar amounts represent the costs of expanding stormwater infrastructure to manage the stormwater that existing trees otherwise absorb and transpire.

Table 4-4: Avoided stormwater-construction costs attributed to trees, as measured by the American Forests' CITYgreen model.

Urban Area	Amount that trees save in one-time stormwater-construction costs
Houston, Texas	$1.33 billion
Atlanta, Georgia	$2.36 billion
Vancouver, Washington/ Portland-Eugene, Oregon	$20.2 billion
Washington D.C.	$4.74 billion
New Orleans, Louisiana	$0.74 billion
San Antonio, Texas	$1.35 billion
San Diego, California	$0.16 billion
Puget Sound Metro Area, Washington	$5.90 billion
Detroit, Michigan	$0.38 billion
Chesapeake Bay Region	$1.08 billion

Source: American Forests 2000-2006

The Bisco Werner et al. (2001) analysis of the economic benefits of trees attributed to stormwater management also employed the CITYgreen model. Researchers applied the CITYgreen model to a case study that included the commercial corridor along a major highway through central New Jersey. The analysis modeled the change in tree canopy between 1975 and 1995, and calculated the value of lost stormwater services. During this time, the value of services declined from $1.1 million to $896,000, a 19-percent reduction. If existing trends continue, the expected value in 2015 will be $715,000, a 35-percent reduction relative to the value of services available in 1975. As services supplied by street trees declines, demand on municipal stormwater controls, and associated costs, increase.

The researchers extended their study to include the economic benefits of tree cover attributed to removing air pollutants. This portion of their analysis studied the tree cover at a number of commercial properties in the New York and New Jersey area. In this case the CITYgreen model calculated avoided stormwater-construction costs associated with stormwater services provided by trees on site and, using values reported in the literature, the amounts of air pollutants absorbed by trees, and the per-unit value for each pollutant.

In one case study of a shopping mall, the analysis estimated that the trees currently on the site manage approximately 53,000 cubic feet of stormwater. The CITYgreen model estimated the value of the associated avoided infrastructure costs at just over $33,000. The value of air-pollutant removed is estimated at $1,441 per year. The report lists results for fifteen such case studies.

Wetlands that absorb stormwater runoff can help minimize stormwater-related management and infrastructure costs. Depending on their location and makeup, wetlands may provide other benefits, such as wildlife habitat and recreational opportunities. Fine (2002)[11] studied the recreational benefits provided by wetlands proposed as part of the Treasure Island redevelopment in San Francisco Bay. The analysis assumes that the wetlands will attract visitors year round, with the winter months providing the best opportunity to view migratory birds. Based on recreational expenditures for similar sites in the San Francisco Bay area, Fine calculates that area visitors will spend $4 to $8 million annually. Other benefits that Fine was unable to quantify and value include fisheries enhancement and water-quality services.

Devinny et al. (2005) developed a first-approximation of a benefit-cost analysis of complying with water-quality requirements throughout Los Angeles County using LID and other stormwater BMPs. They present their analysis as an alternative to the approach described by Gordon et al. (2002), which relies on collecting and treating the county's stormwater using conventional controls. The Devinny et al. approach assumes widespread adoption of LID and other on-site stormwater BMPs.

The Devinny et al. analysis accounts for the fact that the density of existing development will limit the extent to which LID and other BMPs can be retrofitted into developments. As an alternative they propose a combination of LID and BMPs along with directing stormwater to regional wetlands and other infiltration systems. As the density of development increases, so does the size and costs of developing regional wetlands.

This study differs from other benefit-cost analyses of stormwater-management options in that the researchers quantify a range of potential benefits associated with the approach that emphasizes on-site treatment of stormwater. They estimate the cost of their approach at $2.8 billion if disbursed LID and other on-site BMPs sufficiently control stormwater quality. Costs increase to $5.7 to $7.4 billion if regional wetlands and other infiltration systems are needed. This approach costs less than the estimated cost of $44 billion to implement the option that emphasizes conventional controls (California Department of Transportation 2005).

The estimated value of the economic benefits of implementing LID, other on-site BMPs and regional wetlands range from $5.6 to $18 billion. Benefits include the economic aspects of reduced flood control, increased property values adjacent to new greenspaces and wetlands, additional groundwater supplies, improved beach tourism, and reduced sedimentation of area harbors. The conventional approach would provide none of these economic benefits.

[11] We were unable to obtain a copy of the full report. We base our description on a summary of the analysis.

V. Developers' Experiences With Low-Impact Development

Baring regulations that mandate LID controls, developers adopt LID because they help reduce construction costs, increase sales, boost profits, or some combination of the three. These deliberations focus primarily on the extent to which local property markets account for the direct costs and benefits that LID can provide. Typically these deliberations do not include indirect costs and benefits and the potential non-market impacts of LID that may be important to others such as municipal stormwater managers and area residents. These non-market impacts may include reduced downstream flooding, improved water quality and habitat of water bodies that receive stormwater, reduced CSO events, or impacts on the costs of operating municipal-stormwater infrastructure.

In this section we summarize developers' experiences installing LID. As with other new technologies, adopting LID includes opportunities and risks. We begin by describing the risks and challenges that developers face by including LID in their projects. These risks include uncertain construction delays as the developer applies for variances to local zoning codes because the codes do not explicitly recognize LID as an accepted stormwater control.

Next, we describe some of the efforts by municipal governments to reduce the developers' regulatory risk and uncertainty of using LID. Finally, we list some of the successes developers have had adopting LID and the resulting impacts on construction costs, sales, and profits.

A. Challenges Developers Face Using LID

Much of the general public is still unaware of LID attributes, the benefits they can provide, or their O & M costs. As such, they may not understand or appreciate why a developer included LID in a project. This may give developers pause because they supply products that they believe their customers—homebuyers—want and will purchase. Potential buyers may shy away from homes that include an unfamiliar technology.

A general lack of understanding of LID may concern developers in part because including on-site treatment of stormwater will also require on-site management of stormwater facilities, the LID technologies. Homeowners unfamiliar with LID likely will have no understanding of their maintenance requirements (Lewis 2006; England 2002; Foss 2005). For example, a bioswale clogged with sediment may not control stormwater volume or quality, which could negatively reflect on the builder. Another concern has to do with the lack of understanding as to the life-expectancy of LID controls (Lewis 2006). A builder may be concerned that an untimely failure of stormwater controls could negatively affect their reputation.

Similar to the public's general lack of understanding of LID, many builders are also unfamiliar with the technology. A builder may not be able to identify the most effective and least-cost LID technology for a given development from the wide variety of possible LID controls (Foss 2005; Lewis 2006). A related point is that construction costs for LID technologies are site specific. For example, not all soils can support LID technologies that emphasize stormwater infiltration. Assessing a site and designing LID technologies that will function on the site may also increase a builder's design costs (Coffman 2002; Strassler et al. 1999).

A much-mentioned impediment to builders' adoption of LID is building codes that do not account for LID as stormwater controls. Many municipalities have zoning and building-inspection standards in place that were adopted many years ago, long before LID was an option (Coffman 2002; NAHB Research Center Inc. 2003; Foss 2005; Lewis 2006). These standards emphasize conventional stormwater controls that collect stormwater and transport it off site to a receiving body of water or to a treatment facility. Municipalities with outdated stormwater regulations typically require that builders file variances if they want to use LID controls. Filing variances for LID increases design and regulatory costs, which delays construction and can increase a builder's financing costs (Clar 2004; Coffman 2002; Lewis 2006; NAHB Research Center Inc. 2003).

A related constraint in some jurisdictions with outdated regulations is a lack of technical expertise or understanding by regulators regarding LID stormwater controls. In some cases, regulators unfamiliar with LID technology must be convinced of their effectiveness, which also increases a builder's design and regulatory costs (Coffman 2002; NAHB 2003; Lewis 2006).

B. Municipal Actions To Increase LID Adoption On Private Developments

Some jurisdictions help promote LID adoption on private lands and take steps that reduce the regulatory uncertainty and risk that builders face when including LID in private developments. These jurisdictions may have CSO problems, or are trying to extend the useful life of their stormwater infrastructure in the face of increasing population and economic activity. In any case, they recognize the importance of managing as much stormwater on site as possible and keeping it out of the jurisdiction's stormwater pipes.

One way that jurisdictions promote LID adoption on private lands is by updating their zoning codes and building-inspection standards to explicitly address LID stormwater controls (Coffman 2002; NAHB Research Center Inc. 2003; Foss 2005; Lewis 2006). This helps reduce a builder's regulatory risk because it eliminates the need to file variances. Rather than spending time convincing regulators as to the desirable stormwater attributes or effectiveness of LID controls, builders can instead proceed with their development.

Granting density bonuses for developments that install LID stormwater controls is another way jurisdictions encourage the proliferation of LID techniques. In this case, the jurisdiction grants the developer a greater number of individual building lots than would have been allowed if the development relied on conventional stormwater controls (Coffman 2002; NAHB Research Center Inc. 2003). This type of incentive not only reduces a builder's regulatory risk, and associated costs, but also increases the number of lots that can be sold, which can increase the builder's revenue and profits. Jurisdictions also promote LID installation on private lands by reducing development-related fees, such as inspection fees (Coffman 2002; NAHB Research Center Inc. 2003).

C. Benefits To Developers of Including LID Controls in Their Projects

Developers who accept the regulatory uncertainty and other challenges of adopting LID do so with the expectation that controlling stormwater on site can have economic advantages. These advantages include increasing the number of developable lots and reducing expenditures associated with stormwater infrastructure. Managing stormwater on site using LID controls can mean doing away with stormwater ponds, thus increasing a site's developable area (Coffman 2002; NAHB Research Center Inc. 2003). Selling additional lots can increase a builder's revenues and profits. Replacing curbs, gutters and stormwater pipes with bioswales, pervious pavers and other LID controls reduces construction costs for some developers (Coffman 2002; NAHB Research Center Inc. 2003; Center for Watershed Protection 2001).

An analysis of a development in Prince George's County, Maryland, documented the impacts that controlling stormwater on site with LID can have on the site's buildable area and construction costs. The Somerset Community development installed rain gardens, grass swales along streets, and other LID controls. Substituting LID for conventional controls saved the developer approximately $900,000. Doing away with the site's stormwater ponds gave the developer six additional lots (Foss 2005).

A study of the Pembroke Woods Subdivision in Frederick County, Maryland found similar results (Clar 2004). The developer substituted LID for conventional controls, doing away with curbs, gutters, sidewalks, and eliminated two stormwater ponds. Eliminating the curbs and gutters saved the developer $60,000. Installing narrower streets eliminated impervious area and reduced paving costs by 17 percent. Excluding the stormwater ponds saved $200,000 in construction costs and added two developable lots, valued at $45,000 each. Other economic benefits to the developer include reduced costs of clearing land for development of $160,000, and adding 2.5 additional acres of open space, which reduced the developer's wetland-mitigation requirements.

Conservation subdivisions take a comprehensive approach to stormwater management by combining LID controls with a site design that takes advantage of existing drainage patterns. Narrow streets and clustered building lots make maximum use of natural stormwater controls, thus reducing construction costs (Center for Watershed Protection 2001). A study of ten subdivisions found that conservation subdivisions that emphasized LID and protected natural drainage patterns cost, on average, thirty-six percent less than subdivisions that relied on conventional stormwater controls (Conservation Research Institute 2005).

Researchers note that some conservation subdivisions have an additional benefit in that there's greater demand for lots in these subdivisions compared with the demand for lots in conventional subdivisions. Greater demand for lots means the developer can charge more for the lot and lots may sell faster (Center for Watershed Protection 2001).

A case study of conservation and conventional subdivisions in South Kingstown, Rhode Island quantified the market benefits of conservation developments. The study compared the costs of developing the lots and the market value of the lots (Mohamed 2006). Results show that conservation lots cost less to develop and sell for a higher price. On average, conservation lots cost $7,400 less to produce than lots in conventional subdivisions, and sold for 12 to 16 percent more, per acre, than conventional lots. Lots in the conservation subdivision also sold in approximately half the time as lots in conventional subdivisions.

Another study of cluster developments in New England found that houses in these types of developments appreciate faster than houses in conventional developments (Lacy 1990). Lacy identified developments in Concord and Amherst, Massachusetts that were characterized by smaller individual lots surrounded by natural open space, limited lot clearing, and narrower streets. He compared these with nearby conventional developments. The Concord cluster development appreciated 26 percent more than conventional developments over an eight-year study period. The Amherst cluster development also yielded a higher rate of return on investment over a 21-year study period, compared to nearby conventional development.

In Tables 5-1 and 5-2 below we summarize the results of studies that compared construction costs using LID vs. conventional stormwater controls for residential and commercial developments (respectively). We included information in the tables if a study described the source of the cost difference, e.g., substituting a bioswale for curbs and gutters saved $Z. We excluded studies that reported a cost difference, but did not describe the details of the cost comparison. We found many studies in the literature that did not provide details of cost comparisons.

We distinguish between study results for built developments from results for proposed or modeled developments. In some cases the studies report total cost savings for a development but not savings per lot in the development. In these cases we calculated the per-lot cost savings. We recognize that the cost savings values reported below are in dollars from different years, and so comparisons of cost savings between examples may not be appropriate. We found insufficient data in most case studies to convert all values to the same-year dollars.

The large majority of studies listed in Tables 5-1 and 5-2 describe LID installed or proposed to be installed in new developments. We found very few studies that measured the economic outcomes of including LID stormwater controls in urban, redevelopment projects. We identified these studies as “retrofits” in the tables.

Table 5-1: Cost savings attributed to installing LID stormwater controls in residential developments.

Location	Description	LID Cost Savings[a]
Meadow on the Hylebos Residential Subdivision Pierce County, WA	9-acre development reduced street width, added swale drainage system, rain gardens, and a sloped bio-terrace to slowly release stormwater to a creek. Stormwater pond reduced by 2/3, compared to conventional plan. (Zickler 2004)	LID cost 9% less than conventional
Somerset Community Residential Subdivision Prince George's Co., MD	80-acre development included rain gardens on each lot and a swale drainage system. Eliminated a stormwater pond and gained six extra lots. (NAHB Research Center Inc. 2003)	$916,382 $4,604 per lot
Pembroke Woods Residential Subdivision Frederick County, MD	43-acre, 70-lot development reduced street width, eliminated sidewalks, curb and gutter, and 2 stormwater ponds, and added swale drainage system, natural buffers, and filter strips. (Clar 2004; Lehner et al. 2001)	$420,000 $6,000 per lot[b]
Madera Community Residential Subdivision Gainesville, FL	44-acre, 80-lot development used natural drainage depressions in forested areas for infiltration instead of new stormwater ponds. (PATH 2005)	$40,000 $500 per lot[b]
Prairie Crossing Residential Subdivision Grayslake, IL	667-acre, 362-lot development clustered houses reducing infrastructure needs, and eliminated the need for a conventional stormwater system by building a natural drainage system using swales, constructed wetlands, and a central lake. (Lehner et al. 2001; Conservation Research Institute 2005)	$1,375,000- $2,700,000 $3,798-$7,458 per lot[b]
SEA Street Retrofit Residential street retrofit Seattle, WA	1-block retrofit narrowed street width, installed swales and rain gardens. (Tilley 2003)	$40,000
Gap Creek Residential Subdivision Sherwood, AK	130-acre, 72-lot development reduced street width, and preserved natural topography and drainage networks. (U.S. EPA 2005; Lehner et al. 2001; NAHB Research Center Inc. 2003)	$200,021 $4,819 per lot
Poplar Street Apartments Residential complex Aberdeen, NC	270-unit apartment complex eliminated curb and gutter stormwater system, replacing it with bioretention areas and swales. (U.S. EPA 2005)	$175,000
Kensington Estates* Residential Subdivision Pierce County, WA	24-acre, 103-lot hypothetical development reduced street width, used porous pavement, vegetated depressions on each lot, reduced stormwater pond size. (CH2MHill 2001; U.S. EPA 2005)	$86,800 $843 per lot[b]
Garden Valley* Residential Subdivision Pierce County, WA	10-acre, 34-lot hypothetical development reduced street width, used porous paving techniques, added swales between lots, and a central infiltration depression. (CH2MHill 2001)	$60,000 $1,765 per lot[b]
Circle C Ranch Residential Subdivision Austin, TX	Development employed filter strips and bioretention strips to slow and filter runoff before it reached a natural stream. (EPA 2005)	$185,000 $1,250 per lot

Location	Description	LID Cost Savings[a]
Woodland Reserve* Residential Development Lexana, KS	Reduced land clearing, reduced impervious surfaces, and added native plantings. (Beezhold 2006)	$118,420
The Trails* Multi-Family Residential Lexana, KS	Reduced land clearing, reduced impervious surfaces, and added native plantings. (Beezhold 2006)	$89,043
Medium Density Residential* Stafford County, VA	45-acre, 108-lot clustered development, reduced curb and gutter, storm sewer, paving, and stormwater pond size. (Center for Watershed Protection 1998b)	$300,547 $2,783 per lot[b]
Low Density Residential* Wicomico County, MD	24-acre, 8-lot development eliminated curb and gutter, reduced paving, storm drain, and reforestation needs. Eliminated stormwater pond and replaced with bioretention and bioswales. (Center for Watershed Protection 1998b)	$17,123 $2,140 per lot[b]

Source: ECONorthwest, with data from listed sources.
Notes: * indicates hypothetical or modeled project, not actually constructed.
[a] Dollar amounts as reported at the time of study.
[b] Per-lot cost savings calculated by ECONorthwest.

Table 5-2: Cost savings attributed to installing LID stormwater controls in commercial developments.

Location	Description	LID Cost Savings[a]
Parking Lot Retrofit Largo, MD	One-half acre of impervious surface. Stormwater directed to central bioretention island. (U.S. EPA 2005)	$10,500-$15,000
Old Farm Shopping Center* Frederick, MD	9.3-acre site redesigned to reduce impervious surfaces, added bioretention islands, filter strips, and infiltration trenches. (Zielinski 2000)	$36,230 $3,986 per acre[b]
270 Corporate Office Park* Germantown, MD	12.8-acre site redesigned to eliminate pipe and pond stormwater system, reduce impervious surface, added bioretention islands, swales, and grid pavers. (Zielinski 2000)	$27,900 $2,180 per acre[b]
OMSI Parking Lot Portland, OR	6-acre parking lot incorporated bioswales into the design, and reduced piping and catch basin infrastructure. (Liptan and Brown 1996)	$78,000 $13,000 per acre[b]
Light Industrial Parking Lot* Portland, OR	2-acre site incorporated bioswales into the design, and reduced piping and catch basin infrastructure. (Liptan and Brown 1996)	$11,247 $5,623 per acre[b]
Point West Shopping Center* Lexana, KS	Reduced curb and gutter, reduced storm sewer and inlets, reduced grading, and reduced land cost used porous pavers, added bioretention cells, and native plantings. (Beezhold 2006)	$168,898
Office Warehouse* Lexana, KS	Reduced impervious surfaces, reduced storm sewer and catch basins, reduced land cost, added bioswales and native plantings. (Beezhold 2006)	$317,483
Retail Shopping Center*	9-acre shopping development reduced parking lot area, added porous pavers, clustered retail spaces, added infiltration trench, bioretention and a sand filter, reduced curb and gutter and stormwater system, and eliminated infiltration basin. (Center for Watershed Protection 1998b)	$36,182 $4,020 per acre[b]
Commercial Office Park*	13-acre development reduced impervious surfaces, reduced stormwater ponds and added bioretention and swales. (Center for Watershed Protection 1998b)	$160,468 $12,344 per acre[b]
Tellabs Corporate Campus Naperville, IL	55-acre site developed into office space minimized site grading and preserved natural topography, eliminated storm sewer pipe and added bioswales. (Conservation Research Institute 2005)	$564,473 $10,263 per acre[b]
Vancouver Island Technology Park Redevelopment Saanich, British Columbia	Constructed wetlands, grassy swales and open channels, rather than piping to control stormwater. Also used amended soils, native plantings, shallow stormwater ponds within forested areas, and permeable surfaces on parking lots. (Tilley 2003)	$530,000

Source: ECONorthwest, with data from listed sources.
Notes: * indicates hypothetical or modeled project, not actually constructed.
[a] Dollar amounts as reported at the time of study.
[b] Per-acre cost savings calculated by ECONorthwest.

VI. Directions for Future Research

Despite the increasing use of LID stormwater controls, and the growing number of economic studies of this technique, our literature review found areas for further research. These areas include:

- Additional research that quantifies the costs and benefits of stormwater management. This includes economic research on the lifetime O & M costs for LID and conventional controls, as well as, studies that quantify the economic benefits of LID methods.

- More detailed information on costs associated with LID. Specifically, information on the factors that contribute to cost savings or cost increases of LID relative to conventional controls.

- Economic studies of LID and conventional methods that control for the effectiveness of the techniques regarding managing stormwater volumes and improving water quality. Comparing LID techniques that cost more to install than conventional methods, but control larger amounts of stormwater, is an apples-to-oranges comparison.

- The large majority of economic studies of LID methods apply to new construction. More research is needed on the economic outcomes of including LID methods in urban redevelopment projects.

- Some preliminary evidence exists that LID can help control CSO volumes at a lower cost than conventional controls. Stormwater managers and public-policy decisionmakers would benefit from additional economic research on this topic.

- Economic studies that model theoretical LID and conventional controls, while informative, may be less convincing to some stormwater managers, decisionmakers and ratepayer stakeholders than retrospective studies of installed controls.

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APPENDIX: ADDITIONAL LOW-IMPACT DEVELOPMENT RESOURCES

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Economic Factors that Influence Developers' Decisions

June 2011

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ECONorthwest specializes in economics, planning, and finance. Founded in 1974, we're one of the oldest independent economic consulting firms in the Pacific Northwest. We have extensive experience applying rigorous analytical methods to examine the benefits, costs, and other economic effects of environmental and natural resource topics for a diverse array of public and private clients throughout the United States and across the globe.

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Acknowledgements

This report was made possible by funding from the William Penn Foundation, the Keith Campbell Foundation, and the Russell Foundation.

We gratefully acknowledge the assistance of the many individuals who provided us with information and insight in this project. We emphasize, however, that we, alone, are responsible for the report's contents—they do not necessarily represent the opinions of the other individuals involved in this research. We have prepared this report based on our synthesis of the interviews and literature search conducted in the scope of this project, and from our general knowledge of economic principles.

Table of Contents

I. Introduction and Summary

Low-impact development and green-infrastructure (LID) are viable strategies for managing stormwater, as reflected by the increasing number of jurisdictions that are either encouraging or requiring their use. As the U.S. EPA develops regulations for controlling non-point-source pollution from stormwater runoff, it is considering requiring local jurisdictions to implement stronger stormwater standards.[1] Among the options it is considering is a volume-based standard that will drive the use of LID more broadly nationwide.

There is currently disagreement as to whether strong stormwater standards uniformly applied across development types would have an impact on where and how development occurs. Some regulators and interest groups have raised concerns that widespread, uniform mandates for stronger stormwater controls, including LID, would undercut efforts to reduce sprawl and to direct future development into already-urbanized areas. These concerns arise from a premise that stronger stormwater controls, and LID in particular, are more expensive to integrate into redevelopment than greenfield development because of site constraints, land costs and other regulatory factors. Facing these increased costs, it is argued, developers may focus their resources on greenfield development and reduce their investment in redevelopment projects. This shift could have unintended, adverse consequences for water quality in the long run by increasing the overall amount of impervious areas in a given watershed.

Other interest groups share concerns about the adverse environmental effects of sprawl, but suggest that the data do not support claims of prohibitive cost and diversion of development to greenfields allegedly caused by strong stormwater requirements. These advocates note that the development process is complex and motivated by a range of factors, many which are highly site-specific, and that no one factor drives decisions on the location and type of development. Further, they argue that, the economic benefits of a stormwater standard—particularly if it requires the use of green infrastructure—will provide economic and livability benefits that will actually encourage the redevelopment of existing communities rather than push development to greenfields.

Smart Growth America (SGA), in collaboration with American Rivers, the Center for Neighborhood Technology, River Network, and the Natural Resources Defense Council, asked us to investigate what impact, if any, strong stormwater regulations that require or encourage LID techniques, uniformly applied to greenfield development and redevelopment, would have on developers' decisions about where and how to build. We approached this project by reviewing relevant literature and interviewing jurisdiction staff and individuals in the development community on these topics:

[1] Throughout this report, we refer to "stronger stormwater standards" to mean water-quality and/or volume standards that require developers to manage the majority of stormwater runoff from impervious surface conversion on-site, ideally using infiltration or retention techniques. The three jurisdictions we focus on in this report recently adopted stronger stormwater standards, relative to what they required previously, and relative to the stormwater controls many jurisdictions in the nation currently require. Each set of requirements is slightly different (see Section II, B for a summary), but in general, they are among the strongest in the nation, and are an indication of the level of stormwater control EPA may consider requiring more broadly as it revises the national stormwater regulations.

- the factors that affect development decisions in greenfield and redevelopment contexts, and the significance of stormwater management in these decision-making processes
- the challenges and benefits of implementing stronger stormwater standards in greenfield and redevelopment contexts
- the range of incentives jurisdictions have implemented or considered to facilitate the adoption of LID in greenfield and redevelopment projects

We focused our inquiry on the developers' decision-making process in three jurisdictions that have recently implemented stronger stormwater standards for retention and/or water-quality treatment, and allow or require consideration of LID or Environmentally Sensitive Design (referred to here as LID): Montgomery County, Maryland; Philadelphia, Pennsylvania; and Olympia, Washington. We first reviewed the literature on the topics above and each jurisdiction's efforts to implement stronger stormwater controls. We then interviewed members of the development community and permitting and planning staff in each jurisdiction to focus on specific issues the existing literature does not sufficiently address.

This report presents the information we have collected on these topics. We organize our findings into seven broad conclusions that inform the primary research question. We summarize them below. We elaborate on each with evidence from the literature and interviews in the following sections. Appendix A presents a bibliography, and Appendix B lists the individuals we interviewed and consulted during this project.

1. Developers are successfully incorporating stronger stormwater controls to meet strict volume-reduction and water-quality standards in both redevelopment and greenfield projects.

Our study found that some developers can and do meet stronger stormwater standards in both redevelopment and greenfield projects. Interviewees who had completed developments that met stronger stormwater standards using LID indicated that doing so required creativity and willingness to experiment with new approaches to projects. They emphasized that pursuing these projects was not without challenge, but they will continue developing in places that require strong stormwater controls and LID. Developers pointed to a variety of reasons for this choice: the markets they participate in respond favorably to the new stormwater designs; meeting regulations with green-infrastructure techniques could be more cost effective than conventional controls; and for some, they simply believed it was the right thing to do for the environment. Some developers we interviewed had not yet implemented projects under the stronger stormwater standards. Some were skeptical, based on their own initial experiences or other developers they'd talked to, that they could make a project pencil out using LID controls. A minority of interviewees held this perspective. Although staff at each jurisdiction had encountered this opinion, none had actually observed that developers were choosing to invest in greenfield projects over redevelopment projects because of the new standards. This is consistent with other findings in the literature (Leistra, Weiss, and Helman 2010).

2. Complying with stormwater regulations is one factor among many that influences a project's costs. It is rarely the driving factor.

Stronger stormwater standards can affect the costs of both greenfield and redevelopment projects. These costs are folded into a *pro forma* analysis that developers and lenders use to assess the viability of a project. Developers we interviewed revealed that their decision-making process incorporates a wide range of economic factors, including various construction costs, current and future market conditions, regulatory incentives and disincentives, and uncertainty and risk. While some developers we interviewed indicated that the costs associated with meeting stronger stormwater standards may change the types of projects they will pursue in the future, many developers described the cost of implementing stormwater controls as minor compared to the other economic factors they considered in deciding whether or not to pursue a project. This is especially true in the context of highly-complex redevelopment projects and green-building infill projects. In general, stronger stormwater standards increase the costs of implementing stormwater controls, a trend that many of the developers we interviewed have experienced since at least the 1980s. Some developers pointed out, however, that using LID controls has helped offset some of the increased cost, compared to using conventional controls.

3. The costs of stormwater controls in general, and LID controls in particular, tend to be more variable and site-specific for redevelopment versus greenfield development.

The developers we interviewed were reluctant to make specific predictions about the extent to which stronger stormwater controls influence the cost of projects. They emphasized that stormwater designs are highly site-specific, and one solution may be feasible and cost-effective at one site, but infeasible or cost-prohibitive at another site. The conceptual framework in Section II outlines the different factors we identified in the literature and through the interviews that influence the cost of implementing stronger stormwater standards. They underscore the site-specific nature of stormwater-control costs, and explain why implementing stronger stormwater controls in redevelopment projects tends to be more expensive than in greenfield projects.

4. Developers respond to benefits that influence their bottom line. In some cases, these may help offset increased costs of complying with stronger stormwater regulations.

While stronger stormwater regulations and LID controls can provide a range of environmental and amenity benefits, developers generally only respond to those benefits that affect their bottom line. Developers we interviewed suggested that LID controls that helped them comply with stronger stormwater regulations at lower cost, increased the sale price or rent of a project, reduced the time to sale, or all three, would affect their decisions to use LID. Specific examples of LID controls providing economic benefits to developers include bioswales and other vegetative stormwater controls that improve the appearance and market appeal of a development while also reducing overall landscaping costs, and greenroofs that reduce energy costs and the long-term cost of roof maintenance. Developers noted, however, that market demand for projects that include LID stormwater controls have not yet expanded beyond niche markets. Factors such as unfamiliarity with the technology and uncertainty about how to address operations and maintenance of LID controls limit broader use of LID by developers and demand from consumers.

5. Cost-effective responses to stronger stormwater standards require a more collaborative approach to addressing stormwater management.

Interviewees who successfully implement stronger stormwater controls using infiltration and volume-reduction practices in redevelopment projects emphasize the importance of considering stormwater management at the earliest stages of development, and of integrating professionals' expertise throughout the project. These principles are consistent with the conclusions of the broader literature on green building, which emphasize the importance of collaboration among professionals throughout the design process to achieve reductions in overall costs. These principles are especially important in the success of redevelopment projects, because these projects tend to require more complex, site-specific, and creative solutions to effectively manage stormwater.

6. Market adjustments are already reducing costs of implementing stronger stormwater standards, for both redevelopment and greenfield development, a trend that is likely to continue.

Market adjustments include changes on the supply side that result in lower costs to implement stronger stormwater standards and changes in demand that result in increased consumer willingness to pay for projects that incorporate stronger stormwater controls. Market adjustments that have the potential to lower costs include more widespread availability of materials (such as porous pavers), better technologies that reduce the time and/or expense of installation (such as modular greenroof systems), and improved design and engineering expertise. Increased regulatory certainty as more developers become familiar with the permitting process and more permitting officials become comfortable with the new regulatory system also will reduce developers' costs of implementing stronger stormwater controls. Market adjustments also have the potential to increase consumers' willingness to pay for projects that integrate some types of stormwater controls—especially those that add amenities, such as rain gardens, and those that reduce building operating costs, such as greenroofs. Willingness to pay may increase as more consumers recognize and demand the environmental benefits LID provides, as LID techniques become more familiar and main-stream, and as time and increased use demonstrate LID's long-term effectiveness across wider geographic regions and climate conditions.

7. Developers are supportive of incentives that offset costs and ease the transition to stronger stormwater standards. Jurisdictions can use them to increase the level of social benefits derived from LID practices.

All three jurisdictions have or have considered implementing incentives to encourage developers to adopt LID controls as a way of complying with stronger stormwater standards. Jurisdictions themselves have an incentive to offer developers incentives, in part, because many of the benefits LID provides accrue to the jurisdiction or the public at large, but don't register in the developers' private accounting of costs and benefits. Enhancing the private benefits developers can receive from LID by passing through some of the public benefits can create a more economically efficient outcome for society.

Incentives come in a variety of different forms, from direct financial payments and subsidies, to efforts to reduce the costs and risks associated with the permitting and review process. Each jurisdiction we focused on has processes in place to help developers navigate the permitting process more efficiently if they propose to implement LID beyond what current regulations require. Developers generally responded favorably to these efforts and said that they took advantage of them. Among the jurisdictions we looked at, Philadelphia has the most developed financial incentive programs, including a fee offset for managing stormwater onsite and a greenroof tax credit. Developers we interviewed who work in Philadelphia indicated they were aware of these incentives and, in some cases, they had taken advantage of them. Many interviewees expressed their support of stormwater credit and off-site mitigation programs to address the reality that on-site stormwater retention may not be physically possible in every project, and may not be economically feasible in some projects.

II. CONCEPTUAL FRAMEWORK AND METHODOLOGY

We approached this project in two phases: a literature review followed by key-informant interviews. Through the literature review, we developed a conceptual framework to understand the issues developers face with regard to the factors that influence the costs and benefits of implementing increasingly stringent stormwater regulations in redevelopment and greenfield projects. The interviews provided an opportunity to test the framework against developers' practical experiences and collect information not available in the literature.

A. Literature Review

There are many stand-alone studies and reviews of the literature that describe the benefits and costs associated with LID and green infrastructure and compare the costs of LID to conventional development (*see,* e.g., Center for Neighborhood Technology 2010, U.S. EPA 2007, MacMullan and Reich 2007, Gunderson et al. 2011). We drew heavily from our knowledge of these studies to develop our conceptual framework, and cite to them throughout the following section. We did not, however, set out to add another broad literature review of LID economics to the existing body of literature. Instead, we narrowly focused our review of the literature on two specific topics:

1) Studies that describe the differential impact of stronger stormwater regulations on greenfield and redevelopment activities, either quantitatively or qualitatively.

2) Studies that describe the impact of stronger stormwater regulations on developers' decisions to build.

1. Differential Impacts of Stormwater Regulations on Development

Our review found no broad-scale studies that systematically investigated the impacts that stronger stormwater regulations may have on different types of development, specifically greenfield projects and redevelopment projects. The literature contains an ever-growing list of case studies that illustrate developer's experiences integrating LID into different types of projects. Many of these illustrations contain cost information. It is very difficult, however, to draw meaningful conclusions about the relative costs of implementing stormwater controls in greenfield and redevelopment projects from these largely anecdotal illustrations. It is more difficult still to determine potential differential impacts under specific regulatory standards.

We found only one study that directly addressed the differential cost impact between greenfield development and redevelopment (Chesapeake Stormwater Network 2010). This study, which was specific to developments and regulations in the mid-Atlantic region and may have limited applicability in other regions of the country, found that installing LID controls at redevelopment sites with less than 65 percent impervious coverage could be successfully accomplished at little to no extra cost than new development sites. Integrating LID into sites with greater than 65 percent impervious coverage—those in highly urban settings—can be up to 4 times more expensive than new development, however. This conclusion may or may not be relevant beyond the limited cases described in this study. More quantitative research is warranted on this topic to understand how the cost impacts of stronger stormwater standards may vary across different development types and different markets.

2. Impacts of Stronger Stormwater Regulations on Developers' Decisions

Economists and other researchers have attempted to describe the locational behavior of firms in response to environmental regulation of all types at a regional level for decades. The studies that have emerged illustrate the challenge of finding a definitive answer to this question, given the complexity of the world within which such decisions are made. One analysis summarizes the literature by concluding that the studies have found positive, negative, and no impact, and often produce conflicting, contradictory results (Jeppesen and Folmer 2001). Perhaps because of the methodological and practical challenges inherent in answering such a question, we found no studies that used statistical or quantitative methods to determine how developers have responded to changes in stormwater regulations.

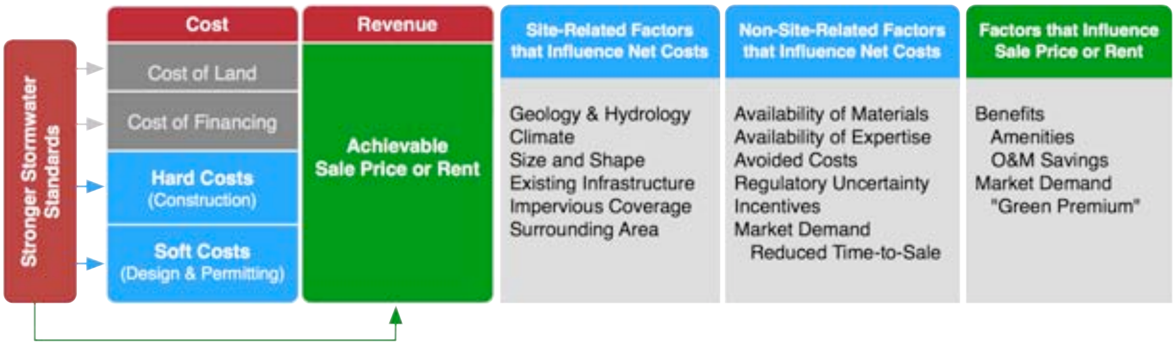
We did, however, find one recent study that used interviews of local permitting officials to inform how stronger stormwater regulations in the District of Columbia might affect developers' decisions about where to build (Leistra, Weiss, and Helman 2010). As part of the study, the researchers attempted to describe how developers responded to similar stormwater regulations in four other jurisdictions: Philadelphia, Chicago, Portland, and Seattle. Through interviews with municipal officials, the study's authors found that the new stormwater requirements have not had, or are not expected to have, discernible effects on development. In Philadelphia, which we also focus on in this study, the study's authors found that, while some developers threatened to pull projects when the regulations went into effect, municipal officials did not actually observe that this occurred. Officials attributed this to other factors influencing developers' decisions more than stormwater costs, and the City's expedited approval process, incentives, and customer service.

B. Conceptual Framework

The results of our focused literature review suggest that few researchers have set out to answer the question we were asked to investigate. There are many ways one might attempt to answer this question. Limited resources, time, and data required us to take a qualitative approach. We focus broadly on describing the economic drivers of developers' decisions, and how stronger stormwater standards may interact with these decisions. Our study does not attempt to quantify the costs developers incur from complying with particular stormwater regulations, to estimate the benefits of stronger stormwater regulations, or to predict the specific effects stronger stormwater regulations will have on particular developments or regional development patterns.

Many factors influence developers' decisions on where and how to build. We developed a conceptual framework to guide our inquiry into developers' decision-making processes and provide insight into this question: *How will stronger stormwater regulations influence how and where developers decide to build, and what impact, if any, are they likely to have on overall development patterns and trends*? Figure 1 illustrates our conceptual framework.

Figure 1. Conceptual Framework



Source: ECONorthwest

When developers embark on a project, they usually develop a financial model, called a *pro forma*, that estimates the project's anticipated financial return. The *pro forma* typically includes four major categories of costs: land, financing, hard costs (e.g., construction), soft costs (e.g., design and permitting) (Nachem 2007). A *pro forma* assumes that all these costs are financed upfront into a stream of debt service that, when compared to achievable sale price or rent, generates a reasonable return on investment. What a developer considers "reasonable" varies depending on their personal preferences and a project's risk and complexity.

The cost categories are shown in the left side of the diagram in Figure 1, the revenue on the right. Stronger stormwater regulations primarily affect two categories of cost most directly: hard costs and soft costs, shown in blue. To a lesser extent, stormwater regulations may also influence the cost of land and financing costs, identified in gray in Figure 1. Depending on how a developer implements stormwater controls, stronger stormwater standards also may affect the achievable sale price or rent, shown in the diagram in green.

The first two subsections, below, describe how stronger stormwater standards might affect the cost and revenue sides of a development *pro forma*. The third and fourth subsections unpack these relationships, and describe how variations in site and non-site related factors might affect the extent to which stronger stormwater standards influence cost and revenue, and ultimately, the developers' decision-making process.

1. Cost-Related Factors in the Developers' Decision-Making Process

Stronger stormwater standards have the potential to influence the costs in the *pro forma* analysis and affect how a project pencils out. The most direct effects are on hard and soft costs, identified in blue in Figure 1. The extent to which stronger stormwater standards affect these costs will depend, in part, on the existing level of stormwater management controls developers are accustomed to factoring into their projects. The effect on cost could be very different if regulations impose a new requirement where none existed before, versus incrementally strengthening retention or water-quality standards or requiring the use of certain best management practices (BMPs), such as LID, over more conventional controls. In the first instance, the direction of the effect likely will be more predictable (positive) and uniform in magnitude across development projects. In the second instance, depending on the degree of regulatory change and how different developers are already approaching stormwater management, the direction and magnitude of the effect will likely vary considerably, and the overall effect from project to project may be less clear.

Hard Costs. Both conventional and LID stormwater controls have hard costs—in the short-run to install, and in the long-run to maintain. Stormwater controls represent a portion of the total construction costs, and the ratio of stormwater-control costs to other hard costs can vary considerably from project to project. An extensive and growing body of literature exists on the construction cost of conventional stormwater controls (*see*, e.g., Brown and Schueler 1997, Heaney, Sample, and Wright 2002, Narayan and Pitt 2006). There is also a growing body of information on the construction costs of various LID controls (Schueler et al. 2007, WERF 2009), although the costs of LID controls are still less-well understood and documented (Stephenson and Beamer 2008). In general, the costs of LID controls are more dependent on site characteristics than conventional controls, and the variation in costs across LID BMPs for different development types, geographic regions, and climates is not well documented through systematic research (although the body of anecdotal case studies is growing).

Stronger stormwater management regulations (those that require LID and those that do not) may affect hard costs by requiring more extensive stormwater infrastructure to treat higher volumes or greater levels of contamination. The effect of stronger regulations, however, may not always be straightforward: by using LID techniques that provide higher levels of treatment, many developers have been able to minimize conventional infrastructure and actually reduce the overall hard costs associated with stormwater management (U.S. EPA 2007, MacMullan and Reich 2007). In general, the infrastructure to address stormwater (LID or conventional controls) on more constrained sites with higher levels of impervious coverage—typical of redevelopment and retrofit projects—will cost more than unconstrained sites with large amounts of land (Schueler et al. 2007, Chesapeake Stormwater Network 2011). Schueler et al. (2007), for example, found that the cost of implementing stormwater controls in redevelopment projects with high ratios of impervious surface can be 1.5 to 4 times the cost of constructing stormwater controls at new development sites. This research was conducted in the mid-Atlantic region and may not be applicable to other regions, with different climate, hydrology, and geology. Ultimately, it is critical to acknowledge that the effect of stronger stormwater regulations on hard costs depends on a variety of site-specific factors described in more detail in subsection three, below.

Soft Costs. Stormwater systems require engineering expertise to design, and jurisdictions typically require developers to demonstrate a stormwater control plan before they issue a building permit. The literature suggests the design and permitting costs, for LID and conventional controls, range depending on the BMP, but are typically around 25 to 40 percent of a BMP's construction costs (Schueler et al. 2007, Brown and Schueler 1997).

Stronger stormwater management regulations can increase the design and permitting costs by requiring more studies and documentation to obtain permits and more specialized engineering expertise to design new types of controls. Increased uncertainty about how to meet new regulations or how jurisdictions implement new regulations can increase the time and costs of navigating the regulatory process, which also increases project costs (Braconi 1996, Randolph et al. 2007). More complicated or constrained sites may require more intensive and expensive stormwater design and permitting efforts, which would suggest that soft costs associated with LID or conventional stormwater controls could be higher for redevelopment projects than greenfield projects.

Cost of Land. The value of land is a function of the allowable uses on the property (entitlements), achievable pricing (rents), costs (hard costs like building materials and plumbers, and soft costs like planning and financing), and expected returns (profit). Developers see the market price of the finished project and hard and soft costs as being largely outside of their control. Thus, the developer focuses on the cost he or she can influence most strongly: the cost of property acquisition. In other words, a developer will solve backwards to determine what he or she is willing to pay for property based on the other costs to complete the project. Shifts in variables, such as hard costs, will directly affect the ability to pay for land. Stronger stormwater controls that increase the hard or soft costs of stormwater management may limit or lower what the developer can pay for land. In some cases, developers already own the land. In that situation, the cost of land factors into a developers' decision as an opportunity cost (what the developer could sell the land for if he or she did not want to redevelop it), and the effect of stronger stormwater standards in this calculation is more complicated.

Financing Costs. Lenders provide developers with working capital. They are risk limiters, not profit maximizers. Lending is a low-margin, high-volume business that generally receives fixed returns in the form of upfront fees and interest. These fees and interest factor into the developers' *pro forma.* Financial institutions make credit decisions based on a project's cash flow that will be available to pay debt service. Some lenders are important partners in community development efforts, and will accept a higher risk project without a corresponding increase in interest rates, but in general, riskier projects will cost a developer more as lenders seek to cover the risk in their portfolio. Stronger stormwater management regulations that increase a project's overall cost have the potential to reduce the margin of certainty that a project will pencil out, which would increase the risk from the lender's perspective and lead to higher financing rates.

2. Revenue-Related Factors in the Developers' Decision-Making Process

Developers' decisions are affected not only by factors that influence costs, but also by factors that influence the achievable sale price or rent (the revenue, identified in green in Figure 1)—the benefits to developers. LID stormwater controls can have **market and non-market benefits** that conventional stormwater controls do not (Center for Neighborhood Technology and American Rivers 2010). When considering developers' decision-making processes, however, it is very important to identify when these benefits materialize and to whom. While stormwater controls may produce water-quality benefits in the local watershed, for example, these benefits are unlikely to translate directly into an economic benefit a developer can capitalize into the sale price or rent of the development.[2]

[2] Some studies show that water-quality improvements can positively affect the values of adjacent property (Kirshner and Moore 1989, Leggett and Bockstael 2000).

Other benefits more directly accrue to the building owner or resident and may affect property value. Some consider the amenities that LID controls provide to be visually appealing, and would be willing to pay more to live or work in the environment they create. This demand may positively influence property values (Ward, MacMullan, and Reich 2008). Recent research is demonstrating that neighborhoods built around green streets provide more opportunities for neighbors to interact with each other, providing a positive community environment that many people may be willing to pay more to enjoy this benefit (Dill et al. 2010). Other features associated with LID BMPs, particularly green roofs, can generate benefits for building owners and occupants by reducing heating and cooling costs, and reducing maintenance costs by increasing the lifespan of the roof (David Evans and Associates and ECONorthwest 2008).

In the end, **market demand** and consumer willingness to pay determine the rent or sales price that developers earn on a project. If people aren't willing to pay for the features that LID stormwater controls provide, or don't recognize a difference between LID and conventional stormwater practices, the benefits of stronger stormwater standards that require LID may have little influence over developers' decisions. In some cases, if regulations produce features that consumers perceive as negative, they may actually lower the achievable sales price or rent. In general, however, the demand for green buildings and sustainable stormwater practices has been increasing in response to the rapid growth in the global green building industry, which is the fastest growing sector of the building industry (Jackson et al., 2010). This trend likely means that these factors will play an increasingly important role in developers' decisions.

3. Site-Related Factors that Influence Costs and Benefits

The costs and benefits associated with implementing stormwater management controls are highly site-specific. This is especially true when stronger stormwater management controls require on-site retention and treatment using LID controls. Site characteristics largely determine which types of LID controls may be used, and the wide range of costs across different LID controls may lead to widely-divergent control costs from project to project. Different LID controls also result in different levels of benefits and interactions with market demand. Local differences in public and private experience adapting LID to local conditions can also affect costs and the way benefits are perceived at the site level.

A site's **geology and hydrology** determine how effectively different infiltration techniques will address stormwater management (Langdon 2007). Level sites that infiltrate well may support infiltration techniques with little additional soil amendment or earth movement. Sites that do not infiltrate well or are sloped may require extensive modification to implement infiltration practices effectively, increasing costs, in some cases substantially. Some sites may not support any infiltration, and techniques that don't rely on infiltration, such as collection systems (rain barrels and cisterns) or vegetative systems (greenroofs and tree planters) must be used instead, often (though not always) at increased cost (Schueler et al. 2007 and U.S. Army Corps of Engineers 2009).

A site's **regional and micro-climate** can influence the way both infiltration and retention techniques are designed, with various implications on cost and achievable benefits (*see,* e.g., U.S. EPA 2010). Places with prolonged drought or freeze periods will have the greatest influence on design considerations. In some cases, cold-weather climates may limit the range of BMPs, or their effectiveness (Roseen et al. 2009). Total precipitation and variation in precipitation throughout the year may influence the design and utility of other BMPs, such as rainwater capture systems and greenroofs (Schroll et al. 2011, Sands 2003).

The overall **size and shape of the site** is important, as sites with large amounts of land—again, more typical of new development projects than redevelopment projects—may benefit from economies of scale (Langdon 2007). The literature suggests that construction costs decrease on a per-unit basis as the overall size of the stormwater control increases (Lampe et al. 2005).

Existing infrastructure and **impervious surface coverage** also affect the costs of implementing stormwater controls (Chesapeake Stormwater Network 2011 and Lukes and Kloss 2008). Existing built infrastructure reduces the land available for stormwater control, and reduces the flexibility to implement a wide range of stormwater-control designs.

4. Non-Site-Related Factors that Influence Costs and Benefits

The site-related factors described above have the potential to directly influence the costs and benefits associated with implementing stronger stormwater standards. There are several other factors unrelated to a given development site that may influence developers' decisions about whether to pursue a project that requires LID stormwater controls. Some of these factors affect the cost side of a developers' equation, while others influence the revenue side and lower a development's net costs.

The **availability of materials and expertise** to implement new or unfamiliar stormwater controls or **regulatory uncertainty** regarding these controls can affect a developers' costs. Developers operating where few engineers with experience implementing LID-type controls are working, for example, may pay more to obtain that expertise. Similarly, some LID techniques require specialized materials that may need to be shipped from other parts of the country, increasing costs beyond what they would be if they were available locally. Regulatory uncertainty is often cited as a big factor affecting the overall cost of implementing stronger stormwater standards. Sites that require more complex stormwater-control strategies may take more time to navigate regulatory reviews. Some LID controls may not be clearly defined or allowed, reducing the range of options engineers have to manage stormwater and potentially increasing costs.

Using LID controls can help **avoid other development costs**, and some jurisdictions offer **regulatory or monitory incentives**, all of which can financially benefit developers. Some LID stormwater controls may cost more than traditional controls, but can help developers avoid other costs that the traditional approaches cannot. The literature provides many examples of avoided costs when LID controls are integrated into a project, including less conveyance infrastructure and fewer curbs and gutters (U.S. EPA 2007). Sometimes jurisdictions offer financial and other **incentives**, such as fee reductions or fast-track permitting that help offset overall project costs and provide a reason for developers to pursue certain stormwater-management techniques even if they add hard costs up front.

C. Interview Site Selection and Methodology

We conducted key-informant interviews with public officials and individuals involved in development. We designed these interviews to better-understand the gaps in the literature about the range of economic factors that influence developers' decisions when faced with complying with stronger stormwater standards.

In conjunction with SGA and its partner organizations, we selected three jurisdictions that have implemented stronger stormwater controls. We used these screening criteria to guide our selection process:

1. The jurisdiction has adopted a strong stormwater regulation (e.g., volume-based, water-quality-based, or explicit LID requirement).
2. Jurisdiction boundaries should include a mix of potential redevelopment and new development opportunities.
3. Regulation should apply similarly to redevelopment and new development.
4. Set of jurisdictions should reflect a diversity of geography.
5. Preference for jurisdictions that haven't received a lot of research attention already.

Our selection process was challenged by the fact that few jurisdictions in the country have actually implemented mandatory LID requirements or stormwater regulations that require significant retention or water-quality treatment on-site. Those that have, have done so only recently. We selected these communities:

Montgomery County, Maryland. Montgomery County enacted its first stormwater management standards nearly forty years ago, and has strengthened them several times to address declining water-quality in the region. In 2010, the County passed a revised stormwater ordinance that maintained the existing volume standards, which require both new development and redevelopment projects to protect water quality for the first inch of stormwater and control volume for the first 2.6 inches of stormwater. The new regulations require greenfield developments to use environmental site design (ESD, which is equivalent to LID) to meet these standards for the first inch of stormwater, and require ESD to the "maximum extent practicable" for redevelopment. County staff is in the process of clarifying what "maximum extent practicable," means for redevelopment projects, and are adjusting local ordinances to remove barriers to implementing LID (Montgomery County Department of Environmental Protection 2011, Biohabitats 2010). After considerable concern from the development community that the proposed regulations would have a significant impact on the cost of projects and discourage redevelopment, the regulations incorporated a provision to allow the County to grant administrative waivers for projects that received approval before the regulations were passed (Montgomery County Department of Permitting Services 2011).

Olympia, Washington. Olympia's stormwater program is one of the oldest in western Washington, and continues to be one of the most stringent. It adopted its most recent regulations in 2009, which apply to both new development and redevelopment (City of Olympia, Washington 2009). The regulations are modeled on the Western Washington Stormwater Manual (Washington Department of Ecology

2005), but go beyond the state-level standards, especially for water-quality treatment. Developments meeting certain minimum size and disturbance criteria must match stormwater discharges to pre-development rates from 50-percent of the 2-year peak flow to the full 50-year peak flow. Water-quality standards also apply, and must be managed using approved on-site treatment BMPs, including LID controls. Although the regulations apply to both new development and redevelopment, in its 2009 revision to the regulations, Olympia added a financial cap for mitigating existing impervious surfaces at redevelopment projects, at 30-percent of the total project costs. The state of Washington is currently considering more broadly requiring LID controls in its next regions of the Western Washington Stormwater Manual, due out in 2012 (Washington Department of Ecology 2010).

Philadelphia, Pennsylvania. Philadelphia adopted revised stormwater regulations in 2006 that apply to both new development and redevelopment. All development projects (new and redevelopment) must control stormwater quality for the first one-inch of runoff from connected impervious surfaces. This provision was adopted to 1) recharge groundwater and increase stream base flows, 2) restore more natural site hydrology, 3) improve water quality, and 4) reduce combined sewer overflows (CSOs) from the city's CSO system. This requirement must be met using infiltration techniques. If infiltration is demonstrated to be infeasible, a waiver may be considered. Philadelphia also has adopted channel protection and flood control standards, which require slow release of the 1-year, 24-hour storm event and require developers to prevent the occurrence of flooding in downstream areas. Redevelopment projects may apply for exemptions from the channel protection and flood control requirements by reducing land disturbance by 20 percent from predevelopment and post-development conditions (Philadelphia Water Department 2011).

Within each jurisdiction, we identified and interviewed the key municipal officials with experience designing and implementing the new stormwater regulations. These interviews helped us clarify the regulatory context within which developers were making decisions. They also helped us understand how the development community, as a whole, is responding to the new regulations.

To capture the range of perspectives from the development community, we interviewed builders, engineers, landscape designers, and architects in each jurisdiction. We identified potential interviewees by contacting trade organizations (e.g., the U.S. Green Building Council, Master Builders Associations), reviewing public documents, searching web-based directories, and soliciting recommendations from the public officials and other interviewees in each jurisdiction.

Appendix B contains a complete list of the individuals we interviewed for this project.

III. FINDINGS AND CONCLUSIONS

Our review of the literature, described in the previous section, and the interviews we conducted revealed many insights into how developers in different parts of the country respond to stronger stormwater standards. In this section we present the results of our interviews in each jurisdiction together, rather than as three separate case studies, because the themes that emerged were strikingly similar across the jurisdictions. Where interesting differences across jurisdictions stand out, we highlight them. We organize the results of the interviews, with insights from the literature, into seven broad findings.

As we attempted to understand how developers responded to the most recent regulatory changes, we were faced with the reality that economic conditions since 2007 have had an unprecedented effect on all types of development. The three jurisdictions we focused on all adopted stronger stormwater standards between 2006 and 2010—although each had stronger-than-average regulations prior to this. In many places, very little development activity has occurred at all since stronger stormwater regulations were implemented. Many of the projects that have gone forward were grandfathered under previous stormwater regulations. Because of this, the responses we collected in our interviews were often—but not always—based on conjecture or theoretical understanding, rather than actual experience or observation. In all jurisdictions we studied, the market has yet to fully respond to the new regulatory environment. Repeating this study in 2 to 3 years likely would yield an interesting comparison to our results.

1. Developers are successfully incorporating stronger stormwater controls to meet strict volume-reduction and water-quality standards in both greenfield and redevelopment projects.

Our study found that some developers can and do meet stronger stormwater standards in both redevelopment and greenfield projects. Interviewees who had completed developments that met stronger stormwater standards using LID indicated that doing so required creativity and willingness to experiment with new approaches to projects. They emphasized that pursuing these projects was not without challenge, but they will continue developing in places that require strong stormwater controls and LID for a variety of reasons: the markets they participate in respond favorably to the new stormwater designs; meeting regulations with green-infrastructure techniques could be more cost effective than conventional controls; and for some, they simply believed it was the right thing to do for the environment. Some developers we interviewed had not yet implemented projects under the stronger stormwater standards. Some were skeptical, based on their own initial experiences or other developers they'd talked to, that they could make a project pencil out using LID controls. A minority of interviewees held this perspective. Although staff at each jurisdiction had encountered this opinion, none had actually observed that developers were choosing to invest in greenfield projects over redevelopment projects because of the new standards. This is consistent with other findings in the literature (Leistra, Weiss, and Helman 2010).

Several important distinctions about the way developers approached compliance with stronger stormwater standards in redevelopment projects stand out:

- Redevelopment applications of stormwater controls, including LID techniques, are usually more site-specific and custom than greenfield applications, although this depends on the nature of the redevelopment. Redevelopment sites that are taken down to bare soil can often be treated more like greenfield sites. Redevelopment sites with considerable existing impervious cover, or sites that are surrounded by or incorporate existing infrastructure are generally more challenging to accommodate stormwater management than greenfield or less-dense redevelopment sites.
- The three jurisdictions in our study have strong stormwater regulations that govern greenfield and redevelopment projects. Each jurisdiction also has "off-ramps" that permit developers to avoid full compliance with the new regulations if they can demonstrate engineering, site-condition, or financial reasons why they cannot implement the new controls. Off-ramps can include payment in lieu, off-site mitigation, on-site trading, alternative treatment practices, and reduced performance criteria. Staff in Montgomery County are currently developing clear and consistent guidelines for applying off-ramp provisions, such as using LID to the "maximum extent practicable," that may relax standards for some redevelopment projects. In Olympia, permitting officials described taking a pragmatic approach to permitting stormwater controls for some redevelopment projects that contend with complex existing infrastructure (both on-site and off-site) and connections to existing systems. In Philadelphia, permitting officials allow on-site trading for difficult sites, where one part of a site may not meet the standards, but another part exceeds the standards. There are currently no explicit requirements in any of the jurisdictions that mandate the use of specific BMPs, such as green roofs, on redevelopment sites to fully meet infiltration or water-quality targets.

2. Complying with stormwater regulations is one factor among many that influences a project's costs. It is rarely the driving factor.

Stronger stormwater standards can affect the costs of both greenfield and redevelopment projects. These costs are folded into a *pro forma* analysis that developers and lenders use to assess the viability of a project. Our interviews revealed that developers' decision-making process incorporates a wide range of economic factors, including various construction costs, current and future market conditions, regulatory incentives and disincentives, and uncertainty and risk. While some developers we interviewed indicated that the costs associated with meeting stronger stormwater standards may change the types of projects they will pursue in the future, many developers described the cost of implementing stormwater controls as minor compared to the other economic factors they considered in deciding whether or not to pursue a project, especially in the context of highly-complex redevelopment projects and green-building infill projects.

- In general, stronger stormwater standards have increased the costs to implement stormwater controls, a trend that many of the developers we interviewed have experienced since at least the 1980s. Some developers pointed out, however, that using LID controls has helped offset some of the increased cost, compared to using conventional controls.

- Among the interviewees we spoke to, the majority agreed that complying with stormwater regulations has become a larger component of both greenfield and redevelopment projects, in terms of complexity and cost.
- Complying with stormwater regulations is considered a cost of doing business, and most members of the development community we spoke with did not view the cost of managing stormwater as a major deciding factor in whether or not they pursued a particular project.
- Interviewees cited zoning regulations (and related provisions, such as density limitations and height restrictions) and non-stormwater environmental regulations, such as wetlands and critical habitat areas, as the primary regulatory factors guiding a site's development potential and a project's viability. These are usually larger factors in greenfield development than redevelopment.
- Several interviewees in Philadelphia said that labor costs, which they claimed were driven higher by union wages, made many redevelopment projects in the city unviable. Interviewees in Olympia or Montgomery County did not identify labor costs as a major factor.
- Consumer demand and market conditions matter to developers above all other factors. Developers emphasized that they build where the market demands development. If the market is strong for redevelopment projects in urban areas, interviewees said they would continue to meet that demand. Likewise, if people continue to demand the type of housing that new greenfield sites accommodate, developers maintained that they would continue to pursue these projects.
- In deciding between sites that would accommodate similar types of development, developers indicated that the potential stormwater management costs associated with a site could be among the deciding factors. In general, however, developers noted that market demand trumps the costs of stormwater controls. All things being equal, however, where there are substitute sites, higher stormwater costs could dictate project location.
- Redevelopment projects generally fall into one of two categories: those that are more financially risky because they are being built in a market with soft demand and many potential substitutes with fewer site constraints, and those that are less financially risky because they are being driven by high demand and are higher-end, and sometimes green-branded, projects. For the former group, any factor that influences costs—including stricter stormwater regulations—may affect the project's viability. For the latter group, stricter stormwater controls have not been an issue, and may actually be integrated as an amenity or help the project achieve green ratings.

3. The costs of stormwater controls in general, and LID controls in particular, tend to be more variable and site-specific for redevelopment versus greenfield development.

The developers we interviewed were reluctant to make broad generalizations about the extent to which stronger stormwater controls influence the cost of projects. They emphasized that stormwater designs are highly site-specific, and one solution may be feasible and cost-effective at one site, but infeasible or cost-prohibitive at another site.

The diagram presented in Section II outlines the different factors we identified in the literature and through the interviews that influence the cost of implementing stronger stormwater standards. They underscore the site-specific nature of stormwater-control costs, and explain why implementing stronger stormwater controls in redevelopment projects tends to be more expensive than in greenfield projects. This discussion of costs, however, cannot be separated from the discussion of other factors that influence developers' decisions: avoided costs and market and non-market benefits may help offset increases in direct costs, and market demand and other regulatory and non-regulatory factors may support increases in net project costs.

- Developers incorporate stormwater-management costs into *pro forma* analyses of all development projects. The proportion of total development costs attributable to stormwater controls is highly variable, especially in redevelopment projects. Developers we interviewed were unable or unwilling to provide specific "rules of thumb" for either the proportional costs of stormwater relative to overall development costs or the difference in costs to implement stormwater controls between redevelopment and greenfield projects.

- Many developers we interviewed noted that it is not difficult to incorporate LID for equal or less cost than conventional stormwater controls in a greenfield development. When asked the same question about redevelopment or infill development, developers were very reluctant to make broad generalizations. They were quick to note that the additional costs could be insignificant or major, depending on site conditions.

- Implementing stronger stormwater standards are often, though not always, more expensive in redevelopment projects than greenfield projects. Developers identified several reasons for this:

  Soil characteristics: poor, compacted soils require more amendment to support infiltration. Infiltration may not be allowed at all on sites with contaminated soils. Redevelopment sites are more likely to display these challenging soil conditions.

  Impervious coverage: infiltration techniques are cheaper to construct on large sites with extensive pervious area. Redevelopment sites tend to have higher densities than new development, with less land available for infiltration BMPs. In general, the higher the impervious coverage, the more expensive managing stormwater is likely to be.

  Existing infrastructure: redevelopment sites tend to have existing infrastructure that must be considered in designing stormwater controls. In some cases, this may reduce the flexibility engineers have to design cost-effective solutions for managing stormwater, increasing costs.

- Driving the cost differential, in large part, is the more limited range of BMPs available to manage stormwater on constrained, largely impervious sites. Developers indicated that for many urban redevelopment projects, BMPs on the lower end of the cost curve (e.g., rain gardens and managed wetlands) are not possible. Instead, they must rely on BMPs that are perceived as being on the higher end of the cost curve in many cases, such as greenroofs, micro-swales, water capture and reuse, stormwater planters, and permeable pavement materials (either pavers or pavement).

- Regulatory uncertainty can increase a developers' costs in the planning and design stages of a project. While regulatory uncertainty is not unique to stronger stormwater regulations, the site-specific nature of using green infrastructure to comply with regulations is inherently more varied than conventional approaches to managing stormwater. It is more difficult for regulators to provide black-and-white guidance for complying with the regulations across all potential circumstances. Moreover, the application of regulatory guidance for stormwater management in redevelopment projects may be more uncertain than in greenfield sites because of the greater variability across and unique characteristics of each redevelopment site. This may, in part, contribute to the perception that it costs more to integrate stronger stormwater controls into redevelopment projects. The developers we interviewed identified these ways in which regulatory uncertainty increased their costs, especially for redevelopment projects:

    Multiple plan reviews: All three jurisdictions require stormwater designs to be incorporated into early plan review, before other permits are issued. If changes to the stormwater design are required later—a common situation, especially in redevelopment projects—plans often must be re-reviewed, adding time and cost to the review process. It is important to note that some developers indicated that early plan review requirements actually helped reduce uncertainty and costs in many cases, because they were forced to address and resolve potential stormwater-related issues while there was still flexibility in the design process.

    Inconsistent application of standards and guidance: Inconsistency in how both developers and permitting officials interpret stormwater standards can cause considerable uncertainty that may lead to increased costs. Developers identified two issues that have increased their uncertainty under the stronger stormwater regulations: 1) receiving different signals from officials within the same jurisdiction about how applications of stormwater controls on a given site may be approved and 2) stormwater design applications that are approved for one site may not be approved for a site with similar characteristics at a different location or future time. Without clear, predictable, and consistent guidance, developers spend more time, and thus cost, navigating the permit-review process.

    Overbuilding: Engineers and developers may hedge against a plan rejection by overdesigning or building multiple levels of stormwater controls, which adds unnecessary costs to the project (but, in theory, reduces the costs associated with regulatory review.)

4. Developers respond to benefits that influence their bottom line. In some cases, these may help offset increased costs of complying with stronger stormwater regulations.

While stronger stormwater regulations and LID controls can provide a range of environmental and amenity benefits, developers generally only respond to those benefits that affect their bottom line. Developers we interviewed suggested that LID controls that helped them comply with stronger stormwater regulations at lower cost, increased the sale price or rent of a project, reduced the time to sale, or all three, would affect their decisions to use LID. Specific examples of LID controls providing economic benefits to developers include bioswales and other vegetative stormwater controls that improved the appearance and market appeal of a development while also reducing overall landscaping costs, and greenroofs that reduced energy costs and long-term cost of roof maintenance for their customers. Developers noted, however, that market demand for projects that include LID stormwater controls have not yet expanded beyond niche markets. Factors such as unfamiliarity with the technology and uncertainty how to address operations and maintenance of LID controls limit broader use of LID by developers and demand from consumers.

- Developers in each jurisdiction recognized that many of their customers respond positively to the landscape amenities LID BMPs provide. Few developers said that the landscape amenities translated directly into increased property values or higher rents, however.
- Developers who observed that LID could increase property values focused narrowly on the green sector of the market, and incorporated many green-building techniques into their residential infill properties. LID is one of the multiple green attributes of these developments, and the relative importance of LID compared to the other green attributes (e.g., high-efficiency windows, low-VOC building materials, etc.) is difficult for developers to identify.
- Several developers, particularly in Montgomery County, MD and Olympia, Washington, said that some of their customers still expect to see the traditional curb-and-gutter, sidewalk design that characterizes conventional stormwater management techniques. They do not respond as favorably to the LID designs characterized by rain gardens, bioswales, narrow streets, and fewer sidewalks.
- Several developers commented that some customers are wary of LID designs that require maintenance, and that bioswales and rain gardens may actually deter some potential customers from buying a property.

5. Cost-effective responses to stronger stormwater standards require a more collaborative approach to addressing stormwater management.

Engineers and developers who successfully implement stronger stormwater controls using infiltration and retention practices emphasize the importance of considering stormwater management at the earliest stages of development, and of integrating professionals' expertise throughout the project. These principles are consistent with the conclusions of the broader literature on green building, which emphasize the importance of integrating professionals throughout the design process to achieve reductions in capital costs (*see,* e.g., Kibert 2008).

- Some professionals and jurisdictions recognize that thinking about stormwater management early in a project's design is critical to successfully and cost-effectively implementing stronger stormwater controls. Jurisdictions encourage this approach by requiring stormwater management plans, or encouraging consultation with permitting officials early in a project's evolution. Considering stormwater first allows engineers and developers the flexibility to extract cost savings, maximize site efficiencies, and work around more complex features of a site that could lead to increased costs later.

- Interviewees who successfully and cost-effectively implement LID emphasize the value of collaboration among professionals involved in site design, including the engineer, architect, and builder. This approach treats stormwater management as an integral part of project and site design, rather than as an isolated engineering exercise.

- Engineers often lead the design process that includes implementing stormwater controls. Yet, many engineers have not yet acquired the necessary skills and experience to implement LID controls efficiently and cost-effectively. This lack of experience increases the cost of responding to stronger stormwater standards. Developers raised these issues about the lack of skilled engineering expertise:

  Scarcity of expertise. Those engineers that have LID expertise often charge a premium for it, which increases the overall cost of implementing LID, compared to conventional controls.

  Lack of appropriate tools. Many engineers rely on engineering software or other tools that do not easily accommodate LID designs or collaboration with other professionals, e.g., architects, designers, builders, etc.

  Need for education. Some engineering higher-education programs now include LID training as part of their curriculum. As more engineering students learn LID techniques and apply them in their professional careers, the costs associated with these issues will decrease.

6. Market adjustments are already reducing costs of implementing stronger stormwater standards, for both redevelopment and greenfield development, a trend that is likely to continue.

Market adjustments include changes on the supply side that result in lower costs to implement stronger stormwater standards and changes in demand that result in increased consumer willingness to pay for projects that incorporate stronger stormwater controls. Market adjustments that have the potential to lower costs include more widespread availability of materials (such as porous pavers), better technologies that reduce the time and/or expense of installation (such as modular greenroof systems), and improved design and engineering expertise. Increased regulatory certainty as more developers become familiar with the permitting process and as more permitting officials become comfortable with the new regulatory system also will reduce the developers' cost of implementing stronger stormwater controls. Market adjustments also have the potential to increase consumers' willingness to pay for projects that integrate some types of stormwater controls—especially those that add amenities, such as rain gardens and reduce building operating costs, such as greenroofs. Willingness to pay may increase as more consumers recognize and demand the environmental benefits LID provides, as LID techniques become more familiar and main-stream, and as time and increased use demonstrate LID's long-term effectiveness across wider geographic regions and climate conditions.

- Developers and engineers we interviewed reported that new LID materials and technologies are becoming more available, less costly, and more reliable. They indicated that they expect this trend will further reduce costs.
- Some developers in Montgomery County reported that finding engineers and designers who specialize in LID practices and are comfortable with navigating the permit review process is difficult, because this expertise is limited and in high demand. They reported that the professionals with this expertise can charge a premium to work on projects, which developers must factor into their overall costs. This was not identified as a major issue in Olympia or Philadelphia, which suggests that the market may have already responded to the higher demand for those types of services.
- LID is still perceived as a new technology, and consumers don't always fully understand or value the services it provides. As information on LID spreads, demand may increase for developments that incorporate LID—especially those BMPs with enhanced amenities, such as landscaped bioswales, greenroofs, and rainwater catchment. This could lead to higher rents, higher property values, and less time on the market. These demand-side factors can help offset the increased costs that may occur when integrating LID into a project. Anecdotal evidence in Portland and Seattle, where LID techniques have been implemented for over a decade, suggests that property values are enhanced where these techniques are used (Leistra, Weiss, and Helman 2010, Ward, MacMullan, and Reich 2008).
- Demand for the benefits that LID provides can influence whether developers are willing to take on more risk or higher costs to implement LID. Most developers we interviewed reported that demand for the benefits LID provides is limited, and these benefits don't influence their decisions on how to implement stormwater management. With the exception of a developer in Olympia, Washington that specializes in infill residential construction of green homes, the developers we interviewed did not perceive that LID currently offers significant benefits in terms of increased property values or other amenity values. Many recognize, however, that with future market changes, these benefits could become a larger factor in the future.

7. Developers are supportive of incentives that offset costs and ease the transition to stronger stormwater standards. Jurisdictions can use them to increase the level of social benefits derived from LID practices.

All three jurisdictions have or have considered implementing incentives to encourage developers to adopt LID controls as a way of complying with stronger stormwater standards. Jurisdictions themselves have an incentive to offer developers incentives, in part, because many of the benefits LID provides accrue to the jurisdiction or the public at large, but don't register in the developers' private accounting of costs and benefits. Enhancing the private benefits developers can receive from LID by passing through some of the public benefits can create a more economically efficient outcome for society. Incentives come in a variety of different forms, from direct financial payments and subsidies, to efforts to reduce the costs and risks associated with the permitting and review process. Each jurisdiction we focused on has processes in place to help developers navigate the permitting process more efficiently if they propose to implement LID beyond what current regulations require. Developers generally responded favorably to these efforts and said that they took advantage of them.

- Developers responded favorably to incentives that reduce the uncertainty associated with the permitting, to the extent that these incentives reduce the time (and associated costs) of getting approval to implement LID. Developers identified these techniques that help with the permitting process: streamlined or fast-track permitting, guaranteed permit review times, and access to permitting staff for collaborative problem solving early in the process. All three jurisdictions have fast-track review processes for green development concepts in place. Philadelphia guarantees plan review for redevelopment projects that disconnect 95 percent of impervious area and don't increase the burden on public infrastructure within 5 business days. Developers expressed mixed opinions about how well these fast-track processes actually work in practice.
- Reduced stormwater fees provided many developers with strong incentives to incorporate LID into redevelopment projects. Fees pegged to impervious area coverage tipped the economic equation for at least one developer considering integrating pervious pavement, one of the more common BMPs used in redevelopment. Developers and engineers in Philadelphia indicated that the City's fee reduction program was becoming a useful tool to get buy-in from customers on including BMPs that would quality for the credit.
- Direct subsidies for LID BMPs on the higher end of the cost scale, such as greenroofs and rainwater catchment systems, can encourage developers to integrate LID into redevelopment projects where other BMPs are not technically feasible. These types of incentives are useful transition tools, helping to build a market for materials and expertise that eventually drives costs down and makes these techniques more broadly affordable in the long run.
- Many developers mentioned that a fee-in-lieu or credit-offset program for stormwater would be an effective way for dealing with exceptionally difficult sites where LID is physically impossible or too costly. Such programs may serve a useful role in a LID regulatory scheme, but they would have to be designed carefully to maximize the environmental benefits that are achievable on-site and collect a payment that is sufficient to actually implement controls off-site that can address the remaining stormwater-related effects.
- Philadelphia has a fee-in-lieu program. Permitting officials said that it is rarely used, because the fee is set such that it is usually cheaper for developers to implement stormwater controls on-site. Permitting officials suggested that this fee-in-lieu program is designed as a useful way to force developers to take a harder look at their site when considering the feasibility of implementing stormwater controls.

APPENDIX A: REFERENCES

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APPENDIX B: LIST OF INTERVIEWEES

Montgomery County, Maryland

Rick Brush, Manager, Montgomery County Department of Permitting Services, Water Resource Plan Review

Steve Shofar, Chief, Montgomery County Division of Watershed Management

David Borchardt, P.E., LEED-AP, Tower Companies

Chris Earley, LEED-AP, Greening Urban

Kenneth Michael, NAI Michael Companies, Inc.

Ken Wallace, McCarthy and Associates

Paul Woodburn, Ben Dyer Associates, Inc.

Mike Novy, P.E., Ben Dyer Associates, Inc.

Guy Semmes, Hopkins & Porter Construction, Inc.

Olympia, Washington

Andy Haub, Planning and Engineering Manager, City of Olympia Public Works Department

Tom Hill, Permit and Inspections Manager, City of Olympia Community Planning and Development

Art Castle, Interim Vice President, Building Industry Association of Washington

Sean Comfort, P.E., AHBL

Scott Bergford, Scott Homes

Damon DeRosa, P.E., LeRoy Surveyors & Engineers

Bill Creveling, P.G., LeRoy Surveyors & Engineers

Philadelphia, Pennsylvania

Chris Crockett, Director of Planning and Research, City of Philadelphia Water Department

Christine Marjoram, Stormwater Plan Review Program Manager, City of Philadelphia Water Department

Howard Steinberg, Onion Flats/Plumbob

Michele Adams P.E., Meliora Environmental Design

Bob Rosenthal, Hovnanaian Homes

Thomas May, P.E., LEED-AP, Urban Engineers

Angelo Waters, P.E., LEED-AP, Urban Engineers

FACT SHEET

National Pollutant Discharge Elimination System (NPDES)
Municipal Separate Storm Sewer System (MS4)
Permit No. DC0000221 (Government of the District of Columbia)
Draft Modification #1

NPDES PERMIT NUMBER: DC0000221, Modification #1

FACILITY NAME AND MAILING ADDRESS:

Government of the District of Columbia
The John A. Wilson Building
1350 Pennsylvania Avenue, N.W.
Washington, D.C. 20004

MS4 ADMINISTRATOR NAME AND MAILING ADDRESS:

Director, District Department of the Environment
1200 First Street, N.E., 6th Floor
Washington, D.C. 20002

FACILITY LOCATION:

District of Columbia's Municipal Separate Storm Sewer System (MS4)

RECEIVING WATERS:

Potomac River, Anacostia River, Rock Creek, and Stream Segments Tributary
To Each Such Water Body

INTRODUCTION:

Today's action proposes a limited modification of the District of Columbia Municipal Separate Storm Sewer System (MS4) Permit. On September 30, 2011, the U.S. Environmental Protection Agency (EPA) issued the Phase I National Pollutant Discharge Elimination System (NPDES) permit for the District of Columbia Municipal Separate Storm Sewer System, Permit No. DC0000221. The permit became effective October 7, 2011.

On November 4, 2011, the Friends of the Earth, Anacostia Riverkeeper, Inc., Potomac Riverkeeper Inc., and Natural Resources Defense Council, Inc. (collectively, the Environmental Petitioners) filed a petition requesting the Environmental Appeals Board (EAB) to review the permit (appeal 11-06). On the same day, the District of Columbia Water and Sewer Authority (DC Water) and the Wet Weather Partnership (WWP) also jointly filed a petition requesting the EAB to review the permit (appeal 11-05).

On November 17, 2011, the District Department of the Environment (DDOE) filed a motion with the EAB requesting permission to intervene and file a response to both petitions for review. On February 2, 2012 the EAB granted DDOE's motion.

On December 20, 2011, the EPA provided notification to DDOE of its determination of which permit elements would be stayed pending resolution of the appeals. The stay was limited only to certain provisions. The remainder of the permit remained in effect, and continues to remain in effect.

All parties agreed to attempt to resolve the appeals through Alternative Dispute Resolution (ADR) and on March 8-9, 2012 convened with an EAB judge and a representative of the EAB to agree upon the issues that would be discussed in negotiations. The parties conducted subsequent discussions over the following two months to attempt to reach agreement on relevant issues.

On May 18, 2012, the EPA and the Environmental Petitioners (appeal 11-06) signed a settlement agreement in which the EPA agreed to propose modifications to language in several sections of the permit and to provide certain clarifications in the draft fact sheet for those proposed modifications. The petition for review filed by DC Water and the Wet Weather Partnership (appeal 11-05) was not resolved via ADR; that petition is pending before the EAB.

For additional information on the appeal proceedings the EAB docket is available at: http://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/f22b4b245fab46c6852570e6004df1bd/a4dedd0575d39c4f852579420055a56a!OpenDocument

ACTION TO BE TAKEN:

The EPA is today proposing specific and limited modifications, consistent with the settlement agreement and ADR discussions described above, to the District of Columbia NPDES MS4 Permit No. DC0000221, issued on September 30, 2011. Pursuant to 40 C.F.R. § 122.62 and 40 C.F.R. § 124.19, the EPA is taking comments *only* on the proposed language changes identified in draft Modification #1. The remaining portions of the permit are not open for comment or modification.

The following conventions are used to show proposed changes to the existing permit language: deleted language is indicated in ~~strikethrough~~ font and added language is indicated in <u>underline</u> font.

I. MINOR MODIFICATIONS

References to two section numbers were erroneously cited in the final permit. Pursuant to 40 C.F.R. 122.63(a), those section numbers are being corrected as follows:

1. On page 9, Table 1, the part number for the Retrofit Program will be corrected to 4.1.5.

2. On page 53, within the definition for "TMDL Implementation Plan", the erroneous reference to section 8.1.4 will be replaced with the correct reference to section 4.10.3.

II. PROPOSED MODIFICATIONS

Pursuant to 40 C.F.R. §§ 122.62 and 124.19, the EPA is proposing several modifications to the permit. In general the proposed modifications are intended to serve several purposes:

1) **To provide additional public notice and input on the District's development of its Consolidated TMDL Implementation Plan.** The proposed modifications specifically provide for public participation in the development of the Consolidated Total Maximum Daily Load (TMDL) Implementation Plan (*see* II.E), and also add six (6) months to the schedule for submitting the Plan to the EPA for approval, in order to facilitate public participation and an adequate public notice period for the draft Plan.

The EPA is also taking comment on a provision to require public notification of sanitary sewer overflows to the MS4 (*see* II.C) in section 4.3.1.3 of the permit.

2) **To provide additional clarity and accountability for specific water quality-related outcomes**. The proposed modifications to discharge limitations (*see* II.B), content requirements for the Consolidated TMDL Implementation Plan (*see* II.E), and the specific addition of definitions for the terms “benchmarks” and “milestones” used for TMDL planning (*see* II.G) are to clarify what are to be enforceable permit requirements. The EPA clarifies that final dates for attainment of wasteload allocations (WLAs) must be specified in the Plan and that the EPA will incorporate interim and final milestones for attainment as enforceable permit provisions.

The EPA also clarifies that *all* provisions of this permit are enforceable. The permittee must comply with all conditions of this permit. The EPA intends each provision of the permit to be enforceable. Compliance with any provision of this permit does not relieve the permittee from compliance with any other provision of the permit.

3**) To provide clarity that the Government of the District of Columbia is the sole permittee.** To eliminate any possible confusion about who the "permittee" is, the EPA is proposing modifications of the definition of "permittee" and standardization of language throughout the permit. Specifically, the EPA is proposing to remove a reference to DC Water (*see* II.C), to simplify the definition of permittee (*see* II. G), and to replace the term "District" with "permittee" in many places throughout the permit (*see* II.A).

The EPA recognizes that the Government of the District of Columbia has the institutional policies, regulations and agreements to make internal determinations about which District entities shall implement the various provisions of the permit. The EPA realizes that a number of departments, agencies and authorities of the Government of the District of Columbia will be engaged in carrying out particular responsibilities under the permit. However, the permit does not purport to identify which of these entities are responsible for any particular requirement, as this does not fall within the EPA's purview as the permitting authority. The EPA will continue to work directly with DDOE, the current stormwater administrator.

The following describe the specific proposed modifications:

A. PERMITTEE

To simplify and clarify the definition of "permittee", the EPA is proposing to replace the term "District" with "permittee" in all places in the permit where the term "District" has been used in the context of a mandate to the permittee to carry out a provision. The term "District" or "District of Columbia" continues to be used when the reference is to the specific geographical area.

Consistent with simplification of the definition of "permittee" (*see* II.G) these changes are intended to clarify that there is a single permittee, *i.e.*, the Government of the District of Columbia. As stated in Part 2.3 of the permit, the specific duties and obligations under the permit may ultimately be carried out by particular agencies, departments or authorities with the Government of the District of Columbia. DC law recognizes that implementing the MS4 permit involves a number of agencies, as outlined in the *Comprehensive Stormwater Management Enhancement Amendment Act of 2008*.[1] Section 151(a), which was enacted as part of the 2008 law, established a Stormwater Administration within DDOE, and provides that the Stormwater Administration "shall be responsible for monitoring and coordinating the activities of all District agencies, including the activities of the District of Columbia Water and Sewer Authority . . . which are required to maintain compliance with the Stormwater Permit" (referring to the MS4 permit). Section 151(c) further requires various agencies "and any other District agency identified by the Director" of DDOE to comply "with all requests made by the Director relating to stormwater related requests . . .". Therefore, while the permit stipulates the requirements to be fulfilled, determination of which agency or entity will be charged with bringing those tasks to fruition is governed by the DC statute and not a determination made by the permitting authority.

B. DISCHARGE LIMITATIONS

In Part 1.4 of the permit the EPA proposes to modify the final sentence to read:

> "Compliance with the ~~performance standards and~~ provisions contained in Parts 2 through 8 of this permit, including milestones and final dates for attainment of applicable WLAs, shall constitute adequate progress toward compliance with DCWQS and WLAs for this permit term."

The purpose of the proposed modification is to emphasize the importance of robust and timely progress towards implementation of the applicable wasteload allocations and attainment of water quality standards within defined timeframes.

C. SANITARY SEWAGE SYSTEM MAINTENANCE OVERFLOW AND SPILL PREVENTION RESPONSE

1. Modification to Part 4.3.1

[1] Draft Modification #1 Administrative Record, Document #18 (District of Columbia, *Comprehensive Stormwater Management Enhancement Amendment Act of 2008*, DC Law 16-51; DC Official Code §8.151.01 *et seq.*)

In Part 4.3.1 of the permit the EPA proposes the following modification:

> "The permittee shall ~~coordinate with DC Water to~~ implement an effective response protocol for overflows of the sanitary sewer system into the MS4."

The EPA had not originally included the phrase "coordinate with DC Water to" in the draft permit proposed in April 2010, but added it to the final permit per the request of DC Water in their comments on the proposed permit[2]. The EPA has subsequently concluded that this provided more confusion than clarity, and is now proposing to delete the phrase consistent with the modifications described above (*see* II.A) emphasizing that the Government of the District of Columbia is the permittee, and that the permittee will coordinate implementation of the permit according to its policies and regulations.

2. Public Comment on Part 4.3.1.3

In addition the EPA solicits public comment on the provision in the final permit that the permittee shall provide public notification of sanitary sewer overflows to the MS4. The final permit provided that the permittee would have procedures for:

> "Notifying appropriate sewer, public health agencies and the public within 24 hours when the sanitary sewer overflows to the MS4."

In the draft permit provision, the EPA did not originally include the phrase "and the public." However, in response to comments for more public notification and review generally[3,4,5,6], the EPA included it in the final permit as a logical outgrowth of the draft permit provision. The draft permit included requiring notice to appropriate public health agencies, and the rationale for notifying the public directly is the same: to ensure that people know to stay out of waterways in which untreated domestic sewage has been discharged. Notification of the public directly is also consistent with agency policy and guidance[7,8,9,10,11,12,13,14] on sanitary sewer overflow (SSO)

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[2] Final Permit Administrative Record Document #14 (District of Columbia Water & Sewer Authority, George Hawkins, Comment Letter (June 4, 2010)).
[3] Final Permit Administrative Record Document #3 (Alice Ferguson Foundation, Inc., Tracy Bowen, Comment Letter (June 4, 2010)).
[4] Final Permit Administrative Record Document #5 (Anacostia Watershed Society (50 form letters) (May – June 2010)).
[5] Final Permit Administrative Record Document #8 (Chesapeake Bay Foundation, Lee Epstein, Comment Letter (June 4, 2010)).
[6] Final Permit Administrative Record Document #16 (Friends of Rock Creek's Environment, Beth Mullin, Comment Letter (June 4, 2010)).
[7] Draft Modification #1 Administrative Record, Document #1 (U.S. EPA, *Report to Congress: Impacts and Control of CSOs and SSOs*, August 2004, EPA 833-R-04-001).
[8] Draft Modification #1 Administrative Record, Document #2 (U.S. EPA, *Why Control Sanitary Sewer Overflows?*, fact sheet).
[9] Draft Modification #1 Administrative Record, Document #3 (U.S. EPA, *National Pollutant Discharge Elimination System Permit Requirements for Peak Wet Weather Discharges from Publicly Owned Treatment Works Treatment Plants Serving Separate Sanitary Sewer Collection Systems*, December 2005).
[10] Draft Modification #1 Administrative Record, Document #4 (U.S. EPA, *Guide for Evaluating Capacity, Management, Operation and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems*, January 2005).

notification. Nonetheless, in order to be sure that the public has an opportunity to comment on this provision, the EPA seeks public comment on the requirement to include notice to the public when sanitary sewers overflow to the MS4. Upon receipt of those public comments, the EPA will decide whether to retain the requirement for public notification of SSOs to the MS4, remove it, or include a variation on this provision in the permit. The EPA emphasizes that, because this is an MS4 permit, this provision includes *only* those SSOs that reach the MS4.

D. PUBLIC INVOLVEMENT AND PARTICIPATION

In Part 4.9.4.1 of the permit the EPA proposes to add the following:

> "The permittee shall continue to create opportunities for the public to participate in the decision making processes involving the implementation of the permittee's SWMP. In particular the permittee shall provide meaningful opportunity for the public to participate in the development of the permittee's Consolidated TMDL Implementation Plan. The permittee shall continue to implement its process for consideration of public comments on their SWMP."

The purpose of this modification is to ensure that all parties with an interest in TMDL implementation have ample opportunity to participate in the planning process. Other modifications are also being proposed to Part 4.10.4 of the permit (*see* II.E) to achieve that purpose.

E. TOTAL MAXIMUM DAILY LOAD (TMDL) WASTELOAD ALLOCATION (WLA) PLANNING AND IMPLEMENTATION

A number of changes to Parts 4.10.3 and 4.10.4 are being proposed, which are summarized here. For the specific modifications to the permit language being proposed, please refer to the proposed modifications document.

1. The EPA is proposing to extend the compliance schedule for development of the Consolidated TMDL Implementation Plan (the Plan) from 24-months to 30-months to allow for adequate public involvement and public notification. The permit requirement to develop the Plan has been stayed due to permit appeal. Under 40 CFR § 124.19(d) the EPA is proposing to withdraw the original permit requirement and replace it with the modified provision. Therefore, the 30-month period would begin with the effective date of the permit modification. (Part 4.10.3)

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[11] Draft Modification #1 Administrative Record, Document #5 (U.S. EPA, *Sanitary Sewer Capacity, Management, Operation and Maintenance Self-Assessment Check-list*, (see Overflow Emergency Response Plan, page 22)).
[12] Draft Modification #1 Administrative Record, Document #6 (American Society of Civil Engineers, *Sanitary Sewer Overflow Solutions, Guidance Manual*, April 2004).
[13] Draft Modification #1 Administrative Record, Document #7 (U.S. EPA, Model NPDES Permit Language for Sanitary Sewer Overflows, August 2007 Draft).
[14] Draft Modification #1 Administrative Record, Document #8 (U.S. EPA, NPDES Permit Requirements for Municipal Sanitary Sewer Collection Systems and SSOs, August 2007 Draft).

2. The EPA is proposing to remove the reference to the 2002 TMDL for Total Suspended Solids in the Upper and Lower Anacostia River from the permit because that TMDL has been superseded by the 2007 TMDL for Sediment/Total Suspended Solids for the Anacostia River Basin. (Part 4.10.3)
3. The EPA is proposing modifications that provide additional clarification that the EPA will take action to incorporate milestones and final WLA attainment dates into the permit as enforceable requirements of the program. (Part 4.10.3)
4. The EPA is proposing modifications that clarify when and how modifications to the Plan must be submitted to the EPA. (Part 4.10.3)
5. The EPA is proposing modifications that clarify what the interim and final elements of the Plan must be, including benchmarks, milestones and final attainment objectives (*also see*, II.G). (Part 4.10.3)
6. The EPA is proposing to add a requirement that the Plan include adequate narrative to ensure that there is clear understanding of the rationale for TMDL implementation schedules and controls. (Part 4.10.3)
7. The EPA is proposing modifications that clarify that all TMDLs with WLAs assigned to the MS4 that are in effect, e.g., haven't been withdrawn, reissued, or the water delisted, must be included in the Plan. (Part 4.10.3)
8. The EPA is proposing modifications that clarify that the most current version of the Plan must be posted on the permittee's website. (Part 4.10.3)
9. The EPA is proposing modifications to the language describing actions the permittee must take should the permittee make insufficient progress toward attaining any WLA. (Part 4.10.4)

In the event the permittee does not submit a Consolidated TMDL Implementation Plan, submits a plan that fails to address one or more applicable TMDLs, or submits a plan that the EPA disapproves, the EPA will initiate action to set the relevant milestones and final dates for attainment by which the permittee will meet applicable WLAs, pursuant to section 4.10.3 of the permit, within 6 months of the failure and finalize those requirements within 2 years of the failure. The EPA will incorporate those elements as enforceable permit provisions.

The EPA believes these modifications would improve the transparency of the process with respect to implementing the various, and to some extent overlapping, TMDLs that apply to the receiving waters in question. Moreover, the clarifications should make it easier for both the permittee and the public to identify the enforceable elements of the permit.

F. DESIGN OF THE REVISED MONITORING PROGRAM

The final permit aligned the schedules for development of the Consolidated TMDL Implementation Plan and the Revised Monitoring Program (Part 5.1.1) because of the importance of tailoring monitoring to support TMDL implementation. Since the EPA is proposing to extend the compliance date for submittal of the Consolidated TMDL Plan to 30 months, the EPA also proposes to extend the compliance date for submittal of the Revised Monitoring Strategy to 30 months to maintain the alignment between the two schedules. Both 30 month schedules would start with the effective date of this permit modification.

G. DEFINITIONS

In conjunction with the changes to 4.10.3 and 4.10.4, the EPA proposes two new definitions to support and clarify the expectations for TMDL planning and implementation:

> "'Benchmark' as used in this permit is a quantifiable goal or target to be used to assess progress toward "milestones" (see separate definition) and WLAs, such as a numeric goal for BMP implementation. If a benchmark is not met, the permittee should take appropriate corrective action to improve progress toward meeting milestones or other objectives. Benchmarks are intended as an adaptive management aid and generally are not considered to be enforceable."

> "'Milestone' as used in this permit is an interim step toward attainment of a WLA that upon incorporation into the permit will become an enforceable limit or requirement to be achieved by a stated date. A milestone should be expressed in numeric terms, i.e. as a volume reduction, pollutant load, specified implementation action or set of actions or other objective metric, when possible and appropriate."

In addition, the EPA proposes to simplify the definition of "permittee" as follows:

> "'Permittee' refers to the Government of the District of Columbia ~~and all subordinate District and independent agencies, such as the District of Columbia Water and Sewer Authority, directly accountable and responsible to the City Council and Mayor as authorized under the Stormwater Permit Compliance Amendment Act of 2000 and any subsequent amendments for administrating, coordinating, implementing, and managing stormwater for MS4 activities within the boundaries of the District of Columbia~~."

As explained above (*see*, II.A), under District of Columbia law, it is the responsibility of DDOE to coordinate implementation of the MS4 permit.

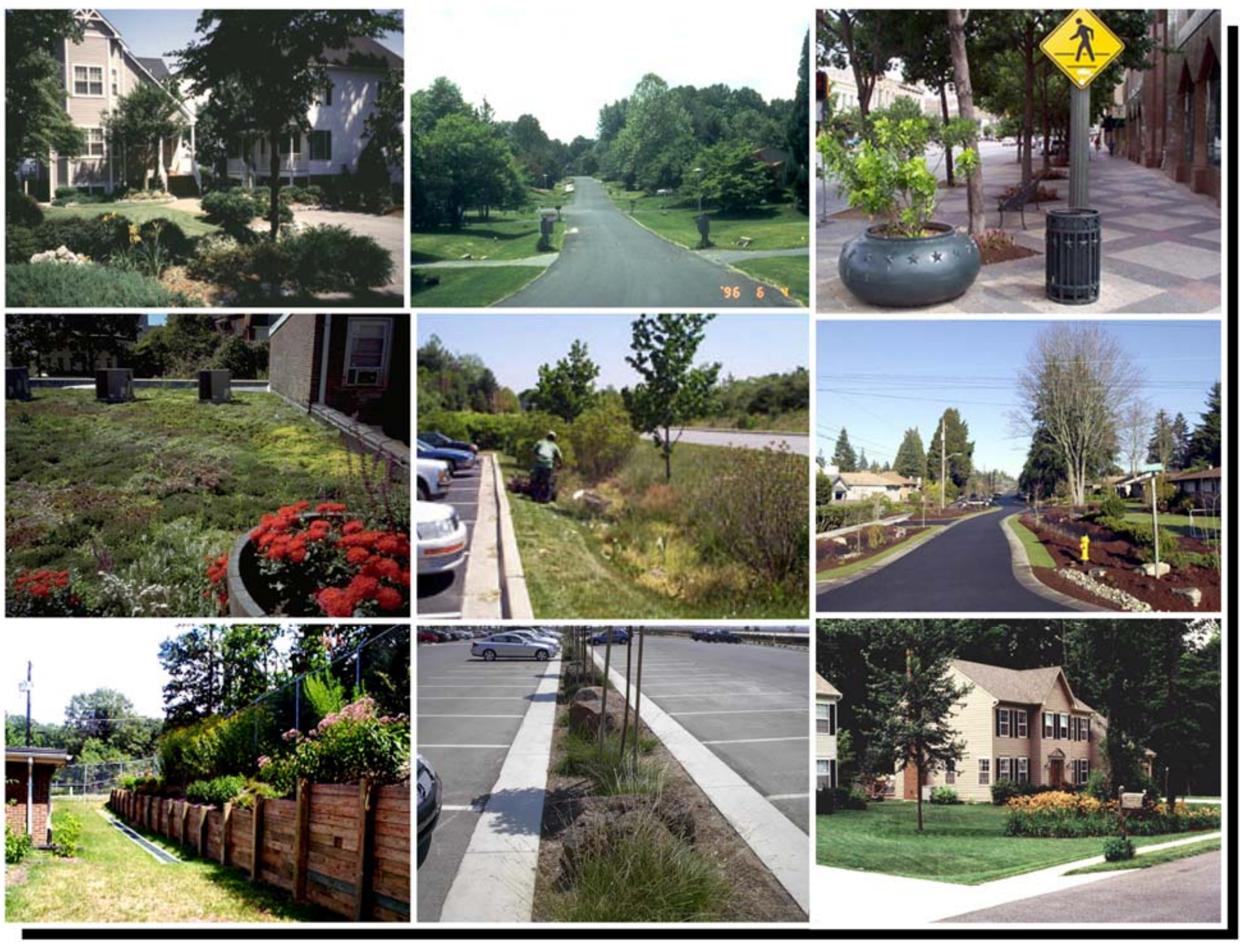
WHERE TO SEND COMMENTS:

Comments on the proposed modifications may be sent via electronic mail or regular mail to:

Ms. Kaitlyn Bendik
U.S. Environmental Protection Agency
Region 3
NPDES Permits Branch, Mailcode 3WP41
1650 Arch Street
Philadelphia, PA 19103-2029
bendik.kaitlyn@epa.gov

Comments must be postmarked (if regular mail) or sent (if electronic mail) on or before August 27, 2012.

Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices



Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices

December 2007

EPA 841-F-07-006

Prepared under Contract No. 68-C-02-108

United States Environmental Protection Agency

Nonpoint Source Control Branch (4503T)

1200 Pennsylvania Ave., NW

Washington, DC 20460

Available for download at www.epa.gov/nps/lid

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FOREWORD

One of the most exciting new trends in water quality management today is the movement by many cities, counties, states, and private-sector developers toward the increased use of Low Impact Development (LID) to help protect and restore water quality. LID comprises a set of approaches and practices that are designed to reduce runoff of water and pollutants from the site at which they are generated. By means of infiltration, evapotranspiration, and reuse of rainwater, LID techniques manage water and water pollutants at the source and thereby prevent or reduce the impact of development on rivers, streams, lakes, coastal waters, and ground water.

Although the increase in application of these practices is growing rapidly, data regarding both the effectiveness of these practices and their costs remain limited. This document is focused on the latter issue, and the news is good. In the vast majority of cases, the U.S. Environmental Protection Agency (EPA) has found that implementing well-chosen LID practices saves money for developers, property owners, and communities while protecting and restoring water quality.

While this study focuses on the cost reductions and cost savings that are achievable through the use of LID practices, it is also the case that communities can experience many amenities and associated economic benefits that go beyond cost savings. These include enhanced property values, improved habitat, aesthetic amenities, and improved quality of life. This study does not monetize and consider these values in performing the cost calculations, but these economic benefits are real and significant. For that reason, EPA has included a discussion of these economic benefits in this document and provided references for interested readers to learn more about them.

Readers interested in increasing their knowledge about LID and Green Infrastructure, which encompasses LID along with other aspects of green development, should see www.epa.gov/npdes/greeninfrastructure and www.epa.gov/nps/lid. It is EPA's hope that as professionals and citizens continue to become more knowledgeable about the effectiveness and costs of LID, the use of LID practices will continue to increase at a rapid pace.

EXECUTIVE SUMMARY

This report summarizes 17 case studies of developments that include Low Impact Development (LID) practices and concludes that applying LID techniques can reduce project costs and improve environmental performance. In most cases, LID practices were shown to be both fiscally and environmentally beneficial to communities. In a few cases, LID project costs were higher than those for conventional stormwater management practices. However, in the vast majority of cases, significant savings were realized due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping. Total capital cost savings ranged from 15 to 80 percent when LID methods were used, with a few exceptions in which LID project costs were higher than conventional stormwater management costs.

EPA has identified several additional areas that will require further study. First, in all cases, there were benefits that this study did not monetize and did not factor into the project's bottom line. These benefits include improved aesthetics, expanded recreational opportunities, increased property values due to the desirability of the lots and their proximity to open space, increased total number of units developed, increased marketing potential, and faster sales. Second, more research is also needed to quantify the environmental benefits that can be achieved through the use of LID techniques and the costs that can be avoided. Examples of environmental benefits include reduced runoff volumes and pollutant loadings to downstream waters, and reduced incidences of combined sewer overflows. Finally, more research is needed to monetize the cost reductions that can be achieved through improved environmental performance, reductions in long-term operation and maintenance costs, and/or reductions in the life cycle costs of replacing or rehabilitating infrastructure.

INTRODUCTION

BACKGROUND

Most stormwater runoff is the result of the man-made hydrologic modifications that normally accompany development. The addition of impervious surfaces, soil compaction, and tree and vegetation removal result in alterations to the movement of water through the environment. As interception, evapotranspiration, and infiltration are reduced and precipitation is converted to overland flow, these modifications affect not only the characteristics of the developed site but also the watershed in which the development is located. Stormwater has been identified as one of the leading sources of pollution for all waterbody types in the United States. Furthermore, the impacts of stormwater pollution are not static; they usually increase with more development and urbanization.

Extensive development in the United States is a relatively recent phenomenon. For the past two decades, the rate of land development across the country has been twice the rate of population growth. Approximately 25 million acres were developed between 1982 and 1997, resulting in a 34 percent increase in the amount of developed land with only a 15 percent increase in population.[1,2] The 25 million acres developed during this 15-year period represent nearly 25 percent of the total amount of developed land in the contiguous states. The U.S. population is expected to increase by 22 percent from 2000 to 2025. If recent development trends continue, an additional 68 million acres of land will be developed during this 25-year period.[3]

Water quality protection strategies are often implemented at three scales: the region or large watershed area, the community or neighborhood, and the site or block. Different stormwater approaches are used at different scales to afford the greatest degree of protection to waterbodies because the influences of pollution are often found at all three scales. For example, decisions about where and how to grow are the first and perhaps most important decisions related to water quality. Growth and development can give a community the resources needed to revitalize a downtown, refurbish a main street, build new schools, and develop vibrant places to live, work, shop, and play. The environmental impacts of development, however, can pose challenges for communities striving to protect their natural resources. Development that uses land efficiently and protects undisturbed natural lands allows a community to grow and still protect its water resources.

Strategies related to these broad growth and development issues are often implemented at the regional or watershed scale. Once municipalities have determined where to grow and where to preserve, various stormwater management techniques are applied at the neighborhood or community level. These measures, such as road width requirements, often transcend specific development sites and can be applied throughout a neighborhood. Finally, site-specific stormwater strategies, such as rain gardens and infiltration areas, are incorporated within a particular development. Of course, some stormwater management strategies can be applied at several scales. For example, opportunities to maximize infiltration can occur at the neighborhood and site levels.

Many smart growth approaches can decrease the overall amount of impervious cover associated with a development's footprint. These approaches include directing development to already degraded land; using narrower roads; designing smaller parking lots; integrating retail, commercial, and residential uses; and designing more compact residential lots. These development approaches, combined with other techniques aimed at reducing the impact of development, can offer communities superior stormwater management.

Stormwater management programs have struggled to provide adequate abatement and treatment of stormwater at the current levels of development. Future development will create even greater challenges for maintaining and improving water quality in the nation's waterbodies. The past few decades of stormwater management have resulted in the current convention of control-and-treatment strategies. They are largely engineered, end-of-pipe practices that have been focused on controlling peak flow rate and suspended solids concentrations. Conventional practices, however, fail to address the widespread and cumulative hydrologic modifications within the watershed that increase stormwater volumes and runoff rates and cause excessive erosion and stream channel degradation. Existing practices also fail to adequately treat for other pollutants of concern, such as nutrients, pathogens, and metals.

Low Impact Development

Low Impact Development (LID)[4] is a stormwater management strategy that has been adopted in many localities across the country in the past several years. It is a stormwater management approach and set of practices that can be used to reduce runoff and pollutant loadings by managing the runoff as close to its source(s) as possible. A set or system of small-scale practices, linked together on the site, is often used. LID approaches can be used to reduce the impacts of development and redevelopment activities on water resources. In the case of new development, LID is typically used to achieve or pursue the goal of maintaining or closely replicating the predevelopment hydrology of the site. In areas where development has already occurred, LID can be used as a retrofit practice to reduce runoff volumes, pollutant loadings, and the overall impacts of existing development on the affected receiving waters.

In general, implementing integrated LID practices can result in enhanced environmental performance while at the same time reducing development costs when compared to traditional stormwater management approaches. LID techniques promote the use of natural systems, which can effectively remove nutrients, pathogens, and metals from stormwater. Cost savings are typically seen in reduced infrastructure because the total volume of runoff to be managed is minimized through infiltration and evapotranspiration. By working to mimic the natural water cycle, LID practices protect downstream resources from adverse pollutant and hydrologic impacts that can degrade stream channels and harm aquatic life.

It is important to note that typical, real-world LID designs usually incorporate more than one type of practice or technique to provide integrated treatment of runoff from a site. For example, in lieu of a treatment pond serving a new subdivision, planners might incorporate a bioretention area in each yard, disconnect downspouts from driveway surfaces, remove curbs, and install grassed swales in common areas. Integrating small practices throughout a site instead of using extended detention wet ponds to control runoff from a subdivision is the basis of the LID approach.

When conducting cost analyses of these practices, examples of projects where actual practice-by-practice costs were considered separately were found to be rare because material and labor costs are typically calculated for an entire site rather than for each element within a larger system. Similarly, it is difficult to calculate the economic benefits of individual LID practices on the basis of their effectiveness in reducing runoff volume and rates or in treating pollutants targeted for best management practice (BMP) performance monitoring.

The following is a summary of the different categories of LID practices, including a brief description and examples of each type of practice.

Conservation designs can be used to minimize the generation of runoff by preserving open space. Such designs can reduce the amount of impervious surface, which can cause increased runoff volumes. Open space can also be used to treat the increased runoff from the built environment through infiltration or evapotranspiration. For example, developers can use conservation designs to preserve important features on the site such as wetland and riparian areas, forested tracts, and areas of porous soils. Development plans that outline the smallest site disturbance area can minimize the stripping of topsoil and compaction of subsoil that result from grading and equipment use. By preserving natural areas and not clearing and grading the entire site for housing lots, less total runoff is generated on the development parcel. Such simplistic, nonstructural methods can reduce the need to build large structural runoff controls like retention ponds and stormwater conveyance systems and thereby decrease the overall infrastructure costs of the project. Reducing the total area of impervious surface by limiting road widths, parking area, and sidewalks can also reduce the volume of runoff that must be treated. Residential developments that incorporate conservation design principles also can benefit residents and their quality of life due to increased access and proximity to communal open space, a greater sense of community, and expanded recreational opportunities.

Examples of Conservation Design

- Cluster development
- Open space preservation
- Reduced pavement widths (streets, sidewalks)
- Shared driveways
- Reduced setbacks (shorter driveways)
- Site fingerprinting during construction

Infiltration practices are engineered structures or landscape features designed to capture and infiltrate runoff. They can be used to reduce both the volume of runoff discharged from the site and the infrastructure needed to convey, treat, or control runoff. Infiltration practices can also be used to recharge ground water. This benefit is especially important in areas where maintaining drinking water supplies and stream baseflow is of special concern because of limited precipitation or a high ratio of withdrawal to recharge rates. Infiltration of runoff can also help to maintain stream temperatures because the infiltrated water that moves laterally to replenish stream baseflow typically has a lower temperature than overland flows, which might be subject

Examples of Infiltration Practices

- Infiltration basins and trenches
- Porous pavement
- Disconnected downspouts
- Rain gardens and other vegetated treatment systems

to solar radiation. Another advantage of infiltration practices is that they can be integrated into landscape features in a site-dispersed manner. This feature can result in aesthetic benefits and, in some cases, recreational opportunities; for example, some infiltration areas can be used as playing fields during dry periods.

Runoff storage practices. Impervious surfaces are a central part of the built environment, but runoff from such surfaces can be captured and stored for reuse or gradually infiltrated, evaporated, or used to irrigate plants. Using runoff storage practices has several benefits. They can reduce the volume of runoff discharged to surface waters, lower the peak flow hydrograph to protect streams from the erosive forces of high flows, irrigate landscaping, and provide aesthetic benefits such as landscape islands, tree boxes, and rain gardens. Designers can take advantage of the void space beneath paved areas like parking lots and sidewalks to provide additional storage. For example, underground vaults can be used to store runoff in both urban and rural areas.

Examples of Runoff Storage Practices

- Parking lot, street, and sidewalk storage
- Rain barrels and cisterns
- Depressional storage in landscape islands and in tree, shrub, or turf depressions
- Green roofs

Runoff conveyance practices. Large storm events can make it difficult to retain all the runoff generated on-site by using infiltration and storage practices. In these situations, conveyance systems are typically used to route excess runoff through and off the site. In LID designs, conveyance systems can be used to slow flow velocities, lengthen the runoff time of concentration, and delay peak flows that are discharged off-site. LID conveyance practices can be used as an alternative to curb-and-gutter systems, and from a water quality perspective they have advantages over conventional approaches designed to rapidly convey runoff off-site and alleviate on-site flooding. LID conveyance practices often have rough surfaces, which slow runoff and increase evaporation and settling of solids. They are typically permeable and vegetated, which promotes infiltration, filtration, and some biological uptake of pollutants. LID conveyance practices also can perform functions similar to those of conventional curbs, channels, and gutters. For example, they can be used to reduce flooding around structures by routing runoff to landscaped areas for treatment, infiltration, and evapotranspiration.

Examples of Runoff Conveyance Practices

- Eliminating curbs and gutters
- Creating grassed swales and grass-lined channels
- Roughening surfaces
- Creating long flow paths over landscaped areas
- Installing smaller culverts, pipes, and inlets
- Creating terraces and check dams

Filtration practices are used to treat runoff by filtering it through media that are designed to capture pollutants through the processes of physical filtration of solids and/or cation exchange of dissolved pollutants. Filtration practices offer many of the same benefits as infiltration, such as reductions in the volume of runoff transported off-site, ground water recharge, increased stream baseflow, and reductions in thermal impacts to receiving waters. Filtration practices also have the added advantage of providing increased pollutant removal benefits. Although pollutant build-up and removal may be of concern, pollutants are typically captured in the upper soil horizon and can be removed by replacing the topsoil.

Examples of Filtration Practices

- Bioretention/rain gardens
- Vegetated swales
- Vegetated filter strips/buffers

Low impact landscaping. Selection and distribution of plants must be carefully planned when designing a functional landscape. Aesthetics are a primary concern, but it is also important to consider long-term maintenance goals to reduce inputs of labor, water, and chemicals. Properly preparing soils and selecting species adapted to the microclimates of a site greatly increases the success of plant establishment and growth, thereby stabilizing soils and allowing for biological uptake of pollutants. Dense, healthy plant growth offers such benefits as pest resistance (reducing the need for pesticides) and improved soil infiltration from root growth. Low impact landscaping can thus reduce impervious surfaces, improve infiltration potential, and improve the aesthetic quality of the site.

Examples of Low Impact Landscaping

- Planting native, drought-tolerant plants
- Converting turf areas to shrubs and trees
- Reforestation
- Encouraging longer grass length
- Planting wildflower meadows rather than turf along medians and in open space
- Amending soil to improve infiltration

EVALUATIONS OF BENEFITS AND COSTS

To date, the focus of traditional stormwater management programs has been concentrated largely on structural engineering solutions to manage the hydraulic consequences of the increased runoff that results from development. Because of this emphasis, stormwater management has been considered primarily an engineering endeavor. Economic analyses regarding the selection of solutions that are not entirely based on pipes and ponds have not been a significant factor in management decisions. Where costs have been considered, the focus has been primarily on determining capital costs for conventional infrastructure, as well as operation and maintenance costs in dollars per square foot or dollars per pound of pollutant removed.

Little attention has been given to the benefits that can be achieved through implementing LID practices. For example, communities rarely attempt to quantify and monetize the pollution prevention benefits and avoided treatment costs that might accrue from the use of conservation designs or LID techniques. To be more specific, the benefits of using LID practices to decrease the need for combined sewer overflow (CSO) storage and conveyance systems should be factored into the economic analyses. One of the major factors preventing LID practices from receiving equal consideration in the design or selection process is the difficulty of monetizing the environmental benefits of these practices. Without good data and relative certainty that these alternatives will work and not increase risk or cost, current standards of practice are difficult to change.

This report is an effort to compare the projected or known costs of LID practices with those of conventional development approaches. At this point, monetizing the economic and environmental benefits of LID strategies is much more difficult than monetizing traditional infrastructure costs or changes in property values due to improvements in existing utilities or transportation systems. Systems of practices must be analyzed to determine net performance and monetary benefits based on the capacity of the systems to both treat for pollutants and reduce impacts through pollution prevention. For example, benefits might come in the form of reduced stream channel degradation, avoided stream restoration costs, or reduced drinking water treatment costs.

One of the chief impediments to getting useful economic data to promote more widespread use of LID techniques is the lack of a uniform baseline with which to compare the costs and benefits of LID practices against the costs of conventional stormwater treatment and control. Analyzing benefits is further complicated in cases where the environmental performance of the conservation design or LID system exceeds that of the conventional runoff management system, because such benefits are not easily monetized. The discussion below is intended to provide a general discussion of the range of economic benefits that may be provided by LID practices in a range of appropriate circumstances.

OVERVIEW OF BENEFITS

The following is a brief discussion of some of the actual and assumed benefits of LID practices. Note that environmental and ancillary benefits typically are not measured as part of development projects, nor are they measured as part of pilot or demonstration projects, because they can be difficult to isolate and quantify. Many of the benefits described below are assumed on the basis of limited studies and anecdotal evidence.

The following discussion is organized into three categories: (1) environmental benefits, which include reductions in pollutants, protection of downstream water resources, ground water recharge, reductions in pollutant treatment costs, reductions in the frequency and severity of CSOs, and habitat improvements; (2) land value benefits, which include reductions in downstream flooding and property damage, increases in real estate value, increased parcel lot yield, increased aesthetic value, and improvement of quality of life by providing open space for recreation; and (3) compliance incentives.

Environmental Benefits

Pollution abatement. LID practices can reduce both the volume of runoff and the pollutant loadings discharged into receiving waters. LID practices result in pollutant removal through settling, filtration, adsorption, and biological uptake. Reductions in pollutant loadings to receiving waters, in turn, can improve habitat for aquatic and terrestrial wildlife and enhance recreational uses. Reducing pollutant loadings can also decrease stormwater and drinking water treatment costs by decreasing the need for regional stormwater management systems and expansions in drinking water treatment systems.

Protection of downstream water resources. The use of LID practices can help to prevent or reduce hydrologic impacts on receiving waters, reduce stream channel degradation from erosion and sedimentation, improve water quality, increase water supply, and enhance the recreational and aesthetic value of our natural resources. LID practices can be used to protect water resources that are downstream in the watershed. Other potential benefits include reduced incidence of illness from contact recreation activities such as swimming and wading, more robust and safer seafood supplies, and reduced medical treatment costs.

Ground water recharge. LID practices also can be used to infiltrate runoff to recharge ground water. Growing water shortages nationwide increasingly indicate the need for water resource management strategies designed to integrate stormwater, drinking water, and wastewater programs to maximize benefits and minimize costs. Development pressures typically result in increases in the amount of impervious surface and volume of runoff. Infiltration practices can be used to replenish ground water and increase stream baseflow. Adequate baseflow to streams during dry weather is important because low ground water levels can lead to greater fluctuations in stream depth, flows, and temperatures, all of which can be detrimental to aquatic life.

Water quality improvements/reduced treatment costs. It is almost always less expensive to keep water clean than it is to clean it up. The Trust for Public Land[5] noted Atlanta's tree cover has saved more than $883 million by preventing the need for stormwater retention facilities. A study of 27 water suppliers conducted by the Trust for Public Land and the American Water Works Association[6] found a direct relationship between forest cover in a watershed and water supply treatment costs. In other words, communities with higher percentages of forest cover had lower treatment costs. According to the study, approximately 50 to 55 percent of the variation in treatment costs can be explained by the percentage of forest cover in the source area. The researchers also found that for every 10 percent increase in forest cover in the source area, treatment and chemical costs decreased approximately 20 percent, up to about 60 percent forest cover.

Reduced incidence of CSOs. Many municipalities have problems with CSOs, especially in areas with aging infrastructure. Combined sewer systems discharge sanitary wastewater during storm events. LID techniques, by retaining and infiltrating runoff, reduce the frequency and amount of CSO discharges to receiving waters. Past management efforts typically have been concentrated on hard engineering approaches focused on treating the total volume of sanitary waste together with the runoff that is discharged to the combined system. Recently, communities like Portland (Oregon), Chicago, and Detroit have been experimenting with watershed approaches aimed at reducing the total volume of runoff generated that must be handled by the combined system. LID techniques have been the primary method with which they have experimented to reduce runoff. A Hudson Riverkeeper report concluded, based on a detailed technical analysis, that New York City could reduce its CSO's more cost-effectively with LID practices than with conventional, hard infrastructure CSO storage practices. [7]

Habitat improvements. Innovative stormwater management techniques like LID or conservation design can be used to improve natural resources and wildlife habitat, maintain or increase land value, or avoid expensive mitigation costs.

Land Value and Quality of Life Benefits

Reduced downstream flooding and property damage. LID practices can be used to reduce downstream flooding through the reduction of peak flows and the total amount or volume of runoff. Flood prevention reduces property damage and can reduce the initial capital costs and the operation and maintenance costs of stormwater infrastructure. Strategies designed to manage runoff on-site or as close as possible to its point of generation can reduce erosion and sediment transport as well as reduce flooding and downstream erosion. As a result, the costs for cleanups and streambank restoration can be reduced or avoided altogether. The use of LID techniques also can help protect or restore floodplains, which can be used as park space or wildlife habitat.[8]

Real estate value/property tax revenue. Homeowners and property owners are willing to pay a premium to be located next to or near aesthetically pleasing amenities like water features, open space, and trails. Some stormwater treatment systems can be beneficial to developers because they can serve as a "water" feature or other visual or recreational amenity that can be used to market the property. These designs should be visually attractive and safe for the residents and should be considered an integral part of planning the development. Various LID projects and smart growth studies have shown that people are willing to pay more for clustered homes than conventionally designed subdivisions. Clustered housing with open space appreciated at a higher rate than conventionally designed subdivisions. EPA's *Economic Benefits of Runoff Controls*[9] describes numerous examples where developers and subsequent homeowners have received premiums for proximity to attractive stormwater management practices.

Lot yield. LID practices typically do not require the large, contiguous areas of land that are usually necessary when traditional stormwater controls like ponds are used. In cases where LID practices are incorporated on individual house lots and along roadsides as part of the landscaping, land that would normally be dedicated for a stormwater pond or other large structural control can be developed with additional housing lots.

Aesthetic value. LID techniques are usually attractive features because landscaping is an integral part of the designs. Designs that enhance a property's aesthetics using trees, shrubs, and flowering plants that complement other landscaping features can be selected. The use of these designs may increase property values or result in faster sale of the property due to the perceived value of the "extra" landscaping.

Public spaces/quality of life/public participation. Placing water quality practices on individual lots provides opportunities to involve homeowners in stormwater management and enhances public awareness of water quality issues. An American Lives, Inc., real estate study found that 77.7 percent of potential homeowners rated natural open space as "essential" or "very important" in planned communities.[10]

Compliance Incentives

Regulatory compliance credits. Many states recognize the positive benefits LID techniques offer, such as reduced wetland impacts. As a result, they might offer regulatory compliance credits, streamlined or simpler permit processes, and other incentives similar to those offered for other green practices. For example, in Maryland the volume required for the permanent pool of a wet pond can be reduced if rooftop runoff is infiltrated on-site using LID practices. This procedure allows rooftop area to be subtracted from the total impervious area, thereby reducing the required size of the permanent pool. In addition, a LID project can have less of an environmental impact than a conventional project, thus requiring smaller impact fees.

Cost Considerations

Traditional approaches to stormwater management involve conveying runoff off-site to receiving waters, to a combined sewer system, or to a regional facility that treats runoff from multiple sites. These designs typically include hard infrastructure, such as curbs, gutters, and piping. LID-based designs, in contrast, are designed to use natural drainage features or engineered swales and vegetated contours for runoff conveyance and treatment. In terms of costs, LID techniques like conservation design can reduce the amount of materials needed for paving roads and driveways and for installing curbs and gutters. Conservation designs can be used to reduce the total amount of impervious surface, which results in reduced road and driveway lengths and reduced costs. Other LID techniques, such as grassed swales, can be used to infiltrate roadway runoff and eliminate or reduce the need for curbs and gutters, thereby reducing infrastructure costs. Also, by infiltrating or evaporating runoff, LID techniques can reduce the size and cost of flood-control structures. Note that more research is needed to determine the optimal combination of LID techniques and detention practices for flood control.

It must be stated that the use of LID techniques might not always result in lower project costs. The costs might be higher because of the costs of plant material, site preparation, soil amendments, underdrains and connections to municipal stormwater systems, and increased project management.

Another factor to consider when comparing costs between traditional and LID designs is the amount of land required to implement a management practice. Land must be set aside for both traditional stormwater management practices and LID practices, but the former require the use of land *in addition to* individual lots and other community areas, whereas bioretention areas and swales can be incorporated into the landscaping of yards, in rights-of-way along roadsides, and in or adjacent to parking lots. The land that would have been set aside for ponds or wetlands can in many cases be used for additional housing units, yielding greater profits.

Differences in maintenance requirements should also be considered when comparing costs. According to a 1999 EPA report, maintenance costs for retention basins and constructed wetlands were estimated at 3 to 6 percent of construction costs, whereas maintenance costs for swales and bioretention practices were estimated to be 5 to 7 percent of construction costs.[11] However, much of the maintenance for bioretention areas and swales can be accomplished as part of routine landscape maintenance and does not require specialized equipment. Wetland and pond maintenance, on the other hand, involves heavy equipment to remove accumulated sediment, oils, trash, and vegetation in forebays and open ponds.

Finally, in some circumstances LID practices can offset the costs associated with regulatory requirements for stormwater control. In urban redevelopment projects where land is not likely to be available for large stormwater management practices, developers can employ site-dispersed BMPs in sidewalk areas, in courtyards, on rooftops, in parking lots, and in other small outdoor spaces, thereby avoiding the fees that some municipalities charge when stormwater mitigation requirements cannot otherwise be met. In addition, stormwater utilities often provide credits for installing runoff management practices such as LID practices.[12]

CASE STUDIES

The case studies presented below are not an exhaustive list of LID projects nationwide. These examples were selected on the basis of the quantity and quality of economic data, quantifiable impacts, and types of LID practices used. Economic data are available for many other LID installations, but those installations often cannot be compared with conventional designs because of the unique nature of the design or the pilot status of the project. Table 1 presents a summary of the LID practices employed in each case study.

Table 1. Summary of LID Practices Employed in the Case Studies

Name	LID Techniques							
	Biore-tention	Cluster Building	Reduced Impervious Area	Swales	Permeable Pavement	Vegetated Landscaping	Wetlands	Green Roofs
2nd Avenue SEA Street	✓		✓	✓				
Auburn Hills	✓		✓	✓		✓	✓	
Bellingham Parking Lot Retrofits	✓							
Central Park Commercial Redesigns	✓			✓				
Crown Street	✓		✓	✓				
Gap Creek			✓			✓		
Garden Valley	✓	✓		✓	✓		✓	
Kensington Estates		✓	✓		✓	✓	✓	
Laurel Springs	✓	✓	✓	✓				
Mill Creek		✓	✓	✓				
Poplar Street Apartments	✓			✓			✓	
Portland Downspout Disconnection*			✓					
Prairie Crossing	✓		✓	✓		✓		
Prairie Glen	✓	✓	✓	✓		✓	✓	
Somerset	✓			✓				
Tellabs Corporate Campus	✓			✓		✓	✓	
Toronto Green Roofs								✓

*Although impervious area stays the same, the disconnection program reduces directly connected impervious area.

The case studies contain an analysis of development costs, which are summarized in Table 2. Note that some case study results do not lend themselves well to a traditional vs.

LID cost comparison and therefore are not included in Table 2 (as noted). *Conventional development cost* refers to costs incurred or estimated for a traditional stormwater management approach, whereas *LID cost* refers to costs incurred or estimated for using LID practices. *Cost difference* is the difference between the conventional development cost and the LID cost. *Percent difference* is the cost savings relative to the conventional development cost.

Table 2. Summary of Cost Comparisons Between Conventional and LID Approaches[a]

Project	Conventional Development Cost	LID Cost	Cost Difference[b]	Percent Difference[b]
2nd Avenue SEA Street	$868,803	$651,548	$217,255	25%
Auburn Hills	$2,360,385	$1,598,989	$761,396	32%
Bellingham City Hall	$27,600	$5,600	$22,000	80%
Bellingham Bloedel Donovan Park	$52,800	$12,800	$40,000	76%
Gap Creek	$4,620,600	$3,942,100	$678,500	15%
Garden Valley	$324,400	$260,700	$63,700	20%
Kensington Estates	$765,700	$1,502,900	–$737,200	-96%
Laurel Springs	$1,654,021	$1,149,552	$504,469	30%
Mill Creek[c]	$12,510	$9,099	$3,411	27%
Prairie Glen	$1,004,848	$599,536	$405,312	40%
Somerset	$2,456,843	$1,671,461	$785,382	32%
Tellabs Corporate Campus	$3,162,160	$2,700,650	$461,510	15%

[a] The Central Park Commercial Redesigns, Crown Street, Poplar Street Apartments, Prairie Crossing, Portland Downspout Disconnection, and Toronto Green Roofs study results do not lend themselves to display in the format of this table.
[b] Negative values denote increased cost for the LID design over conventional development costs.
[c] Mill Creek costs are reported on a per-lot basis.

2ND AVENUE SEA STREET, SEATTLE, WASHINGTON

The 2nd Avenue Street Edge Alternative (SEA) Street project was a pilot project undertaken by Seattle Public Utilities to redesign an entire 660-foot block with a number of LID techniques. The goals were to reduce stormwater runoff and to provide a more “livable” community. Throughout the design and construction process, Seattle Public Utilities worked collaboratively with street residents to develop the final street design.[13]

The design reduced imperviousness, included retrofits of bioswales to treat and manage stormwater, and added 100 evergreen trees and 1,100 shrubs.[14] Conventional curbs and gutters were replaced with bioswales in the rights-of-way on both sides of the street, and the street width was reduced from 25 feet to 14 feet. The final constructed design reduced imperviousness by more than 18 percent. An estimate for the final total project cost was $651,548. A significant amount of community outreach was involved, which raised the level of community acceptance. Community input is important for any project, but because this was a pilot study, much more was spent on communication and redesign than what would be spent for a typical project.

The costs for the LID retrofit were compared with the estimated costs of a conventional street retrofit (Table 3). Managing stormwater with LID techniques resulted in a cost savings of 29 percent. Also, the reduction in street width and sidewalks reduced paving costs by 49 percent.

Table 3. Cost Comparison for 2nd Avenue SEA Street [15]

Item	Conventional Development Cost	SEA Street Cost	Cost Savings*	Percent Savings*	Percent of Total Savings*
Site preparation	$65,084	$88,173	–$23,089	–35%	–11%
Stormwater management	$372,988	$264,212	$108,776	29%	50%
Site paving and sidewalks	$287,646	$147,368	$140,278	49%	65%
Landscaping	$78,729	$113,034	–$34,305	–44%	–16%
Misc. (mobilization, etc.)	$64,356	$38,761	$25,595	40%	12%
Total	**$868,803**	**$651,548**	**$217,255**	—	—

* Negative values denote increased cost for the LID design over conventional development costs.

The avoided cost for stormwater infrastructure and reduced cost for site paving accounted for much of the overall cost savings. The nature of the design, which included extensive use of bioswales and vegetation, contributed to the increased cost for site preparation and landscaping. Several other SEA Street projects have been completed or are under way, and cost evaluations are expected to be favorable.

For this site, the environmental performance has been even more significant than the cost savings. Hydrologic monitoring of the project indicates a 99 percent reduction in total potential surface runoff, and runoff has not been recorded at the site since December 2002, a period that included the highest-ever 24-hour recorded rainfall at Seattle-Tacoma Airport.[16] The site is retaining more than the original design estimate of 0.75 inch of rain. A modeling analysis indicates that if a conventional curb-and-gutter system had been installed along 2nd Avenue instead of the SEA Street design, 98 times more stormwater would have been discharged from the site.[17]

Auburn Hills Subdivision, Southwestern Wisconsin

Auburn Hills in southwestern Wisconsin is a residential subdivision developed with conservation design principles. Forty percent of the site is preserved as open space; this open space includes wetlands, green space and natural plantings, and walking trails. The subdivision was designed to include open swales and bioretention for stormwater management. To determine potential savings from using conservation design, the site construction costs were compared with the estimated cost of building the site as a conventional subdivision.[18] Reduced stormwater management costs accounted for approximately 56 percent of the total cost savings. A cost comparison is provided in Table 4. Other savings not shown in Table 4 were realized as a result of reduced sanitary sewer, water distribution, and utility construction costs.

Table 4. Cost Comparison for Auburn Hills Subdivision [19]

Item	Conventional Development Cost	Auburn Hills LID Cost	Cost Savings*	Percent Savings*	Percent of Total Savings*
Site preparation	$699,250	$533,250	$166,000	24%	22%
Stormwater management	$664,276	$241,497	$422,779	64%	56%
Site paving and sidewalks	$771,859	$584,242	$187,617	24%	25%
Landscaping	$225,000	$240,000	–$15,000	-7%	-2%
Total	$2,360,385	$1,598,989	$761,396	—	—

* Negative values denote increased cost for the LID design over conventional development costs.

The clustered design used in the development protected open space and reduced clearing and grading costs. Costs for paving and sidewalks were also decreased because the cluster design reduced street length and width. Stormwater savings were realized primarily through the use of vegetated swales and bioswales. These LID practices provided stormwater conveyance and treatment and also lowered the cost of conventional stormwater infrastructure. The increase in landscaping costs resulted from additional open space present on-site compared to a conventional design, as well as increased street sweeping. Overall, the subdivision's conservation design retained more natural open space for the benefit and use of the homeowners and aided stormwater management by preserving some of the site's natural hydrology.[20]

Bellingham, Washington, Parking Lot Retrofits

The City of Bellingham, Washington, retrofitted two parking lots—one at City Hall and the other at Bloedel Donovan Park—with rain gardens in lieu of installing underground vaults to manage stormwater.[21] At City Hall, 3 parking spaces out of a total of 60 were used for the rain garden installation. The Bloedel Donovan Park retrofit involved converting to a rain garden a 550-square-foot area near a catch basin. Both installations required excavation, geotextile fabric, drain rock, soil amendments, and native plants. Flows were directed to the rain gardens by curbs. An overflow system was installed to accommodate higher flows during heavy rains.

The City compared actual rain garden costs to estimates for conventional underground vaults based on construction costs for similar projects in the area ($12.00 per cubic foot of storage). Rain garden costs included labor, vehicle use/rental, and materials. Table 5 shows that the City Hall rain garden saved the City $22,000, or 80 percent, over the underground vault option; the Bloedel Donovan Park installation saved $40,000, or 76 percent.

Table 5. Cost Comparison for Bellingham's Parking Lot Rain Garden Retrofits[22]

Project	Conventional Vault Cost	Rain Garden Cost	Cost Savings	Percent Savings
City Hall	$27,600	$5,600	$22,000	80%
Bloedel Donovan Park	$52,800	$12,800	$40,000	76%

CENTRAL PARK COMMERCIAL REDESIGNS, FREDERICKSBURG, VA (A MODELING STUDY)

The Friends of the Rappahannock undertook a cost analysis involving the redesign of site plans for several stores in a large commercial development in the Fredericksburg, Virginia, area called Central Park.[23,24] Table 6 contains a side-by-side analysis of the cost additions and reductions for each site for scenarios where LID practices (bioretention areas and swales) were incorporated into the existing, traditional site designs. In five of the six examples, the costs for the LID redesigns were higher than those for the original designs, although they never exceeded $10,000, or 10 percent of the project. One example yielded a $5,694 savings. The fact that these projected costs for LID were comparable to the costs for traditional designs convinced the developer to begin incorporating LID practices into future design projects.[25]

Table 6. Site Information and Cost Additions/Reductions Using LID Versus Traditional Designs

Name	Total BMP Area (ft^2)	Total Impervious Area Treated (ft^2)	Percent of Impervious Area Treated	Cost Additions[a]	Cost Reductions[b]	Change in Cost After Redesign
Breezewood Station Alternative 1	4,800	64,165	98.4%	$36,696	$34,785	+ $1,911
Breezewood Station Alternative 2	3,500	38,775	59.5%	$24,449	$21,060	+ $3,389
Olive Garden	1,780	31,900	59.1%	$14,885	$11,065	+ $3,790
Kohl's, Best Buy, & Office Depot	14,400	354,238	56.3%	$89,433	$80,380	+ $9,053
First Virginia Bank	1,310	20,994	97.7%	$6,777	$1,148	+ $5,629
Chick-Fil-A[c]	1,326	28,908	82.2%	$6,846	$12,540	– $5,694

[a] Additional costs for curb, curb blocks, storm piping, inlets, underdrains, soil, mulch, and vegetation as a result of the redesign.
[b] Reduced cost for curb, storm piping, roof drain piping, and inlets as a result of the redesign.
[c] Cost reduction value includes the cost of a Stormceptor unit that is not needed as part of the redesign.

CROWN STREET, VANCOUVER, BRITISH COLUMBIA

In 1995 the Vancouver City Council adopted a Greenways program that is focused on introducing pedestrian-friendly green space into the City to connect trails, environmental areas, and urban space. As a part of this program, the City has adopted strategies to manage stormwater runoff from roadways. Two initiatives are discussed here.

The Crown Street redevelopment project, completed in 2005, retrofitted a 1,100-foot block of traditional curb-and-gutter street with a naturalized streetscape modeled after the Seattle SEA Street design. Several LID features were incorporated into the design. The total imperviousness of the street was decreased by reducing the street width from 28 feet to 21 feet with one-way sections of the road narrowed to 10 feet. Roadside swales that use vegetation and structural grass (grass supported by a grid and soil structure that prevents soil compaction and root damage) were installed to collect and treat stormwater through infiltration.[26]

Modeling predicts that the redesigned street will retain 90 percent of the annual rainfall volume on-site; the remaining 10 percent of runoff will be treated by the system of vegetated swales before discharging.[27,28] The City chose to use the LID design because stormwater runoff from Crown Street flows into the last two salmon-bearing creeks in Vancouver.[29] Monitoring until 2010 will assess the quality of stormwater runoff and compare it with both the modeling projections and the runoff from a nearby curb-and-gutter street.

The cost of construction for the Crown Street redevelopment was $707,000. Of this, $311,000 was attributed to the cost of consultant fees and aesthetic design features, which were included in the project because it was the first of its kind in Vancouver. These added costs would not be a part of future projects. Discounting the extra costs, the $396,000 construction cost is 9 percent higher than the estimated $364,000 conventional curb-and-gutter design cost.[30] The City has concluded that retrofitting streets that have an existing conventional stormwater system with naturalized designs will cost marginally more than making curb-and-gutter improvements, but installing naturalized street designs in new developments will be less expensive than installing conventional drainage systems.[31,32]

One goal of Vancouver's Greenways program is to make transportation corridors more pedestrian-friendly. A method used to achieve this goal is to extend curbs at intersections out into the street to lessen the crossing distance and improve the line of sight for pedestrians. When this initiative began, the City relocated stormwater catch basins that would have been enclosed within the extended curb. Now, at certain intersections, the City uses the new space behind the curb to install "infiltration bulges" to collect and infiltrate roadway runoff. The infiltration bulges are constructed of permeable soils and vegetation. (The City of Portland, Oregon, has installed similar systems, which they call "vegetated curb extensions.") The catch basins are left in place, and any stormwater that does not infiltrate into the soil overflows into the storm drain system.[33]

The infiltration bulges have resulted in savings for the City. Because the stormwater infiltration bulges are installed in conjunction with planned roadway improvements, the only additional costs associated with the stormwater project are the costs of a steel curb insert to allow stormwater to enter the bulge and additional soil excavation costs. These additional costs are more than offset by the $2,400 to $4,000 cost that would have been required to relocate the catch basins. To date, the City has installed nine infiltration bulges, three of which are maintained by local volunteers as part of a Green Streets program in which local residents adopt city green space.[34]

GAP CREEK SUBDIVISION, SHERWOOD, ARKANSAS

Gap Creek's original subdivision plan was revised to include LID concepts. The revised design increased open space from the originally planned 1.5 acres to 23.5 acres. Natural drainage areas were preserved and buffered by greenbelts. Traffic-calming circles were used, allowing the developer to reduce street widths from 36 to 27 feet. In addition, trees were kept close to the curb line. These design techniques allowed the development of 17 additional lots.

The lots sold for $3,000 more and cost $4,800 less to develop than comparable conventional lots. A cost comparison is provided in Table 7. For the entire development, the combination of cost savings and lot premiums resulted in an additional profit to the developer of $2.2 million.[35,36]

Table 7. Cost Comparison for Gap Creek Subdivision[37]

Total Cost of Conventional Design	Gap Creek LID Cost	Cost Savings	Percent Savings	Savings per Lot
$4,620,600	$3,942,100	$678,500	15%	$4,800

GARDEN VALLEY, PIERCE COUNTY, WASHINGTON (A MODELING STUDY)

The Garden Valley subdivision is a 9.7-acre site in Pierce County, Washington. A large wetland on the eastern portion of the site and a 100-foot buffer account for 43 percent of the site area. Designers evaluated a scenario in which roadway widths were reduced and conventional stormwater management practices were replaced with swales, bioretention, and soil amendments. The use of these LID elements would have allowed the cost for stormwater management on the site to be reduced by 72 percent. A cost comparison is provided in Table 8.[38] Other costs expected with the LID design were a $900 initial cost for homeowner education with $170 required annually thereafter. Annual maintenance costs for the LID design (not included above) were expected to be $600 more than those for the conventional design, but a $3,000 annual savings in the stormwater utility bill was expected to more than offset higher maintenance costs.

Table 8. Cost Comparison for Garden Valley Subdivision[39]

Item	Conventional Development Cost	Garden Valley LID Cost	Cost Savings*	Percent Savings*
Stormwater management	$214,000	$59,800	$154,200	72%
Site paving	$110,400	$200,900	–$90,500	–82%
Total	$324,400	$260,700	$63,700	—

* Negative values denote increased cost for the LID design over conventional development costs.

The design incorporated the use of narrower roadways coupled with Grasscrete parking along the roadside, which increased the overall site paving costs. However, this added cost was more than offset by the savings realized by employing LID for stormwater management. The LID practices were expected to increase infiltration and reduce stormwater discharge rates, which can improve the health and quality of receiving streams.

Kensington Estates, Pierce County, Washington (A Modeling Study)

A study was undertaken to evaluate the use of LID techniques at the Kensington Estates subdivision, a proposed 24-acre development consisting of single-family homes on 103 lots. The study assumed that conventional stormwater management practices would be replaced entirely by LID techniques, including reduced imperviousness, soil amendments, and bioretention areas. The design dictated that directly connected impervious areas on-site were to be minimized. Three wetlands and an open space tract would treat stormwater discharging from LID installations. Open space buffers were included in the design. The LID proposal also included rooftop rainwater collection systems on each house.[40,41]

The proposed LID design reduced effective impervious area from 30 percent in the conventional design to approximately 7 percent, and it was approximately twice as expensive as the traditional design. A cost comparison is provided in Table 9.

Table 9. Cost Comparison for Kensington Estates Subdivision[42]

Item	Conventional Development Cost	Kensington Estate LID Cost	Additional Cost
Stormwater management	$243,400	$925,400	$ 682,000
Site paving	$522,300	$577,500	$55,200
Total	$765,700	$1,502,900	$737,200

Although the study assumed that roadways in the LID design would be narrower than those in the conventional design, site paving costs increased because the LID design assumed that Grasscrete parking would be included along the roadside to allow infiltration. The use of Grasscrete increased the overall site paving costs.

The avoidance of conventional stormwater infrastructure with the use of LID afforded significant cost savings. The LID measures eliminated the need for a detention pond and made more lots available for development. The significant cost for the rooftop rainwater collection systems was assumed to be offset somewhat by savings on stormwater utility bills.[43]

The study also anticipated that the use of LID would reduce stormwater peak flow discharge rates and soil erosion. Furthermore, greater on-site infiltration increases ground water recharge, resulting in increased natural baseflows in streams and a reduction in dry channels. Proposed clustering of buildings would allow wetlands and open space to be preserved and create a more walkable community. The reduced road widths were anticipated to decrease traffic speeds and accident rates.

Laurel Springs Subdivision, Jackson, Wisconsin

The Laurel Springs subdivision in Jackson, Wisconsin, is a residential subdivision that was developed as a conservation design community. The use of cluster design helped to preserve open space and minimize grading and paving. The use of bioretention and vegetated swales lowered the costs for stormwater management.

The costs of using conservation design to develop the subdivision were compared with the estimated cost of developing the site with conventional practices (Table 10).[44] The total savings realized with conservation design were just over $504,469, or approximately 30 percent of the estimated conventional construction cost. Savings from stormwater management accounted for 60 percent of the total cost savings. Other project savings were realized with reduced sanitary sewer, water distribution, and utility construction costs.

Table 10. Cost Comparison for Laurel Springs Subdivision[45]

Item	Conventional Development Cost	Laurel Springs LID Cost	Cost Savings	Percent Savings	Percent of Total Savings
Site preparation	$441,600	$342,000	$99,600	23%	20%
Stormwater management	$439,956	$136,797	$303,159	69%	60%
Site paving and sidewalks	$607,465	$515,755	$91,710	15%	18%
Landscaping	$165,000	$155,000	$10,000	6%	2%
Total	$1,654,021	$1,149,552	$504,469	—	—

In addition to preserving open space and reducing the overall amount of clearing and grading, the cluster design also reduced street lengths and widths, thereby lowering costs for paving and sidewalks. Vegetated swales and bioswales largely were used to replace conventional stormwater infrastructure and led to significant savings. Each of these factors helped to contribute to a more hydrologically functional site that reduced the total amount of stormwater volume and managed stormwater through natural processes.

MILL CREEK SUBDIVISION, KANE COUNTY, ILLINOIS

The Mill Creek subdivision is a 1,500-acre, mixed-use community built as a conservation design development. Approximately 40 percent of the site is identified as open space; adjacent land use is mostly agricultural. The subdivision was built using cluster development. It uses open swales for stormwater conveyance and treatment, and it has a lower percentage of impervious surface than conventional developments. An economic analysis compared the development cost for 40 acres of Mill Creek with the development costs of 30 acres of a conventional development with similar building density and location.[46]

When compared with the conventional development, the conservation site design techniques used at Mill Creek saved approximately $3,411 per lot. Nearly 70 percent of these savings resulted from reduced costs for stormwater management, and 28 percent of the savings were found in reduced costs for site preparation. A cost comparison is provided in Table 11. Other savings not included in the table were realized with reduced construction costs for sanitary sewers and water distribution.

Table 11. Cost Comparison for Mill Creek Subdivision[47]

Item	Conventional Development Cost per Lot	Mill Creek LID Cost per Lot	Cost Savings per Lot	Percent Savings per Lot	Percent of Total Savings
Site preparation	$2,045	$1,086	$959	47%	28%
Stormwater management	$4,535	$2,204	$2,331	51%	68%
Site paving and sidewalks	$5,930	$5,809	$121	2%	4%
Total	$12,510	$9,099	$3,411	—	—

The use of cluster development and open space preservation on the site decreased site preparation costs. The majority of the cost savings were achieved by avoiding the removal and stockpiling of topsoil. In addition to cost savings from avoided soil disturbance, leaving soils intact also retains the hydrologic function of the soils and aids site stormwater management by reducing runoff volumes and improving water quality. The site's clustered design was also responsible for a decrease in costs for paving and sidewalks because the designers intentionally aimed to decrease total road length and width.

The designers used open swales as the primary means for stormwater conveyance. Coupled with other site techniques to reduce runoff volumes and discharge rates, significant savings in stormwater construction were avoided because of reduced storm sewer installation; sump pump connections; trench backfill; and catch basin, inlet, and cleanout installation.

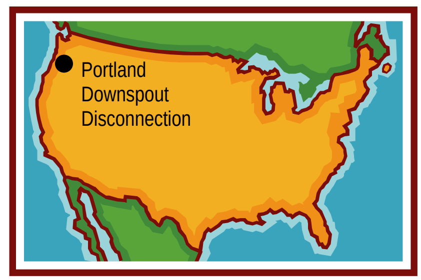
In addition to the cost savings, the conservation design at Mill Creek had a positive effect on property values: lots adjacent to walking/biking trails include a $3,000 premium, and lots adjacent to or with views of open space include a $10,000 to $17,500 premium. The

600 acres of open space on the site include 127 acres of forest preserve with quality wetlands, 195 acres of public parks, and 15 miles of walking/biking trails.[48]

POPLAR STREET APARTMENTS, ABERDEEN, NORTH CAROLINA

The use of bioretention, topographical depressions, grass channels, swales, and stormwater basins at the 270-unit Poplar Street Apartment complex improved stormwater treatment and lowered construction costs. The design allowed almost all conventional underground storm drains to be eliminated from the design. The design features created longer flow paths, reduced runoff volume, and filtered pollutants from runoff. According to the U.S. Department of Housing and Urban Development, use of LID techniques resulted in a $175,000 savings (72 percent).[49]

PORTLAND DOWNSPOUT DISCONNECTION PROGRAM, PORTLAND, OREGON

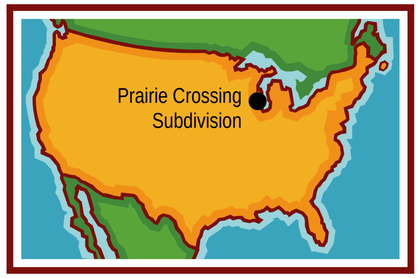


The City of Portland, Oregon, implemented a Downspout Disconnection Program as part of its CSO elimination program. Every year, billions of gallons of stormwater mixed with sewage pour into the Willamette River and Columbia Slough through CSOs. When roof runoff flows into Portland's combined sewer system, it contributes to CSOs. The City has reduced the frequency of CSOs to the Columbia Slough and hopes to eliminate 94 percent of the overflows to the Willamette River by 2011.[50]

The Downspout Disconnection Program gives homeowners, neighborhood associations, and community groups the chance to work as partners with the Bureau of Environmental Services and the Office of Neighborhood Involvement to help reduce CSOs. Residents of selected neighborhoods disconnect their downspouts from the combined sewer system and allow their roof water to drain to gardens and lawns. Residents can do the work themselves and earn $53 per downspout, or they can have community groups and local contractors disconnect for them. Community groups earn $13 for each downspout they disconnect. (Materials are provided by the City.)

More than 44,000 homeowners have disconnected their downspouts, removing more than 1 billion gallons of stormwater per year from the combined sewer system. The City estimates that removing the 1 billion gallons will result in a $250 million reduction in construction costs for an underground pipe to store CSOs by reducing the capacity needed to handle the flows. The City has spent $8.5 million so far to implement this program and will continue to encourage more homeowners and businesses to disconnect their downspouts to achieve additional CSO and water quality benefits.

PRAIRIE CROSSING SUBDIVISION, GRAYSLAKE, ILLINOIS



The Prairie Crossing subdivision is a conservation development on 678 acres, of which 470 acres is open space. The site was developed as a mixed-use community with 362 residential units and 73 acres of commercial property, along with schools, a community center, biking trails, a lakefront beach, and a farm. The site uses bioretention cells and vegetated swales to manage stormwater.[51]

A cost analysis was performed to compare the actual construction costs of Prairie Crossing with the estimated costs of a conventional design on the site with the same layout. Cost savings with conservation design were realized primarily in four areas: stormwater management, curb and gutter installation, site paving, and sidewalk installation. The total savings were estimated to be almost $1.4 million, or nearly $4,000 per lot (Table 12). Savings from stormwater management accounted for approximately 15 percent of the total savings. The cost savings shown are relative to the estimated construction cost for the items in a conventional site design based on local codes and standards.

Table 12. Cost Comparison for Prairie Crossing Subdivision[52]

Item	Cost Savings	Percent Savings
Reduced Road Width	$178,000	13%
Stormwater Management	$210,000	15%
Decreased Sidewalks	$648,000	47%
Reduced Curb and Gutter	$339,000	25%
Total	$1,375,000	—

Reduced costs for sidewalks accounted for nearly half of the total cost savings. This savings is attributed in part to the use of alternative materials rather than concrete for walkways in some locations. In addition, the design and layout of the site, which retained a very high percentage of open space, contributed to the cost savings realized from reducing paving, the length and number of sidewalks, and curbs and gutters. The use of alternative street edges, vegetated swales, and bioretention and the preservation of natural areas all reduced the need for and cost of conventional stormwater infrastructure.[53] Benefits are associated with the mixed-use aspect of the development as well: residents can easily access schools, commercial areas, recreation, and other amenities with minimal travel. Proximity to these resources can reduce traffic congestion and transportation costs. Also, mixed-use developments can foster a greater sense of community and belonging than other types of development. All of these factors tend to improve quality of life.

PRAIRIE GLEN SUBDIVISION, GERMANTOWN, WISCONSIN

The Prairie Glen subdivision is nationally recognized for its conservation design approach. A significant portion of the site (59 percent) was preserved as open space. Wetlands were constructed to manage stormwater runoff, and the open space allowed the reintroduction of native plants and wildlife habitat. The site layout incorporated hiking trails, which were designed to allow the residents to have easy access to natural areas.[54]

To evaluate the cost benefits of Prairie Glen's design, the actual construction costs were compared with the estimated costs of developing the site conventionally. When compared with conventional design, the conservation design at Prairie Glen resulted in a savings of nearly $600,000. Savings for stormwater management accounted for 25 percent of the total savings. Table 13 provides a cost comparison. Other savings not included in the table were realized with reduced sanitary sewer, water distribution, and utility construction costs.

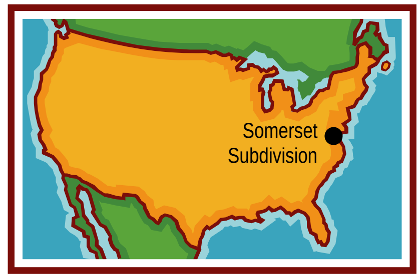
Table 13. Cost Comparison for Prairie Glen Subdivision[55]

Item	Conventional Development Cost	Prairie Glen LID Cost	Cost Savings*	Percent Savings*	Percent of Total Savings*
Site preparation	$277,043	$188,785	$88,258	32%	22%
Stormwater management	$215,158	$114,364	$100,794	47%	25%
Site paving and sidewalks	$462,547	$242,707	$219,840	48%	54%
Landscaping	$50,100	$53,680	–$3,580	–7%	–1%
Total	$1,004,848	$599,536	$405,312	—	—

* Negative values denote increased cost for the LID design over conventional development costs.

The cluster design and preservation of a high percentage of open space resulted in a significant reduction in costs for paving and sidewalks. These reduced costs accounted for 54 percent of the cost savings for the overall site. Reduced costs for soil excavation and stockpiling were also realized. The use of open-channel drainage and bioretention minimized the need for conventional stormwater infrastructure and accounted for the bulk of the savings in stormwater management. Landscaping costs increased due to the added amount of open space on the site.

SOMERSET SUBDIVISION, PRINCE GEORGE'S COUNTY, MARYLAND



The Somerset subdivision, outside Washington, D.C., is an 80-acre site consisting of nearly 200 homes. Approximately half of the development was built using LID techniques; the other half was conventionally built using curb-and-gutter design with detention ponds for stormwater management. Bioretention cells and vegetated swales were used in the LID portion of the site to replace conventional stormwater infrastructure. Sidewalks were also eliminated from the design. To address parking concerns, some compromises were made: because of local transportation department concern that roadside parking would damage the swales, roads were widened by 10 feet.[56] (Note that there are alternative strategies to avoid increasing impervious surface to accommodate parking, such as installing porous pavement parking lanes next to travel lanes.)

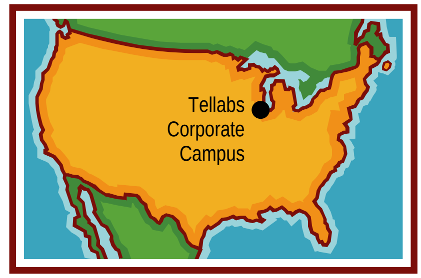
Most of the 0.25-acre lots have a 300- to 400-square-foot bioretention cell, also called a rain garden. The cost to install each cell was approximately $500—$150 for excavation and $350 for plants. The total cost of bioretention cell installation in the LID portion of the site was $100,000 (swale construction was an additional cost). The construction cost for the detention pond in the conventionally designed portion of the site was $400,000, excluding curbs, gutters, and sidewalks.[57,58] By eliminating the need for a stormwater pond, six additional lots could be included in the LID design. A comparison of the overall costs for the traditional and LID portions of the site is shown in Table 14.

Table 14. Cost Comparison for Somerset Subdivision

Conventional Development Cost	Somerset LID Cost	Cost Savings	Percent Savings	Savings per Lot
$2,456,843	$1,671,461	$785,382	32%	$4,000

In terms of environmental performance, the LID portion of the subdivision performed better than the conventional portion.[59] A paired watershed study compared the runoff between the two portions of the site, and monitoring indicated that the average annual runoff volume from the LID watershed was approximately 20 percent less than that from the conventional watershed. The number of runoff-producing rain events in the LID watershed also decreased by 20 percent. Concentrations of copper were 36 percent lower; lead, 21 percent lower; and zinc, 37 percent lower in LID watershed runoff than in conventional watershed runoff. The homeowners' response to the bioretention cells was positive; many perceived the management practices as a free landscaped area.

TELLABS CORPORATE CAMPUS, NAPERVILLE, ILLINOIS



The Tellabs corporate campus is a 55-acre site with more than 330,000 square feet of office space. After reviewing preliminary planning materials that compared the costs of conventional and conservation design, the company chose to develop the site with conservation design approaches. Because the planning process included estimating costs for the two development approaches, this particular site provides good information on commercial/industrial use of LID.[60]

Development of the site included preserving trees and some of the site's natural features and topography. For stormwater management, the site uses bioswales, as well as other infiltration techniques, in parking lots and other locations. The use of LID techniques for stormwater management accounted for 14 percent of the total cost savings for the project. A cost comparison is provided in Table 15. Other cost savings not shown in Table 15 were realized with reduced construction contingency costs, although design contingency costs were higher.

Table 15. Cost Comparison for Tellabs Corporate Campus[61]

Item	Conventional Development Cost	Tellabs LID Cost	Cost Savings	Percent Savings	Percent of Total Savings
Site preparation	$2,178,500	$1,966,000	$212,500	10%	46%
Stormwater management	$480,910	$418,000	$62,910	13%	14%
Landscape development	$502,750	$316,650	$186,100	37%	40%
Total	$3,162,160	$2,700,650	$461,510	—	—

Savings in site preparation and landscaping had the greatest impact on costs. Because natural drainage pathways and topography were maintained to the greatest extent possible, grading and earthwork were minimized; 6 fewer acres were disturbed using the conservation design approach. Landscaping at the site maximized natural areas and restored native prairies and wetland areas. The naturalized landscape eliminated the need for irrigation systems and lowered maintenance costs when compared to turf grass, which requires mowing and regular care. In the end, the conservation approach preserved trees and open space and provided a half acre of wetland mitigation. The bioswales used for stormwater management complemented the naturalized areas and allowed the site to function as a whole; engineered stormwater techniques augmented the benefits of the native areas and wetlands.[62]

TORONTO GREEN ROOFS, TORONTO, ONTARIO (A MODELING STUDY)

Toronto is home to more than 100 green roofs. To evaluate the benefits of greatly expanded use of green roofs in the city, a study was conducted using a geographic information system to model the effects of installing green roofs on all flat roofs larger than 3,750 square feet. (The model assumed that each green roof would cover at least 75 percent of the roof area.) If the modeling scenario were implemented, 12,000 acres of green roofs (8 percent of the City's land area) would be installed.[63] The study quantified five primary benefits from introducing the green roofs: (1) reduced stormwater flows into the separate storm sewer system, (2) reduced stormwater flows into the combined sewer system, (3) improved air quality, (4) mitigation of urban heat island effects, and (5) reduced energy consumption.[64]

The study predicted economic benefits of nearly $270 million in municipal capital cost savings and more than $30 million in annual savings. Of the total savings, more than $100 million was attributed to stormwater capital cost savings, $40 million to CSO capital cost savings, and nearly $650,000 to CSO annual cost savings. The cost of installing the green roofs would be largely borne by private building owners and developers; the cost to Toronto would consist of the cost of promoting and overseeing the program and would be minimal. Costs for green roof installations in Canada have averaged $6 to $7 per square foot. The smallest green roof included in the study, at 3,750 square feet, would cost between $22,000 and $27,000. The total cost to install 12,000 acres of green roofs would be $3 billion to $3.7 billion.[65,66] Although the modeled total costs exceed the monetized benefits, the costs would be spread across numerous private entities.

CONCLUSION

The 17 case studies presented in this report show that LID practices can reduce project costs and improve environmental performance. In most cases, the case studies indicate that the use of LID practices can be both fiscally and environmentally beneficial to communities. As with almost all such projects, site-specific factors influence project outcomes, but in general, for projects where open space was preserved and cluster development designs were employed, infrastructure costs were lower. In some cases, initial costs might be higher because of the cost of green roofs, increased site preparation costs, or more expensive landscaping practices and plant species. However, in the vast majority of cases, significant savings were realized during the development and construction phases of the projects due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping. Total capital cost savings ranged from 15 to 80 percent when LID methods were used, with a few exceptions in which LID project costs were higher than conventional stormwater management costs.

EPA has identified several additional areas that will require further study. First, in all the cases, there were benefits that this study did not monetize and factor into the project's bottom line. These benefits include improved aesthetics, expanded recreational opportunities, increased property values due to the desirability of the lots and their proximity to open space, increased number of total units developed, the value of increased marketing potential, and faster sales.

Second, more research is also needed to quantify the environmental benefits that can be achieved through the use of LID techniques and the costs that can be avoided by using these practices. For example, substantial downstream benefits can be realized through the reduction of the peak flows, discharge volumes, and pollutant loadings discharged from the site. Downstream benefits also might include reductions in flooding and channel degradation, costs for water quality improvements, costs of habitat restoration, costs of providing CSO abatement, property damage, drinking water treatment costs, costs of maintaining/dredging navigable waterways, and administrative costs for public outreach and involvement.

Finally, additional research is needed monetize the cost reductions that can be achieved through improved environmental performance, reductions in long-term operation and maintenance costs and/or reductions in the life cycle costs of replacing or rehabilitating infrastructure.

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INITIAL INVESTIGATION OF THE FEASIBILITY AND BENEFITS OF LOW-IMPACT SITE DESIGN PRACTICES ("LID") FOR THE SAN FRANCISCO BAY AREA

Richard R. Horner[†]

ABSTRACT

The Clean Water Act NPDES permit that regulates municipal separate storm sewer systems (MS4s) in the San Francisco Bay Area, California will be reissued in 2007. The draft permit includes general provisions related to low impact development practices (LID) for certain kinds of development and redevelopment projects. Using six representative development project case studies, based on California building records, the author investigated the practicability and relative benefits of LID options for the majority of the region having soils potentially suitable for infiltration either in their natural state or after amendment using well recognized LID techniques. The results showed that (1) LID site design and source control techniques are more effective than conventional best management practices (BMPs) in reducing runoff rates; and (2) in each of the case studies, LID methods would reduce site runoff volume and pollutant loading to zero in typical rainfall scenarios.

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INTRODUCTION

The Assessment in Relation to Municipal Permit Conditions

This purpose of this study is to investigate the relative water quality and water reuse benefits of three levels of storm water treatment best management practices (BMPs): (1) basic "treat-and-release" BMPs (e.g., drain inlet filters, CDS units), (2) commonly used BMPs that expose runoff to soils and vegetation (extended-detention basins and biofiltration swales and filter strips), and (3) low impact development (LID) practices. The factors considered in the investigation are runoff volume, pollutant loading, and the availability of water for infiltration or other reuse. In order to assess the differential impact of storm water reduction approaches on these factors, this study examines six case studies typical of development covered by the proposed Municipal Regional Urban Runoff Phase I NPDES Stormwater Permit (MRP).

This report covers locations in the Bay Area most amenable to soil infiltration of stormwater runoff, those areas having soils in Natural Resources Conservation Service (NRCS) Hydrologic Soil Groups A, B, or C as classified by the Natural Resources Conservation Service (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx). Depending on site-specific conditions, A and B soils would generally effectively infiltrate water without modification, whereas C soils could require organic amendments according to now standard LID methods. This report does not cover locations with group D soils, which are generally not amenable to infiltration, again depending on the specific conditions on-site. A subsequent report will examine options in these locations, which include other LID techniques (e.g., roof runoff harvesting for irrigation or gray water supply) and state-of-the-art conventional stormwater management practices. A minority but still substantial fraction of the Bay Area has group D soils (39.3, 68.0, 18.3, and 50.1 percent of the mapped areas of Alameda, Contra Costa, San Mateo, and Santa Clara Counties, respectively). Regarding any mapped soil type, it is important to keep in mind that soils vary considerably within small distances. Characteristics at specific locations can deviate greatly from those of the major mapped unit, making infiltration potential either more or less than may be expected from the mapping.

Low impact development methods reduce storm runoff and its contaminants by decreasing their generation at sources, infiltrating into the soil or evaporating storm flows before they can enter surface receiving waters, and treating flow remaining on the surface through contact with vegetation and soil, or a combination of these strategies. Soil-based LID practices often use soil enhancements such as compost, and thus improve upon the performance of more traditional basins and biofilters. The study encompassed vegetated swales (channels for conveyance at some depth and velocity), vegetated filter strips (surfaces for conveyance in thin sheet flow), and bioretention areas (shallow basins with a range of vegetation types in which runoff infiltrates through soil either to groundwater or a subdrain for eventual surface discharge). Application of these practices in a low impact site design mode requires either determination that existing site soils can support runoff reduction through infiltration or that soils will be amended using accepted LID techniques to attain this objective. Finally, the study further broadened implementation options to include water harvesting (collection and storage for use in, for example, irrigation or gray water systems), roof downspout infiltration trenches, and porous pavements.

The investigation also considered whether typical development patterns and local conditions in the Bay Area would enable LID implementation as required by a new standard proposed for the 2007 Ventura County Municipal Storm Water Permit. This standard requires management of effective impervious area (EIA), limiting it to 5%, as well as other impervious area (what might be termed Not-Connected Impervious Area, NCIA), and pervious areas.

Where treatment control BMPs are required to manage runoff from a site, Volume or Flow Hydraulic Design Bases commonly used in California were assumed to apply. The former basis applies to storage-type BMPs, like ponds, and requires capturing and treating either the runoff volume from the 85th percentile, 24-hour rainfall event for the location or the volume of annual runoff to achieve 80 percent or more volume treatment. The calculations in this analysis used the 85th percentile 24-hour rainfall event basis. The Flow basis applies to flow-through BMPs, like swales, and requires treating the runoff flow rate produced from a rain event equal to at least 0.2 inches per hour intensity (or one of two other approximately equivalent options).

Scope of the Assessment

With respect to each of the six development case studies, three assessments were undertaken: a baseline scenario incorporating no stormwater management controls; a second scenario employing conventional BMPs; and a third development scenario employing LID stormwater management strategies.

To establish a baseline for each case study, annual stormwater runoff volumes were estimated, as well as concentrations and mass loadings of four pollutants: (1) total suspended solids (TSS), (2) total recoverable copper (TCu), (3) total recoverable zinc (TZn), and (4) total phosphorus (TP). These baseline estimates were based on the anticipated land use and cover with no stormwater management efforts.

Two sets of calculations were then conducted using the parameters defined for the six case studies. The first group of calculations estimated the extent to which basic BMPs reduce runoff volumes and pollutant concentrations and loadings, and what impact, if any, such BMPs have on recharge rates or water retention on-site.

The second group of calculations estimated the extent to which commonly used soil-based BMPs and LID site design strategies ameliorate runoff volumes and pollutant concentrations and loadings, and the effect such techniques have on recharge rates. When evaluating LID strategies in the context of the EIA concept employed in the draft Ventura County MS4 permit, it was presumed that EIA would be limited to three percent. It was also assumed that pervious surfaces on a site receiving runoff from other areas on the site would be sized and prepared to manage (through infiltration or storage) the volume directed there in addition to precipitation falling directly on those areas. The assessment of basins, biofiltration, and low impact design practices analyzed the expected infiltration capacity of the case study sites. It also considered related LID techniques and practices, such as source reduction strategies, that could work in concert with infiltration to serve the goals of: (1) preventing increase in annual runoff volume from the pre- to the post-developed state, (2) preventing increase in annual pollutant mass loadings between the two development states, and (3) avoiding exceedances of the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) criteria for copper and zinc.

The results of this analysis show that:

- A full-range of typical development categories common in the Bay Area, from single family residential to restaurants, housing developments, and commercial uses like office buildings, can feasibly implement standard LID techniques to achieve no stormwater discharge during rain events equal to, and in some cases greater than, design storm conditions. This conclusion is based on an analysis that used actual building records in California and annual rainfall records in two rainfall zones in the Bay Area to show that site conditions support this level of performance. In addition, site conditions typical at a wide range of development projects are more than sufficient to attain compliance with a three percent EIA limit, as is being contemplated in other MS4 re-issuance proceedings in California presently.

- Developments implementing no post-construction BMPs result in storm water runoff volume and pollutant loading that are substantially increased, and recharge rates that are substantially decreased, compared to pre-development conditions.

- Developments implementing basic post-construction treatment BMPs achieve reduced pollutant loading compared to developments with no BMPs, but stormwater runoff volume and recharge rates are similar to developments with no BMPs.

- Developments implementing traditional basins and biofilters, and even more so low impact post-construction BMPs, achieve significant reduction of pollutant loading and runoff volume as well as greatly enhanced recharge rates compared to both developments with no BMPs and developments with basic treatment BMPs.

This report covers the methods employed in the investigation, data sources, and references for both. It then presents the results, discusses their consequences, draws conclusions, and makes recommendations relative to the feasibility of utilizing low-impact development practices in Bay Area developments.

CASE STUDIES

Six case studies were selected to represent a range of urban development types considered to be representative of the Bay Area. These case studies involved: a multi-family residential complex (MFR), a relatively small-scale (23 homes) single-family residential development (Sm-SFR), a restaurant (REST), an office building (OFF), a relatively large (1000 homes) single-family residential development (Lg-SFR), and a single home (SINGLE).[1]

Parking spaces were estimated to be 176 sq ft in area, which corresponds to 8 ft width by 22 ft length dimensions. Code requirements vary by jurisdiction, with the tendency now to drop below the traditional 200 sq ft average. About 180 sq ft is common, but various standards for full- and compact-car spaces, and for the mix of the two, can raise or lower the average.[2] The 176 sq ft size is considered to be a reasonable value for conventional practice.

Roadways and walkways assume a wide variety of patterns. Exclusive of the two SFR cases, simple, square parking lots with roadways around the four sides and square buildings with walkways also around the four sides were assumed. Roadways and walkways were taken to be 20 ft and 6 ft wide, respectively.

Single-family residences were assumed each to have a driveway 20 ft wide and 30 ft long. It was further assumed that each would have a sidewalk along the front of the lot, which was calculated to be 5749 sq ft in area. Assuming a square lot, the front dimension would be 76 ft. A 40-ft walkway was included within the property. Sidewalks and walkways were taken to be 4 ft wide. For each case study the total area for all of these impervious features was subtracted from the total site area to estimate the pervious area, which was assumed to have conventional landscaping cover (grass, small herbaceous decorative plants, bushes, and a few trees).

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[1] Building permit records from the City of San Marcos in San Diego County provided data on total site areas for the first four case studies, including numbers of buildings, building footprint areas (including porch and garage for Sm-SFR), and numbers of parking spaces associated with the development projects. While the building permit records made no reference to features such as roadways, walkways, and landscaping normally associated with development projects, these features were taken into account in the case studies using assumptions described herein. Larger developments and redevelopment were not represented in the sampling of building permits from the San Marcos database. To take these types of projects into account in the subsequent analysis, the Lg-SFR scenario scaled up all land use estimates from the Sm-SFR case in the ratio of 1000:23. The single home case (SINGLE) was derived from Bay Area records obtained at http://www.ppic.org/content/other/706EHEP_web_only_appendix.pdf, which showed 8000 ft^2 as a rough average for a single home lot in the region. As with the other cases, these hypothetical developments were assumed to have roadways, walkways, and landscaping, as described herein.

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Table 1 summarizes the characteristics of the six case studies. The table also provides the recorded or estimated areas in each land use and cover type.

Table 1. Case Study Characteristics and Land Use and Land Cover Areas

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
No. buildings	11	23	1	1	1000	1
Total area (ft^2)	476,982	132,227	33,669	92,612	5,749,000	8,000
Roof area (ft^2)	184,338	34,949	3,220	7,500	1,519,522	2114
No. parking spaces	438	-	33	37	-	-
Parking area (ft^2)	77,088	-	5808	6512	-	-
Access road area (ft^2)	22,212	-	6097	6456	-	-
Walkway area (ft^2)	33,960	10,656	1362	2078	463,289	518
Driveway area (ft^2)	-	13,800	-	-	600,000	835
Landscape area (ft^2)	159,384	72,822	17,182	70,066	3,166,190	4533

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single-family home

METHODS OF ANALYSIS

Annual Stormwater Runoff Volumes

Annual surface runoff volumes produced were estimated for both pre- and post-development conditions for each case study site. Runoff volume was computed as the product of annual precipitation, contributing drainage area, and a runoff coefficient (ratio of runoff produced to rainfall received). For impervious areas the following equation was used:

$$C = (0.009)\, I + 0.05$$

where I is the impervious percentage. This equation was derived by Schueler (1987) from Nationwide Urban Runoff Program data (U.S. Environmental Protection Agency 1983). With I = 100 percent for fully impervious surfaces, C is 0.95.

The basis for pervious area runoff coefficients was the Natural Resource Conservation Service's (NRCS) Urban Hydrology for Small Watersheds (NRCS 1986, as revised from the original 1975 edition). This model estimates storm event runoff as a function of precipitation and a variable representing land cover and soil, termed the curve number (CN). Larger events are forecast to produce a greater amount of runoff in relation to amount of rainfall because they more fully saturate the soil. Therefore, use of the model to estimate annual runoff requires selecting some event or group of events to represent the year. The 85th percentile, 24-hour rainfall event was used in the analysis here for the relative comparison between pre- and post-development and applied to deriving a runoff coefficient for annual estimates, recognizing that smaller storms would produce less and larger storms more runoff.

A memorandum titled Rainfall Data Analysis and Guidance for Sizing Treatment BMPs (http://www.cccleanwater.org/construction/Publications/CCCWPBasinSizingMemoFINAL_4-20-05.pdf) prepared for the Contra Costa Clean Water Program demonstrated a linear relationship between unit basin storage volume for 80 percent capture (which is related to the 85th percentile event) and mean annual precipitation. Rainfall for Bay Area 85th percentile, 24-hour events could thus be determined from locations where events have been established in direct proportion to mean annual rainfall.

In order to obtain appropriate regional estimates of annual precipitation, rainfall records were obtained from a number of sites in the four counties, plus the city of Vallejo, covered by the permit.[3] The mean annual range is from 13.73 to 24.30 inches, with quantities close to either 14 or 20 inches predominating. The study was performed for both of these rainfall totals. These figures were used in conjunction with 85th percentile, 24-hour event amounts of 0.75 for Los Angeles and 0.92 for Santa Rosa (http://ci.santa-rosa.ca.us/pworks/other/SW/SRSWManualFinalDraft.pdf), respectively, and mean annual totals of 12 and 31 inches for the respective cities to estimate 85 percentile, 24-hour event quantities of 0.77 and 0.82 inch for the 14 and 20-inch Bay Area rainfall zones, respectively.

Pre- and post-development runoff quantities were computed with selected CN values and the 0.77- and 0.82-inch rainfalls. The CN choices based on tabulated data in NRCS (1986) and professional judgment were 83 before development and 86 after land modification. Estimate runoff amounts were then divided by the rainfall totals to obtain runoff coefficients. The results were about the same for the two rainfall zones at 0.07 and 0.12 before and after development, respectively. Finally, total annual runoff volumes were estimated based on the two average annual precipitation figures.

Stormwater Runoff Pollutant Discharges

Annual pollutant mass discharges were estimated as the product of annual runoff volumes produced by the various land use and cover types and pollutant concentrations typical of those areas. Again, the 0.75-inch precipitation event was used as a basis for volumes. Stormwater pollutant data have typically been measured and reported for general land use types (e.g., single-family residential, commercial). However, an investigation of low impact development practices of the type this study sought to conduct demands data on specific land coverages. The literature offers few data on this basis. Those available and used herein were assembled by a consultant to the City of Seattle for a project in which the author participated. They appear in Attachment A (Herrera Environmental Consultants, Inc. undated).

Pollutant concentrations expected to occur typically in the mixed runoff from the several land use and cover types making up a development were estimated by mass balance; i.e., the concentrations from the different areas of the sites were combined in proportion to their contribution to the total runoff.

The Effect of Conventional Treatment BMPs on Runoff Volume, Pollutant Discharges, and Recharge Rates

The first question in analyzing how BMPs reduce runoff volumes and pollutant discharges was, What BMPs are being employed in Bay Area developments under the permit now in force? These county permits provide regulated entities with a large number of choices and few fixed requirements regarding the selection of stormwater BMPs. (See Contra Costa County NPDES Municipal Stormwater Permit, Order No. 99-058; see also Santa Clara County NPDES Municipal Stormwater Permit, Order No. 01-024, at C.3.a.). Clean Water Program Available options presumably include manufactured BMPs, such as drain inlet inserts (DIls) and continuous deflective separation (CDS) units. Developments may also select such non-

[3] http://www.census.gov/stab/ccdb/cit7140a.txt, http://www.acwd.org/dms_docs/76d0b026b60d97830492079a48b1cb88.pdf, http://www.ci.berkely.ca.us/aboutberkeley/weather.html, http://www.usbr.gov/dataweb/dams/ca10168.htm, http://www.redwoodcity.org/about/weather.html.

proprietary devices as extended-detention basins (EDBs) and biofiltration swales and filter strips. EDBs hold water for two to three days for solids settlement before releasing whatever does not infiltrate or evaporate. Biofiltration treats runoff through various processes mediated by vegetation and soil. In a swale, runoff flows at some depth in a channel, whereas a filter strip is a broad surface over which water sheet flows. Each of these BMP types was applied to each case study, although it is not clear that these BMPs, in actuality, have been implemented consistently within the Bay Area to date.

The principal basis for the analysis of BMP performance was the California Department of Transportation's (CalTrans, 2004) BMP Retrofit Pilot Program, performed in San Diego and Los Angeles Counties. One important result of the program was that BMPs with a natural surface infiltrate and evaporate (probably, mostly infiltrate) a substantial amount of runoff, even if conditions do not appear to be favorable for an infiltration basin. On average, the EDBs, swales, and filter strips lost 40, 50 and 30 percent, respectively, of the entering flow before the discharge point. DIIs and CDS units do not contact runoff with a natural surface, and therefore do not reduce runoff volume.

The CalTrans program further determined that BMP effluent concentrations were usually a function of the influent concentrations, and equations were developed for the functional relationships in these cases. BMPs generally reduced influent concentrations proportionately more when they were high. In relatively few situations influent concentrations were constant at an "irreducible minimum" level regardless of inflow concentrations.

In analyzing the effects of BMPs on the case study runoff, the first step was to reduce the runoff volumes estimated with no BMPs by the fractions observed to be lost in the pilot study. The next task was estimating the effluent concentrations from the relationships in the CalTrans report. The final step was calculating discharge pollutant loadings as the product of the reduced volumes and predicted effluent concentrations. As before, typical pollutant concentrations in the mixed runoff were established by mass balance.

Estimating Infiltration Capacity of the Case Study Sites

Infiltrating sufficient runoff to maintain pre-development hydrologic characteristics and prevent pollutant transport is the most effective way to protect surface receiving waters. Successfully applying infiltration requires soils and hydrogeological conditions that will pass water sufficiently rapidly to avoid overly-lengthy ponding, while not allowing percolating water to reach ground-water before the soil column captures pollutants.

The study assumed that infiltration would occur in surface facilities and not in below-ground trenches. The use of trenches is certainly possible, and was judged to be an approved BMP by CalTrans after the pilot study. However, the intent of this investigation was to determine the ability of pervious areas to manage the site runoff. This was accomplished by determining the infiltration capability of the pervious areas in their original condition for each development case study, and further assessing the pervious areas' infiltration capabilities if soils were modified according to low impact development practices.

The chief basis for this aspect of the work was an assessment of infiltration capacity and benefits for Los Angeles' San Fernando Valley (Chralowicz et al. 2001). The Chralowicz study posited providing 0.1-0.5 acre for infiltration basins to serve each 5 acres of contributing drainage area. At 2-3 ft deep, it was estimated that such basins could infiltrate 0.90-1.87 acre-ft/year of runoff in San Fernando Valley conditions. Soils there are generally various loam textures with infiltration rates of approximately 0.5-2.0 inches/hour. Loams are also common formations in the portion of the Bay Area covered by this report, those areas with Hydrologic

Soil Groups A, B, and C,[4] thus making the conclusions of the San Fernando Valley study applicable for these purposes. This information was used to estimate how much of each case study site's annual runoff would be infiltratable, and if the pervious portion would provide sufficient area for infiltration. For instance, if sufficient area were available, the infiltration configuration would not have to be in basin form but could be shallower and larger in surface area. This study's analyses assumed the use of bioretention areas rather than traditional infiltration basins.

Volume and Pollutant Source Reduction Strategies

As mentioned above, the essence of low impact development is reducing runoff problems before they can develop, at their sources, or exploiting the infiltration and treatment abilities of soils and vegetation. If a site's existing infiltration and treatment capabilities are inadequate to preserve pre-development hydrology and prevent runoff from causing or contributing to violations of water quality standards, then LID-based source reduction strategies can be implemented, infiltration and treatment capabilities can be upgraded, or both.

Source reduction can be accomplished through various LID techniques. Soil can be upgraded to store runoff until it can infiltrate, evaporate, or transpire from plants through compost addition. Soil amendment, as this practice is known, is a standard LID technique.

Upgraded soils are used in bioretention cells that hold runoff and effect its transfer to the subsurface zone. This standard LID tool can be used where sufficient space is available. This study analyzed whether the six development case study sites would have sufficient space to effectively reduce runoff using bioretention cells, assuming the soils and vegetation could be amended and enhanced where necessary.

Conventional pavements can be converted to porous asphalt or concrete or replaced with concrete or plastic unit pavers or grid systems. For such approaches to be most effective, the soils must be capable of infiltrating the runoff passing through, and may require renovation.

Source reduction can be enhanced by the LID practice of water harvesting, in which water from impervious surfaces is captured and stored for reuse in irrigation or gray water systems. For example, runoff from roofs and parking lots can be harvested, with the former being somewhat easier because of the possibility of avoiding pumping to use the water and fewer pollutants. Harvesting is a standard technique for Leadership in Energy and Environmental Design (LEED) buildings.[5] Many successful systems of this type are in operation, such as the Natural Resources Defense Council office (Santa Monica, CA), the King County Administration Building (Seattle, WA), and two buildings on the Portland State University campus (Portland, OR). This investigation examined how water harvesting could contribute to stormwater management for case study sites where infiltration capacity, available space, or both appeared to be limited.

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[4] http://gis.ca.gov/catalog/BrowseCatalog.epl?id=108, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

[5] New Buildings Institute, Inc., *Advanced Buildings* (2005) (http://www.poweryourdesign.com/LEEDGuide.pdf).

RESULTS OF THE ANALYSIS

1. *"Base Case" Analysis: Development without Stormwater Controls*

Comparison of Pre- and Post-Development Runoff Volumes

Table 2 presents a comparison between the estimated runoff volumes generated by the respective case study sites in the pre- and post-development conditions, assuming implementation of no stormwater controls on the developed sites. On sites dominated by impervious land cover, most of the infiltration that would recharge groundwater in the undeveloped state is expected to be lost to surface runoff after development. This greatly increased surface flow would raise peak flow rates and volumes in receiving water courses, raise flooding risk, and transport pollutants. Only the office building, the plan for which retained substantial pervious area, would lose less than 40 percent of the site's pre-development recharge.

Table 2. Pre- and Post-Development without BMPs: Distribution of Surface Runoff Versus Recharge to Groundwater (annual volume in acre-ft)

Distribution	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
Precipitation[b]	12.8	3.54	0.90	2.47	154	0.21
Pre-development runoff[c]	0.89	0.25	0.07	0.17	10	0.02
Pre-development recharge[d]	11.9	3.29	0.83	2.30	144	0.19
Post-development impervious runoff[c]	8.07	1.51	0.42	0.57	66	0.09
Post-development pervious runoff[c]	0.51	0.24	0.06	0.23	10	0.01
Post-development total runoff[c]	8.58	1.75	0.48	0.80	76	0.10
Post-development recharge[d]	4.22	1.79	0.42	1.67	78	0.11
Post-development recharge loss (% of pre-development)	7.68 (65%)	1.50 (46%)	0.41 (49%)	0.65 (27%)	66 (45%)	0.08 (41%)
20 Inches/Year Rainfall:						
Precipitation[b]	18.2	5.06	1.29	3.54	220	0.30
Pre-development runoff[c]	1.28	0.35	0.10	0.24	15	0.03
Pre-development recharge[d]	16.9	4.71	1.19	3.30	205	0.27
Post-development impervious runoff[c]	11.5	2.16	0.60	0.82	94	0.13
Post-development pervious runoff[c]	0.73	0.34	0.08	0.33	15	0.01
Post-development total runoff[c]	12.2	2.50	0.68	1.15	109	0.14
Post-development recharge[d]	6.0	2.56	0.61	2.39	111	0.16
Post-development recharge loss (% of pre-development)	10.9 (65%)	2.15 (46%)	0.58 (49%)	0.91 (27%)	94 (45%)	0.11 (41%)

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single family home
[b] Volume of precipitation on total project area
[c] Quantity of water discharged from the site on the surface
[d] Quantity of water infiltrating the soil; the difference between precipitation and runoff

Pollutant Concentrations and Loadings

Table 3 presents the pollutant concentrations from the literature and loadings calculated as described for the various land use and cover types represented by the case studies. Landscaped areas are expected to release the highest TSS concentration, although relatively low TSS mass loading because of the low runoff coefficient. The highest copper concentrations and loadings are expected from parking lots. Roofs, especially commercial roofs, top the list for both zinc concentrations and loadings. Landscaping would issue by far the highest phosphorus, although access roads and driveways would contribute the highest mass loadings. With expected concentrations being equal in the two rainfall zones, mass loadings in the 20 inches/year zone would be higher than those in the 14 inches/year zone in the same proportion as the ratio of rainfall quantities.

Table 3. Pollutant Concentrations and Loadings for Case Study Land Use and Cover Types

Land Use	Concentrations				Loadings			
	TSS (mg/L)	TCu (mg/L)	TZn (mg/L)	TP (mg/L)	Lbs. TSS/ acre-year	Lbs. TCu/ acre-year	Lbs. TZn/ acre-year	Lbs. TP/ acre-year
14 Inches/Year Rainfall:								
Residential roof	25	0.013	0.159	0.11	75	0.039	0.477	0.330
Commercial roof	18	0.014	0.281	0.14	54	0.042	0.844	0.420
Access road/driveway	120	0.022	0.118	0.66	360	0.066	0.354	1.981
Parking	75	0.036	0.097	0.14	225	0.108	0.291	0.420
Walkway	25	0.013	0.059	0.11	75	0.039	0.177	0.330
Landscaping	213	0.013	0.059	2.04	81	0.005	0.022	0.774
20 Inches/Year Rainfall:								
Residential roof	25	0.013	0.159	0.11	107	0.056	0.683	0.472
Commercial roof	18	0.014	0.281	0.14	77	0.060	1.207	0.601
Access road/driveway	120	0.022	0.118	0.66	515	0.094	0.507	2.834
Parking	75	0.036	0.097	0.14	322	0.155	0.417	0.601
Walkway	25	0.013	0.059	0.11	107	0.056	0.253	0.472
Landscaping	213	0.013	0.059	2.04	135	0.008	0.037	1.291

The Basin Plan freshwater acute criteria for copper and zinc are 0.013 mg/L and 0.120 mg/L, respectively (http://www.swrcb.ca.gov/rwqcb2/basinplan/web/BP_CH3.html). All developed land uses are expected to discharge copper at or above the criterion, based on the mass balance calculations using concentrations from Table 3. Any surface release from the case study sites would just meet or violate the criterion at the point of discharge, although dilution by the receiving water would lower the concentration below the criterion at some point. Even if copper mass loadings are reduced by BMPs, any surface discharge would equal or exceed the criterion initially, but it would be easier to dilute below that level. In contrast, runoff from land covers other than roofs would not violate the acute zinc criterion. Because of this difference, the evaluation considered whether or not the zinc criterion would be exceeded in each analysis, whereas there was no point in this analysis for copper. There are no equivalent water quality criteria for TSS and TP; hence, their concentrations were not further analyzed in the different scenarios.

Table 4 shows the overall loadings, as well as zinc concentrations, expected to be delivered from the case study developments should they not be fitted with any BMPs. As Table 4 shows, all cases are forecast to exceed the 0.120 mg/L acute zinc criterion. Because of its size, the large residential development dominates the mass loading emissions.

Table 4. Case Study Pollutant Concentration and Loading Estimates without BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/ Year Rainfall:						
TZn (mg/L)	0.127	0.123	0.128	0.133	0.123	0.121
Lbs. TSS/year	1254	328	119	230	14249	20
Lbs. TCu/year	0:44	0.070	0.030	0.043	3.04	0.004
Lbs. TZn/year	2.94	0.576	0.165	0.286	25.04	0.034
Lbs. TP/year	6.24	2.27	0.68	1.69	98.55	0:14
20 Inches/ Year Rainfall:						
TZn (mg/L)	0.127	0.123	0.128	0.133	0.123	0.121
Lbs. TSS/year	1864	501	180	360	21781	30
Lbs. TCu/year	0.63	0.102	0.043	0.063	4.44	0.006
Lbs. TZn/year	4.22	0.833	0.238	0.417	36.2	0.050
Lbs. TP/year	9.60	3.55	1.05	2.71	154	0.22

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single-family home

2. "Conventional BMP" Analysis: Effect of Basic Treatment BMPs

Effect of Basic Treatment BMPs on Post-Development Runoff Volumes

The current set of regional permits allows regulated parties to select from a range of BMPs in order to treat or infiltrate a given quantity of annual rainfall. The administrative draft of the proposed MRP is also non-specific regarding the role of LID in satisfying permit conditions. The range of BMPs includes drain inlet inserts, CDS units, and other manufactured BMPs, detention vaults, and sand filters, all of which isolate runoff from the soil; as well as basins and biofiltration BMPs built in soil and generally having vegetation. Treatment BMPs that do not permit any runoff contact with soils discharge as much stormwater runoff as equivalent sites with no BMPs, and hence yield zero savings in recharge. As mentioned above, the CalTrans (2004) study found that BMPs with a natural surface can reduce runoff by substantial margins (30-50 percent for extended-detention basins and biofiltration).

With such a wide range of BMPs in use, runoff reduction ranging from 0 to 50 percent, and a lack of clearly ascertainable requirements, it is not possible to make a single estimate of how much recharge savings are afforded by maximal implementation of the current permits or the Municipal Regional Permit (MRP), if issued as now proposed. We made the following assumptions regarding implementation of BMPs. Assuming natural-surface BMPs perform at the average of the three types tested by CalTrans (2004), i.e., 40 percent runoff reduction, the estimate can be bounded as shown in Table 5. The table demonstrates that allowing free choice of BMPs without regard to their ability to direct water into the ground forfeits substantial groundwater recharge benefits when hardened-surface BMPs are selected. Use of soil-based conventional BMPs could cut recharge losses from half or more of the full potential to about one-quarter to one-third or less, except with the highly impervious commercial development. This analysis shows the wisdom of draining impervious to pervious surfaces, even if those surfaces are not prepared in any special way. But as subsequent analyses showed, soil amendment can gain considerably greater benefits.

Table 5. Pre- and Post-Development with Conventional BMPs: Distribution of Surface Runoff Versus Recharge to Groundwater (annual volume in acre-ft)

Distribution	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
Precipitation[b]	12.8	3.54	0.90	2.47	154	0.21
Pre-development runoff[c]	0.89	0.25	0.07	0.17	10	0.02
Pre-development recharge[d]	11.9	3.29	0.83	2.30	144	0.19
Post-development impervious runoff[e]	4.84-8.07	0.90-1.51	0.25-0.42	0.34-0.57	39-66	0.05-0.09
Post-development pervious runoff[e]	0.30-0.51	0.14-0.24	0.04-0.06	0.13-0.23	6.3-10	0.006-0.01
Post-development total runoff[e]	5.15-8.58	1.05-1.75	0.29-0.48	0.48-0.80	46-76	0.06-0.10
Post-development recharge[d, e]	4.22-7.60	1.79-2.49	0.42-0.62	1.67-2.00	78-108	0.11-0.15
Post-development recharge loss (% of pre-development)[e]	4.29-7.68 (36-65%)	0.80-1.50 (24-46%)	0.80-0.41 (26-49%)	0.30-0.65 (13-27%)	34-66 (24-45%)	0.05-0.08 (24-41%)
20 Inches/Year Rainfall:						
Precipitation[b]	18.2	5.06	1.29	3.54	220	0.30
Pre-development runoff[c]	1.28	0.35	0.10	0.24	15	0.03
Pre-development recharge[d]	16.9	4.71	1.19	3.30	205	0.27
Post-development impervious runoff[e]	6.92-11.5	1.29-2.16	0.35-0.60	0.49-0.82	56-94	0.08-0.13
Post-development pervious runoff[e]	0.44-0.73	0.20-0.34	0.05-0.08	0.19-0.33	9.0-15	0.006-0.01
Post-development total runoff[e]	7.36-12.2	1.50-2.50	0.41-0.68	0.68-1.15	65-109	0.08-0.14
Post-development recharge[d, e]	6.0-10.8	2.56-3.56	0.61-0.88	2.39-2.86	111-155	0.16-0.22
Post-development recharge loss (% of pre-development)[e]	6.1-10.9 (36-65%)	1.14-2.15 (24-46%)	0.31-0.58 (26-49%)	0.44-0.91 (13-27%)	49-94 (24-45%)	0.07-0.11 (24-41%)

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single-family home. Ranges represent 40 percent runoff volume reduction, with full site coverage by BMPs having a natural surface, to no reduction, with BMPs isolating runoff from soil.
[b] Volume of precipitation on total project area
[c] Quantity of water discharged from the site on the surface
[d] Quantity of water infiltrating the soil; the difference between precipitation and runoff [e] Ranging from the quantity with hardened bed BMPs to the quantity with soil-based BMPs

Effect of Basic Treatment BMPs on Pollutant Discharges

Table 6 presents estimates of zinc effluent concentrations and mass loadings of the various pollutants discharged from four types of conventional treatment BMPs. The loading reduction results show the CDS units always performing below 50 percent reduction for all pollutants analyzed, and most often in the vicinity of 20 percent, with zero copper reduction.

Table 6. Pollutant Concentration and Mass Loading Reduction Estimates with Conventional BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
Effluent Concentrations:						
CDS TZn (mg/L)[a]	0.095	0.095	0.098	0.102	0.095	0.094
EDB TZn (mg/L)[a]	0.085	0.086	0.084	0.084	0.086	0.084
Swale TZn (mg/L)	0.055	0.054	0.055	0.056	0.054	0.053
Filter strip TZn (mg/L)	0.039	0.039	0.039	0.041	0.039	0.038
Mass Loading Reductions—14 Inches/Year Rainfall:						
CDS TSS reduction	15.7%	19.9%	22.0%	24.0%	19.9%	20.2%
CDS TCu reduction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CDS TZn reduction	22.7%	22.4%	22.9%	23.1%	22.4%	22.5%
CDS TP reduction	30.6%	41.5%	40.7%	45.9%	41.5%	42.0%
EDB TSS reduction	68.1%	73.7%	79.0%	81.1%	73.7%	74.3%
EDB TCu reduction	61.9%	55.7%	66.2%	63.0%	55.7%	55.8%
EDB TZn reduction	59.7%	59.6%	60.4%	61.9%	59.6%	59.8%
EDB TP reduction	61.9%	69.7%	69.1%	72.9%	69.7%	70.1%
Swale TSS reduction	68.8%	71.1%	73.1%	73.9%	71.1%	71.3%
Swale TCu reduction	72.5%	68.5%	78.2%	73.3%	68.5%	68.5%
Swale TZn reduction	78.4%	78.1%	84.3%	78.8%	78.1%	78.2%
Swale TP reduction	66.3%	70.7%	67.2%	76.2%	70.7%	71.1%
Filter strip TSS reduction	69.9%	75.4%	80.6%	82.6%	75.4%	76.0%
Filter strip TCu reduction	74.4%	69.1%	78.2%	75.4%	69.1%	69.1%
Filter strip TZn reduction	78.3%	77.9%	78.4%	78.7%	77.9%	78.1%
Filter strip TP reduction	48.4%	53.1%	63.7%	59.8%	53.1%	53.5%

Table 6 continued

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
Mass Loading Reductions—20 Inches/Year Rainfall:						
CDS TSS reduction	18.8%	25.0%	26.3%	30.5%	25.0%	25.4%
CDS TCu reduction	0.7%	1.9%	1.1%	3.0%	1.9%	2.0%
CDS TZn reduction	23.1%	23.3%	23.6%	24.7%	23.3%	23.4%
CDS TP reduction	35.4%	46.6%	44.8%	51.8%	46.6%	47.1%
EDB TSS reduction	68.8%	74.6%	79.6%	81.6%	74.6%	75.1%
EDB TCu reduction	61.8%	55.6%	66.0%	62.7%	55.6%	55.7%
EDB TZn reduction	59.6%	59.3%	60.2%	61.5%	59.3%	59.6%
EDB TP reduction	63.0%	70.4%	69.7%	73.4%	70.4%	70.7%
Swale TSS reduction	69.1%	71.4%	73.6%	74.1%	71.4%	71.6%
Swale TCu reduction	72.5%	68.4%	77.9%	73.1%	68.4%	68.5%
Swale TZn reduction	78.3%	78.0%	84.1%	78.6%	78.0%	78.1%
Swale TP reduction	67.6%	71.9%	68.2%	77.1%	71.9%	72.3%
Filter strip TSS reduction	70.6%	76.3%	81.2%	83.1%	76.3%	76.8%
Filter strip TCu reduction	74.4%	69.0%	78.0%	75.1%	69.0%	69.1%
Filter strip TZn reduction	78.2%	77.8%	78.3%	78.5%	77.8%	77.9%
Filter strip TP reduction	49.9%	54.6%	66.3%	61.0%	54.6%	55.0%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single family home; CDS— continuous deflective separation unit; EDB—extended-detention basin

When treated with extended-detention basins, swales, or filter strips, effluents from each development case study site are expected to fall below the Basin Plan acute zinc criterion. These natural-surface BMPs, if fully implemented and well maintained, are predicted to prevent the pollutant masses generated on the six case study development sites from reaching a receiving water in both rainfall zones, which do not differ appreciably. Only total phosphorus reduction falls below 50 percent for three case studies. Otherwise, mass loading reductions range from about 60 to above 80 percent for the EDB, swale, and filter strip. These data indicate that draining impervious to pervious surfaces, even if those surfaces are not prepared in any special way, pays water quality as well as hydrologic dividends.

3. LID Analysis

(a) Hydrologic Analysis

The LID analysis repeats the analysis above, focusing here on the performance of LID techniques in reducing or eliminating runoff from the six development case studies. In addition to assessing the total runoff that would be expected, the analysis also considered whether LID techniques would be sufficient to attain compliance with a performance standard being considered by the Los Angeles Regional Water Quality Control Board for Ventura County, California. This standard limits EIA (Effective Impervious Area) to five percent (but our analysis further assumed EIA would be ultimately reduced to three percent). All runoff from NCIA (Not-Connected Impervious Area) was assumed to drain to vegetated surfaces.

One goal of this exercise was to identify methods that reduce runoff production in the first place. It was hypothesized that implementation of source reduction techniques could allow all of the case study sites to infiltrate substantial proportions, or all, of the developed site runoff, advancing the hydromodification mitigation objective of the Draft Permit. When runoff is dispersed into the soil instead of being rapidly collected and conveyed away, it recharges groundwater, supplementing a resource that maintains dry season stream flow and wetlands. An increased water balance can be tapped by humans for potable, irrigation, and process water supply. Additionally, runoff volume reduction would commensurately decrease pollutant mass loadings.

Accordingly, the analysis considered the practicability of more than one scenario. In one option, all roof runoff is harvested and stored for some beneficial use. A second option disperses runoff into the soil via roof downspout infiltration trenches. The former option is probably best suited to cases like large commercial and office buildings, while distribution in the soil would fit best with residences and relatively small commercial developments. The analysis was repeated with the assumptions of harvesting OFF roof runoff for some beneficial use and dispersing roof runoff from the remaining four cases in roof downspout infiltration systems.

Expected Infiltration Capacities of the Case Study Sites

The first inquiry on this subject sought to determine how much of the total annual runoff each property is expected to infiltrate, since infiltration is a basic (although not exclusive) LID technique. Based on the findings of Chralowicz et al. (2001), it was assumed that an infiltration zone of 0.1-0.5 acres in area and 2-3 ft deep would serve a drainage catchment area in the size range 0-5 acres and infiltrate 0.9-1.9 acre-ft/year. The conclusions of Chralowicz et al. (2001) were extrapolated to conservatively assume that 0.5 acre would be required to serve each additional five acres of catchment, and would infiltrate an incremental 1.4 acre-ft/year (the midpoint of the 0.9-1.9 acre-ft/year range). According to these assumptions, the following schedule of estimates applies:

Pervious Area Available for Infiltration	Catchment Served acres	Infiltration Capacity
0.5 acres	0-5 acres	1.4 acre-ft/year
1.0 acres	5-10 acres	2.8 acre-ft/year
1.5 acres	10-15 acres	4.2 acre-ft/year
(Etc.)	...	...

As a formula, infiltration capacity ≈ 2.8 x available pervious area. To apply the formula conservatively, the available area was reduced to the next lower 0.5-acre increment before multiplying by 2.8.

As shown in Table 7, in both rainfall zones all six of the sites have adequate or greater capacity to infiltrate the full annual runoff volume expected from NCIA and pervious areas where EIA is limited to three percent of the total site area. Indeed, five of the six development types have sufficient pervious area to infiltrate *all* runoff, including runoff from EIA areas. These results are based on infiltrating in the native soils with no soil amendment. For any development project at which infiltration-oriented BMPs are considered, it is important that infiltration potential be carefully assessed using site-specific soils and hydrogeologic data. In the event such an investigation reveals a marginal condition (e.g., hydraulic conductivity, spacing to groundwater) for infiltration basins, soils could be enhanced to produce bioretention zones to assist infiltration. Notably, the five case studies with far greater than necessary infiltration capacity would offer substantial flexibility in designing infiltration, allowing ponding at less than 2-3 ft depth.

Table 7. Infiltration and Runoff Volume (With 3 Percent EIA and All NCIA Draining to Pervious Areas)

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
EIA runoff (acre-ft/year)	0.36	0.10	0.03	0.07	4.4	0.01
NCIA + pervious area runoff (acre-ft/year)	**8.20**	**1.64**	**0.45**	**0.73**	**71.3**	**0.08**
Total runoff (acre-ft/year)	8.56	1.74	0.48	0.80	75.7	0.09
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.10
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**0.28**
Infiltration potential[c]	>100%	>100%	>100%	>100%	>100%	>100%
20 Inches/Year Rainfall:						
EIA runoff (acre-ft/year)	0.52	0.14	0.04	0.10	6.2	0.01
NCIA + pervious area runoff (acre-ft/year)	**11.7**	**2.34**	**0.64**	**1.04**	**101.7**	**0.14**
Total runoff (acre-ft/year)	12.2	2.48	0.68	1.14	108.0	0.15
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.10
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**0.28**
Infiltration potential[c]	84%	>100%	>100%	>100%	>100%	>100%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single family home;
[b] Based on Chralowicz et al. (2001) according to the schedule described above
[c] Compare runoff production from NCIA + pervious area (**row 3**) with estimated infiltration capacity (**row 6**)

As Table 7 shows, each of the six case study sites have the capacity to infiltrate *all* or substantially all of the runoff produced onsite annually by draining impervious surfaces to pervious areas on native soils or, in some soil regimes, soils amended with organic matter. If these sites were designed as envisioned in this analysis, no runoff discharge is expected in storms as large as, and probably larger than, the design storm event—using infiltration only. Discharge would be anticipated only with exceptionally intense, large, or prolonged rainfall that saturates the ground at a faster rate than water can infiltrate or evaporate. Even runoff from the area assumed to be EIA could be infiltrated in most cases based on the amount of pervious area available in typical development projects. Therefore, this analysis shows that the EIA performance standard being considered for Ventura County, California, or one more stringent, can be met readily in development projects occurring on A, B, and C soils in the San Francisco Bay Area.

Additional Source Reduction Capabilities of the Case Study Sites: Water Harvesting Example

As noted, infiltration is one of a wide variety of LID-based source reduction techniques. Where site conditions such as soil quality or available area limit a site's infiltration capacity, other source LID measures can enhance a site's runoff retention capability. For example, soil amendment, which improves infiltration, is a standard LID technique. Water harvesting is another. Such practices can also be used where infiltration capacity is adequate, but the developer desires greater flexibility for land use on-site. Table 8 shows the added LID implementation flexibility created by subtracting roof runoff by harvesting it or efficiently directing it into the soil through downspout dispersion systems, further demonstrating the feasibility and robust performance of LID options for reducing or eliminating runoff in most expected conditions. Specifically, all development types studied could readily infiltrate and/or retain all expected annual precipitation.

Table 8. Infiltration and Runoff Volume Reduction Analysis Including Roof Runoff Harvesting or Disposal in Infiltration Trenches (Assuming 3 Percent EIA and All NCIA Draining to Pervious Areas)

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
EIA runoff (acre-ft/year)	0.36	0.10	0.03	0.07	4.4	0.01
Roof runoff (acre-ft/year)	4.68	0.89	0.08	0.19	38.5	0.05
Other NCIA + pervious area runoff (acre-ft/year)	**3.52**	**0.75**	**0.37**	**0.54**	**32.7**	**0.04**
Total runoff (acre-ft/year)	8.56	1.74	0.48	0.80	75.6	0.10
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.10
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**0.28**
Infiltration capacity[c]	>100%	>100%	>100%	>100%	>100%	>100%
20 Inches/Year Rainfall:						
EIA runoff (acre-ft/year)	0.52	0.14	0.04	0.10	6.2	0.01
Roof runoff (acre-ft/year)	6.67	1.27	0.12	0.28	55.1	0.08
Other NCIA + pervious area runoff (acre-ft/year)	**5.03**	**1.07**	**0.52**	**0.76**	**46.7**	**0.06**
Total runoff (acre-ft/year)	12.2	2.48	0.68	1.14	108.0	0.15
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.10

Table 8 continued

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**0.28**
Infiltration capacity[c]	>100%	>100%	>100%	>100%	>100%	>100%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single family home;
[b] Based on Chralowicz et al. (2001) according to the schedule described above
[c] Comparison of runoff production from NCIA + pervious area **(row 3)** with estimated infiltration capacity **(row 6)**

Effect of Full LID Approach on Recharge

Table 9 shows the recharge benefits of preventing roofs from generating runoff and infiltrating as much as possible of the runoff from the remainder of the case study sites. The data show that LID methods offer significant benefits relative to the baseline (no stormwater controls) in all cases. These benefits are particularly impressive in developments with relatively high site imperviousness, such as in the MFR case.

Table 9. Comparison of Water Captured Annually (in acre-ft) from Development Sites for Beneficial Use with a Full LID Approach Compared to Development With No BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
Pre-development recharge[b] (acre-ft)	11.9	3.29	0.83	2.30	144	0.19
No BMPs—						
Post-development recharge[b] (acre-ft)	4.22	1.79	0.42	1.67	78	0.11
Post-development recharge lost (acre-ft)	7.68	1.50	0.41	0.65	66	0.08
Post-development % recharge lost	65%	46%	49%	27%	45%	41%
Full LID approach—						
Post-development runoff capture (acre-ft)[c]	11.9	3.29	0.83	2.30	144	0.19
Post-development recharge lost (acre-ft)	0	0	0	0	0	0
Post-development % recharge lost	0%	0%	0%	0%	0%	0%

Table 9 continued

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
20 Inches/Year Rainfall:						
Pre-development recharge[b] (acre-ft)	16.9	4.71	1.19	3.30	205	0.27
No BMPs—						
Post-development recharge[b] (acre-ft)	6.0	2.56	0.61	2.39	111	0.16
Post-development recharge lost (acre-ft)	10.9	2.15	0.58	0.91	94	0.11
Post-development % recharge lost	65%	46%	49%	27%	45%	41%
Full LID approach—						
Post-development runoff capture (acre-ft)[c]	16.9	4.71	1.19	3.30	205	0.27
Post-development recharge lost (acre-ft)	0	0	0	0	0	0
Post-development % recharge lost	0%	0%	0%	0%	0%	0%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—Single family home
[b] Quantity of water infiltrating the soil; the difference between precipitation and runoff
[c] Water either entirely infiltrated in BMPs and recharged to groundwater or partially harvested from roofs and partially infiltrated in BMPs. EIA was not distinguished from the remainder of the development, because these sites have the potential to capture all runoff.

(b) Water Quality Analysis

It was assumed that any site discharges would be subject to treatment control. For purposes of the analysis, treatment control was assumed to be provided by conventional sand filtration. This choice is appropriate for study purposes for two reasons. First, sand filters can be installed below grade, and land above can be put to other uses. Pervious area should be reserved for receiving NCIA drainage, and using sand filters would not draw land away from that service or other site uses. A second reason for the choice is that sand filter performance data equivalent to the data used in analyzing other conventional BMPs are available from the CalTrans (2004) work. Sand filters may or may not expose water to soil, depending on whether or not they have a hard bed. This analysis assumed a hard bed, meaning that no infiltration would occur and thus there would be no additional recharge in sand filters. Performance would be even better than shown in the analytical results if sand filters were built in earth.

Pollutant Discharge Reduction Through LID Techniques

The preceding analyses demonstrated that in each of the six case studies, *all* stormwater discharges could be eliminated at least under most meteorological conditions by dispersing runoff from impervious surfaces to pervious areas. Therefore, pollutant additions to receiving waters would also be eliminated.

SUMMARY AND CONCLUSIONS

This paper demonstrated that common Bay Area residential and commercial development types subject to the Municipal NPDES Permit are likely, without stormwater management, to reduce groundwater recharge from the pre-development state by approximately half in most cases to a much higher fraction with a large ratio of impervious to pervious area. With no treatment, runoff from these developments is expected to exceed Basin Plan acute copper and zinc criteria at the point of discharge and to deliver large pollutant mass loadings to receiving waters.

Conventional soil-based BMP solutions that promote and are component parts of low impact development approaches, by contrast, regain about 30-50 percent of the recharge lost in development without stormwater management in Bay Area locations having NRCS Hydrologic Soil Groups A, B, and C. It is expected the soil-based BMPs generally would release effluent that meets the acute zinc criterion at the point of discharge, although it would still exceed or just barely meet the copper limit. Excepting phosphorus, it was found that these BMPs would capture and prevent the movement to receiving waters of the majority of the pollutant loadings considered in the analysis.

It was found that by draining all site runoff to pervious areas with A, B, or C soil types, runoff can be eliminated entirely in most development categories. It follows that a three percent Effective Impervious Area standard can be met in typical developments, as well. This result was reached assuming the use of native soils or well recognized soil enhancement techniques (typically, with compost). Draining impervious surfaces onto these soils, in connection with limiting directly connected impervious area to three percent of the site total area, should eliminate storm runoff from some development types and greatly reduce it from more highly impervious types. Adding roof runoff elimination to the LID approach (by harvesting or directing it to downspout infiltration trenches) provides an additional tool, increasing flexibility and confidence that no discharge in most meteorological conditions is a feasible performance expectation. Even in the development scenarios involving the highest relative proportion of impervious surface, losses of rainfall capture for beneficial uses could be reduced from the untreated scenario when draining to pervious areas was supplemented with water harvesting. These results demonstrate the basic soundness of the concept of using LID techniques to reduce stormwater pollution in the Bay Area, and further show that limiting directly connected impervious area and draining the remainder over pervious surfaces, as contemplated by some Regional Water Boards in California, is also feasible.

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ATTACHMENT A

POLLUTANT CONCENTRATIONS FOR URBAN SOURCE AREAS (HERRERA ENVIRONMENTAL CONSULTANTS, INC. UNDATED)

Source Area	Study	Location	Sample Size (n)	TSS (mg/L)	TCu (ug/L)	TPb (ug/L)	TZn (ug/L)	TP (mg/L)	Notes
Roofs									
Residential	Steuer, et al. 1997	MI	12	36	7	25	201	0.06	2
Residential	Bannerman, et al. 1993	WI	~48	27	15	21	149	0.15	3
Residential	Waschbusch, et al. 2000	WI	25	15	n.a.	n.a.	n.a.	0.07	3
Residential	FAR 2003	NY		*19*	*20*	*21*	*312*	*0.11*	4
Residential	Gromaire, et al. 2001	France		*29*	*37*	*493*	*3422*	*n.a.*	5
Representative Residential Roof Values				**25**	**13**	**22**	**159**	**0.11**	
Commercial	Steuer, et al. 1997	MI	12	24	20	48	215	0.09	2
Commercial	Bannerman, et al. 1993	WI	~16	15	9	9	330	0.20	3
Commercial	Waschbusch, et al. 2000	WI	25	18	n.a.	n.a.	n.a.	0.13	3
Representative Commercial Roof Values				**18**	**14**	**26**	**281**	**0.14**	
Parking Areas									
Res. Driveways	Steuer, et al. 1997	MI	12	157	34	52	148	0.35	2
Res. Driveways	Bannerman, et al. 1993	WI	~32	173	17	17	107	1.16	3
Res. Driveways	Waschbusch, et al. 2000	WI	25	34	n.a.	n.a.	n.a.	0.18	3
Driveway	FAR 2003	NY		*173*	*17*		*107*	*0.56*	4
Representative Residential Driveway Values				**120**	**22**	**27**	**118**	**0.66**	
Comm./ Inst. Park. Areas	Pitt, et al. 1995	AL	16	110	116	46	110	n.a.	1
Comm. Park. Areas	Steuer, et al. 1997	MI	12	110	22	40	178	0.2	2
Com. Park. Lot	Bannerman, et al. 1993	WI	5	58	15	22	178	0.19	3
Parking Lot	Waschbusch, et al. 2000	WI	25	51	n.a.	n.a.	n.a.	0.1	3
Parking Lot	Tiefenthaler, et al. 2001	CA	5	36	28	45	293	n.a.	6
Loading Docks	Pitt, et al. 1995	AL	3	40	22	55	55	n.a.	1
Highway Rest Areas	CalTrans 2003	CA	53	*63*	*16*	*8*	*142*	*0.47*	7
Park and Ride Facilities	CalTrans 2003	CA	179	*69*	*17*	*10*	*154*	*0.33*	7
Comm./ Res. Parking	FAR 2003	NY		*27*	*51*	*28*	*139*	*0.15*	4
Representative Parking Area/Lot Values				**75**	**36**	**26**	**97**	**0.14**	

Landscaping/Lawns									
Landscaped Areas	Pitt, et al. 1995	AL	6	33	81	24	230	n.a.	1
Landscaping	FAR 2003	NY		*37*	*94*	*29*	*263*	n.a.	4
Representative Landscaping Values				**33**	**81**	**24**	**230**	**n.a.**	
Lawns - Residential	Steuer, et al. 1997	MI	12	262	n.a.	n.a.	n.a.	2.33	2
Lawns - Residential	Bannerman, et al. 1993	WI	~30	397	13	n.a.	59	2.67	3
Lawns	Waschbusch, et al. 2000	WI	25	59	n.a.	n.a.	n.a.	0.79	3
Lawns	Waschbusch, et al. 2000	WI	25	122	n.a.	n.a.	n.a.	1.61	3
Lawns - Fertilized	USGS 2002	WI	58	n.a.	n.a.	n.a.	n.a.	2.57	3
Lawns - Non-P Fertilized	USGS 2002	WI	38	n.a.	n.a.	n.a.	n.a.	1.89	3
Lawns - Unfertilized	USGS 2002	WI	19	n.a.	n.a.	n.a.	n.a.	1.73	3
Lawns	FAR 2003	NY	3	*602*	*17*	*17*	*50*	*2.1*	4
Representative Lawn Values				**213**	**13**	**n.a.**	**59**	**2.04**	

Notes:

Representative values are weighted means of collected data. Italicized values were omitted from these calculations.

1 - Grab samples from residential, commercial/institutional, and industrial rooftops. Values represent mean of DETECTED concentrations

2 - Flow-weighted composite samples, geometric mean concentrations

3 - Geometric mean concentrations

4 - Citation appears to be erroneous - original source of data is unknown. Not used to calculate representative value

5 - Median concentrations. Not used to calculate representative values due to site location and variation from other values.

6 - Mean concentrations from simulated rainfall study

7 - Mean concentrations. Not used to calculate representative values due to transportation nature of land use.

INVESTIGATION OF THE FEASIBILITY AND BENEFITS OF LOW-IMPACT SITE DESIGN PRACTICES ("LID") FOR VENTURA COUNTY

Richard R. Horner†

ABSTRACT

The Clean Water Act NPDES permit that regulates municipal separate storm sewer systems (MS4s) in Ventura County, California will be reissued in 2007. The draft permit includes provisions for requiring the use of low impact development practices (LID) for certain kinds of development and redevelopment projects. Using six representative development project case studies, the author investigated the practicability and relative benefits of the permit's LID requirements. The results showed that (1) LID site design and source control techniques are more effective than conventional best management practices (BMPs) in reducing runoff rates; (2) Effective Impervious Area (EIA) can practicably be capped at three percent, a standard more protective than that proposed in the draft permit; and (3) in five out of six case studies, LID methods would reduce site runoff volume and pollutant loading to zero in typical rainfall scenarios.

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INTRODUCTION

The Assessment in Relation to Municipal Permit Conditions

This purpose of this study is to investigate the relative water quality and water reuse benefits of three levels of storm water treatment best management practices (BMPs): (1) basic "treat-and-release" BMPs (e.g., drain inlet filters, CDS units), (2) commonly used BMPs that expose runoff to soils and vegetation (extended-detention basins and biofiltration swales and filter strips), and (3) low-impact development (LID) practices. The factors considered in the investigation are runoff volume, pollutant loading, and the availability of water for infiltration or other reuse. In order to assess the differential impact of storm water reduction approaches on these factors, this study examines six case studies typical of development covered by the Ventura County Municipal Separate Storm Sewer System Permit.

Low-impact development methods reduce storm runoff and its contaminants by decreasing their generation at sources, infiltrating into the soil or evaporating storm flows before they can enter surface receiving waters, and treating flow remaining on the surface through contact with vegetation and soil, or a combination of these strategies. Soil-based LID practices often use soil enhancements such as compost, and thus improve upon the performance of more traditional basins and biofilters. For the study's purposes, verification of the practicability and utility of LID practices was based on a modified version of the Planning and Land Development Program (Part 4, section E) in the Draft Ventura County Municipal Separate Storm Sewer System Permit ("Draft Permit"). The Draft Permit requires that Effective Impervious Area (EIA) of certain types of new development and redevelopment projects be limited to five percent of total development project area. EIA is defined as hardened surface hydrologically connected via sheet flow or a discrete hardened conveyance to a drainage system or receiving water body. (Draft Permit p. 50) The study modified this requirement to three percent, as a way to test both the feasibility of meeting the higher, five percent standard in the draft permit and because as the lower, three percent EIA is essential to protect the Ventura County aquatic environment (see Attachment A).

The Draft Permit further requires minimizing the overall percentage of impervious surfaces in new development and redevelopment projects to support storm water infiltration. The Draft Permit also directs an integrated approach to minimizing and mitigating storm water pollution, using a suite of strategies including source control, LID, and treatment control BMPs. (Draft Permit p. 50) It is noted in this section of the document that impervious surfaces can be rendered "ineffective" if runoff is dispersed through properly designed vegetated swales. In testing the practicability of the draft permit's requirements and a three percent EIA standard, this study broadened this approach to encompass not only vegetated swales (channels for conveyance at some depth and velocity) but also vegetated filter strips (surfaces for conveyance in thin sheet flow) and bioretention areas (shallow basins with a range of vegetation types in which runoff infiltrates through soil either to groundwater or a subdrain for eventual surface discharge). The Draft Permit's stipulation of "properly designed" facilities was interpreted to entail, among other requirements, either determination that existing site soils can support runoff reduction through infiltration or that soils will be amended using accepted LID techniques to attain this objective. Finally, the study further broadened implementation options to include water harvesting (collection and storage for use in, for example, irrigation or gray water systems), roof downspout infiltration trenches, and porous pavements.

The Draft permit was interpreted to require management of EIA, other impervious area (what might be termed Not-Connected Impervious Area, NCIA), and pervious areas as follows:

- Runoff from EIA is subject to treatment control and the Draft Permit's Hydromodification Mitigation Control requirements before discharge.

- NCIA must be drained onto a properly designed vegetated surface or its runoff managed by one of the other options discussed in the preceding paragraph. To the extent NCIA runoff is not eliminated prior to discharge from the site in one of these ways, it is subject to treatment control and the Draft Permit's Hydromodification Mitigation Control requirements before discharge.

- Runoff from pervious areas is subject to treatment control and the Draft Permit's Hydromodification Mitigation Control requirements before discharge. This provision applies to pervious areas that both do and do not receive drainage from NCIA.

Where treatment control BMPs are required to manage runoff from the site, the Draft Permit's Volumetric or Hydrodynamic (Flow Based) Treatment Control design bases were assumed to apply. The former basis applies to storage-type BMPs, like ponds, and requires capturing and treating either the runoff volume from the 85th percentile 24-hour rainfall event for the location, the volume of annual runoff to achieve 80 percent or more volume treatment, or the volume of runoff produced from a 0.75 inch storm event. The calculations in this analysis used the 0.75-inch quantity. The Hydrodynamic basis applies to flow-through BMPs, like swales, and requires treating the runoff flow rate produced from a rain event equal to at least 0.2 inches per hour intensity (or one of two other approximately equivalent options).

Scope of the Assessment

With respect to each of the six development case studies, three assessments were undertaken: a baseline scenario incorporating no storm water management controls; a second scenario employing conventional BMPs; and a third development scenario employing LID storm water management strategies.

To establish a baseline for each case study, annual storm water runoff volumes were estimated, as well as concentrations and mass loadings of four pollutants: (1) total suspended solids (TSS), (2) total recoverable copper (TCu), (3) total recoverable zinc (TZn), and (4) total phosphorus (TP). These baseline estimates were based on the anticipated land use and cover with no storm water management efforts.

Two sets of calculations were then conducted using the parameters defined for the six case studies.

The first group of calculations estimated the extent to which basic BMPs reduce runoff volumes and pollutant concentrations and loadings, and what impact, if any, such BMPs have on recharge rates or water retention on-site.

The second group of calculations estimated the extent to which commonly used soil-based BMPs and LID site design strategies ameliorate runoff volumes and pollutant concentrations and loadings, and the effect such techniques have on recharge rates. When evaluating LID strategies, it was presumed that EIA would be limited to three percent and runoff from EIA, NCIA, and pervious areas would be managed as indicated above. The assessment of basins, biofiltration, and low-impact design practices analyzed the expected infiltration capacity of the case study sites. It also considered related LID techniques and practices, such as source reduction strategies, that could work in concert with infiltration to serve the goals of: (1) preventing increase in annual runoff volume from the pre- to the post-developed state, (2) preventing increase in annual pollutant mass loadings between the two development states, and (3) avoiding exceedances of California Toxics Rule (CTR) acute saltwater criteria for copper and zinc.

The results of this analysis show that:

- Developments implementing no post-construction BMPs result in storm water runoff volume and pollutant loading that are substantially increased, and recharge rates that are substantially decreased, compared to pre-development conditions.

- Developments implementing basic post-construction treatment BMPs achieve reduced pollutant loading compared to developments with no BMPs, but storm water runoff volume and recharge rates are similar to developments with no BMPs.

- Developments implementing traditional basins and biofilters, and even more so low-impact post-construction BMPs, achieve significant reduction of pollutant loading and runoff volume as well as greatly enhanced recharge rates compared to both developments with no BMPs and developments with basic treatment BMPs.

- Typical development categories, ranging from single family residential to large commercial, can feasibly implement low-impact post-construction BMPs designed in compliance with the draft permit’s requirements, as modified to include a lower, three percent EIA requirement.

This report covers the methods employed in the investigation, data sources, and references for both. It then presents the results, discusses their consequences, draws conclusions, and makes recommendations relative to the feasibility of utilizing low-impact development practices in Ventura County developments.

CASE STUDIES

Six case studies were selected to represent a range of urban development types considered to be representative of coastal Southern California, including Ventura County. These case studies involved: a multi-family residential complex (MFR), a relatively small-scale (23 homes) single-family residential development (Sm-SFR), a restaurant (REST), an office building (OFF), a relatively large (1000 homes) single-family residential development (Lg-SFR) and a sizeable commercial retail installation (COMM).[1]

Parking spaces were estimated to be 176 sq ft in area, which corresponds to 8 ft width by 22 ft length dimensions. Code requirements vary by jurisdiction, with the tendency now to drop below the traditional 200 sq ft average. About 180 sq ft is common, but various standards for full- and compact-car spaces, and for the mix of the two, can raise or lower the average.[2] The 176 sq ft size is considered to be a reasonable value for conventional practice.

Roadways and walkways assume a wide variety of patterns. Exclusive of the two SFR cases, simple, square parking lots with roadways around the four sides and square buildings with walkways also around the four sides were assumed. Roadways and walkways were taken to be 20 ft and 6 ft wide, respectively.

Single-family residences were assumed each to have a driveway 20 ft wide and 30 ft long. It was further assumed that each would have a sidewalk along the front of the lot, which was calculated to be 5749 sq ft in area. Assuming a square lot, the front dimension would be 76 ft. A 40-ft walkway was included within the property. Sidewalks and walkways were taken to be 4 ft wide.

Exclusive of the COMM case, the total area for all of these impervious features was subtracted from the total site area to estimate the pervious area, which was assumed to have conventional landscaping cover (grass, small herbaceous decorative plants, bushes, and a few trees). For the COMM scenario, the hypothetical total impervious cover was enlarged by 10 percent to represent the landscaping, on the belief that a typical retail commercial establishment would typically be mostly impervious.

Table 1 (page 5) summarizes the characteristics of the six case studies. The table also provides the recorded or estimated areas in each land use and cover type.

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[1] Building permit records from the City of San Marcos in San Diego County provided data on total site areas for the first four case studies, including numbers of buildings, building footprint areas (including porch and garage for Sm-SFR), and numbers of parking spaces associated with the development projects. While the building permit records made no reference to features such as roadways, walkways, and landscaping normally associated with development projects, these features were taken into account in the case studies using assumptions described herein. Larger developments were not represented in the sampling of building permits from the San Marcos database. To take larger development projects into account in the subsequent analysis, the two larger scale case studies were hypothesized. The Lg-SFR scenario scaled up all land use estimates from the Sm-SFR case in the ratio of 1000:23. The hypothetical COMM scenario consisted of a building with a 2-acre footprint and 500 parking spaces. As with the smaller-scale cases, these hypothetical developments were assumed to have roadways, walkways, and landscaping, as described herein.

[2] J. Gibbons, *Parking Lots*, NONPOINT EDUCATION FOR MUNICIPAL OFFICERS, Technical Paper No. 5 (1999) (http://nemo.uconn.edu/tools/publications/tech_papers/tech_paper_5.pdf).

Table 1. Case Study Characteristics and Land Use and Land Cover Areas

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
No. buildings	11	23	1	1	1000	1
Total area (ft^2)	476,982	132,227	33,669	92,612	5,749,000	226,529
Roof area (ft^2)	184,338	34,949	3,220	7,500	1,519,522	87,120
No. parking spaces	438	-	33	37	-	500
Parking area (ft^2)	77,088	-	5808	6512	-	88,000
Access road area (ft^2)	22,212	-	6097	6456	-	23,732
Walkway area (ft^2)	33,960	10,656	1362	2078	463,289	7,084
Driveway area (ft^2)	-	13,800	-	-	600,000	-
Landscape area (ft^2)	159,384	72,822	17,182	70,066	3,166,190	20,594

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial

METHODS OF ANALYSIS

Annual Storm Water Runoff Volumes

Annual surface runoff volumes produced were estimated for both pre- and post-development conditions for each case study site. Runoff volume was computed as the product of annual precipitation, contributing drainage area, and a runoff coefficient (ratio of runoff produced to rainfall received). For impervious areas the following equation was used:

$$\mathbf{C = (0.009)\,\mathit{I} + 0.05}$$

where I is the impervious percentage. This equation was derived by Schueler (1987) from Nationwide Urban Runoff Program data (U.S. Environmental Protection Agency 1983). With I = 100 percent for fully impervious surfaces, C is 0.95.

The basis for pervious area runoff coefficients was the Natural Resource Conservation Service's (NRCS) Urban Hydrology for Small Watersheds (NRCS 1986, as revised from the original 1975 edition). This model estimates storm event runoff as a function of precipitation and a variable representing land cover and soil, termed the curve number (CN). Larger events are forecast to produce a greater amount of runoff in relation to amount of rainfall because they more fully saturate the soil. Therefore, use of the model to estimate annual runoff requires selecting some event or group of events to represent the year. A 0.75-inch rainfall event was used in the analysis here for the relative comparison between pre- and post-development and applied to deriving a runoff coefficient for annual estimates, recognizing that smaller storms would produce less and larger storms more runoff.

To select CN for the pre-development case, an analysis performed in the area of the Cedar Fire in San Diego County was used in which CN was determined before and after the 2003 fire.[3] In the San Diego analysis, CN = 83 was estimated for the pre-existing land cover, which was generally chaparral, a vegetative cover also typical of Ventura County. As indicated below, soils are also similar in Ventura and San Diego Counties, making the parameter selection reasonable for use in both locations. For post-development landscaping, CN = 86 was selected based on tabulated data in NRCS (1986) and professional judgment.

Pre- and post-development runoff quantities were computed with these CN values and the 0.75-inch rainfall, and then divided by the rainfall to obtain runoff coefficients. The results were 0.07

[3] American Forests, *San Diego Urban Ecosystem Analysis After the Cedar Fire* (Feb. 3, 2006) (http://www.ufei.org/files/pubs/SanDiegoUrbanEcosystemAnalysis-PostCedarFire.pdf).

and 0.12, respectively. Finally, total annual runoff volumes were estimated based on an average annual precipitation in the City of Ventura of 14.71 inches.[4]

Storm Water Runoff Pollutant Discharges

Annual pollutant mass discharges were estimated as the product of annual runoff volumes produced by the various land use and cover types and pollutant concentrations typical of those areas. Again, the 0.75-inch precipitation event was used as a basis for volumes. Storm water pollutant data have typically been measured and reported for general land use types (e.g., single-family residential, commercial). However, an investigation of low-impact development practices of the type this study sought to conduct demands data on specific land coverages. The literature offers few data on this basis. Those available and used herein were assembled by a consultant to the City of Seattle for a project in which the author participated. They appear in Attachment B (Herrera Environmental Consultants, Inc. undated).

Pollutant concentrations expected to occur typically in the mixed runoff from the several land use and cover types making up a development were estimated by mass balance; i.e., the concentrations from the different areas of the sites were combined in proportion to their contribution to the total runoff.

The Effect of Conventional Treatment BMPs on Runoff Volume, Pollutant Discharges, and Recharge Rates

The first question in analyzing how BMPs reduce runoff volumes and pollutant discharges was, What BMPs are being employed in Ventura County developments under the permit now in force? This permit is open-ended and provides regulated entities with a large number of choices and few fixed requirements. These options presumably include manufactured BMPs, such as drain inlet inserts (DIIs) and continuous deflective separation (CDS) units. Developments may also select such non-proprietary devices as extended-detention basins (EDBs) and biofiltration swales and filter strips. EDBs hold water for two to three days for solids settlement before releasing whatever does not infiltrate or evaporate. Biofiltration treats runoff through various processes mediated by vegetation and soil. In a swale, runoff flows at some depth in a channel, whereas a filter strip is a broad surface over which water sheet flows. Each of these BMP types was applied to each case study, although it is not clear that these BMPs, in actuality, have been implemented consistently within Ventura County to date.

The principal basis for the analysis of BMP performance was the California Department of Transportation's (CalTrans, 2004) BMP Retrofit Pilot Program, performed in San Diego and Los Angeles Counties. One important result of the program was that BMPs with a natural surface infiltrate and evaporate (probably, mostly infiltrate) a substantial amount of runoff, even if conditions do not appear to be favorable for an infiltration basin. On average, the EDBs, swales, and filter strips lost 40, 50 and 30 percent, respectively, of the entering flow before the discharge point. DIIs and CDS units do not contact runoff with a natural surface, and therefore do not reduce runoff volume.

The CalTrans program further determined that BMP effluent concentrations were usually a function of the influent concentrations, and equations were developed for the functional

[4] Ventura County Watershed Protection District (http://www.vcwatershed.org/fws/specialmedia.htm). The City of Ventura is considered to be representative of most of the developed and developing areas in Ventura County. However, there is some variation around the county, with the maximum precipitation registered at Ojai (annual average 21.32 inches). Ojai is about 15 miles inland and lies at elevation 745 ft at the foot of the Topatopa Mountains, the orographic effect of which influences its meteorology. Ojai's higher rainfall was taken into account in the calculations, and the report notes the few instances where it affected the conclusions.

relationships in these cases. BMPs generally reduced influent concentrations proportionately more when they were high. In relatively few situations influent concentrations were constant at an "irreducible minimum" level regardless of inflow concentrations.

In analyzing the effects of BMPs on the case study runoff, the first step was to reduce the runoff volumes estimated with no BMPs by the fractions observed to be lost in the pilot study. The next task was estimating the effluent concentrations from the relationships in the CalTrans report. The final step was calculating discharge pollutant loadings as the product of the reduced volumes and predicted effluent concentrations. As before, typical pollutant concentrations in the mixed runoff were established by mass balance.

Estimating Infiltration Capacity of the Case Study Sites

Infiltrating sufficient runoff to maintain pre-development hydrologic characteristics and prevent pollutant transport is the most effective way to protect surface receiving waters. Successfully applying infiltration requires soils and hydrogeological conditions that will pass water sufficiently rapidly to avoid overly-lengthy ponding, while not allowing percolating water to reach ground-water before the soil column captures pollutants.

The study assumed that infiltration would occur in surface facilities and not in below-ground trenches. The use of trenches is certainly possible, and was judged to be an approved BMP by CalTrans after the pilot study. However, the intent of this investigation was to determine the ability of pervious areas to manage the site runoff. This was accomplished by determining the infiltration capability of the pervious areas in their original condition for each development case study, and further assessing the pervious areas' infiltration capabilities if soils were modified according to low impact development practices.

The chief basis for this aspect of the work was an assessment of infiltration capacity and benefits for Los Angeles' San Fernando Valley (Chralowicz et al. 2001). The Chralowicz study posited providing 0.1-0.5 acre for infiltration basins to serve each 5 acres of contributing drainage area. At 2-3 ft deep, it was estimated that such basins could infiltrate 0.90-1.87 acre-ft/year of runoff in San Fernando Valley conditions. Soils there are generally various loam textures with infiltration rates of approximately 0.5-2.0 inches/hour. The most prominent soils in Ventura County, at least relatively near the coast, are loams, sandy loams, loamy sands, and silty clay loams, thus making the conclusions of the San Fernando Valley study applicable for these purposes.[5] This information was used to estimate how much of each case study site's annual runoff would be infiltratable, and if the pervious portion would provide sufficient area for infiltration. For instance, if sufficient area were available, the infiltration configuration would not have to be in basin form but could be shallower and larger in surface area. This study's analyses assumed the use of bioretention areas rather than traditional infiltration basins.

Volume and Pollutant Source Reduction Strategies

As mentioned above, the essence of low-impact development is reducing runoff problems before they can develop, at their sources, or exploiting the infiltration and treatment abilities of soils and vegetation. If a site's existing infiltration and treatment capabilities are inadequate to preserve pre-development hydrology and prevent runoff from causing or contributing to violations of water quality standards, then LID-based source reduction strategies can be implemented, infiltration and treatment capabilities can be upgraded, or both.

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[5] Cabrillo Port Liquefied Natural Gas Deepwater Port Draft EIS/EIR (Oct. 2004) (http://www.cabrilloport.ene.com/files/eiseir/4.05%20%20-Agriculture%20and%20Soils.pdf).

Source reduction can be accomplished through various LID techniques. Soil can be upgraded to store runoff until it can infiltrate, evaporate, or transpire from plants through compost addition. Soil amendment, as this practice is known, is a standard LID technique.

Upgraded soils are used in bioretention cells that hold runoff and effect its transfer to the subsurface zone. This standard LID tool can be used where sufficient space is available. This study analyzed whether the six development case study sites would have sufficient space to effectively reduce runoff using bioretention cells, assuming the soils and vegetation could be amended and enhanced where necessary.

Conventional pavements can be converted to porous asphalt or concrete or replaced with concrete or plastic unit pavers or grid systems. For such approaches to be most effective, the soils must be capable of infiltrating the runoff passing through, and may require renovation.

Source reduction can be enhanced by the LID practice of water harvesting, in which water from impervious surfaces is captured and stored for reuse in irrigation or gray water systems. For example, runoff from roofs and parking lots can be harvested, with the former being somewhat easier because of the possibility of avoiding pumping to use the water and fewer pollutants. Harvesting is a standard technique for Leadership in Energy and Environmental Design (LEED) buildings.[6] Many successful systems of this type are in operation, such as the Natural Resources Defense Council offices (Santa Monica, CA), the King County Administration Building (Seattle, WA), and two buildings on the Portland State University campus (Portland, OR). This investigation examined how water harvesting could contribute to storm water management for case study sites where infiltration capacity, available space, or both appeared to be limited.

RESULTS OF THE ANALYSIS

1. "Base Case" Analysis: Development without Storm Water Controls

Comparison of Pre- and Post-Development Runoff Volumes

Table 2 (page 9) presents a comparison between the estimated runoff volumes generated by the respective case study sites in the pre- and post-development conditions, assuming implementation of no storm water controls on the developed sites. On sites dominated by impervious land cover, most of the infiltration that would recharge groundwater in the undeveloped state is expected to be lost to surface runoff after development. This greatly increased surface flow would raise peak flow rates and volumes in receiving water courses, raise flooding risk, and transport pollutants. Only the office building, the plan for which retained substantial pervious area, would lose less than half of the site's pre-development recharge.

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[6] New Buildings Institute, Inc., *Advanced Buildings* (2005) (http://www.poweryourdesign.com/LEEDGuide.pdf).

Table 2. Pre- and Post-Development without BMPs: Distribution of Surface Runoff Versus Recharge to Groundwater

Annual Volume (acre-ft)	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Precipitation[b]	13.4	3.72	0.95	2.60	162	6.37
Pre-development runoff[c]	0.94	0.26	0.07	0.18	11	0.45
Pre-development recharge[d]	12.5	3.46	0.88	2.42	150	5.92
Post-development impervious runoff[c]	8.48	1.59	0.44	0.60	69	5.50
Post-development pervious runoff[c]	0.54	0.25	0.06	0.24	11	0.07
Post-development total runoff[c]	9.02	1.83	0.50	0.84	80	5.57
Post-development recharge[d]	4.39	1.88	0.45	1.76	82	0.80
Post-development recharge loss (% of pre-development recharge)	8.08 (65%)	1.57 (46%)	0.43 (49%)	0.66 (27%)	68 (45%)	5.12 (86%)

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential;
COMM—retail commercial
[b] Volume of precipitation on total project area
[c] Quantity of water discharged from the site on the surface
[d] Quantity of water infiltrating the soil; the difference between precipitation and runoff

Pollutant Concentrations and Loadings

Table 3 presents the pollutant concentrations from the literature and loadings calculated as described for the various land use and cover types represented by the case studies. Landscaped areas are expected to release the highest TSS concentration, although relatively low TSS mass loading because of the low runoff coefficient. The highest copper concentrations and loadings are expected from parking lots. Roofs, especially commercial roofs, top the list for both zinc concentrations and loadings. Landscaping would issue by far the highest phosphorus, although access roads and driveways would contribute the highest mass loadings.

Table 3. Pollutant Concentrations and Loadings for Case Study Land Use and Cover Types

Land Use	Concentrations				Loadings			
	TSS (mg/L)	TCu (mg/L)	TZn (mg/L)	TP (mg/L)	Lbs. TSS/ acre-year	Lbs. TCu/ acre-year	Lbs. TZn/ acre-year	Lbs. TP/ acre-year
Residential roof	25	0.013	0.159	0.11	79	0.041	0.503	0.348
Commercial roof	18	0.014	0.281	0.14	57	0.044	0.889	0.443
Access road/driveway	120	0.022	0.118	0.66	380	0.070	0.373	2.088
Parking	75	0.036	0.097	0.14	237	0.114	0.307	0.443
Walkway	25	0.013	0.059	0.11	79	0.041	0.187	0.348
Landscaping	213	0.013	0.059	2.04	85	0.005	0.024	0.815

The CTR acute criteria for copper and zinc are 0.0048 mg/L and 0.090 mg/L, respectively. Table 3 shows that all developed land uses are expected to discharge copper above the criterion, based on the mass balance calculations using concentrations from Table 3. Any surface release from the case study sites would violate the criterion at the point of discharge, although dilution by the receiving water would lower the concentration below the criterion at some point. Even if copper mass loadings are reduced by BMPs, any surface discharge would exceed the criterion initially, but it would be easier to dilute below that level. In contrast, runoff from some land covers would not violate the acute zinc criterion. Because of this difference, the evaluation considered whether or not the zinc criterion would be exceeded in each analysis, whereas there was no point in this analysis for copper. There are no equivalent water quality criteria for TSS and TP; hence, their concentrations were not further analyzed in the different scenarios.

Table 4 shows the overall loadings, as well as zinc concentrations, expected to be delivered from the case study developments should they not be fitted with any BMPs. As Table 4 shows, all cases are forecast to exceed the 0.090 mg/L acute zinc criterion, and the retail commercial development does so by a wide margin. Because of its size, the large residential development dominates the mass loading emissions.

Table 4. Case Study Pollutant Concentration and Loading Estimates without BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
TZn (mg/L)	0.127	0.123	0.128	0.133	0.123	0.175
Lbs. TSS/year	1321	345	125	242	15016	853
Lbs. TCu/year	0.46	0.074	0.032	0.045	3.21	0.37
Lbs. TZn/year	3.09	0.607	0.174	0.301	26.4	2.64
Lbs. TP/year	6.58	2.39	0.72	1.78	104	3.36

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial

2. *"Conventional BMP" Analysis: Effect of Basic Treatment BMPs*

Effect of Basic Treatment BMPs on Post-Development Runoff Volumes

The current permit allows regulated parties to select from a range of BMPs in order to treat or infiltrate a given quantity of annual rainfall. The range includes drain inlet inserts, CDS units, and other manufactured BMPs, detention vaults, and sand filters, all of which isolate runoff from the soil; as well as basins and biofiltration BMPs built in soil and generally having vegetation. Treatment BMPs that do not permit any runoff contact with soils discharge as much storm water runoff as equivalent sites with no BMPs, and hence yield zero savings in recharge. As mentioned above, the CalTrans (2004) study found that BMPs with a natural surface can reduce runoff by substantial margins (30-50 percent for extended-detention basins and biofiltration).

With such a wide range of BMPs in use, runoff reduction ranging from 0 to 50 percent, and a lack of clearly ascertainable requirements, it is not possible to make a single estimate of how much recharge savings are afforded by maximal implementation of the current permit. We made the following assumptions regarding implementation of BMPs. Assuming natural-surface BMPs perform at the average of the three types tested by CalTrans (2004), i.e., 40 percent runoff reduction, the estimate can be bounded as shown in Table 5 (page 11). The table demonstrates that allowing free choice of BMPs without regard to their ability to direct water into the ground forfeits substantial groundwater recharge benefits when hardened-surface BMPs are selected. Use of soil-based conventional BMPs could cut recharge losses from half or e more of the full potential to about one-quarter to one-third or less, except with the highly impervious commercial development. This analysis shows the wisdom of draining impervious to pervious surfaces, even if those surfaces are not prepared in any special way. But as subsequent analyses showed, soil amendment can gain considerably greater benefits.

Table 5. Pre- and Post-Development with Conventional BMPs: Distribution of Surface Runoff Versus Recharge to Groundwater

Annual Volume (acre-ft)	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Precipitation[b]	13.4	3.72	0.95	2.60	162	6.37
Pre-development runoff[c]	0.94	0.26	0.07	0.18	11	0.45
Pre-development recharge	12.5	3.46	0.88	2.42	150	5.92
Post-development impervious runoff[c, d]	5.09-8.48	0.95-1.59	0.26-0.44	0.36-0.60	41-69	3.30-5.50
Post-development pervious runoff[c, d]	0.32-0.54	0.15-0.25	0.04-0.06	0.14-0.24	6.6-11	0.04-0.07
Post-development total runoff[c, d]	5.41-9.02	1.10-1.83	0.30-0.50	0.50-0.84	48-80	3.34-5.57
Post-development recharge[d, e]	4.39-7.99	1.88-2.62	0.45-0.65	1.76-2.10	82-114	0.80-3.03
Post-development recharge loss (% of pre-development recharge)[d, e]	4.51-8.08 (36-65%)	0.84-1.57 (24-46%)	0.23-0.43 (26-49%)	0.32-0.66 (13-27%)	36-68 (24-45%)	2.89-5.12 (49-86%)

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial. Ranges represent 40 percent runoff volume reduction, with full site coverage by BMPs having a natural surface, to no reduction, with BMPs isolating runoff from soil.
[b] Volume of precipitation on total project area
[c] Quantity of water discharged from the site on the surface
[d] Ranging from the quantity with hardened bed BMPs to the quantity with soil-based BMPs
[e] Quantity of water infiltrating the soil; the difference between precipitation and runoff

Effect of Basic Treatment BMPs on Pollutant Discharges

Table 6 (page 12) presents estimates of zinc effluent concentrations and mass loadings of the various pollutants discharged from four types of conventional treatment BMPs. The manufactured CDS BMPs in this table, which do not expose runoff to soil or vegetation, are not expected to drop any of the concentrations sufficiently to meet the acute zinc criterion at the discharge point. The loading reduction results show the CDS units always performing below 50 percent reduction for all pollutants analyzed, and most often in the vicinity of 20 percent, with zero copper reduction.

When treated with swales or filter strips, effluents from each development case study site are expected to fall below the CTR acute zinc criterion. All but the large commercial site would meet the criterion with EDB treatment. These natural-surface BMPs, if fully implemented and well maintained, are predicted to prevent the majority of the pollutant masses generated on most of the development sites from reaching a receiving water. Only total phosphorus reduction falls below 50 percent for two case studies. Otherwise, mass loading reductions range from about 60 to above 80 percent for the EDB, swale, and filter strip. This data indicates that draining impervious to pervious surfaces, even if those surfaces are not prepared in any special way, pays water quality as well as hydrologic dividends.

Table 6. Pollutant Concentration and Loading Reduction Estimates with Conventional BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Effluent Concentrations:						
CDS TZn (mg/L)[a]	0.095	0.095	0.098	0.102	0.095	0.131
EDB TZn (mg/L)[a]	0.085	0.086	0.084	0.084	0.086	0.098
Swale TZn (mg/L)	0.055	0.054	0.055	0.056	0.054	0.068
Filter strip TZn (mg/L)	0.039	0.039	0.039	0.041	0.039	0.048
Loading Reductions:						
CDS TSS loading reduction	15.7%	19.9%	22.0%	24.0%	19.9%	16.9%
CDS TCu loading reduction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CDS TZn loading reduction	22.7%	22.4%	22.9%	23.1%	22.4%	25.1%
CDS TP loading reduction	30.6%	41.5%	40.7%	45.9%	41.5%	20.3%
EDB TSS loading reduction	68.1%	73.7%	79.0%	81.1%	73.7%	71.7%
EDB TCu loading reduction	61.9%	55.7%	66.2%	63.0%	55.7%	66.8%
EDB TZn loading reduction	59.7%	59.6%	60.4%	61.9%	59.6%	66.6%
EDB TP loading reduction	61.9%	69.7%	69.1%	72.9%	69.7%	54.5%
Swale TSS loading reduction	68.8%	71.1%	73.1%	73.9%	71.1%	69.4%
Swale TCu loading reduction	72.5%	68.5%	78.2%	73.3%	68.5%	75.8%
Swale TZn loading reduction	78.4%	78.1%	84.3%	78.8%	78.1%	80.7%
Swale TP loading reduction	66.3%	70.7%	67.2%	76.2%	70.7%	55.0%
Filter strip TSS loading reduction	69.9%	75.4%	80.6%	82.6%	75.4%	72.3%
Filter strip TCu loading reduction	74.4%	69.1%	78.2%	75.4%	69.1%	78.7%
Filter strip TZn loading reduction	78.3%	77.9%	78.4%	78.7%	77.9%	80.9%
Filter strip TP loading reduction	48.4%	53.1%	63.7%	59.8%	53.1%	34.6%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial; CDS— continuous deflective separation unit; EDB—extended-detention basin

3. LID Analysis: Development According to Modified Draft Permit Provisions

(a) Hydrologic Analysis

The LID analysis was first performed according to the Draft Permit provisions under the Planning and Land Development Program (Part 4, section E). In this analysis, however, EIA was limited to three instead of five percent, under the reasoning presented in Attachment A. All runoff from NCIA was assumed to drain to vegetated surfaces, as provided in the Draft Permit.

One goal of this exercise was to identify methods that reduce runoff production in the first place. It was hypothesized that implementation of source reduction techniques could allow all of the case study sites to infiltrate substantial proportions of the developed site runoff, advancing the hydromodification mitigation objective of the Draft Permit. When runoff is dispersed into the soil instead of being rapidly collected and conveyed away, it recharges groundwater, supplementing a resource that maintains dry season stream flow and wetlands. An increased water balance can be tapped by humans for potable, irrigation, and process water supply. Additionally, runoff volume reduction would commensurately decrease pollutant mass loadings.

Accordingly, the analysis considered the practicability of more than one scenario by which the draft permit's terms could be met, as modified to reflect three percent EIA. In one option, all roof runoff is harvested and stored for some beneficial use. A second option disperses runoff into the soil via roof downspout infiltration trenches. The former option is probably best suited to cases like the large commercial and office buildings, while distribution in the soil would fit best with residences and relatively small commercial developments. The analysis was repeated with the assumptions of harvesting OFF and COMM roof runoff for some beneficial use and dispersing roof runoff from the remaining four cases in roof downspout infiltration systems.

Expected Infiltration Capacities of the Case Study Sites

The first inquiry on this subject sought to determine how much of the total annual runoff each property is expected to infiltrate. This assessment tested the feasibility of draining all but three percent of impervious area to pervious land on the sites. Based on the findings of Chralowicz et al. (2001), it was assumed that an infiltration zone of 0.1-0.5 acres in area and 2-3 ft deep would serve a drainage catchment area in the size range 0-5 acres and infiltrate 0.9-1.9 acre-ft/year. The conclusions of Chralowicz et al. (2001) were extrapolated to conservatively assume that 0.5 acre would be required to serve each additional five acres of catchment, and would infiltrate an incremental 1.4 acre-ft/year (the midpoint of the 0.9-1.9 acre-ft/year range). According to these assumptions, the following schedule of estimates applies:

Pervious Area Available for Infiltration	Catchment Served acres	Infiltration Capacity
0.5 acres	0-5 acres	1.4 acre-ft/year
1.0 acres	5-10 acres	2.8 acre-ft/year
1.5 acres	10-15 acres	4.2 acre-ft/year
(Etc.)	...	...

As a formula, infiltration capacity ≈ 2.8 x available pervious area. To apply the formula conservatively, the available area was reduced to the next lower 0.5-acre increment before multiplying by 2.8.

As shown in Table 7, five of the six sites have adequate or greater capacity to infiltrate the full annual runoff volume from NCIA and pervious areas where EIA is limited to three percent of the total site area (four at the higher Ojai rainfall). Indeed, five of the six development types have sufficient pervious area to infiltrate *all* runoff, including runoff from EIA areas. With the most representative rainfall, only the large commercial development, with little available pervious area, falls short of the needed capacity to infiltrate all rainfall, but it still has the capacity to meet the terms of the draft permit, as modified for this analysis. These results are based on infiltrating in the native soils with no soil amendment. For any development project at which infiltration-oriented BMPs are considered, it is important that infiltration potential be carefully assessed using site-specific soils and hydrogeologic data. In the event such an investigation reveals a marginal condition (e.g., hydraulic conductivity, spacing to groundwater) for infiltration basins, soils could be enhanced to produce bioretention zones to assist infiltration. Notably, the four case studies with far greater than necessary infiltration capacity would offer substantial flexibility in designing infiltration, allowing ponding at less than 2-3 ft depth.

Table 7. Infiltration and Runoff Volume With 3 Percent EIA and All NCIA Draining to Pervious Areas

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
EIA runoff (acre-ft/year)	0.38	0.11	0.03	0.07	4.6	0.18
NCIA + pervious area runoff (acre-ft/year)	**8.63**	**1.73**	**0.47**	**0.76**	**75.0**	**5.39**
Total runoff (acre-ft/year)	9.01	1.84	0.50	0.83	79.6	5.57
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.47
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**1.4**
Infiltration capacity [c]	> 100%[d]	> 100%	> 100%	> 100%	> 100%	~26% [d]

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial;
[b] Based on Chralowicz et al. (2001) according to the schedule described above
[c] Compare runoff production from NCIA + pervious area (**row 3**) with estimated infiltration capacity (**row 6**)
[d] At Ojai rainfall levels, capacity would be ~78 percent at the MFR site and ~18 percent at the COMM site.

As Table 7 shows, five of the six case study sites have the capacity to infiltrate *all* runoff produced onsite by draining impervious surfaces to pervious areas. Even runoff from the area assumed to be EIA could be infiltrated in most cases based on the amount of pervious area available in typical development projects. By showing that it is possible under normal site conditions and using native soils to retain *all* runoff in typical developments, these results demonstrate that a three percent EIA requirement, which would not demand that all runoff be retained, is feasible and practicable.

Additional Source Reduction Capabilities of the Case Study Sites: Water Harvesting Example

Infiltration is one of a wide variety of LID-based source reduction techniques. Where site conditions such as soil quality or available area limit a site's infiltration capacity, other source LID measures can enhance a site's runoff retention capability. For example, soil amendment, which improves infiltration, is a standard LID technique. Water harvesting is another. Such practices can also be used where infiltration capacity is adequate, but the developer desires greater flexibility for land use on-site. Table 8 shows the added implementation flexibility created by subtracting roof runoff by harvesting it or efficiently directing it into the soil through downspout dispersion systems, further demonstrating the feasibility of meeting the draft permit's proposed requirements, as modified to include a three percent EIA standard.

Table 8. Infiltration and Runoff Volume Reduction Analysis Including Roof Runoff Harvesting or Disposal in Infiltration Trenches (Assuming 3 Percent EIA and All NCIA Draining to Pervious Areas)

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
EIA runoff (acre-ft/year)	0.38	0.11	0.03	0.07	4.6	0.18
Roof runoff (acre-ft/year)	4.92	0.93	0.09	0.20	41	2.33
Other NCIA + pervious area runoff (acre-ft/year)	**3.71**	**0.79**	**0.39**	**0.56**	**35**	**3.06**
Total runoff (acre-ft/year)	9.01	1.84	0.50	0.83	79.6	5.57
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.47
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**1.4**
Infiltration capacity [c]	> 100%	> 100%	> 100%	> 100%	> 100%	~45% [d]

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial;
[b] Based on Chralowicz et al. (2001) according to the schedule described above
[c] Comparison of runoff production from NCIA + pervious area (**row 3**) with estimated infiltration capacity (**row 6**)
[d] If the higher rainfall at Ojai is assumed, capacity would be ~32 percent of the amount needed for the COMM case.

Effect of Full LID Approach on Recharge

Table 9 (page 15) shows the recharge benefits of preventing roofs from generating runoff and infiltrating as much as possible of the runoff from the remainder of the case study sites. The data show that LID methods offer significant benefits relative to the baseline (no storm water controls) in all cases. These benefits are particularly impressive in developments with relatively high site imperviousness, such as in the MFR and COMM cases. In the latter case the full LID approach (excluding the common and effective practice of soil amendment) would cut loss of the potential water resource represented by recharge and harvesting from 86 to 37 percent.

Table 9. Comparison of Water Captured Annually (in acre-ft) from Development Sites for Beneficial Use With a Full LID Approach Compared to Development With No BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Pre-development recharge[b] (acre-ft)	12.5	3.46	0.88	2.42	150	5.92
No BMPs:						
post-development recharge [b] (acre-ft)	4.39	1.88	0.45	1.76	82	0.80
post-development runoff (acre-ft)	8.08	1.57	0.43	0.66	68	5.12
post-development % recharge lost	65%	46%	49%	27%	45%	86%
Full LID approach:						
post-development runoff capture (acre-ft)[c]	12.5	3.46	0.88	2.42	150	3.73
post-development runoff (acre-ft)	0	0	0	0	0	2.19
post-development % recharge lost	0%	0%	0%	0%	0%	37%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial
[b] Quantity of water infiltrating the soil; the difference between precipitation and runoff
[c] Water either entirely infiltrated in BMPs and recharged to groundwater or partially harvested from roofs and partially infiltrated in BMPs. For the first five case studies, EIA was not distinguished from the remainder of the development, because these sites have the potential to capture all runoff.

(b) Water Quality Analysis

As outlined above, it was assumed that EIA discharges, as well as runoff from all pervious surfaces, are subject to treatment control. For purposes of the analysis, treatment control was assumed to be provided by conventional sand filtration. This choice is appropriate for study purposes for two reasons. First, sand filters can be installed below grade, and land above can be put to other uses. Under the Draft Permit's approach, pervious area should be reserved for receiving NCIA drainage, and using sand filters would not draw land away from that service or other site uses. A second reason for the choice is that sand filter performance data equivalent to the data used in analyzing other conventional BMPs are available from the CalTrans (2004) work. Sand filters may or may not expose water to soil, depending on whether or not they have a hard bed. This analysis assumed a hard bed, meaning that no infiltration would occur and thus there would be no additional recharge in sand filters. Performance would be even better than shown in the analytical results if sand filters were built in earth.

Pollutant Discharge Reduction Through LID Techniques

The preceding analyses demonstrated that each of the six case studies could feasibly comply with the draft permit's requirements, as modified to include a more protective three percent EIA standard. Moreover, for five of the six case studies, *all* storm water discharges could be eliminated at least under most meteorological conditions by dispersing runoff from impervious surfaces to pervious areas. Therefore, pollutant additions to receiving waters would also be eliminated. This demonstrates not only that a lower EIA (three percent) is a feasible and practicable approach to maintaining the natural hydrology of land being developed, as discussed above, but that a lower EIA is a feasible and practicable way to eliminate the discharge of pollutants that could cause or contribute to violations of water quality standards.

While the high proportion of impervious area present on the large commercial site relative to pervious area would not allow eliminating all discharge, harvesting roof water and draining NCIA to properly-prepared pervious area would substantially decrease the volume discharged. Deployment of treatment control BMPs (e.g. sand filter treatment) could cut contaminant discharges from pollutants in the remaining volume of runoff to low levels.

Table 10 presents the pollutant reductions from the untreated case achievable through the complete LID approach described above in comparison to conventional treatments (from Table 6). Assuming EIA still discharges through sand filters, pollutant loadings from the untreated condition are expected to decrease by more than 96 percent for all but the COMM case. In that challenging case loadings would still fall by at least 89 percent for TSS and the metals and by 83 percent for total phosphorus, assuming City of Ventura rainfall levels, and slightly less assuming the higher Ojai rainfall levels. Thus, the Draft Permit's basic premise of disconnecting most impervious area, supplemented by specially managing roof water, is shown by both water quality and hydrologic results to be feasible and to afford broad and significant environmental benefits.

Table 10. Pollutant Loading Reduction Estimates With a Full LID Approach Relative to Conventional BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Conventional TSS loading reduction[b]	15.7-69.9%	19.9-75.4%	22.0-80.6%	24.0-82.6%	19.9-75.4%	16.9-72.3%
Conventional TCu loading reduction[b]	0.0-74.4%	0.0-69.1%	0.0-78.2%	0.0-75.4%	0.0-69.1%	0.0-78.7%
Conventional TZn loading reduction[b]	22.7-78.4%	22.4-78.1%	22.9-84.3%	23.1-78.8%	22.4-78.1%	25.1-80.9%
Conventional TP loading reduction[b]	30.6-66.3%	41.5-70.7%	40.7-69.1%	45.9-76.2%	41.5-70.7%	20.3-55.0%
LID TSS loading reduction[c]	99.4%	99.3%	99.5%	99.4%	99.3%	89.0% [d]
LID TCu loading reduction[c]	98.1%	96.7%	98.0%	96.2%	96.7%	90.6% [d]
LID TZn loading reduction[c]	99.1%	98.8%	98.9%	98.3%	98.8%	94.8% [d]
LID TP loading reduction[c]	98.1%	98.6%	98.8%	98.7%	98.6%	83.1%[d]

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial; CDS— continuous deflective separation unit; EDB—extended-detention basin; NCIA—not connected impervious area; EIA—effective (connected) impervious area
[b] Range from Table 6 represented by treatment by CDS unit, EDB, biofiltration swale, or biofiltration strip
[c] Based on directing roof runoff to downspout infiltration trenches (MFR, Sm-SFR, REST, and Lg-SFR) or harvesting it (OFF and COMM), draining other NCIA to pervious areas, and treating EIA with sand filters
[d] If the higher rainfall at Ojai is assumed, reduction estimates for TSS, TCu, TZn, and TP would be 84.0, 86.3, 92.5, and 75.5 percent, respectively.

SUMMARY AND CONCLUSIONS

This paper demonstrated that common Ventura County area residential and commercial development types subject to the Municipal NPDES Permit are likely, without storm water management, to reduce groundwater recharge from the predevelopment state by approximately half in most cases to a much higher fraction with a large ratio of impervious to pervious area. With no treatment, runoff from these developments is expected to exceed CTR acute copper and zinc criteria at the point of discharge and to deliver large pollutant mass loadings to receiving waters.

Conventional soil-based BMP solutions that promote and are component parts of low-impact development approaches, by contrast, regain about 30-50 percent of the recharge lost in development without storm water management, although commercially-manufactured filtration and hydrodynamic BMPs for storm water management give no benefits in this area. It is expected the soil-based BMPs generally would release effluent that meets the acute zinc criterion at the point of discharge, although it would still exceed the copper limit. Excepting phosphorus, it was found that these BMPs would capture and prevent the movement to receiving waters of the majority of the pollutant loadings considered in the analysis.

It was found that a three percent Effective Impervious Area standard can be met in typical developments, and that by draining all site runoff to pervious areas, runoff can be eliminated entirely in most development types. This result was reached assuming the use of native soils. Soil enhancement (typically, with compost) can further advance infiltration. Draining impervious surfaces onto the loam soils typical of Ventura County, in connection with limiting directly connected impervious area to three percent of the site total area, should eliminate storm runoff from some development types and greatly reduce it from more highly impervious types. Adding roof runoff elimination to the LID approach (by harvesting or directing it to downspout infiltration trenches) should eliminate runoff from all but mostly impervious developments. Even in the development scenario involving the highest relative proportion of impervious surface, losses of rainfall capture for beneficial uses could be reduced from more than 85 to less than 40 percent, and pollutant mass loadings would fall by 83-95 percent from the untreated scenario when draining to pervious areas was supplemented with water harvesting. These results demonstrate the basic soundness of the Draft Permit's concept to limit directly connected impervious area and drain the remainder over pervious surfaces.

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ATTACHMENT A

JUSTIFICATION OF PROPOSED EFFECTIVE IMPERVIOUS AREA LIMITATION

Summary

The literature shows that adverse impacts to the physical habitat and biological integrity of receiving waters occur as a result of the conversion of natural areas to impervious cover. These effects are observed at the lowest levels of impervious cover in associated catchments (two to three percent) and are pronounced by the point that impervious cover reaches five percent. To protect biological productivity, physical habitat, and other beneficial uses, effective impervious area should be capped at no more than three percent.

I. Impacts to physical habitat of California receiving waters observed at three percent impervious cover

Stein *et al*.[7] note that while studies from parts of the country with climates more humid than California's indicate that physical degradation of stream channels can initially be detected when watershed impervious cover approaches 10%, biological effects, which may be more difficult to detect, may occur at lower levels (CWP 2003).[8] Recent studies from both northern and southern California indicate that intermittent and ephemeral streams in California are more susceptible to the effects of hydromodification than streams from other regions of the US, with stream degradation being recognized when the associated catchment's impervious cover is as little as 3-5% (Coleman *et al*. 2005).[9] Furthermore, supplemental landscape irrigation in semi-arid regions, like California, can substantially increase the frequency of erosive flows (AQUA TERRA Consultants 2004).[10]

Coleman, *et al*.[3] report that the ephemeral/intermittent streams in southern California (northwestern Los Angeles County through southern Ventura County to central Orange County) appear to be more sensitive to changes in percent impervious cover than streams in other areas. Stream channel response can be represented using an *enlargement curve*, which relates the percent of impervious cover to a change in cross-sectional area. The data for southern California streams forms a relationship very similar in shape to the enlargement curves developed for other North American streams. However, the curve for southern California streams is above the general curve for streams in other climates. This suggests that a specific enlargement ratio is produced at a lower value of impervious surface area in southern California than in other parts of North America. Specifically, the estimated threshold of response is approximately 2-3% impervious cover, as compared to 7-10% for other portions of the U.S. It is important to note that this conclusion applies specifically to streams with a catchment drainage area less than 5 square miles.

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[7] Stein, E.D., S. Zaleski, (2005) *Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California*. (Proceedings of a Special Technical Workshop Co-sponsored by California Stormwater Quality Association (CASQA), Stormwater Monitoring Coalition (SMC), University of Southern California Sea Grant (USC Sea Grant), Technical Report #475).
[8] Center for Watershed Protection (CWP), (2003) *Impacts of Impervious Cover on Aquatic Systems*. Ellicott City, MD.
[9] Coleman, D., C. MacRae, and E.D. Stein, (2005) *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Southern California Coastal Water Research Project Technical Report #450, Westminster, CA.
[10] AQUA TERRA Consultants, (2004) *Urbanization and Channel Stability Assessment in the Arroyo Simi Watershed of Ventura County CA*. FINAL REPORT. Prepared for Ventura County Watershed Protection Division, Ventura CA.

This study concludes that disconnecting impervious areas from the drainage network and adjacent impervious areas is a key approach to protecting channel stability. Utilizing this strategy can make it practical to keep the effective impervious cover (*i.e*. the amount hydrologically connected to the stream) equal to or less than the identified threshold of 2-3%.

II. Impacts to biological integrity of receiving waters observed with any conversion from natural to impervious surface

Two separate studies conducted by Horner *et al*.[11,12] in the Puget Sound region (Washington State), Montgomery County, Maryland, and Austin, Texas built a database totaling more than 650 reaches on low-order streams in watersheds ranging from no urbanization and relatively little human influence (the reference state, representing “best attainable” conditions) to highly urban (>60 percent total impervious area, “TIA”). Biological health was assessed according to the benthic index of biotic integrity (B-IBI) and, in Puget Sound, the ratio of young-of-the-year coho salmon (*Oncorhynchus kisutch*), a relatively stress-intolerant fish, to cutthroat trout (*Oncorhynchus clarki*), a more stress-tolerant species. The following discussion summarizes the results and conclusions of these two studies.

There is no single cause for the decline of water resource conditions in urbanizing watersheds. Instead, it is the cumulative effects of multiple stressors that are responsible for degraded aquatic habitat and water quality. Imperviousness, while not a perfect yardstick, appears to be a useful predictor of ecological condition. However, a range of stream conditions can be associated with any given level of imperviousness. In general, only streams that retain a significant proportion of their natural vegetative land-cover <u>and</u> have very low levels of watershed imperviousness appear to retain their natural ecological integrity. It is this change in watershed land-cover that is largely responsible for the shift in hydrologic regime from a sub-surface flow dominated system to one dominated by surface runoff.

While the decline in ecological integrity is relatively continuous and is consistent for all parameters, the impact on physical conditions appears to be more pronounced earlier in the urbanization process than chemical degradation. It is generally acknowledged, based on field research and hydrologic modeling, that it is the shift in hydrologic conditions that is the driving force behind physical changes in urban stream-wetland ecosystems.

Multiple scales of impact operate within urbanizing watersheds: landscape-level impacts, including the loss of natural forest cover and the increase in impervious surface area throughout the watershed; riparian corridor-specific impacts such as encroachment, fragmentation, and loss of native vegetation; and local impacts such as water diversions, exotic vegetation, stream channelization, streambank hardening, culvert installation, and pollution from the widespread use of pesticides and herbicides. All of these stressors contribute to the overall cumulative impact.

The researchers found that there is no clear threshold of urbanization below which there exists a “no-effect” condition. Instead, there appears to be a relatively continuous decline in almost all measures of water quality or ecological integrity. Losses of integrity occur from the lowest levels of TIA and are already pronounced by the point that TIA reaches 5 percent.

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[11] Horner, R. R., C. W. May, (2002) *The Limitations of Mitigation-Based Stormwater Management in the Pacific Northwest and the Potential of a Conservation Strategy based on Low-Impact Development Principles*. (Proceedings of the American Society of Engineers Stormwater Conference, Portland, OR).

[12] Horner, R.R., E. H. Livingston, C. W. May, J. Maxted, (2006) *BMPs, Impervious Cover, and Biological Integrity of Small Streams*. (Proceedings of the Eighth Biennial Stormwater Research and Watershed Management Conference, Tampa, FL).

Similarly, the Alliance for the Chesapeake Bay[13] reports that small-watershed studies by the Maryland Department of Natural Resources Biological Stream Survey have shown that some sensitive species are affected by even low amounts of impervious cover. In one study, no brook trout were observed in any stream whose watershed had more than 2 percent impervious cover, and brook trout were rare in any watershed with more than 0.5 percent impervious cover.

III. Ventura County's watersheds include biologically-significant water bodies

The literature discussed above is relevant to the watersheds of Ventura County, which contain rivers and streams that currently or historically support a variety of beneficial uses that may be impaired by water quality degradation and stream hydromodification as a result of storm water runoff from impervious land cover. Unlike some Southern California watersheds, Ventura County still has many natural stream systems with a high degree of natural functionality.

For instance, the Ventura River watershed in northwestern Ventura County "supports a large number of sensitive aquatic species,"[14] including steelhead trout, a federally-listed endangered species. Although "local populations of steelhead and rainbow trout have nearly been eliminated along the Ventura River" itself, the California Department of Fish and Game has "recognized the potential for the restoration of the estuary and enhancement of steelhead populations in the Ventura River."[15] Steelhead may also be present in tributaries such as San Antonio Creek.[16] Thriving rainbow trout populations exist in tributaries of the Ventura River including Matilija Creek and Coyote Creek.[17] The Ventura River either does or is projected to support the following beneficial uses: warm freshwater habitat; cold freshwater habitat; wildlife habitat; rare, threatened, or endangered species; migration of aquatic organisms; and spawning and reproduction.[18] Furthermore, the Ventura River Estuary also supports commercial fishing, shellfish harvesting, and wetland habitat.[19] The Ventura River receives municipal storm drain discharges from Ojai, San Buenaventura, and unincorporated areas of Ventura County.[20]

The Santa Clara River watershed in northern Ventura County "is the largest river system in southern California that remains in a relatively natural state."[21] Sespe Creek is one of the Santa Clara's largest tributaries, and "supports significant steelhead spawning and rearing habitat."[22] Other creeks in the Santa Clara River watershed that support steelhead are Piru Creek and Santa Paula Creek. Sespe Creek and the Santa Clara River also provide spawning habitat for the Pacific lamprey. Rainbow trout populations exist in tributaries of the Santa Clara River including Sespe Creek.[23] The creeks and the Santa Clara river do or are projected to support the following beneficial uses: warm freshwater habitat; cold freshwater habitat; wildlife habitat; preservation of biological habitats rare, threatened, or endangered species; migration of aquatic organisms; and spawning and reproduction.[24] Los Padres National Forest covers much of the Santa Clara River watershed, but increasing development in floodplain areas has been

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[13] Karl Blankenship, BAY JOURNAL,"It's a hard road ahead for meeting new sprawl goal: States will try to control growth of impervious" (July/August 2004), at http://www.bayjournal.com/article.cfm?article=66.
[14] Los Angeles Region Water Quality Control Plan (1994) p. 1-18 ("Basin Plan").
[15] Basin Plan, p. 1-16; Ventura County Environmental & Energy Resources Division, "Endangered Steelhead Trout in Ventura County: Past, Present, and Future," available at http://www.wasteless.org/Eye_articles/steelhead.htm.
[16] Ventura County Environmental & Energy Resources Division, "Steelhead Spawning in Ventura County," (2005), available at http://www.wasteless.org/Eye_articles/steehead2005.html.
[17] Ventura County Environmental & Energy Resources Division, "Endangered Steelhead Trout in Ventura County: Past, Present, and Future," available at http://www.wasteless.org/Eye_articles/steelhead.htm.
[18] Basin Plan, Table 2-1.
[19] Basin Plan, Table 2-4.
[20] Ventura County Watershed Protection District, *Report of Waste Discharge* (January 2005) at p. 3.
[21] Basin Plan, p. 1-16.
[22] Basin Plan, p. 1-16.
[23] Ventura County Environmental & Energy Resources Division, "Endangered Steelhead Trout in Ventura County: Past, Present, and Future," available at http://www.wasteless.org/Eye_articles/steelhead.htm.
[24] Basin Plan, Table 2-1.

identified as a threat to the river system's water quality.[25] Furthermore, the Santa Clara estuary supports the additional beneficial uses of shellfish harvesting and wetlands habitat.[26] The Santa Clara River receives municipal storm drain discharges from Fillmore, Oxnard, San Buenaventura, Santa Paula, and unincorporated areas of Ventura County.[27]

The Calleguas Creek watershed "empties into Mugu Lagoon, one of southern California's few remaining large wetlands."[28] It supports or is projected to support the following beneficial uses: estuarine habitat; marine habitat; wildlife habitat; preservation of biological habitats; rare, threatened, or endangered species; migration of aquatic organisms; spawning and reproduction; shellfish harvesting; and wetlands habitat.[29] Historically, Calleguas Creek drained largely agricultural areas. But this watershed has been under increasing pressure from sedimentation due to increased surface flow from municipal discharges and urban wastewaters, among other sources.[30] Increasing residential developments on steep slopes has been identified as a substantial contributing factor to the problem of accelerated erosion in the watershed (and sedimentation in the Lagoon). Calleguas Creek receives municipal storm drain discharges from Camarillo, Moorpark, Simi Valley, Thousand Oaks, and unincorporated areas of Ventura County.[31]

Ventura County's coastal streams also support a variety of beneficial uses:[32]

- Little Sycamore Canyon Creek in southern Ventura County (warm freshwater habitat; wildlife habitat; rare, threatened or endangered species; and spawning and reproduction);
- Lake Casitas tributaries (warm freshwater habitat; cold freshwater habitat; wildlife habitat; rare, threatened or endangered species; spawning and reproduction; and wetland habitat);
- Javon Canyon and Padre Juan Canyon (warm freshwater habitat; cold freshwater habitat; wildlife habitat; and spawning and reproduction); and
- Los Sauces Creek in northern Ventura County (warm freshwater habitat; cold freshwater habitat; wildlife habitat; migration of aquatic species; and spawning and reproduction).

IV. Conclusion

In order to protect the biological habitat, physical integrity, and other beneficial uses of the water bodies in Ventura County, effective impervious area should be capped at no more than three percent.

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[25] Basin Plan, pp. 1-16, 1-18.
[26] Basin Plan, Table 2-4.
[27] Ventura County Watershed Protection District, *Report of Waste Discharge* (January 2005) at p. 3.
[28] Basin Plan, p. 1-18.
[29] Basin Plan, Table 2-1.
[30] Basin Plan, pp. 1-16, 1-18.
[31] Ventura County Watershed Protection District, *Report of Waste Discharge* (January 2005) at p. 3.
[32] Basin Plan, Table 2-1.

ATTACHMENT B

POLLUTANT CONCENTRATIONS FOR URBAN SOURCE AREAS (HERRERA ENVIRONMENTAL CONSULTANTS, INC. UNDATED)

Source Area	Study	Location	Sample Size (n)	TSS (mg/L)	TCu (ug/L)	TPb (ug/L)	TZn (ug/L)	TP (mg/L)	Notes
Roofs									
Residential	Steuer, et al. 1997	MI	12	36	7	25	201	0.06	2
Residential	Bannerman, et al. 1993	WI	~48	27	15	21	149	0.15	3
Residential	Waschbusch, et al. 2000	WI	25	15	n.a.	n.a.	n.a.	0.07	3
Residential	FAR 2003	NY		*19*	*20*	*21*	*312*	*0.11*	4
Residential	Gromaire, et al. 2001	France		*29*	*37*	*493*	*3422*	*n.a.*	5
Representative Residential Roof Values				**25**	**13**	**22**	**159**	**0.11**	
Commercial	Steuer, et al. 1997	MI	12	24	20	48	215	0.09	2
Commercial	Bannerman, et al. 1993	WI	~16	15	9	9	330	0.20	3
Commercial	Waschbusch, et al. 2000	WI	25	18	n.a.	n.a.	n.a.	0.13	3
Representative Commercial Roof Values				**18**	**14**	**26**	**281**	**0.14**	
Parking Areas									
Res. Driveways	Steuer, et al. 1997	MI	12	157	34	52	148	0.35	2
Res. Driveways	Bannerman, et al. 1993	WI	~32	173	17	17	107	1.16	3
Res. Driveways	Waschbusch, et al. 2000	WI	25	34	n.a.	n.a.	n.a.	0.18	3
Driveway	FAR 2003	NY		*173*	*17*		*107*	*0.56*	4
Representative Residential Driveway Values				**120**	**22**	**27**	**118**	**0.66**	
Comm./ Inst. Park. Areas	Pitt, et al. 1995	AL	16	110	116	46	110	n.a.	1
Comm. Park. Areas	Steuer, et al. 1997	MI	12	110	22	40	178	0.2	2
Com. Park. Lot	Bannerman, et al. 1993	WI	5	58	15	22	178	0.19	3
Parking Lot	Waschbusch, et al. 2000	WI	25	51	n.a.	n.a.	n.a.	0.1	3
Parking Lot	Tiefenthaler, et al. 2001	CA	5	36	28	45	293	n.a.	6
Loading Docks	Pitt, et al. 1995	AL	3	40	22	55	55	n.a.	1
Highway Rest Areas	CalTrans 2003	CA	53	*63*	*16*	*8*	*142*	*0.47*	7
Park and Ride Facilities	CalTrans 2003	CA	179	*69*	*17*	*10*	*154*	*0.33*	7
Comm./ Res. Parking	FAR 2003	NY		*27*	*51*	*28*	*139*	*0.15*	4
Representative Parking Area/Lot Values				**75**	**36**	**26**	**97**	**0.14**	

Landscaping/Lawns										
Landscaped Areas	Pitt, et al. 1995	AL	6	33	81	24	230	n.a.	1
Landscaping	FAR 2003	NY		*37*	*94*	*29*	*263*	n.a.	4
Representative Landscaping Values				**33**	**81**	**24**	**230**	**n.a.**	
Lawns - Residential	Steuer, et al. 1997	MI	12	262	n.a.	n.a.	n.a.	2.33	2
Lawns - Residential	Bannerman, et al. 1993	WI	~30	397	13	n.a.	59	2.67	3
Lawns	Waschbusch, et al. 2000	WI	25	59	n.a.	n.a.	n.a.	0.79	3
Lawns	Waschbusch, et al. 2000	WI	25	122	n.a.	n.a.	n.a.	1.61	3
Lawns - Fertilized	USGS 2002	WI	58	n.a.	n.a.	n.a.	n.a.	2.57	3
Lawns - Non-P Fertilized	USGS 2002	WI	38	n.a.	n.a.	n.a.	n.a.	1.89	3
Lawns - Unfertilized	USGS 2002	WI	19	n.a.	n.a.	n.a.	n.a.	1.73	3
Lawns	FAR 2003	NY	3	*602*	*17*	*17*	*50*	*2.1*	4
Representative Lawn Values				**213**	**13**	**n.a.**	**59**	**2.04**	

Notes:

Representative values are weighted means of collected data. Italicized values were omitted from these calculations.

1 - Grab samples from residential, commercial/institutional, and industrial rooftops. Values represent mean of DETECTED concentrations

2 - Flow-weighted composite samples, geometric mean concentrations

3 - Geometric mean concentrations

4 - Citation appears to be erroneous - original source of data is unknown. Not used to calculate representative value

5 - Median concentrations. Not used to calculate representative values due to site location and variation from other values.

6 - Mean concentrations from simulated rainfall study

7 - Mean concentrations. Not used to calculate representative values due to transportation nature of land use.

SUPPLEMENTARY INVESTIGATION OF THE FEASIBILITY AND BENEFITS OF LOW-IMPACT SITE DESIGN PRACTICES ("LID") FOR THE SAN FRANCISCO BAY AREA

Richard R. Horner[†]

ABSTRACT

The Clean Water Act NPDES permit that regulates municipal separate storm sewer systems (MS4s) in the San Francisco Bay Area, California will be reissued in 2007. The draft permit includes general provisions related to low impact development practices (LID) for certain kinds of development and redevelopment projects. Using eight representative development project case studies, based on California building records, the author investigated the practicability and relative benefits of LID options for the portion of the region having soils potentially limiting to infiltration. The principal LID option applicable in this situation is roof runoff harvesting, supplement by dispersion of the roof water in single-home sites. Other site runoff would be treated by conventional stormwater best management practices (BMPs), as specified in the permit. The results showed that effectively managing roof runoff and treating the remainder with conventional BMPS can: (1) reduce annual runoff volumes by almost half to more than 3/4, depending on land use characteristics, with much of the water saved available for a beneficial use; and (2) decrease mass loadings of pollutants to receiving waters by 63 to over 90 percent, depending on pollutant and land use.

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INTRODUCTION

Background

A report titled Initial Investigation of the Feasibility and Benefits of Low-Impact Development Practices ("LID") for the San Francisco Bay Area used six representative development project case studies, based on California building records, to investigate the practicability and relative benefits of LID options for the majority of the region having soils potentially suitable for infiltration either in their natural state or after amendment using well recognized LID techniques. The results demonstrated that: (1) LID site design and source control techniques are more effective than conventional best management practices (BMPs) in reducing runoff rates; and (2) in each of the case studies, LID methods would reduce site runoff volume and pollutant loading to zero in typical rainfall scenarios.

For a broad regional assessment of relatively large scale use of soil-based, infiltrative LID practices, the initial report covered areas having soils in Natural Resources Conservation Service (NRCS) Hydrologic Soil Groups A, B, or C as classified by the Natural Resources Conservation Service (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx). Depending on site-specific conditions, A and B soils would generally effectively infiltrate water without modification, whereas C soils could require organic amendments according to now standard LID methods. This supplementary report covers locations with group D soils, which are generally not amenable to infiltration, again depending on the specific conditions on-site. A minority but still substantial fraction of the Bay Area has group D soils (39.3, 68.0, 18.3, and 50.1 percent of the mapped areas of Alameda, Contra Costa, San Mateo, and Santa Clara Counties, respectively). Regarding any mapped soil type, it is important to keep in mind that soils vary considerably within small distances. Characteristics at specific locations can deviate greatly from those of the major mapped unit, making infiltration potential either more or less than may be expected from the mapping. The soil survey data are regarded as appropriate for use in broad-scale assessments such as underlie this and the initial report, but once site-specific implementation begins, it is important to verify site conditions.

General Assessment Methods

The assessment for group D soils reported herein emphasizes the use of LID practices appropriate in areas with relatively restrictive soils to the greatest possible extent, supplemented by conventional stormwater management practices implemented at fully practicable, high levels of effectiveness. The assessment was performed in a manner analogous to the analysis for the other soil groups and as described in the initial report. To recap briefly, with respect to each of several development case studies, three assessments were undertaken: a baseline scenario incorporating no stormwater management controls; a second scenario employing conventional BMPs; and a third development scenario employing LID stormwater management strategies. In each assessment, annual stormwater runoff volumes were estimated, as well as concentrations and mass loadings (the products of concentrations times flow volumes) of four pollutants: (1) total suspended solids (TSS), (2) total recoverable copper (TCu), (3) total recoverable zinc (TZn), and (4) total phosphorus (TP). The results of the second and third assessments were expressed in terms of the extent to which the management practices would reduce pollutant concentrations and loadings and runoff volumes, converting stormwater discharge a potential beneficial use (direct consumption or, in the case of group A, B, C soil areas, groundwater recharge).

Six case studies were selected to represent a range of urban development types considered to be representative of the Bay Area. These case studies involved: a multi-family residential complex (MFR), a relatively small-scale (23 homes) single-family residential development (Sm-SFR), a restaurant (REST), an office building (OFF), a relatively large (1000 homes) single-family residential development (Lg-SFR), and a single home (SINGLE). The land cover types for these various land uses were derived from building permit and other public records from the Bay Area or elsewhere in California.

Adaptation of Methods for Areas with Group D Soils

A key LID technique in a setting with soils relatively restrictive to infiltration is water harvesting, which can be applied at larger scales in commercial and light industrial developments and at smaller residential scales using cisterns or rain barrels. Harvesting has been successful in reducing runoff discharged to the storm drain system and conserving water in applications at all scales. For example, in downtown Seattle the King County Government Center collects enough roof runoff to supply over 60 percent of the toilet flushing and plant irrigation water requirements, saving approximately 1.4 million gallons of potable water per year (http://www.psat.wa.gov/Publications/LID_studies/rooftop_rainwater.htm, http://dnr.metrokc.gov/dnrp/ksc_tour/features/features.htm). A much smaller public building in Seattle, the Carkeek Environmental Learning Center, drains roof runoff into a 3500-gallon cistern to supply toilets (http://www.harvesth2o.com/seattle.shtml). Collecting drainage from individual dwellings for household use is a standard technique around the world, particularly in areas deficient in rainfall and without affordable alternative sources.

An additional general category of LID practices for poorly infiltrating locations, applicable especially at single homes and other relatively small-scale developments, is runoff dispersion for storage in vegetation and soil until evapotranspiration and some infiltration occurs. Section C.3.c of the California Regional Water Quality Control Board San Francisco Bay Region "Administrative Draft" NPDES Municipal Regional Stormwater Permit (“the Permit”) requires all single-family home projects that create and/or replace 5,000 square feet or more of impervious surface to implement one or more stormwater lot-scale BMPs from a selection of: (1) diverting roof runoff to vegetated areas; (2) directing paved surface runoff flow to vegetated areas; and/or (3) installing driveways, patios, and walkways with pervious material such as pervious concrete or pavers. Another way of distributing and dissipating roof runoff used successfully in varied soils in the state of Washington is the downspout dispersion system, consisting of a splash block or gravel-filled trench serving to spread roof runoff over a vegetated area (Washington Department of Ecology 2005 [Volume III, Section 3.1.2]).

The basis of the group D soils assessment was harvesting roof runoff to the maximum possible degree, supplemented in smaller-scale developments by runoff dispersion methods. The report asserts that, through these LID BMPs, it is practicable to prevent the entrance of any roof runoff into the municipal storm drain system in any soils setting in the Bay Area. In group D soils, infiltration likely cannot be relied upon to reduce runoff from other portions of developments, such as walkways, driveways, parking lots, access roads, and landscaping. Some water loss would undoubtedly occur, especially through evapotranspiration and at least some infiltration of runoff generated on or directed to landscaping. The analysis presented in this report does not take account of these losses and hence is somewhat conservative in estimating benefits.

As required by the Permit, any runoff not attenuated by harvest, evapotranspiration, or infiltration would be subject to quantity and quality controls. The analysis assumes that extended-detention basins (EDBs) with water residence times up to 72 hours would provide this control. EDBs are one of several general-purpose, conventional stormwater BMPs available for this service, others being wet ponds, constructed wetlands, sand or other media filters, and biofiltration swales and filter strips. The California Department of Transportation (Caltrans, 2004) tested the performance of all of these practices in its BMP Retrofit Pilot Program, conducted in San Diego and Los Angeles Counties. The initial report investigating LID for A, B, and C soils presented estimates of benefits for EDBs, swales, and filter strips, along with continuous deflective separation (CDS) units, a practice that effectively captures only large particulate pollutants. For brevity, this follow-up report focuses on just EDBs as the supplement to LID. In performance, EDBs tend to fall between swales and filter strips for total suspended solids, slightly lower than the other two BMP types for metals, and either between the two or comparable to swales for total phosphorus.

These practices were applied to the same six case studies used in the initial analysis and described in Table 1 of the first report. Two additional case studies were defined for the assessment reported here: a sizeable commercial retail installation (COMM) and an urban redevelopment (REDEV). The hypothetical COMM scenario consists of a building with a 2-acre footprint and 500 parking spaces. Parking spaces were estimated to be 176 sq ft in area, which corresponds to 8 ft width by 22 ft length dimensions. A simple, square parking lot with roadways around the four sides and a square building with walkways also around the four sides were assumed. Roadways and walkways were taken to be 20 ft and 6 ft wide, respectively. The REDEV case was taken from an actual project in Berkeley involving a remodel of an existing structure, built originally as a corner grocery store with apartments above and a large side yard, and the addition of a new building on the same site to create a nine-unit, mixed-use, urban infill project. Table 1 summarizes the characteristics of these two case studies. The table also provides the recorded or estimated areas in each land use and cover type.

Table 1. Characteristics and Land Use and Land Cover Areas of Added Case Studies

	COMM[a]	REDEV[a]
No. buildings	1	1
Total area (ft^2)	226,529	5,451
Roof area (ft^2)	87,120	3,435
No. parking spaces	500	2 uncovered
Parking area (ft^2)	88,000	316 uncovered
Access road area (ft^2)	23,732	-
Walkway area (ft^2)	7,084	350
Driveway area (ft^2)	-	650
Landscape area (ft^2)	20,594	700

[a] COMM—retail commercial; REDEV—commercial/residential infill

The assessment for group D soils employed the same methods as the earlier analysis to estimate annual stormwater runoff volumes and pollutant discharges. Please refer to the initial report for details on those methods. The Natural Resource Conservation Service (NRCS, 1986) methodology cited in that report was applied to estimate that infiltration in group D soils would be roughly 60 percent of the amount through landscaping or the bed of a conventional BMP in C soils, which were the basis for establishing runoff coefficients in the first analysis. While that initial analysis was performed for both 14- and 20-inch average annual runoff zones, typical of different Bay Area locations, this supplementary work covered only the former condition. This simplification was made in the interest of brevity in this report, given that the first analysis showed almost no difference in conclusions between the two situations.

RESULTS OF THE ANALYSIS

Table 2 provides a comprehensive summary of the results. Rows shaded in gray compare runoff and pollutant discharges with and without treatment by CDS units, which can capture relatively large solids but have no mechanisms for dissolved substances and the finer particles. Having no soil contact and very limited residence time for evaporation, this BMP cannot reduce runoff volume at all. It can achieve some substantial reductions in TSS and TP for land uses relatively high in landscaped area but little removal of metals, especially copper.

The blue-shaded rows show the performance of conventional EDBs. In the group D soils considered in this analysis, they were estimated to reduce annual runoff volumes by 13-23 percent, the higher values for land uses with relatively small impervious footprints (OFF and REST). These BMPs can capture the majority of the long-term mass loading of most pollutants from most land uses in these soils, falling below 50 percent in reducing metals in stormwater flowing from residential developments.

Rows shaded in green present the results of applying LID BMPs appropriate for group D soils, roof runoff harvesting supplemented by dispersion in single-home land uses, plus treating the remaining runoff with EDBs. Comparing annual runoff volumes with and without LID, it can be seen that removing roof runoff from the storm drain system affords very significant benefits in reducing surface discharge and putting much of that water to productive use. Compared to directing all site runoff to EDBs, LID is expected to reduce volume by almost 10 times in the REDEV case, by about five times for the various residential land uses, 3.6 times for the large commercial development, and around twice for the OFF and REST cases. This management strategy can recover over 3/4 of the stormwater that would otherwise go down the drain in the intense redevelopment case, approximately 2/3 for the multi- and single-family residential cases, over half in the COMM development, and almost half in the office and restaurant cases with relatively small roof footprints.

Reduction of volume translates to decreases in pollutant loadings also. The combination of LID and EDB treatment is estimated to raise copper and zinc reductions to about 70 to over 90 percent in all except the developments with relatively low roof proportions (60-65 percent in these cases). TSS predictions come in at a quite consistent 75-82 percent across land uses. Total phosphorus estimates are a similarly consistent 63-71 percent, a bit higher in the highly impervious REDEV case.

Effectively managing roof runoff gives a way out of the dilemma posed by group D soils in the Bay Area. The analysis has demonstrated that harvesting this runoff stream, supplemented by ground dispersion techniques with sufficient space, shows strong promise to reduce the majority of flow inputs to municipal storm drain systems while conserving water. Moreover, this strategy can also stem the majority of solids, copper, zinc, and phosphorus transport to receiving waters.

Table 2. Runoff Volume and Pollutant Loading Reductions with Conventional and Low-Impact Development (LID) Best Management Practices (BMPs) for Eight Land Use Case Studies in Hydrologic Group D Soils

	COMM[a]	OFF[a]	REST[a]	REDEV[a]	MFR[a]	Lg-SFR[a]	Sm-SFR[a]	SINGLE
Total annual runoff with no BMPs (ac-ft)	5.29	0.80	0.47	0.12	8.57	75.66	1.74	0.10
Total annual runoff with CDS units[b] (reduction)	5.29 (0.0%)	0.80 (0.0%)	0.47 (0.0%)	0.12 (0.0%)	8.57 (0.0%)	75.66 (0.0%)	1.74 (0.0%)	0.10 (0.0%)
Total annual runoff with EDBs[b] (reduction)	4.43 (16.3%)	0.63 (21.3%)	0.36 (23.2%)	0.11 (8.1%)	7.48 (12.7%)	65.27 (13.7%)	1.50 (13.7%)	0.09 (13.3%)
Total annual runoff with LID[b] (reduction)	2.22 (58.0%)	0.44 (45.0%)	0.28 (40.4%)	0.03 (78.9%)	2.80 (67.3%)	26.72 (64.8%)	0.61 (64.8%)	0.04 (65.7%)
CDS TSS reduction[b, c]	19.4%	44.8%	33.9%	22.1%	27.1%	37.1%	37.1%	37.7%
CDS TCu reduction[b, c]	0.4%	11.0%	4.2%	0.9%	2.7%	7.3%	7.3%	7.6%
CDS TZn reduction[b, c]	25.3%	29.1%	25.5%	25.5%	24.1%	25.6%	25.6%	25.9%
CDS TP reduction[b, c]	25.9%	63.7%	54.3%	35.7%	46.7%	57.6%	57.6%	58.2%
EDB TSS reduction[b, c]	64.7%	78.1%	74.9%	66.5%	62.8%	70.3%	70.3%	70.9%
EDB TCu reduction[b, c]	57.9%	51.6%	56.4%	53.2%	51.4%	43.5%	43.5%	43.6%
EDB TZn reduction[b, c]	57.6%	49.6%	48.9%	58.1%	48.5%	47.7%	47.7%	48.0%
EDB TP reduction[b, c]	44.4%	67.6%	63.3%	52.8%	56.3%	64.4%	64.4%	64.7%
LID + EDB TSS reduction[b, c, d]	74.6%	80.3%	77.0%	81.5%	79.4%	81.3%	81.3%	81.8%
LID + EDB TCu reduction[b, c, d]	71.9%	60.3%	62.2%	82.3%	73.8%	68.9%	68.9%	69.5%
LID + EDB TZn reduction[b, c, d]	79.7%	65.1%	60.9%	92.3%	78.9%	76.4%	76.4%	77.0%
LID + EDB TP reduction[b, c, d]	63.1%	69.8%	66.0%	75.2%	69.4%	70.8%	70.8%	71.1%

[a] COMM—retail commercial; OFF—office building; REST—restaurant; REDEV—commercial/residential redevelopment; MFR—multi-family residential; Lg-SFR—large-scale single-family residential; Sm-SFR—small-scale single-family residential; SINGLE—single family home
[b] CDS— continuous deflective separation; EDBs—extended-detention basins; reduction—comparison with no BMPs
[c] TSS—total suspended solids; TCu—total recoverable copper; TZn—total recoverable zinc; TP—total phosphorus
[d] LID + EDB—roof runoff harvesting for COMM, OFF, REST, REDEV, AND MFR; harvesting supplemented by dispersion of roof runoff for Lg-SFR, Sm-SFR, and SINGLE; treatment of remaining runoff by EDBs

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INVESTIGATION OF THE FEASIBILITY AND BENEFITS OF LOW-IMPACT SITE DESIGN PRACTICES APPLIED TO MEET VARIOUS POTENTIAL STORMWATER RUNOFF REGULATORY STANDARDS

By

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Report to

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From

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EXECUTIVE SUMMARY

STUDY DESIGN

A study was performed to investigate the degree to which stormwater management practices, commonly referred to as "low-impact development" methods or "green infrastructure," can retain urban runoff and meet five possible regulatory standards that could be applied nationally. Retention is defined as preventing the conversion of precipitation to runoff discharging from a development site on the surface, from where it can enter a receiving water. Retaining runoff from impervious and pollutant generating pervious surfaces prevents the introduction of urban runoff pollutants to receiving waters as well as reduces runoff volume to prevent stream channel and habitat damage, flooding, and loss of groundwater recharge. ARCD methods were assessed for their ability to: (1-2) meet standards pertaining to retention of the runoff generated by the 85th and 95th percentile, 24-hour precipitation events; (3) retain 90 percent of the post-development runoff; and (4-5) retain the difference between the post- and pre-development runoff, both with and without a cap at the 85th percentile, 24-hour event. The study assessed five urban land use types (three residential, one retail commercial, and one infill redevelopment), each placed in four climate regions in the continental United States on two regionally common soil types.

Infiltrating bioretention was applied as an initial strategy in the analysis of each case. When the initial strategy could not fully retain post-development runoff, additional methods were applied, involving roof runoff harvesting in the most impervious development cases and roof water dispersion in those with substantial pervious area. Benefits were assessed with respect to reduction of the annual average surface runoff volume from the quantity estimated without any stormwater management practices, the associated maintenance of pre-development groundwater recharge, and water quality improvement achieved through preventing discharge to receiving waters of pollutants generated with developed land uses.

RETENTION AND POLLUTANT REDUCTION CAPABILITIES

The initial strategy of infiltrating bioretention could retain all post-development runoff and pre-existing groundwater recharge, as well as attenuate all pollutant transport, in the three residential land use development types on hydrologic soil group (HSG) B soils, in all cases, in all regions, taking a fraction of the available pervious area to do so. For the more highly impervious commercial retail and redevelopment cases, bioretention would retain about 45 percent of the runoff and pollutants generated and save about 40 percent of the pre-development recharge. Adding roof runoff management measures in these cases would approximately double retention and pollutant reduction for the retail commercial land use and raise it to 100 percent for the redevelopment. Results were generally similar with HSG C soils, although more of the pervious portion of sites was required to equal the retention seen on B soils.

For development on the D soils in all climate regions, use of roof runoff management techniques was estimated to increase runoff retention and pollutant reduction from zero to between about one-third to two-thirds of the post-development runoff generated, depending on the land use case. These strategies would offer little groundwater recharge benefit with this soil condition, but would still have the potential to significantly reduce runoff volume and pollutant loading.

ABILITY TO MEET STANDARDS

The projected ability to meet the five standards identified above was found to vary mostly in relation to soil type (B or C versus D) and the relative imperviousness of development. The ability to meet the five standards varied much less across climate regions. With B and C soils, the methods considered were projected to meet all five standards in all but 12 of 125 evaluations. With D soils, however, only three standards could be met at all and those only occasionally. However, even on D soils, all cases for Standard 1 (retention of the 85^{th} percentile, 24-hour precipitation event) were able to retain greater than 50 percent of the required runoff volume. Moreover, opportunities to use ARCD practices or site design principles not modeled in this analysis have the potential to further increase runoff retention volume.

Standard 3 (retain 90 percent of the average annual post-development runoff volume) would be the most environmentally protective standard. Meeting or coming as close as possible to meeting, but not exceeding, this standard was estimated to lead to 66-90 percent of total runoff retention and pollutant loading reduction on B and C soils and 37-66 percent runoff retention on D soils. Standard 2 (retain the runoff produced by the 95^{th} percentile, 24-hour precipitation event) would yield equivalent protection on D soils and only slightly less protection with B and C soils. The outcome with this standard would also be more consistent region to region than with the alternative standard 1, based on the 85^{th} instead of the 95^{th} percentile precipitation event. Sites located on B or C soils were able retain the runoff produced by the 85^{th} percentile storm in 24 of 25 cases modeled (in 18 of the 25 cases by using infiltrating bioretention alone), and were able to retain the runoff produced by the 95^{th} percentile storm in 22 of 25 cases modeled.

Standards 4 and 5, based on the differential between pre- and post-development runoff volume, are inconsistent in retaining runoff and reducing pollutants, in that they are relatively protective where pre-development runoff is estimated to be low relative to post-development flow, but result in progressively lower retention and pollutant loading reduction as pre- and post-development volumes converge, such as in several cases on D soils. Standard 5 is especially weak in this regard. The potentially low level of retention and pollutant loading reduction renders these standards based on the change in pre- versus post-development runoff volume poor candidates for national application, at least as formulated in these terms.

In summary, standards 2 and 3 are clearly superior to the other three options from both a volume and pollutant load reduction standpoint. Standard 3 is entirely consistent from place to place in degree of environmental protection, and standard 2 does not deviate much. Analysis of the five development cases on two soil groups in each of four regions demonstrated the two standards are virtually identical in the runoff retention and pollutant loading reduction they would bring about. Of the remaining standards, standard 1 (retantion of the runoff produced by the 85^{th} percentile storm event) remains more consistent across regions and more protective of water quality for development on D soils than either standard 4 or 5, and is preferable to those standards in this regard.

INTRODUCTION

GENERAL STUDY DESCRIPTION

Study Design

This purpose of this study was to investigate the degree to which low-impact development (LID) [1] practices can meet or exceed the requirements of various potential stormwater management facility design standards and to determine the environmental benefits that can be realized by applying these techniques. The investigation was performed by estimating the stormwater retention possible with full application of low-impact options under a range of conditions broadly representative of different regions within the United States and then determining the implications of the findings for achieving various standards and for providing benefits. Retention is defined as preventing the conversion of precipitation to surface runoff from urbanized land uses through infiltration, evapotranspiration, and/or harvesting for some water supply purpose. Retaining runoff from impervious and pollutant generating pervious surfaces prevents the introduction of urban runoff pollutants to receiving waters as well as reduces runoff volume to prevent stream channel and habitat damage, flooding, and loss of groundwater recharge. Benefits were assessed with respect to reduction of the potential developed land surface runoff volume, the associated maintenance of pre-development groundwater recharge, and water quality improvement achieved through preventing discharge to receiving waters of pollutants generated with developed land uses.

The potential regulatory standards investigated were capture and retention of, at minimum:

- Standard 1—The runoff produced by the 85th percentile, 24-hour precipitation event,[2] a standard commonly used in California;
- Standard 2—The runoff produced by the 95th percentile, 24-hour precipitation event, the standard adopted under Section 438 of the Energy Independence and Security Act;
- Standard 3—90 percent of the average annual post-development runoff volume;
- Standard 4—The difference between the post- and pre-development[3] average annual runoff volumes; and
- Standard 5—The difference between the post- and pre-development runoff volumes for all events up to and including the 85th percentile, 24-hour precipitation event.

Conditions broadly representative of the nation were selected by, first, considering the climate regions defined in USEPA's (1983) Nationwide Urban Runoff Project (NURP) report. For full analysis, climate regions 1 (Northeast-Upper Midwest), 3 (Southeast), 5 (South Central), and 6 (Southwest) were chosen as providing a wide range of climatological conditions and geographic distribution. Once the four regions were picked, a metropolitan area and a specific city in each were chosen to serve as typical models of development circumstances in the general area, as

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[1] The National Research Council (NRC, 2009) renamed LID, also known as green infrastructure, as aquatic resources conservation design (ARCD), the term used henceforth in this report.

[2] The 85th percentile, 24-hour event represents the precipitation quantity in a 24-hour period not exceeded in 85 percent of all events in an extended record.

[3] In this study the pre-development state is taken as the typical land cover existing before European settlement of an area.

detailed in the Case Studies discussion below. In addition, region 7 (Pacific Northwest) was identified as an additional location to be discussed. This region is the site of a considerable amount of ARCD application in an area somewhat different climatologically than other selected regions, in having persistent winter rainfall totaling annually, in the major urban areas, intermediately among the other regions. Results of research on ARCD conducted in this region are discussed at several points in this report.

Soils and topography were the next considerations in developing broadly representative conditions. U.S. Department of Agriculture websites were the source of general soil characterizations for the study regions and specific soil survey data in and around the representative metropolitan areas. Soils generally represented some range in textural classes and associated hydraulic conductivities. For each region, a soil type predominating among those representing hydraulic conductivities relatively high and low for the region were selected to serve as a basis for the analyses. The effect of slope was also investigated but ultimately found not to affect results substantially.

Five types of urban development were selected to represent breadth in land use: (1) multi-family residential, (2) small-scale single-family residential, (3) large-scale single-family residential, (4) large-scale commercial, and (5) infill redevelopment. Building permit data from each region were consulted to determine typical distributions of site features for each (e.g., land cover by buildings, parking areas, roadways, walkways, driveways, landscaping).

Case studies thus comprised four climate regions, each with two soil conditions and five land use types, for a total of 40 permutations. For each, the ability of the site to accommodate soil- and vegetation-based ARCD practices was investigated. Runoff quantities were estimated and compared to the five potential regulatory standards. Annual mass loading discharges were estimated for four pollutants: total suspended solids (TSS), total recoverable copper (TCu) and zinc (TZn), and total phosphorus (TP). In any case where soil- and vegetation-based ARCD infiltration techniques appeared not to be able to attenuate all runoff, specific roof runoff management strategies were investigated as possible measures to achieve additional retention. Runoff quantities and pollutant discharges were recalculated based on use of these additional practices in place.

This report covers the methods employed in the investigation, data sources, and references for both. It then presents the results, discusses their consequences, draws conclusions, and makes recommendations relative to the feasibility of utilizing low-impact development practices to meet the respective potential regulatory standards.

AQUATIC RESOURCES CONSERVATION DESIGN PRACTICES

General Description

As the stormwater management field developed, it passed through several stages. First, it was thought that the key to success was to match post-development with pre-development peak flow rates, while also reducing a few common pollutants (usually, TSS) by a set percentage. Finding that these efforts generally required large ponds, but that they did not forestall impacts, stormwater managers next deduced that runoff volumes and high discharge durations would also have to decrease. Almost simultaneously, although not necessarily in concert, the idea of low-impact development arose to offer a way to achieve actual avoidance, or at least minimization, of discharge quantity and pollutant increases reaching far above pre-development levels. These methods reduce storm runoff and its contaminants by decreasing their generation at sources, infiltrating into the soil or evaporating or transpiring[4] storm flows before they can enter surface receiving waters, and treating flow remaining on the surface through contact with vegetation and soil, or a combination of these strategies.

The National Research Council ("NRC") (2009) renamed LID as Aquatic Resources Conservation Design (ARCD) for several reasons. First, this term signifies that the principles and many of the methods apply not only to building on previously undeveloped sites, but also to redeveloping and retrofitting existing development. Second, incorporating aquatic resources conservation in the title is a direct reminder of the central reason for improving stormwater regulation and management. ARCD encompasses the complete range of practices to counteract all negative urban runoff impacts; i.e., the full suite of practices that emphasize and accomplish retention as defined above. These practices aim at decreasing surface runoff peak flow rates, volumes, and elevated flow durations, as well as avoiding or at least minimizing the introduction of pollutants to any surface runoff produced. Reducing the concentration of pollutants, together with runoff volume decrease, cuts the cumulative mass loadings (mass per unit time) of pollutants entering receiving waters over time.

The menu of ARCD practices begins with conserving, as much as possible, existing trees, other vegetation, and soils, as well as natural drainage features (e.g., depressions, dispersed sheet flows, swales). Clustering development to affect less land is a fundamental practice advancing this goal. Conserving natural features would further entail performing construction in such a way that vegetation and soils are not needlessly disturbed and soils are not compacted by heavy equipment. Using less of polluting materials, isolating contaminating materials and activities from contact with rainfall or runoff, and reducing the introduction of irrigation and other non-stormwater flows into storm drain systems are essential. Many ARCD practices fall into the category of minimizing impervious areas through decreasing building footprints and restricting the widths of streets and other pavements to the minimums necessary. Another important category of ARCD practices involves directing runoff from roofs and pavements onto pervious areas as sheet flow, where all or much of the runoff can infiltrate or evaporate in many situations.

Water can be harvested from impervious surfaces, especially roofs, and put to use for irrigation, non-potable indoor water supply. Harvesting is a standard technique for Leadership in Energy and Environmental Design (LEED) buildings (U.S. Green Building Council, 2008). Many successful systems of this type are in operation, with examples such as the Natural Resources Defense Council offices (Santa Monica, CA), the King County Administration Building (Seattle, WA), and two buildings on the Portland State University campus (Portland, OR). Harvesting is feasible at the small scale using rain barrels and at larger scales using larger collection cisterns and piping systems. These small-scale applications have been used throughout the world for centuries and are rapidly spreading in the United States today (See, e.g., Texas Water Development Board, 2005; Georgia Department of Community Affairs, 2009).

If these practices are used but runoff is still produced, ARCD offers an array of techniques to retain it on-site through infiltration and evapotranspiration (ET). The bioretention cell (rain garden) is the workhorse practice in this category, but swales conveying flow slowly, filter strips set up for sheet flows, and other modes are also important. Relatively low traffic areas can be constructed with permeable surfaces such as porous asphalt, open-graded Portland cement concrete, coarse granular materials, concrete or plastic unit pavers, or plastic grid systems to allow for infiltration.

[4] Transpiration refers to vaporization of water from plant tissue, while evaporation applies to vaporization from a liquid (e.g., pool) or solid (e.g., leaf) surface. The terms are often combined to form the compound evapotranspiration (ET).

ARCD practices should be selected and applied as close to sources as possible to stem runoff and pollutant production near the point of potential generation. However, these practices must also work well together and, in many cases, must be supplemented with strategies operating farther downstream. For example, the City of Seattle, in its "natural drainage system" retrofit initiative, built serial bioretention cells flanking relatively flat streets. "Cascades" of vegetated stepped pools created by weirs were installed along more sloping streets. In some cases the cells drain to downstream cascades. The upstream components are highly effective in attenuating most or even all runoff. Flowing at higher velocities on sloped surfaces, the cascades do not perform at such a high level, although under favorable conditions they can still infiltrate or evapotranspire the majority of the incoming runoff (Chapman 2006, Chapman and Horner 2010). Even if not as impressive statistically, cascades can actually decrease storm discharge to streams more than the cells do, because of their generally greater size. Also, the cascades extract pollutants from remnant runoff through mechanisms mediated by vegetation and soils. The success of Seattle's natural drainage systems demonstrates that well designed ARCD practices can mimic natural landscapes hydrologically, and thereby avoid raising discharge quantities.

A watershed-based program emphasizing ARCD practices would convey significant benefits beyond greatly improved stormwater management. ARCD techniques overall would advance water conservation, and infiltrative practices would increase recharge of groundwater resources. ARCD practices can be made attractive and thereby improve neighborhood aesthetics and property values. Retention of more natural vegetation can both save wildlife habitat and provide recreational opportunities. Municipalities could use the program in their general urban improvement initiatives, giving incentives to property owners to contribute to goals in that area while also protecting water resources.

A Catalogue of ARCD Practices

ARCD practices are numerous and expanding as existing configurations are applied in new ways. Table 1 presents a catalogue adapted from USEPA (2007) and NRC (2009). This catalogue contains practices that are not equally applicable in all settings; e.g., nevertheless, each category offers practices applicable in a broad variety of circumstances.

The best strategy for choosing among and implementing these practices is a decentralized, integrated one; i.e., selecting practices that fit together as a system, starting at or near sources and working through the landscape until management objectives are met. This strategy makes maximum possible use of practices in the first three categories, which prevent stormwater quantity and quality problems, and then selects among the remaining classifications in relation to the localized and overall site conditions. Source control and preservation of existing vegetation and soils obviously avoid post-development runoff quantity and pollutant increases from any portion of the site that can be so treated. Among all strategies, these best maintain natural infiltration and ET patterns and yield of materials flowing from the site. This preventive strategy is supplemented by strategies to create as little impervious cover as possible. The remaining practices then contend with the excess runoff and pollutants over pre-development levels generated by the development.

For the practices that infiltrate water, a site's soil characteristics and depth to groundwater can and should be determined through infiltration rate testing and excavation to determine the infiltration capability. Because of the often substantial variability of conditions around a site, these determinations should be made at multiple points. If the natural infiltration rate is low, generally < 0.5 inch/hour (< 1.25 cm/h, Geosyntec 2008), in many situations the soil can be amended, usually with organic compost, to apply an infiltrative practice.

In addition to soil characteristics, the position of the groundwater table is a crucial determinant of whether or not stormwater infiltration should be promoted by applying ground-based ARCD practices. A seasonal high water table too close to the surface results in rapid saturation of a thin soil column and retarded infiltration. Ponding water longer than 72 hours can permit mosquito growth, damage vegetation, and promote clogging of the facility by microorganism growths and polysaccharide organic materials that form in the reduced-oxygen environment accompanying excessive ponding time (Mitchell and Nevo 1964, Ronner and Wong 1996). Also, storm runoff flow through a short soil column or very rapidly through a coarse-textured soil can convey contaminants to groundwater.

Evidence gathering from available performance data is that evapotranspiration (ET) can be a substantial factor in water retention (discussed below) but may be difficult to quantify at a given site without more research. A conservative approach is to design on the basis of infiltration rate, calculated to include consideration of soil amendments, if any. Together with careful investigation of soils and hydrogeologic conditions, this means of proceeding is very likely to produce facilities that retain at least as much runoff as predicted, and almost certainly more as a result of unquantified ET.

Table 1. A Catalogue of Aquatic Resources Conservation Design Practices (USEPA [2007] and NRC [2009])

Category	Definition	Examples
Source control	Minimizing pollutants or isolating them from contact with rainfall or runoff	• Substituting less for more polluting products • Segregating, covering, containing, and/or enclosing pollutant-generating materials, wastes, and activities • Avoiding or minimizing fertilizer and pesticide applications • Removing animal wastes deposited outdoors • Conserving water to reduce non-stormwater discharges
Conservation site design	Minimizing the generation of runoff by preserving open space and reducing the amount of land disturbance and impervious surface	• Clustering development • Preserving wetlands, riparian areas, forested tracts, and porous soils • Reducing pavement widths (streets, sidewalks, driveways, parking lot aisles) • Reducing building footprints
Conservation construction	Retaining vegetation and avoiding removing topsoil or compacting soil	• Minimizing site clearing • Minimizing site grading • Prohibiting heavy vehicles from driving anywhere unnecessary
Runoff harvesting	Capturing rainwater, generally from roofs, for a beneficial use	• Using storage and distribution systems (rain barrels or cisterns) for irrigation and/or indoor supply for public and private buildings
Natural runoff conveyance practices	Maintaining natural drainage patterns (e.g., depressions, natural swales) as much as possible, and designing drainage paths to increase the time before runoff leaves the site	• Emphasizing sheet instead of concentrated flow • Eliminating curb-and-gutter systems in favor of natural drainage systems • Roughening land surfaces • Creating long flow paths over landscaped areas • When flow must be concentrated, using vegetated channels with flow controls (e.g., check dams)
Practices for temporary runoff storage followed by infiltration and/or evapotranspiration[a]	Use of soil pore space and vegetative tissue to increase the opportunity for runoff to percolate to groundwater or vaporize to the atmosphere	• Bioretention cells (rain garden) • Vegetated swales (channel flow) • Vegetated filter strips (sheet flow) • Planter boxes • Tree pits • Infiltration basins • Infiltration trenches • Roof downspout surface or subsurface dispersal • Permeable pavement • Vegetated (green) roofs
ARCD landscaping[b]	Soil amendment and/or plant selection to increase storage, infiltration, and evapotranspiration	• Organic compost soil amendments • Native, drought-tolerant plantings • Reforestation • Turf conversion to meadow, shrubs, and/or trees

[a] Some of these practices are also conventional stormwater BMPs but are ARCD practices when ARCD landscaping methods are employed as necessary to maximize storage, infiltration, and evapotranspiration. The first five examples can be constructed with an impermeable liner and an underdrain connection to a storm sewer, if full retention is technically infeasible (see further discussion later). Vegetated roofs store and evapotranspire water but offer no infiltration opportunity, unless their discharge is directed to a secondary, ground-based facility.
[b] Selection of landscaping methods depends on the ARCD practice to which it applies and the stormwater management objectives, but amending soils unless they are highly infiltrative and planting several vegetation canopy layers (e.g., herbaceous growth, shrubs, and trees) are generally conducive to increasing storage, infiltration, and evapotranspiration.

Application of ARCD Practices in This Study

The investigation performed for this study first assessed the capacity of each case study site to infiltrate the full average annual post-development storm runoff volume and thereby reduce pollutant releases to zero. The report terms this initial evaluation as the "Basic ARCD Analysis". The means of infiltration was not distinguished at this level of analysis. For example, it was not specified if runoff would be distributed in sheet flow across a pervious area or channeled into a rain garden. As detailed later in the Methods of Analysis section, this analysis was limited to the estimated infiltration capacity of the case study soil type, possibly compost-amended, and the available pervious area.

Critically, there was no attempt to estimate the loss of surface runoff through ET in the Basic ARCD analysis (ET is considered, to address rooftop runoff only, as part of our "Full ARCD analysis," discussed below). In general, the estimated mean annual evapotranspiration in the Southeast is about 70 percent of the precipitation, or roughly 35 inches per year. For large areas of the Southwest, evapotranspiration is virtually equal to 100 percent of the precipitation, which is only about 10 inches per year. The ratio of estimated mean annual evapotranspiration to precipitation is least in the mountains of the Pacific Northwest and New England where evapotranspiration is about 40 percent of the precipitation (Hanson, 1991). By leaving out these substantial losses, generally 40 percent of precipitation or more, the retention estimates in this study can be considered quite conservative.

Additionally, there was no consideration of many ARCD practices in the Table 1 catalogue that could be applied in site-specific design. For example, there were no refinements of the prevailing building standards to reduce street widths or cluster buildings and reduce their footprints. Further, green roofs were not considered in this study, although they are already making a contribution to runoff reduction around the nation and reflect a significant additional opportunity to retain runoff on-site. The U.S. EPA has stated that "a 3.5-4 in. (8 -10 cm) deep green roof can retain 50% or more of the annual precipitation." (U.S. EPA, 2009a). For water quality, we did not assume any source control implementation. Thus, actual site design could take advantage of substantial additional capabilities not considered in this study.

In cases where the practices incorporated in the initial level of analysis (infiltration through bioretention) did not, according to the estimates, fully attenuate post-development pollutant discharges, specific attention was directed at ways of extracting additional water from surface discharge by managing roof runoff. This assessment is called the "Full ARCD Analysis" in the report. The options broadly divide into harvesting water for a purpose such as irrigation and/or non-potable indoor supply, or making special provisions to infiltrate or evapotranspire roof runoff even if soil conditions are limiting. Harvesting applies best to relatively large developments having sufficient demand for the collected water. While single-family residences can harvest water into rain barrels or cisterns for lawn and garden watering, these containers may be small in volume relative to runoff production; and though opportunity exists, no credit was taken for them in this study. However, even in poorly infiltrating soils, options exist to disperse house roof runoff as sheet flow for storage in vegetation and soil until evapotranspiration and some infiltration occurs.

CASE STUDIES

CLIMATE REGIONS

Basis of Selection

The Nationwide Urban Runoff Project divided the nation into nine regions based on differences in volume, intensity, and duration of precipitation and interval between precipitation events (USEPA 1983). For broad representation of the U.S. generally this study chose regions 1 (Northeast-Upper Midwest), 3 (Southeast), 5 (South Central), and 6 (Southwest) for analysis. Table 2 provides the annual precipitation statistics from the NURP compilation.

Table 2. Precipitation Statistics (Means) for Four NURP Regions Selected for Study (USEPA 1983)

Region	Volume (inch)	Intensity (inch/hour)	Duration (hours)	Interval (hours)
1—Northeast-Upper Midwest	0.26	0.051	5.8	73
3—Southeast	0.49	0.102	5.2	89
5—South Central	0.33	0.080	4.0	108
6—Southwest	0.17	0.045	3.6	277

The selected regions represent a volume differential of about a factor of three, intensity variation of approximately two times, and inter-storm interval varying by almost four times. The NURP report shows coefficients of variation (mean/standard deviation) of greater than 1.0 for all of these means, indicating an overall high degree of dispersion.

Figure 1 visually depicts variation in mean annual precipitation across the continental United States. It shows that the selected regions are overall representative of the broadly prevailing range across the nation, particularly its major urban and still urbanizing areas.

Region 7 (Pacific Northwest) was also identified for discussion of research results on ARCD, although not full analysis. It has less intense (mean 0.024 inch/hour) but much more extended (mean 20.0 hours) precipitation compared to any other region in the nation. Mean storm volume ranks with region 3 (mean 0.48 inch); but fewer storms, especially in the summer, yield overall less total annual precipitation in lowland areas holding all urban development in region 7. It was of interest because of the already occurring use of ARCD techniques in a relatively rainy part of the country.

Representative Metropolitan Areas and Cities

Once the regions were identified, a metropolitan area within each area was chosen as a basis for assigning specific precipitation and development characteristics. The areas considered were USEPA-designated Urban Areas: "An urbanized area is a land area comprising one or more places – central place(s) – and the adjacent densely settled surrounding area – urban fringe – that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile" (USEPA 2007). Stormwater regulations would have the most impact in areas that are being quickly developed, redeveloped, or both. Five of the twenty fastest growing counties in the nation from 2000 to 2009 were near Atlanta, GA and five were in the state of Texas (U.S. Census Bureau 2010). These statistics factored into the decision to focus on records from these regions.

Each selected metropolitan area is generally representative of its region in precipitation and development characteristics. Each is also undergoing relatively active new development and redevelopment, offering candidate locations where a prospective stormwater standard would frequently be applied. These metropolitan areas are: region 1—Boston, MA, region 3—Atlanta, GA, region 5—Austin, TX, and region 6—San Diego, CA

Figure 1. Precipitation of the Conterminous States of the United States, National Atlas of the United States, 2011.

Finally, a city with a high rate of development (and often redevelopment) was picked in each metropolitan area for investigation of building patterns and standards. The intent was to match regional patterns of climate, soils (see discussion on physiographic data, below), and land use and land cover realistically. After substantial investigation, the conclusion was that building standards, how land is used, and the relative allocation of impervious and pervious lands do not vary in any systematic way across the nation and cannot be regionally distinguished. Therefore, the variables of interest came down to precipitation and soils.

Alpharetta, about 30 miles north of Atlanta, represents that metropolitan area. In 1981 it was a small town of approximately 3,000 residents but grew to 51,243 by 2007. During the workday, the city swells to more than 120,000 residents, workers, and visitors. Alpharetta is home to large corporations such as AT&T (3500 employees), Verizon Wireless (3000 employees), and ADP, Inc./National Account Services (2100 employees). Infill redevelopment projects are anticipated in the downtown area (City of Alpharetta, 2011).

Round Rock is a typical developing city located 15 miles to the north of Austin, TX. In 1970 there were only 2,700 residents in this town, while today the population exceeds 100,000. Round Rock is the eighth-fastest growing city in the nation and the location of several large corporate campuses.

The Town of Framingham, 20 miles west of Boston, represents the northeastern climate zone. At nearly 67,000 inhabitants, Framingham is the largest entity designated as a “town” in the Commonwealth of Massachusetts. It is home to three large corporations and overall 2200 businesses providing 45,000 jobs. Differing greatly from the representative communities in other regions, Framingham was incorporated in 1700 and developed early in the nation's history. Today's activity includes redevelopment of brownfields and downtown revitalization, although some agricultural land still remains within the town limits (Town of Framingham, 2011).

San Marcos, representing the San Diego area and located about 35 miles north of the city, grew from a population of 17,479 in 1980 to 82,743 by 2008. Major institutions in the city include California State University San Marcos and Palomar Community College. At this stage the city is only approximately 72 percent built out, and thus new development continues (City of San Marcos, 2011).

Precipitation Data

Average monthly precipitation data were obtained from the NOAA Hourly Precipitation Data Rainfall Event Statistics[5] for one station with a long-term record in each region: Southeast—Atlanta/Hartsfield International Airport (Station #90451), South Central—Austin/Robert Mueller Municipal Airport (410428), Northeast—Boston/Logan International Airport (190770), and Southwest—San Diego/San Diego International Airport (Lindbergh Field) (47740). Atlanta receives the most precipitation, averaging about 49 inches per year, followed by Boston (47 inches/year), Austin (33 inches/year), and San Diego (10 inches/year). Figure 2 depicts precipitation variations over more than 50 years.

Values for either the 85th and 95th percentile, 24-hour storms were available in a number of state-specific resources, including the Georgia Stormwater Standards Supplement (Center for Watershed Protection 2009) and the Integrated Stormwater Management Program (North Central Texas Council of Governments 2010), as well as national publications such as an USEPA's technical guidance documents (USEPA 2009). However, few references had values for both 85th and 95th percentile storms. Therefore, these values were calculated following the methodology outlined in the USEPA's Technical Guidance on Implementing the Stormwater Runoff Requirements (USEPA 2009, page 30). Daily precipitation and temperature data from the National Climatic Data Center's TD Summary of the Day data set were collected and analyzed for the four stations lover a time period of 60 years, January 1, 1950 to January, 31 2010.

[5] National Climatic Data Center, Hourly Precipitation Data Rainfall Event Statistics (http://cdo.ncdc.noaa.gov/cgi-bin/HPD/HPDStats.pl, last accessed December 15, 2011).

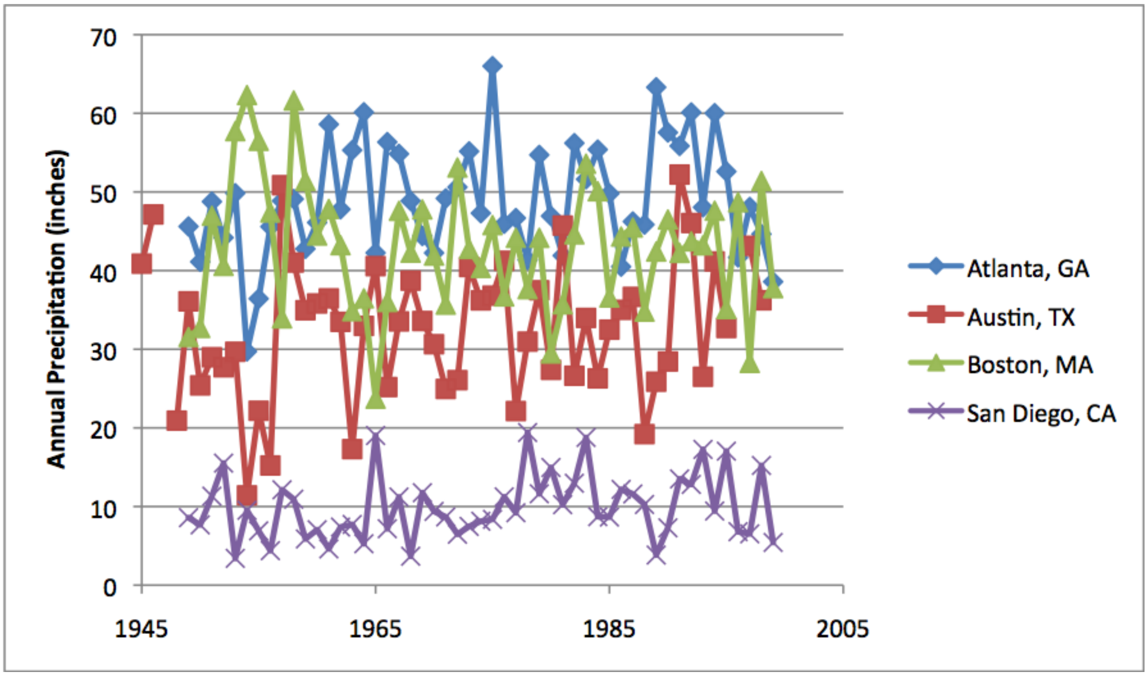

Figure 2. Average Annual Precipitation for Four Climate Regions over the Latter Part of the Twentieth Century (from NOAA Hourly Precipitation Data Rainfall Event Statistics, http://cdo.ncdc.noaa.gov/cgi-bin/HPD/HPDStats.pl)

For snowfall days, snow water equivalent (SWE) was calculated according to the guidelines provided by a National Climate Data Center's (NCDC) document, Estimating the Water Equivalent of Snow, utilizing the reported mean temperature for the day (National Climatic Data Center, accessed December 16, 2011). The NCDC tables calculate that the SWE is at most, about 10 percent of the total snowfall depth. In the methodology for determining the 85th and 95th percentile events, all days with < 0.1 inch precipitation are removed, lowering the impact of snow on the results. Snowfall had no effect in the Southwest region, a very minor effect in the Southeast and South Central, and still a relatively small effect in the Northeast, as follows: San Diego—0 snow days; Atlanta—74 of 4600 total days having ≥ 0.1 inch (1.6 percent), with a contribution ranging 0.01-0.79 inch precipitation; Austin—32 of 2418 days (1.3 percent), contributing 0.01-0.50 inch; and Boston—993 of 4783 days (20.8 percent), contributing 0.01-2.24 inch. Since snow does add to runoff that must be managed in a location like the Northeast, these snow water equivalents were left in the records. Table 3 summarizes precipitation data used in the analyses for the four regions.

Table 3. Precipitation Summary for Study Regions

Region	Average Annual Precipitation (inches)	85th Percentile, 24-Hour Event		95th Percentile, 24-Hour Event	
		Depth (inch)[a]	Fraction Covered[b]	Depth (inch)[a]	Fraction Covered[b]
Southeast	49.02	1.13	0.63	1.79	0.87
South Central	32.67	1.19	0.58	1.99	0.82
Northeast	47.03	1.07	0.81	1.72	0.89
Southwest	9.68	0.76	0.62	1.26	0.83

[a] Calculated from National Climatic Data Center's TD Summary of the Day, for all precipitation days >0.1 inch for period January 1, 1950 – December 31, 2009
[b] Fraction of total annual precipitation covered by event standard

Physiographic Data

General Methods

This section of the report covers the soils, groundwater, and topographic data underlying the analyses. Soil characteristics are largely a product of climate, geology and topography. The characteristics of most interest for this study were those controlling infiltration of surface water and percolation to an aquifer. Although there is variation within each climate region, the major soil orders can be used to identify regional characteristics. The Natural Resources Conservation Service (NRCS) website[6] describing the major soil orders and their locations was the initial source of these data. Maps generated by Miller and White (1998) gave information from the State Soil Geographic Database (STATSGO), including characteristics such as soil texture and hydrologic soil group. These resources were employed to gain a broad view of the soils in each of the four regions.

To extend the scope of the study, soils were investigated in the Upper Midwest, in addition to the Southeast, South Central, Northeast, and Southwest climate regions. Upper Midwest and Northeast soils share general similarities. Both regions also have temperate, seasonal, humid climates. While average annual precipitation is overall somewhat greater in the Northeast compared to the Upper Midwest, the two regions were deemed similar enough physiographically and climatologically to be considered together. This report henceforth groups them as the Northeast – Upper Midwest climate region.

To validate the regional patterns emerging from the general sources, custom “soil resource” reports for four cities were generated using the NRCS Web Soil Survey[7] tool. These reports collected characteristics related to infiltration rates and runoff including soil texture, hydrologic soil group, drainage classification, representative slope, and depth to water table. Using this tool requires selecting an “area of interest”. This examination utilized a size of at least 8,000 acres (10,000 acres is the maximum allowed) to insure a representative sample of soil and related conditions.

Hydrologic soil group assignment is a means of generally categorizing soils according to their tendency to admit and transmit water. The hydrologic soil group (HSG) is determined with respect to the water-transmitting soil layer with the lowest saturated hydraulic conductivity and depth to any layer that is more or less water impermeable (such as a fragipan or duripan) or depth to a water table. Box 1 summarizes the characteristics of the four HSGs (NRCS 2007).

The position of the groundwater table is a crucial determinant of whether or not stormwater infiltration should be promoted by applying ground-based ARCD practices. A seasonal high water table too close to the surface results in rapid saturation of a thin soil column and retarded infiltration. Ponding water longer than 72 hours can permit mosquito growth, damage vegetation, and promote clogging of the facility by microorganism growths and polysaccharide organic materials that form in the reduced-oxygen environment accompanying excessive ponding time (Mitchell and Nevo 1964, Ronner and Wong 1996). Also, storm runoff flow through a short soil column or very rapidly through a coarse-textured soil can potentially convey contaminants to groundwater. To avoid entertaining stormwater management strategies threatening development of these problems, data on depth to groundwater was obtained from the U.S. Geological Survey’s (USGS) Groundwater-Level Annual Statistics (USGS 2011).

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[6] Natural Resources Conservation Service, Distribution Maps of Dominant Soil Orders (http://soils.usda.gov/technical/classification/orders/, last accessed December 16, 2011).

[7] Natural Resources Conservation Service, 2011, Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm).

Topographic slope influences runoff production by setting incident precipitation in motion downslope, thus producing a horizontal component of velocity vector partially counteracting the tendency to penetrate the soil vertically. This study investigated that importance of that effect by considering two slopes typical of urban development sites. As discussed during the presentation of results, below, this factor did not have a large effect on the analysis.

Box 1. Summary of Hydrologic Soil Groups (NRCS 2007)

Group A—Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Some soils having loamy sand, sandy loam, loam or silt loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The saturated hydraulic conductivity of all soil layers exceeds 5.67 inches per hour. The depth to any water-impermeable layer is greater than 20 inches. The depth to the water table is greater than 24 inches. Soils deeper than 40 inches to a water-impermeable layer are in group A if the saturated hydraulic conductivity of all soil layers within 40 inches of the surface exceeds 1.42 inch per hour.[a]

Group B—Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures. Some soils having loam, silt loam, silt, or sandy clay loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The saturated hydraulic conductivity in the least transmissive layer between the surface and 20 inches ranges from 10.0 1.42 to 5.67 inches per hour. The depth to any water-impermeable layer is greater than 20 inches. The depth to the water table is greater than 24 inches. Soils deeper than 40 inches to a water- impermeable layer or water table are in group B if the saturated hydraulic conductivity of all soil layers within 40 inches of the surface exceeds 0.57 inch per hour but is less than 1.42 inch per hour.

Group C—Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Some soils having clay, silty clay, or sandy clay textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The saturated hydraulic conductivity in the least transmissive layer between the surface and 20 inches is between 0.14 and 1.42 inch per hour. The depth to any water-impermeable layer is greater than 20 inches. The depth to the water table is greater than 24 inches. Soils deeper than 40 inches to a restriction or water table are in group C if the saturated hydraulic conductivity of all soil layers within 40 inches of the surface exceeds 0.06 inch per hour but is less than 0.57 inch per hour.

Group D—Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential. All soils with a depth to a water-impermeable layer less than 20 inches and all soils with a water table within 24 inches of the surface are in this group, although some may have a dual classification if they can be adequately drained. For soils with a water-impermeable layer at a depth between 20 and 40 inches, the saturated hydraulic conductivity in the least transmissive soil layer is less than or equal to 0.14 inch per hour. For soils deeper than 40 inches to a restriction or water table, the saturated hydraulic conductivity of all soil layers within 40 inches of the surface is less than or equal to 0.06 inch per hour.

[a] While Group A soils are present across large areas of the country, our analysis considers only Group B, C, and D soils to provide a conservative assessment of infiltration potential in urban areas, and to account for potential issues such as soil compaction that may occur for lawn and other landscaping in urban and suburban development.

Southeast Climate Region

The major soil order found throughout the southeastern United States is Utisols, sub-order Udults. The humid climate with frequent rainfall gives the soils an udic moisture regime; soils are rarely dry for more than 45 consecutive days. Utisols are highly weathered and are deficient in calcium and other bases. Georgia is known for its red soils, which are the unhydrated iron oxides left in the weathered material. Pre-European contact, these soils supported mixed conifer and deciduous woodlands. Due to its relatively flat topography and warmer temperatures, Florida has primarily Spodosols, Alphisols and Histosols (Soil Survey Staff, NRCS 2011).

This region has a variety of soil textures, ranging from sand and sandy loam throughout Mississippi, Alabama, and Georgia; silty loam soils near the Appalachian Mountains; and some areas with significant organic materials in Florida. The major soil hydrologic groups of the region are varied as well, with C and D soils dominating the Georgia coastline and most of Florida. Group A and B soils are more prevalent in the interior parts of the region, in central Georgia and Alabama (Miller and White 1998).

A NRCS web soil survey was conducted for an area of interest (AOI) centered in Alpharetta, GA. The selected AOI did not have complete soil survey coverage, and findings were compared with another AOI of 8990.5 acres north of the city in Fulton County. In both AOIs, the leading HSG is B (86 percent of AOI), followed by group C (11 percent of AOI). Approximately 97 percent of the AOI has a sandy loam soil texture. The leading drainage classification was well drained (86 percent of AOI), followed by somewhat poorly drained (10 percent of AOI). The selected AOI was moderately steep, with approximately 70 percent of the AOI having slopes between 8 and 12 percent.

Fulton County, Georgia has four wells in the USGS record, three with depth-to-groundwater data. Two wells have only one recorded depth: site 08CC08 had a depth of 2.447 ft in 1986, and site 10DD01 had a depth of 16.131 ft in 1968. Site 10DD02 has been monitored annually from 1977-2010 and has an annual well-depth average in this time period of 6.292 ft.

South Central Climate Region

The major soil order in Texas is Mollisols, sub-order ustolls. These soils span the sub-humid and semiarid climate zones, and are common on the western Great Plains and throughout the Rocky Mountain States. These soils originally supported grasslands and (in mountainous regions) forests, and now are ranched or farmed. Houston black soils are also characteristic of the region and are important in agriculture and urban areas, occurring throughout central Texas. Dry soils in the Order Aridisols, sub-orders Argids and Calcids, are found in west Texas and large portions of New Mexico as well. These soils were formerly sparsely vegetated areas, now used for rangeland or wildlife habitat (Soil Survey Staff, NRCS 2011).

Soil characteristic maps generated by Miller & White (1998) indicate that the majority of soil types in the South Central climate region are diverse: sandy loam and clay dominate eastern Texas, clay soils are prevalent in central parts of the state and loam soils are in western Texas and New Mexico. Most soils tend to be in the C and D hydrologic groups, however B soils are found in bands in New Mexico (Miller & White, 1998).

A web soil survey was conducted for an area of interest of 8267.5 acres centered in Round Rock, TX. The leading HSG is D (68 percent of AOI), followed by group C (22 percent of AOI) and group B (10 percent). Primary soil textures are clay (33 percent), silty clay (27 percent), extremely stony clay (17 percent), and silty clay loam (10 percent). The leading drainage classification is well drained (79 percent of AOI) followed by moderately well drained (21 percent). The selected AOI is relatively flat; approximately 70 percent of the AOI has slopes under 2 percent, and 20 percent has slopes of 3-4 percent.

Travis County, Texas had three wells that were measured in 2003 and recorded by USGS (site YD-58-50-216) and 2004 (sites YD-58-50-216 and YD-58-25-907). Groundwater is very deep in each location, averaging 220 ft below the ground surface.

Northeast – Upper Midwest Climate Region

This climate region has significant variation in dominant soil orders. The Spodsols order, sub-order Orthods, dominates the northern portions (northern Minnesota, Wisconsin, Michigan, Vermont, and Maine) and is generally considered infertile without soil amendments. Inceptisols, sub-order Udepts, are also prevalent in the region, especially in New England states, through the Appalachian Mountains and northeastern Minnesota. Alfisols, sub-order Udalfs, too are prevalent in the region, extending from Minnesota east to New York. These two soils both have an udic moisture regime, and are rarely dry for more than 45 consecutive days due to the year-round precipitation in the area (Soil Survey Staff, NRCS 2011). The state soil of Massachusetts is the Paxton fine sandy loam and also extends into New Hampshire, New York and Vermont. These deep soils were formed in acid subglacial till and are derived from schist, gneiss and granite (NRCS undated).

Based on maps generated by Miller and White (1998), sandy loam and silt loam soils tend to dominate the region, with small areas of clay and silty clay soils. Hydrologic soil group B is most prevalent in the Midwestern states (Minnesota, Wisconsin, Illinois), and Group C is most common in the rest of the region, spanning from Indiana to Maine. The region primarily supported forest ecosystems before development.

A web soil survey was conducted for an area of interest centered in Framingham, MA with an AOI of 8645.6 acres. The region has relatively equal amounts of each HSG: 20 percent of the AOI in Group A, 19 percent in group B, 20 percent in Group C, and 24 percent in Group D. Soil textures represented are fine sandy loam (49 percent), muck (10 percent), loamy sand (9 percent), and moderately decomposed plant material (8 percent). The leading drainage classification is well drained (32 percent of AOI) followed by very poorly drained (16 percent), somewhat excessively drained (12 percent), and moderately well drained (11 percent). Fourteen percent of the AOI has slopes of 1 percent or less, with 18 percent at 2-5 percent, 23 percent at 6-8 percent, and another 23 percent at 8-12 percent slopes.

There are three wells in the USGS record for Middlesex County, MA including 5 years of record for an Acton well averaging 17.75 ft, 6 years for the Wakefield well with an average depth of 6.59 ft, and 11 years at the Wilmington well with an average of 8.09 ft.

Southwest Climate Region

There are multiple soil orders in California due to its variation in climate, topography and geologic history. Entisols occur in the southern parts of the state; sub-order Psamments is a frequently found sandy soil that makes productive rangeland. Order Mollisols, sub-order Xerolls, are freely drained and dry soils found in the Mediterranean climate along the coast of California. Pre-settlement ecosystems supported by these soils include oak savanna, grasslands, and chaparral. Current soils may be used as cropland or rangeland (Soil Survey Staff, NRCS 2011).

A web soil survey was conducted for an 8267.5-acre area of interest centered in San Marcos, CA. The leading HSG is D (58 percent of AOI), followed by group C (26 percent) and group B (14 percent). Soil texture include sandy loam (19 percent), coarse sandy loam (17 percent), silt loam (15 percent), very fine sandy loam (14 percent), loamy fine sand (12 percent), loam (7 percent), and clay (5 percent). The leading drainage classification is well drained (51 percent of AOI), followed by moderately well drained (34 percent). Approximately 10 percent of the AOI has slopes ≤ 5 percent, and 66 percent has slopes of 5-10 percent.

There are no groundwater records for San Diego County available on the USGS website. Data were collected from the California Department of Water Resource Water Data Library[8]. Ten wells west of San Marcos near Escondido were sampled in 1987. The depth to groundwater ranged from 2.0 to 28.1 ft for an average of 11.6 ft.

Summary of Physiographic Characteristics

Due to the large area of land encompassed in each climate region, it is difficult to select one location that is truly "representative" of the entire region. By selecting four cities that are spaced throughout the country with different climate and soil characteristics, however, this study can demonstrate the different potential for ARCD strategies in regions around the nation. Table 4 summarizes the major soils, groundwater, and topographic characteristics for these regions. Figure 3 shows the distributions of hydrologic soil groups in areas of interest investigated in the four metropolitan areas.

Table 4. Summary of Physiographic Data

Characteristic	Southeast	South Central	Northeast – Upper Midwest	Southwest
Main soil types	Sandy loam	Clay, clay loam	Sandy loam, silt loam	Sandy loam, loam
Hydrologic soil group near study site	B (GA, AL, SC)	D (TX)	C (Northeastern states)	D
Other hydrologic soil group in climate region	D (FL)	C (NM)	B (MN, WI, IL, MI)	C
Predominant pre-development land cover	Woods	Semi-arid herbaceous	Woods	Narrow-leaved chaparral
Predominant slopes	70% @ 8-12%	90% < 4%	65% < 12%	76% < 10%

LAND USE CASES

Five cases were selected to represent a range of urban development types considered to be representative of the nation. These cases involved: a multi-family residential complex (MFR), a relatively small-scale (23 homes) single-family residential development (Sm-SFR), a relatively large (1000 homes) single-family residential development (Lg-SFR), a sizeable commercial retail installation (COMM), and an urban redevelopment (REDEV).

Building permit records from the City of San Marcos in San Diego County, California provided data on total site areas for the first three cases, including numbers of buildings, building footprint areas (including porch and garage for Sm-SFR), and numbers of parking spaces associated with the development projects. Information was not as complete for cities in other regions, but what data was available indicated no substantial difference in these site features. Therefore, the San Marcos data were used for all regional case studies. This uniformity had the advantage of placing comparisons completely on the basis of the major variables of interest, climatological and soils characteristics.

[8] http://www.water.ca.gov/waterdatalibrary (last accessed December 16, 2011).

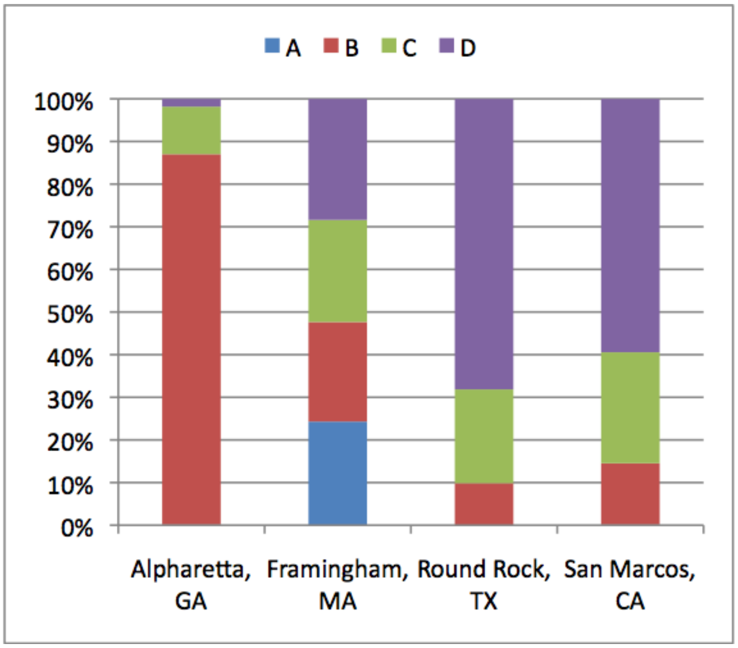


Figure 3. Distribution of Hydrologic Soil Groups in Four Study Cities

The REDEV case was taken from an actual project in Berkeley, California involving conversion of an existing structure, built originally as a corner grocery store, to apartments and addition of a new building to create a nine-unit, mixed-use, urban infill project. Space remained for a large side yard.

Larger developments were not represented in the sampling of building permits from the San Marcos database. To take larger development projects into account in the subsequent analysis, the two larger scale cases were hypothesized. The Lg-SFR scenario scaled up all land use estimates from the Sm-SFR case in the ratio of 1000:23. The hypothetical COMM scenario consisted of a building with a 2-acre footprint and 500 parking spaces. As with the smaller-scale cases, these hypothetical developments were assumed to have roadways, walkways, and landscaping, as described below.

While the building permit records made no reference to features such as roadways, walkways, and landscaping normally associated with development projects, these features were taken into account in the case studies using assumptions described herein. Parking spaces were estimated to be 176 square ft in area, which corresponds to 8 ft width by 22 ft length dimensions. Code requirements vary by jurisdiction, with the tendency now to drop below the traditional 200 square ft average. About 180 square ft is common, but various standards for full- and compact-car spaces, and for the mix of the two, can raise or lower the average (Gibbons, 2009). The 176 square ft size is considered to be a reasonable value for conventional practice.

Roadways and walkways assume a wide variety of patterns. Exclusive of the two SFR cases, simple, square parking lots with roadways around the four sides and square buildings with walkways also around the four sides were assumed. Roadways and walkways were taken to be 20 ft and 6 ft wide, respectively.

Each single-family residences (SFR) was assumed to have a lot area of 5749 square ft,, and a driveway 20 ft wide and 30 ft long. Assuming a square lot, each would have a sidewalk 76 feet by 4 feet wide, and a walkway that is 40 feet by 4 feet. .

Exclusive of the COMM case, the total area for all of these impervious features was subtracted from the total site area to estimate the pervious area, which was assumed to have conventional landscaping cover (grass, small herbaceous decorative plants, bushes, and a few trees). For the COMM scenario, an additional 10 percent was added to the building, parking lot, access road, and walkway area to represent the landscaping, on the belief that a typical retail commercial establishment would be mostly impervious.

Table 5 summarizes the characteristics of the five land use cases. The table also provides the recorded or estimated areas in each land use and cover type.

Table 5. Summary of Cases with Land Use and Land Cover Areas

	MFR[a]	Sm-SFR[a]	Lg-SFR[a]	COMM[a]	REDEV[a]
No. buildings	11	23	1000	1	2
Total area (ft^2)	476,982	132,227	5,749,000	226,529	5,451
Roof area (ft^2)	184,338	34,949	1,519,522	87,120	3,435
No. parking spaces[b]	438	-	-	500	2
Parking area (ft^2)[b]	77,088	-	-	88,000	316
Access road area (ft^2)	22,212	-	-	23,732	-
Walkway area (ft^2)	33,960	10,656	463,289	7,084	350
Driveway area (ft^2)	-	13,800	600,000	-	650
Landscape area (ft^2)	159,384	72,822	3,166,190	20,594	700

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; Lg-SFR—large-scale single-family residential; COMM—retail commercial; REDEV—redevelopment
[b] Uncovered

METHODS OF ANALYSIS

AVERAGE EVENT AND ANNUAL STORMWATER RUNOFF VOLUMES

Calculation Methods

Surface runoff volumes produced were estimated for both pre- and post-development conditions for each case study. The pre-development state was considered to be the predominant land cover for each region prior to European settlement.

For impervious areas, average event and annual runoff volumes were computed as the product of event or average annual precipitation, contributing drainage area, and a runoff coefficient (ratio of runoff produced to precipitation received) according to the familiar Rational Method equation. The runoff coefficient was determined from the equation C = (0.009) I + 0.05, where I is the impervious percentage. This equation was derived by Schueler (1987) from Nationwide Urban Runoff Program data (USEPA 1983). With I = 100 percent for fully impervious surfaces, C is 0.95.

The basis for pervious area runoff coefficients, for both the pre-development state and landscaped areas in developments, was the NRCS's Urban Hydrology for Small Watersheds (NRCS 1986, as revised from the original 1975 edition). This model estimates storm event runoff (R, inch) as a function of precipitation (P, inch) and a variable representing land cover and soil, termed the curve number (CN, dimensionless). CN enters the calculation via a variable S, which is the potential maximum soil moisture retention after runoff begins. The equations for English units of measurement are:

$$R = \frac{(P - 0.2S)^2}{P + 0.8S} \qquad\qquad S = \frac{1000}{CN} - 10$$

The runoff equation is valid for P > 0.2S, which represents the initial abstraction, the amount of water retained before runoff begins by vegetative interception and infiltration (NRCS 1986). According to this model, larger events are forecast to produce a greater amount of runoff in relation to amount of precipitation, because they more fully saturate the soil. Therefore, use of the model to estimate annual runoff requires selecting some event or group of events to compute an average runoff coefficient representing the year.

Average pre- and post-development pervious area average runoff coefficients were derived by computing runoff from a series of precipitation events ranging from 0.1 inch up to the 95th percentile, 24-hour event for the respective metropolitan areas, dividing by the associated precipitation, and averaging for all event amounts > 0.2S. Average annual runoff volumes for pervious areas were estimated based on these runoff coefficients and average annual precipitation quantities recorded at the respective gauging locations.

Curve Number Selection

Pre-development curve numbers were determined from existing studies and NRCS (1986) CN tables based on pre-European settlement land cover. Before development, woods predominated in Georgia and Massachusetts. Pre-development Texas had principally arid and semi-arid range with herbaceous cover. Chaparral was the predominant land cover in the San Diego area, however, this land cover type is not listed in the NRCS tables. For that region the selection came from a study by Easterbrook (undated) on curve numbers and associated soil hydrologic groups in an investigation of mainly chaparral lands before and after wildfires in the San Diego area.

Conversion to landscaping typical of development modifies soil and water infiltration characteristics by removing topsoil and even subsoil, compacting the remaining soil, and changing the vegetative cover. For pervious landscaping after development, CN was based on 1/8-acre urban development for all building types.

To demonstrate a range of results, runoff estimates were made for two soils in each region falling in B and C, B and D, or C and D HSGs. The more infiltrative soil was assumed to be in "good" condition and the less permeable one in "poor" condition, differentiations made in the NRCS tables. Table 6 summarizes the curve numbers used in the analyses. The paragraphs following the table detail how the selections were made for each region.

Table 6. Summary of Curve Numbers for Study Regions

	Southeast		South Central		Northeast – Upper Midwest		Southwest	
Hydrologic soil group-condition	B-good	D-poor	C-good	D-poor	B-good	C-poor	C-good	D-poor
Pre-development	55	83	74	93	55	77	77	90
Post-development	85	92	90	93	85	90	91	93

The Georgia Stormwater Manual Supplement recommends that watershed managers select curve numbers proposed by the NRCS based on hydrologic soil groups A through D and hydrologic condition of the site (Center for Watershed Protection 2009). As aforementioned, the pre-European land cover of the southeastern United States was forested. A study by Dyke (2001) in Forsyth and Hall Counties northeast of Atlanta confirmed that, immediately prior to development, approximately 50 percent of urban lands were forested, with 22 percent in agricultural use.

Because the region includes B soils in the interior of Alabama and Georgia, and poorly draining D soils in Florida and along the coasts, it was decided, for the purpose of demonstrating a range of results, to base NRCS Curve number values on B soils in good condition and D soils in poor condition. The corresponding pre- and post-development curve numbers are 55 and 83 and 85 and 92, respectively.

Prior to human development, approximately 80 percent of Texas, mostly in the central part, was covered in short and tall grassland communities; the western 10 percent of the state was desert grassland; and the eastern 10 percent was forested (University of Texas 2000). McLendon (2002) conducted a study on the observed and predicted curve numbers in 107 watersheds in Texas. For rural watersheds the CNs ranged from 48 to 88. The range in Austin was 49-89 and in Dallas 60-90. The Texas Department of Transportation's (2001) Hydraulic Design Manual Section 7 lists values for pre-development curve numbers for arid and semi- arid rangelands. Based on these sources, the respective pre- and post-development CN choices were 74 (C—good soil) and 93 (D—poor soil) and 90 (C—good soil) and 93 (D—poor soil).

Before European development, most of the Northeast – Upper Midwest region was covered in mixed hardwood and coniferous forests. A recent USGS report confirms that most urban development in the region from 1973 to 2000 has converted forestland (47 percent of all changes), followed by farmland (11 percent) (Auch undated). For this study's pre-development curve number, the woods cover type, soil group B in good condition and C soil in poor condition gave corresponding curve numbers of 55 and 77, respectively. Post-development curve numbers for these soil types at 1/8-acre development size were 85 and 90 for the good B and poor C soils, respectively. These post-development curve numbers are similar to a recent study in the Aberjona River watershed, an urban catchment northwest of Boston, where the authors used an overall CN of 89 to represent the more impervious parts of the watershed (Perez-Pedini et al. 2005).

With the lack of NRCS data for chaparral, CN selection for the San Diego area was based on an analysis performed in the area of the 2003 Cedar Fire in San Diego County by Easterbrook (undated). For pre-development C soils in good condition and D soils in poor condition, the choices were 77 and 90, respectively. Post-development curve numbers were selected from Easterbrook's estimation of CN after a high-burn fire; for good C soils CN = 91, and for poor D soils CN = 93.

Effect of Slope on Curve Number

NRCS documents developing the curve number concept and associated methods did not cover the effect of land slope. Independent researchers have given some attention to the question though. Sharpley and Williams (1990) introduced the empirical equation that has been most often used to adjust CN relative to slope:

$$CN_s = 0.333(CN_w - CN)(1 - 2e^{-13.86s}) + CN$$

where CN is the curve number reported in NRCS tables for an average soil moisture condition and assumed slope ≤ 5 percent, CN_s = slope-adjusted CN, CN_w = CN in an initially wet soil condition, and s = slope (ft/ft). Ward and Trimble provided factors to adjust tabulated CN values to obtain CN_w. Carrying through the analysis in this manner demonstrated that results deviated between two assessed slopes (5 and 10 percent) by only around 2-6 percent. This small difference was considered minimal in the context of the approximations and assumptions inherent in the modeling process. While the results presentation gives some additional data on slope effects, full coverage is given only for 5 percent, the topographic basis of the NRCS model and by far the subject of its greatest application.

ESTIMATING INFILTRATION CAPACITY OF THE CASE STUDY SITES

Infiltration Rates

Infiltrating sufficient runoff to maintain pre-development hydrologic characteristics and prevent pollutant transport is the most effective way to protect surface receiving waters. Successfully applying infiltration requires soils and hydrogeological conditions that will pass water sufficiently rapidly to avoid overly-lengthy ponding, while not allowing percolating water to reach groundwater before the soil column captures pollutants.

The study assumed that infiltration would occur in surface facilities and not in below-ground trenches. The use of trenches is certainly possible. However, the intent of this investigation was to determine the ability of pervious areas to manage the site runoff, and their exclusion is consistent with the conservative approach to modeling taken in this analysis. This inquiry was accomplished by evaluating the ability of the predominant soil types identified for each region to provide an infiltration rate of at least 0.5 inch/hour, the rate often regarded in the stormwater management field as the minimum for the use of infiltration practices (e.g., Geosyntec Consultants 2008). The assessment considered soils that either would provide this rate, at a minimum, in their original condition or could be organically amended to augment soil water storage and increase infiltration, while also safeguarding groundwater. Therefore, prevailing groundwater depths were assessed in relation to runoff percolation times generally regarded as safe.

Infiltration rates were based on saturated hydraulic conductivities (obtained from Leij et al. 1996) typical of the basic soil types incorporated in the U.S. Department of Agriculture (USDA, 1987) soil textural triangle. Sand, loamy sand, sandy loam have conductivities well above 0.5 inch/hour. As Table 4 indicates, three of the four regions have a sandy loam as the dominant soil type. For such a soil in the B HSG in these regions, the infiltration rate was taken as 1.74

inch/hour (Leij et al. 1996). Other textures represented that would generally fall in the C group are mostly loam and silt loam. These soil types either have conductivities in excess of 0.5 inch/hour or, in the first author's experience, can be and have been successfully organically amended to produce such a rate and infiltrate accumulated water within 72 hours, and usually less time. The D soils in some study regions, silty clay and clay, were regarded as not amendable to reach 0.5 inch/hour conductivity to host conventional or ARCD-type facilities designed specifically for infiltration. Still, locations with these soils could distribute sheet flow over pervious areas for evapotranspiration and some infiltration at slow rates and could utilize roof downspout surface or subsurface dispersal.

Groundwater Protection Assessment

Avoidance of groundwater contamination was assessed by assuming a hydraulic conductivity generally regarded as the maximum rate for the use of infiltration practices, 2.4 inches/hour (e.g., Geosyntec Consultants 2008), and a minimum spacing to seasonal high groundwater from the bed of an infiltration facility of 4 ft. These conditions would provide a travel time of 20 hours, during which contaminant capture would occur through soil contact. This 20-hour travel time was regarded as a minimum for any soil type. For example, infiltrating on loamy sand with a hydraulic conductivity of 5.7 inches/hour would require minimum spacing from the infiltration surface to groundwater of 10 ft. This consideration did not actually become an issue for analyses in any region in this study, because all predominant soil types have infiltration rates under 2.4 inches/hour and groundwater spacings that exceed 4 ft.

Site Infiltration Capacities

Runoff volumes were estimated for the 85th and 95th percentile, 24-hour events as described previously. Bioretention cell surface area to accommodate these volumes was calculated based on a method in the City of Santa Barbara's Storm Water BMP Guidance Manual (Geosyntec Consultants 2008) (adapted from the Georgia Stormwater Manual (Atlanta Regional Commission, 2001)):

$$A = \frac{(V_{design})(l)}{(t)(k_{design})(d+l)}$$

where:

V_{design} = design volume of runoff to be infiltrated (ft3);

k_{design} = design infiltration rate (in/hr), taken as 0.5 times the typical rate for the soil type naturally or amended as a safety factor;

d = ponding depth (ft), assumed as 0.25 ft for a shallow landscape feature on the recommendation of the Georgia manual;

l = depth of planting media (ft), assumed as 4 ft on the recommendation of the Georgia manual;

t = required drawdown time (hr), taken as 48 hours.

The design variable selections are conservative in applying a safety factor to hydraulic conductivity, using minimum depths for economy and limiting site disruption, and applying a drain time lower than the maximum of 72 hours.

In considering the long-term capacity of a facility designed to infiltrate, the potential for groundwater mounding below or aside the unit is a concern. To avoid this problem a basic analysis was made using a groundwater rise equation from Zomorodi (2005):

$$\text{Rise} = 0.86\,\frac{(K_v)(W)}{(K_h - K_v)}$$

where:

Rise = mounding occurring in a year of use (ft);

K_v = vertical saturated hydraulic conductivity (ft/year);

W = bioretention cell width (ft); and

K_h = horizontal saturated hydraulic conductivity (ft/year).

This equation was solved for K_v for computation of the allowable annual infiltration rate, assuming a rise limited to 1 ft. It was assumed that the bioretention surface area would be broken up to have no more than one basin for each 5 acres of total site area, another measure safeguarding against groundwater mounding. Also assumed was a square cell (i.e., W was computed as the square root of the surface area calculated according to the equation for A above). Horizontal hydraulic conductivites for loams such as represented among the B and C soils in the study regions tend to run in the range of 10 to 1000 meters/year (0.1 to 9 ft/day. A conservative value of 3 ft/day was used in the analysis.

The yearly rate of infiltration from a bioretention cell can be expressed in terms of volume of runoff per unit infiltrating surface area, acre-ft/acre-year, which is equivalent to K_v expressed as ft/year. The K_v value avoiding groundwater monitoring was therefore used to assess maximum annual infiltration capacity by multiplying by the total available pervious surface area. However, the K_v value was capped at a rate found in a study of infiltration capacity and benefits for Los Angeles' San Fernando Valley by Chralowicz et al. (2001). The Los Angeles study posited providing 0.1-0.5 acre for infiltration basins to serve each 5 acres of contributing drainage area. At 2-3 ft deep, it was estimated that such basins could infiltrate 0.90-1.87 acre-ft/year of runoff in San Fernando Valley conditions. Three types of soils predominate in the study area: sandy loams (35 percent of the area), a clay loam (23 percent), and a silty clay loam (29 percent). The balance of 13 percent includes small amounts at both ends of the textural spectrum, a clay and loamy sands. Infiltration rates are in the approximate range of 0.5-2.0 inches/hour, within the span generally regarded as ideal for successful infiltration without threatening groundwater. Computing the ratios of the rate and basin size data of Chralowicz et al. (2001), K_v maximized at approximately 20 acre-ft of runoff/acre infiltration surface-year under the most limiting conditions of soils and basin dimensions. This value was applied in this study if calculated rates were higher, another conservative feature to obtain the most realistic projections of infiltration potential.

In some cases analyzed, the maximum annual infiltration capacity was estimated at greater than post-development runoff volume production. In these instances complete retention would be possible with excess capacity left, and only a fraction of the available pervious area would have to be devoted to bioretention. That fraction was expressed as the ratio of annual runoff production to infiltration capacity.

STORMWATER RUNOFF VOLUME AND POLLUTANT DISCHARGES

Urban Land Use Pollutant Yields

Annual pollutant mass loadings prior to application of any stormwater management practices were estimated as the product of annual runoff volumes produced by the various land use and cover types and pollutant concentrations typical of those areas. General land use types (e.g., single-family residential, commercial) have typically been the basis for measuring and reporting stormwater pollutant data. However, an investigation of ARCD practices of the type of interest in this study demands data on specific land coverages. The literature offers few data on this basis. Those available and used herein were assembled by a consultant to the City of Seattle for a project in which the author participated. They appear in Attachment A (Herrera Environmental Consultants, Inc. undated). Table 7 summarizes the representative values used in the analysis.

Table 7. Pollutant Concentrations in Runoff from Developed Land Uses (after Herrera Environmental Consultants, Inc. undated)

Land Use	Total Suspended Solids (mg/L)	Total Copper (μg/L)	Total Zinc (μg/L)	Total Phosphorus (μg/L)
Residential roof	25	13	159	110
Commercial roof	18	14	281	140
Access road/driveway	120	22	118	660
Parking	75	36	97	140
Walkway	25	13	59	110
Landscaping	213	13	59	2040

Pollutant concentrations expected to occur typically in the mixed runoff from the several land use and cover types making up a development were estimated by mass balance; i.e., the concentrations from the different areas of the sites were combined in proportion to their contribution to the total runoff.

Estimating Retention

The principal interest of this study was to estimate how much of the post-development runoff volume for the various land use cases could be retained by ARCD measures and prevented from discharging from the site on the surface. The analyses initially evaluated the runoff volume that could potentially be infiltrated by using a portion or all of the available pervious area for bioretention facilities. In some instances judicious use of the pervious area could infiltrate the full volume. In other cases use of the pervious area for as much infiltration as possible plus special management of roof runoff would fully attenuate post-development runoff.

Complete retention would, of course, exceed any ordinary regulatory standard intended to govern discharge quantity and quality. To the extent that full retention could not be expected, the study was interested in assessing the degree to which bioretention and roof runoff management could meet the specific potential standards outlined earlier. Performance was estimated in terms of volume retained versus released, the extent to which pre-development groundwater recharge would be preserved, and the pollutant loading reduction accompanying volume retention in comparison to the quantities that would enter receiving waters with no stormwater management actions. These measures expressed in equation form are:

$$\text{Runoff retention (\%)} = \frac{(\text{Volume with no practices} - \text{Volume with ARCD practices})}{\text{Volume with no practices}} x100$$

(expresses amount of the theoretical maximum post-development runoff prevented from discharging by ARCD)

$$\text{Recharge retention (\%)} = [1 - \frac{(\text{Predevelopment recharge} - \text{Postdevelopment recharge with ARCD})}{\text{Predevelopment recharge}}] x100$$

Pre-development recharge = Rainfall volume – Predevelopment runoff volume

Post-development recharge = The smaller of rainfall volume or post-development infiltration volume

$$\text{Loading reduction (\%)} = \frac{(\text{Loading with no practices} - \text{Loading with ARCD practices})}{\text{Loading with no practices}} x100$$

It should be noted that runoff retention and recharge retention express different quantities and are not equal numerically.

When infiltration alone (Basic ARCD) could not accomplish full retention, roof runoff management strategies were selected as appropriate for the land use case (Full ARCD). For the retail commercial development (COMM), roof runoff management was assumed to be accomplished by harvesting, temporarily storing, and applying water to use in the building. To this end, the assumption was made that the commercial development would be able to manage and would have capacity to store and make use of the entire roof runoff volume. While this particular assumption is, on its own, speculative, the commercial development would, as discussed in the section on Application of ARCD Practices, earlier, see a reduction in runoff as a result of evapotranspiration, and would have the option to employ ARCD site design principles to reduce impervious surface area, to install a green roof to retain runoff, or to implement any of a number of other ARCD practices designed to reduce runoff volume and pollutant loading. As a result, the overall analysis of the commercial site remains conservative in its assessment of the potential to retain runoff onsite.

In the three multi-family and single-family residential cases it was assumed that the roof water would be dispersed on or within the pervious area according to accepted and standardized practices. For example, the Washington Department of Ecology's (2005) Stormwater Management Manual for Western Washington provides design criteria for two methods: splash blocks followed by vegetated dispersion areas and gravel-filled trenches. These devices can be used wherever space is sufficient regardless of infiltration rates, as they operate by evapotranspiration and slow infiltration. Even clay can infiltrate at an approximate rate of 0.2 inch/hour or higher (Leij et al. 1996; Pitt, Chen, and Clark 2002). Care was taken to assure that pervious area already allocated to infiltration would not also be counted upon for dispersion. While dispersion was assumed for simplification of the study analyses, in reality a site designer would have the option of using rain barrels, cisterns, and/or green roofs instead of or along with ground dispersion to manage roof water. Analyses for the final case, the redevelopment scenario (REDEV), assumed dispersion and/or small-scale harvesting of roof runoff above whatever level of infiltration could be accomplished given the soil condition.

Additional Analyses When Full Retention Cannot Be Expected

Retaining runoff from impervious and pollutant generating pervious surfaces is the best stormwater management policy, because it prevents the introduction of urban runoff pollutants to receiving waters as well as serves quantity discharge control requirements. Maintaining pre-development peak flow rates, volumes, and elevated flow durations prevents stream channel and habitat damage, flooding, and loss of groundwater recharge. When conditions were expected to render full retention technically infeasible for the study cases, estimates were made of the volume and pollutant loadings that would be discharged assuming the remaining surface runoff is released to a receiving water with and without treatment. Treatment was assumed to be provided by bioretention discharging either directly on the surface or via an underdrain. While not as environmentally beneficial as retention, such treatment is superior to conventional stormwater management practices like ponds and sand filters. It captures pollutants through a number of mechanisms as contaminants are held for a time in the facility and contact vegetation and soil, such as sedimentation, filtration by plants, and adsorption and ion exchange in soil.

The effectiveness of bioretention in removing pollutants from surface runoff was estimated according to measurements by Chapman and Horner (2010). This study was performed on a linear bioretention device located on a slope and made up of a number of cells separated by weirs (termed a "cascade"). While an estimated 74 percent of all entering runoff infiltrated or evapotranspired before discharging, the flows reaching the end in the larger storms would have less residence time in the facility than in a unit on flat ground percolating water through soil before surface discharge via an underdrain. Therefore, pollutant concentrations exiting such a unit could be less yet. On the other hand, some bioretention facilities bypass the relatively rare higher flows, affording no treatment, while the cascade was designed to convey all runoff, even beyond its water quality design storm flow, and provide some treatment. On balance between the advantage and disadvantage of the facility providing the data, the discharge concentrations are considered to be representative of bioretention.

Chapman and Horner (2010) computed volume-weighted average discharge pollutant concentrations by multiplying concentrations times flow volumes for each monitored storm, summing, and dividing by total volume. The resulting values for the contaminants considered in this study are: total suspended solids (TSS)—30 mg/L, total copper—6.3 µg/L, total zinc—47 µg/L, and total phosphorus—133 µg/L. In a few instances these concentrations are higher than those in Table 7, an expression of the observation sometimes made in stormwater management that treatment cannot reduce concentrations in relatively "clean" flows below certain minimum values. In these situations the concentrations in Table 8 were also used in computing discharge loadings; i.e., no concentration reduction was applied in estimating discharge loadings, although flow volume would still be decreased to the extent infiltration could occur.

RESULTS OF THE ANALYSIS

ASSESSMENT OF MAXIMUM ARCD CAPABILITIES

Runoff Retention and Groundwater Recharge

Basic ARCD

One goal of this exercise was to determine if ARCD practices could eliminate post-development runoff production, and the pollutants it transports, and maintain pre-development groundwater recharge. The first assessment, termed the Basic ARCD analysis in this report, was to estimate if each site's pervious area is sufficient for full infiltration if given to this purpose to the extent necessary without compromising other uses. Accordingly, shallow, unobtrusive bioretention cells (i.e., rain gardens) are envisioned, dispersed through sites at no more than one for each 5 acres. It bears reemphasis that no credit was taken for water loss through evapotranspiration in this assessment, although a substantial, but not necessarily easily quantifiable, amount would undoubtedly occur. Estimates of runoff retention are therefore conservative.

Table 8 presents comparisons, for the Southeast climate region, between estimated annual runoff volumes generated before development and then post-development with and without Basic ARCD stormwater management. The table also gives annual groundwater recharge estimates for these same conditions.

Table 8. Runoff and Groundwater Recharge Volumes with Basic ARCD: Southeast Climate Region[a]

Period	Volume (acre-ft) or Percentage Measure	MFR	Sm-SFR	Lg-SFR	COMM	REDEV
B soil						
Pre-dev.	Runoff	0.046	0.013	0.56	0.022	0.001
	Recharge	44.7	12.4	539	21.2	0.51
Post-dev.	Runoff without stormwater practices	29.5	6.85	298	18.7	0.45
	Runoff retained with Basic ARCD	29.5	6.85	298	8.30	0.21
	Runoff released with Basic ARCD	0	0	0	10.4	0.25
	Runoff retention (%)	100%	100%	100%	44%	45%
	Recharge without stormwater practices	15.3	5.55	241	2.53	0.06
	Recharge with Basic ARCD	44.7	12.4	539	8.30	0.21
	Recharge retention (%)	100%	100	100%	39%	40%
	Pervious area needed (%)[b]	36%	22%	22%	100%	100%
D soil						
Pre-dev.	Runoff	13.5	3.76	163	6.43	0.16
	Recharge	31.2	8.64	376	14.8	0.36
Post-dev.	Runoff without stormwater practices	Full ARCD needed to maximize retention on D soil				
	Runoff retained with Basic ARCD					
	Runoff released with Basic ARCD					
	Runoff retention (%)					
	Recharge without stormwater practices	11.6	4.17	181	2.12	0.05
	Recharge with Basic ARCD	Full ARCD needed to maximize retention on D soil				
	Recharge retention (%)	37%	48%	48%	14%	14%
	Pervious area needed (%)[b]	Full ARCD needed to maximize retention on D soil				

[a] Pre-dev.—pre-development; post-dev.—post-development; ARCD—aquatic resources conservation design; MFR—multi-family residential; Sm-SFR—small-scale single-family residential; Lg-SFR—large-scale single-family residential; COMM—retail commercial; REDEV—infill redevelopment; Basic ARCD—infiltrating bioretention; runoff—quantity of water discharged from the site on the surface; recharge--quantity of water infiltrating the soil
[b] Proportion of the total pervious area on the site required for bioretention to achieve given results

In all cases the majority of the infiltration that would recharge groundwater in the undeveloped state would be lost to surface runoff after development. These losses would approach 90 percent in the most impervious developments. The greatly increased surface flow would raise peak flow rates and volumes in receiving water courses, increase flooding risk, and transport pollutants.

Basic ARCD could retain all post-development runoff and pre-existing groundwater recharge in the three residential cases on the B soils, using from less than one-fourth to just over one-third of the available pervious area for bioretention cells. Taking all available pervious area for the more highly impervious COMM and REDEV cases on B soil, bioretention would retain about 45 percent of the runoff generated and save about 40 percent of the pre-development recharge. To illustrate the relatively small role that slope increase from 5 to 10 percent plays in runoff retention, full retention would still be expected in the three residential cases and for the remaining two cases (COMM and REDEV) would decrease from 44-45 percent only slightly to 40-41 percent (not shown in table).

On the D soil, infiltrating bioretention may not be technically feasible and was not relied upon for retention estimates. Without the use of additional measures in the Full ARCD category, only incidental post-development runoff would be retained; and most pre-development recharge would be lost.

Tables 9-11 are companions to Table 8 for the South Central, Northeast – Upper Midwest, and Southwest climate regions, respectively. Results for the Northeast - Upper Midwest B soil are very close to those for the Southeast B soil, as would be expected given the similar precipitation quantities and soil characteristics. In the three regions having C soils, Basic ARCD can retain all runoff for the MFR, Sm-SFR, and Lg-SFR residential cases. With these soils, except in the Southwest, achieving full retention requires more of the available pervious area than with B soils, up to 69 percent, but is still fully attainable.

The effect of lower rainfall is evident in the South Central and, especially, the Southwest regions. In the latter location, not only the residential cases but also the COMM and REDEV scenarios can achieve full runoff retention with Basic ARCD on the C soil. The residential cases need much smaller percentages of the available pervious area for bioretention than for the same cases on C and even B soils elsewhere. Applying Basic ARCD to the South Central, C soil, REDEV case results in higher runoff retention than for the B soil cases in higher rainfall regions.

The study cases demonstrated two interesting points about groundwater recharge. First, with effective infiltrating bioretention it is possible for post-development annual recharge to exceed the pre-development quantity. This phenomenon is most evident in comparing the two amounts for cases with 100 percent runoff retention on C soils, which in the natural state produce much less recharge in relation to runoff than B soils. The B soils have a recharge-to-runoff ratio of about 500, whereas that ratio is only 4-6 for the C soils studied. One reason for higher post- compared to pre-development recharge is that bioretention is set up to hold water, increasing the time for infiltration to occur, instead of letting it run off. Another is that soils, especially in the C HSG, are often improved by organic amendments to yield both more water storage capacity and higher infiltration rates than the pre-existing soils.

A related point is that the percentage of pre-development recharge retained after development can be higher with C than B soils. This situation can best be seen in cases without full runoff retention, COMM and sometimes REDEV. In terms of recharge, installing bioretention conveys a greater advantage to the C than the B soils, which already have more pore space for water storage and higher infiltration and recharge rates.

Table 9. Runoff and Groundwater Recharge Volumes with Basic ARCD: South Central Climate Region[a]

Period	Volume (acre-ft) or Percentage Measure	MFR	Sm-SFR	Lg-SFR	COMM	REDEV
C soil						
Pre-dev.	Runoff	4.10	1.14	49.4	1.95	0.05
	Recharge	25.7	7.13	310	12.2	0.29
Post-dev.	Runoff without stormwater practices	21.2	5.15	224	12.7	0.31
	Runoff retained with Basic ARCD	21.2	5.15	224	4.33	0.21
	Runoff released with Basic ARCD	0	0	0	8.32	0.10
	Runoff retention (%)	100	100	100	34	67
	Recharge without stormwater practices	8.62	3.11	135	1.51	0.03
	Recharge with Basic ARCD	29.8	8.3	359	4.33	0.21
	Recharge retention (%)	100	100	100	38	70
	Pervious area needed (%)[b]	51	23	30	100	100
D soil						
Pre-dev.	Runoff	18.5	5.14	223	8.80	0.21
	Recharge	11.3	3.13	136	5.36	0.13
Post-dev.	Runoff without stormwater practices	Full ARCD needed to maximize retention on D soil				
	Runoff retained with Basic ARCD					
	Runoff released with Basic ARCD					
	Runoff retention (%)					
	Recharge without stormwater practices	7.23	7.59	112	1.35	0.03
	Recharge with Basic ARCD	Full ARCD needed to maximize retention on D soil				
	Recharge retention (%)	64	83	83	25	24
	Pervious area needed (%)[b]	Full ARCD needed to maximize retention on D soil				

Table 10. Runoff and Groundwater Recharge Volumes with Basic ARCD: Northeast – Upper Midwest Climate Region[a]

Period	Volume (acre-ft) or Percentage Measure	MFR	Sm-SFR	Lg-SFR	COMM	REDEV
B soil						
Pre-dev.	Runoff	0.04	0.01	0.54	0.02	0.001
	Recharge	42.9	11.9	517	20.4	0.49
Post-dev.	Runoff without stormwater practices	28.3	6.68	286	18.0	0.44
	Runoff retained with Basic ARCD	28.3	6.68	286	8.53	0.21
	Runoff released with Basic ARCD	0	0	0	9.43	0.23
	Runoff retention (%)	100	100	100	48	47
	Recharge without stormwater practices	14.6	5.32	231	2.42	0.06
	Recharge with Basic ARCD	42.9	11.9	517	8.53	0.21
	Recharge retention (%)	100	100	100	42	42
	Pervious area needed (%)[b]	34	21	21	100	100
C soil						
Pre-dev.	Runoff	7.87	2.18	94.8	3.74	0.09
	Recharge	35.1	9.72	422	16.6	0.40
Post-dev.	Runoff without stormwater practices	30.5	7.42	323	18.2	0.44
	Runoff retained with Basic ARCD	30.5	7.42	323	4.57	0.21
	Runoff released with Basic ARCD	0	0	0	13.6	0.24
	Runoff retention (%)	100	100	100	25	47
	Recharge without stormwater practices	12.4	4.48	195	2.17	0.05
	Recharge with Basic ARCD	42.9	11.9	517	4.57	0.21
	Recharge retention (%)	100	100	100	27	51
	Pervious area needed (%)[b]	69	31	40	100	100

Table 11. Runoff and Groundwater Recharge Volumes with Basic ARCD: Southwest Climate Region[a]

Period	Volume (acre-ft) or Percentage Measure	MFR	Sm-SFR	Lg-SFR	COMM	REDEV
C soil						
Pre-dev.	Runoff	1.62	0.45	19.5	0.77	0.02
	Recharge	7.22	2.00	87.0	3.43	0.08
Post-dev.	Runoff without stormwater practices	6.41	1.57	68.5	3.77	0.09
	Runoff retained with Basic ARCD	6.41	1.57	68.5	3.77	0.09
	Runoff released with Basic ARCD	0	0	0	0	0
	Runoff retention (%)	100	100	100	100	100
	Recharge without stormwater practices	2.43	0.88	38.1	0.43	0.01
	Recharge with Basic ARCD	8.84	2.45	107	4.20	0.10
	Recharge retention (%)	100	100	100	100	100
	Pervious area needed (%)[b]	12	5	7	69	44
D soil						
Pre-dev.	Runoff	4.47	1.24	53.8	2.12	0.05
	Recharge	4.37	1.21	52.7	2.08	0.05
Post-dev.	Runoff without stormwater practices	Full ARCD needed to maximize retention on D soil				
	Runoff retained with Basic ARCD					
	Runoff released with Basic ARCD					
	Runoff retention (%)					
	Recharge without stormwater practices	2.14	0.77	33.3	0.40	0.01
	Recharge with Basic ARCD	Full ARCD needed to maximize retention on D soil				
	Recharge retention (%)	49	63	63	19	18
	Pervious area needed (%)[b]	Full ARCD needed to maximize retention on D soil				

Full ARCD

Infiltration is one of a wide variety of ARCD-based source reduction techniques. Where site conditions such as soil quality or available area limit a site's infiltration capacity, other ARCD measures can enhance a site's runoff retention capability. Such practices can also be used where infiltration capacity is adequate, but the developer desires greater flexibility for land use on-site. Among those techniques, this study considered special management of roof water in those cases where bioretention could not infiltrate all post-development runoff.

Specifically, water harvesting for supply of irrigation and/or non-potable indoor uses was investigated for the retail commercial development. In residential cases with insufficient capacity for infiltrative bioretention but remaining space not already devoted to infiltration, efficiently directing roof runoff into the soil through downspout dispersion systems was the method of choice. Such cases invariably occurred with HSG D soils. The Full-ARCD scenario applied to the redevelopment case was roof water dispersion, harvesting, or a combination of the two practices. Generally speaking, infiltration consumed all available pervious area in the REDEV cases on B and C soils, making roof runoff harvesting the mechanism to retain more water. With no bioretention facility on D soil, the pervious area would be available for dispersion. Of course, harvesting could be applied instead of or along with dispersion. Again, it was assumed that that the commercial and, as needed, redevelopment sites had capacity to harvest and make use of the full volume of roof runoff generated, however, the analysis remains conservative in terms of the potential for onsite retention as it does not consider the use of ARCD site design principles to reduce impervious surfaces, green roofs, and evaporation/evapotranspration from surfaces other than rooftops.

Table 12 gives Southeast climate region results with the addition of Full ARCD techniques: roof runoff management, consisting of harvesting for reuse in the COMM case, dispersion on or within pervious land for the three residential cases, and a combination of these measures for REDEV. On the B soil runoff retention would approximately double for the retail commercial land use and reach 100 percent for the redevelopment. Groundwater recharge would not be expected to increase over the Basic ARCD case, though; because harvesting still keeps water out of the soil system.

For development on the D soil, use of roof runoff management techniques was estimated to increase runoff retention from zero to about one-third to two-thirds of the post-development runoff generated, depending on the land use case. Groundwater recharge would not materially benefit, however; because harvest does not contribute to it. Also, no recharge credit was taken for dispersion, since infiltration is restricted and loss by ET would tend to occur before infiltration. Some small amount of recharge would still be likely though. To illustrate further the small role of topography, in this D soil, Full ARCD scenario runoff retention is forecast to decrease by only 1-2 percent at a 10 percent slope compared to a 5 percent slope (not shown in table).

Table 12. Runoff and Groundwater Recharge Volumes with Full ARCD: Southeast Climate Region[a]

Period	Volume (acre-ft) or Percentage Measure	MFR	Sm-SFR	Lg-SFR	COMM	REDEV
B soil						
Pre-dev.	Runoff	0.046	0.013	0.56	0.022	0.001
	Recharge	44.7	12.4	539	21.2	0.51
Post-dev.	Runoff without stormwater practices	Complete retention possible with Basic ARCD			18.7	0.45
	Runoff retained with Full ARCD				16.1	0.45
	Runoff released with Full ARCD				2.66	0
	Runoff retention (%)				86%	100%
	Recharge without stormwater practices				2.53	0.06
	Recharge with Full ARCD				8.30	0.21
	Recharge retention (%)				39%	40%
	Pervious area needed (%)[b]				100%	100%
D soil						
Pre-dev.	Runoff	13.5	3.76	163	6.43	0.16
	Recharge	31.2	8.64	376	14.8	0.36
Post-dev.	Runoff without stormwater practices	33.1	8.23	358	19.1	0.46
	Runoff retained with Full ARCD	16.4	3.11	135	7.76	0.31
	Runoff released with Full ARCD	16.7	5.12	222	11.4	0.16
	Runoff retention (%)	50%	38%	38%	41%	66%
	Recharge without stormwater practices	11.6	4.17	181	2.12	0.05
	Recharge with Full ARCD	11.6	4.17	181	2.12	0.05
	Recharge retention (%)	37.2%	48.3%	48.3%	14.3%	13.6%
	Pervious area needed (%)[b]	100%	100%	100%	100%	100%

[a] Pre-dev.—pre-development; post-dev.—post-development; ARCD—aquatic resources conservation design; MFR—multi-family residential; Sm-SFR—small-scale single-family residential; Lg-SFR—large-scale single-family residential; COMM—retail commercial; REDEV—infill redevelopment; Full ARCD—infiltrating bioretention, roof runoff harvesting, and/or roof runoff dispersion; runoff—quantity of water discharged from the site on the surface; recharge--quantity of water infiltrating the soil
[b] Proportion of the total pervious area on the site required for bioretention to achieve given results

Tables 13-15 give data analogous to Table 12 for the South Central, Northeast – Upper Midwest, and Southwest climate regions, respectively. Results are similar to those reported for the Southeast region. Full ARCD can approximately double runoff retention from the Basic ARCD level for the COMM case and extend runoff retention to 100 percent for the redevelopment on both B and C soils. Once again, application of Full ARCD to the D soil cases increases runoff retention from zero to one-third to two-thirds of the volume produced, depending on land use case.

Table 13. Runoff and Groundwater Recharge Volumes with Full ARCD: South Central Climate Region[a]

Period	Volume (acre-ft) or Percentage Measure	MFR	Sm-SFR	Lg-SFR	COMM	REDEV
C soil						
Pre-dev.	Runoff	4.10	1.14	49.4	1.95	0.05
	Recharge	25.7	7.13	310	12.2	0.29
Post-dev.	Runoff without stormwater practices	Complete retention possible with Basic ARCD			12.7	0.31
	Runoff retained with Full ARCD				9.51	0.31
	Runoff released with Full ARCD				3.15	0
	Runoff retention (%)				75	100
	Recharge without stormwater practices				1.51	0.03
	Recharge with Full ARCD				4.33	0.21
	Recharge retention (%)				35	72
	Pervious area needed (%)[b]				100	100
D soil						
Pre-dev.	Runoff	18.5	5.14	223	8.80	0.21
	Recharge	11.3	3.13	136	5.36	0.13
Post-dev.	Runoff without stormwater practices	22.6	5.68	247	12.8	0.31
	Runoff retained with Full ARCD	11.0	2.08	90.3	5.17	0.20
	Runoff released with Full ARCD	11.6	3.60	157	7.63	0.11
	Runoff retention (%)	49	37	37	40	66
	Recharge without stormwater practices	7.23	2.59	112	1.35	0.03
	Recharge with Full ARCD	7.23	2.59	112	1.35	0.03
	Recharge retention (%)	64	83	83	25	24
	Pervious area needed (%)[b]	100	100	100	100	100

Table 14. Runoff and Groundwater Recharge Volumes with Full ARCD: Northeast – Upper Midwest Climate Region[a]

Period	Volume (acre-ft) or Percentage Measure	MFR	Sm-SFR	Lg-SFR	COMM	REDEV
B soil						
Pre-dev.	Runoff	0.04	0.01	0.54	0.02	0.001
	Recharge	42.9	11.9	51.7	20.4	0.49
Post-dev.	Runoff without stormwater practices	Complete retention possible with Basic ARCD			18.0	0.44
	Runoff retained with Full ARCD				16.0	0.44
	Runoff released with Full ARCD				2.00	0
	Runoff retention (%)				89	100
	Recharge without stormwater practices				2.42	0.06
	Recharge with Full ARCD				8.53	0.21
	Recharge retention (%)				42	43
	Pervious area needed (%)[b]				100	100
C soil						
Pre-dev.	Runoff	7.87	2.18	94.8	3.74	0.09
	Recharge	35.1	9.72	422	16.6	0.40
Post-dev.	Runoff without stormwater practices	Complete retention possible with Basic ARCD			18.2	0.44
	Runoff retained with Full ARCD				12.0	0.44
	Runoff released with Full ARCD				6.19	0
	Runoff retention (%)				66	100
	Recharge without stormwater practices				2.17	0.05
	Recharge with Full ARCD				4.57	0.21
	Recharge retention (%)				28	43
	Pervious area needed (%)[b]				100	100

Table 15. Runoff and Groundwater Recharge Volumes with Full ARCD: Southwest Climate Region[a]

Period	Volume (acre-ft) or Percentage Measure	MFR	Sm-SFR	Lg-SFR	COMM	REDEV
C soil						
Pre-dev.	Runoff	1.62	0.45	19.5	0.77	0.02
	Recharge	7.22	2.00	87.0	3.43	0.08
Post-dev.	Runoff without stormwater practices	Complete retention possible with Basic ARCD				
	Runoff retained with Full ARCD					
	Runoff released with Full ARCD					
	Runoff retention (%)					
	Recharge without *stormwater* practices					
	Recharge with Full ARCD					
	Recharge retention (%)					
	Pervious area needed (%)[b]					
D soil						
Pre-dev.	Runoff	4.47	1.24	53.8	2.12	0.05
	Recharge	4.37	1.21	52.7	2.08	0.05
Post-dev.	Runoff without stormwater practices	6.70	1.68	73.2	3.80	0.09
	Runoff retained with Full ARCD	3.25	0.62	26.8	1.53	0.06
	Runoff released with Full ARCD	3.45	1.07	46.5	2.26	0.03
	Runoff retention (%)	49	37	37	40	66
	Recharge without stormwater practices	2.14	0.77	33.3	0.40	0.01
	Recharge with Full ARCD	2.14	0.77	33.3	0.40	0.01
	Recharge retention (%)	49	63	63	19	18
	Pervious area needed (%)[b]	100	100	100	100	100

Pollutant Loading Reductions

The examination of maximum ARCD capabilities considered the reductions of annual mass loadings of four water pollutants that would accompany runoff retention. Since retention means no surface discharge, these loading reductions are, at a minimum, equal to the percentages of runoff retention. In those cases with less than full runoff retention, there is good reason to expect pollutant loading reductions higher than the percentage of runoff retained. The early runoff ("first flush"), occurring when the soils are least saturated, is more likely to be retained than later runoff. It is frequently observed that the first flush has higher pollutant concentrations than later runoff, particularly in the wash off after relatively extended dry periods.

For the B and D soil and the residential cases on C soils, the reductions were very consistent among regions:

- B and C soils, Basic ARCD, residential cases—100%;
- B soil, Basic ARCD, COMM and REDEV cases—44-45%;
- B soil, Full ARCD, COMM and REDEV cases—86-100%;
- D soil, Full ARCD, SFR and COMM cases—38-41%;
- D soil, Full ARCD, MFR case—50%; and
- D soil, Full ARCD, REDEV case—66%.

For the most highly impervious cases, COMM and REDEV, on C soils reduction was variable and dependent on precipitation. With Basic ARCD the range was from 25 to 100 percent, going from relatively high to low precipitation. Full ARCD is expected to raise the lowest reductions to 100 percent for REDEV and at least 66 percent for COMM.

Therefore, taking the greatest advantage of what ARCD offers could prevent the addition to receiving waters of all or almost all pollutant mass that would otherwise discharge from a range of urban developments on B and C soils. With D soils, Full ARCD can accomplish loading reductions approaching or somewhat exceeding 50 percent.

ABILITY TO MEET POTENTIAL STANDARDS

General Summary

This section evaluates the ability of the Basic and Full ARCD strategies to meet each of the five potential stormwater management standards enumerated in the beginning of the report. It also examines the extent of pollutant loading reduction if the standards are just met; i.e., if runoff is retained at the minimum needed to meet the standard. It has already been demonstrated that retention of all post-development runoff and full pollutant attenuation is possible in some circumstances. Table 16 summarizes the results for all regions and cases and both ARCD strategies.

Ability to Meet Standards

The projected ability to meet the standards overall varies mostly in relation to soil type (B or C versus D) and the relative imperviousness of development, and much less across climate regions. The one exception to this generality is that implementing Basic ARCD practices on the Southwest region C soil would meet all five standards. This uniformity does not occur elsewhere on either B or C soils, and is apparently primarily a function of the relatively low precipitation in the region.

Setting aside the Southwest region, success in complying with standards is mostly comparable among the various B and C soils, with a small number of instances where a development type meets a standard on B but not on C soil. Basic ARCD methods invariably can meet all standards on B and C soils for the residential development cases (MFR and Sm- and Lg-SFR). Full ARCD practices are forecast to meet all standards for the redevelopment case on B soils but only standards 1 and 5 consistently on C soils. The combination of infiltration and roof runoff management applied to the retail commercial development allows meeting these same two standards on B soils but only the latter on both of the C soils occurring outside the Southwest region. The only standards that cannot be met on B and C soils by the ARCD methods considered are standards 2-4 for the COMM case. Therefore, of the 125 standards assessments, ARCD practices are projected to meet 113 (90.4 percent) with B and C soils.

The ability to meet these standards is much reduced on D soils. Standard 1 can be met occasionally with Full ARCD used in the redevelopment. All cases with Full ARCD comply with standard 4 on this soil where pre-development runoff is estimated to be relatively high, reflecting a low overall requirement for retention volume. Standard 5 can be met with Full ARCD with the exception of one COMM case. Standards 2 and 3 were never estimated to be met in any D soil case. All in all, with this soil 26 of the 75 scenarios (34.7 percent) are expected to meet a standard.

Table 16. Ability to Meet Potential Regulatory Standards with Basic/Full ARCD Practices

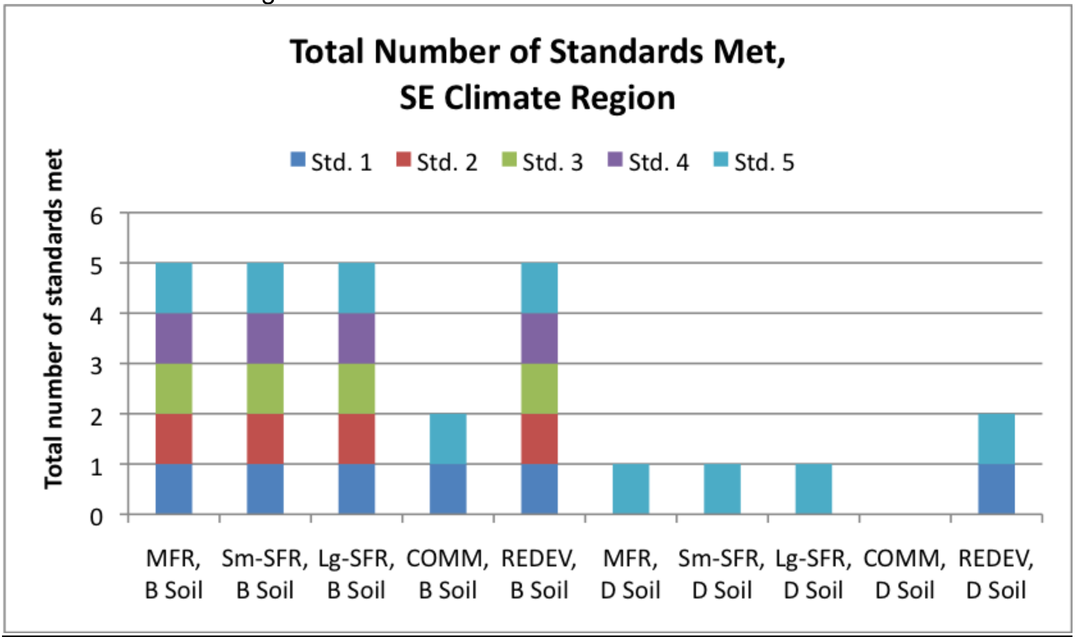
Region-Case[a]	Standards Met— Basic ARCD[b]	Standards Met— Full ARCD[b]	Runoff Retention and Pollutant Loading Reduction (%)[b, c]				
			Std. 1	Std. 2	Std. 3	Std. 4	Std. 5
SE(B)-MFR	1, 2, 3, 4, 5		63	87	90	>99	63
Sm-SFR	1, 2, 3, 4, 5		63	87	90	>99	63
Lg-SFR	1, 2, 3, 4, 5		63	87	90	>99	63
COMM		1, 5	63	86	86	86	63
REDEV		1, 2, 3, 4, 5	63	87	90	>99	63
SE(D)-MFR		5	50	50	50	50	37
Sm-SFR		5	38	38	38	38	34
Lg-SFR		5	38	38	38	38	34
COMM			41	41	41	41	41
REDEV		1, 5	63	66	66	66	42
SC(C)-MFR	1, 2, 3, 4, 5		58	82	90	81	47
Sm-SFR	1, 2, 3, 4, 5		58	82	90	78	45
Lg-SFR	1, 2, 3, 4, 5		58	82	90	78	45
COMM		1, 5	58	75	75	75	49
REDEV		1, 2, 3, 4, 5	58	82	90	84	49
SC(D)-MFR		4, 5	49	49	49	18	10
Sm-SFR		4, 5	37	37	37	10	6
Lg-SFR		4, 5	37	37	37	10	6
COMM		4, 5	40	40	40	31	18
REDEV		1, 4, 5	58	66	66	32	18
NM(B)-MFR	1, 2, 3, 4, 5		81	89	90	>99	81
Sm-SFR	1, 2, 3, 4, 5		81	89	90	>99	81
Lg-SFR	1, 2, 3, 4, 5		81	89	90	>99	81
COMM		1, 2, 5	81	89	89	89	81
REDEV		1, 2, 3, 4, 5	81	89	90	>99	81
NM(C)-MFR	1, 2, 3, 4, 5		81	89	90	74	60
Sm-SFR	1, 2, 3, 4, 5		81	89	90	71	57
Lg-SFR	1, 2, 3, 4, 5		81	89	90	71	57
COMM		5	66	66	66	66	64
REDEV		1, 2, 3, 4, 5	81	89	90	80	64
SW(C)-MFR	1, 2, 3, 4, 5		62	83	90	75	46
Sm-SFR	1, 2, 3, 4, 5		62	83	90	72	44
Lg-SFR	1, 2, 3, 4, 5		62	83	90	72	44
COMM	1, 2, 3, 4, 5		62	83	90	80	49
REDEV	1, 2, 3, 4, 5		62	83	90	80	49
SW(D)-MFR		4, 5	49	49	49	33	21
Sm-SFR		4, 5	37	37	37	27	16
Lg-SFR		4, 5	37	37	37	27	16
COMM		5	40	40	40	40	27
REDEV		1, 4, 5	62	66	66	44	28

[a] Region (hydrologic soil group)—land use; regions: SE—Southeast, SC—South-central, NM—Northeast-Upper Midwest, SW—Southwest; land uses: MFR—multi-family residential, Sm-SFR—small single-family residential, Lg-SFR--large single-family residential, COMM—retail commercial, REDEV--redevelopment

[b] Standard (Std.) 1—Retain the runoff produced by the 85th percentile, 24-hour precipitation event
Standard 2—Retain the runoff produced by the 95th percentile, 24-hour precipitation event
Standard 3—Retain 90 percent of the average annual post-development runoff volume
Standard 4—Retain the difference between the post- and pre-development average annual runoff volumes
Standard 5—Retain the difference between the post- and pre-development runoff volumes for all events up to and including the 85th percentile, 24-hour precipitation event

[c] Reduction estimated to result from meeting the standard, to the extent it can be met (fully met if so indicated in preceding columns), without treatment of remaining discharge. Where a standard can be met using Basic or Full ARCD application it is indicated in black, where a standard cannot be met using Basic or Full ARCD it is highlighted red.

Figure 4a. Ability to Meet Potential Regulatory Standards with Basic/Full ARCD Practices for Southeast Climate Region



MFR—multi-family residential, Sm-SFR—small single-family residential, Lg-SFR--large single-family residential, COMM—retail commercial, REDEV—redevelopment. Standard (Std.) 1—Retain the runoff produced by the 85th percentile, 24-hour precipitation event; Standard 2—the 95th percentile, 24-hour precipitation event; Standard 3—90 percent of the average annual post-development runoff volume; Standard 4—the difference between the post- and pre-development average annual runoff volumes; and, Standard 5—the difference between the post- and pre-development runoff volumes for all events up to and including the 85th percentile, 24-hour precipitation event

Figure 4b. Ability to Meet Potential Regulatory Standards with Basic/Full ARCD Practices for South Central Climate Region

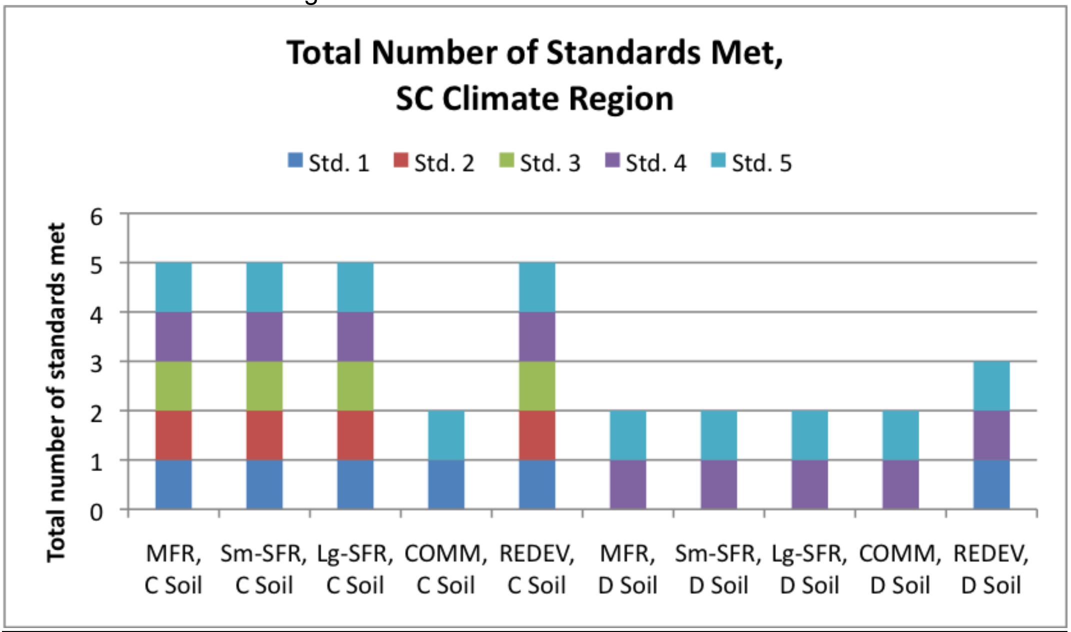


Figure 4c. Ability to Meet Potential Regulatory Standards with Basic/Full ARCD Practices for Northeast-Midwest Climate Region

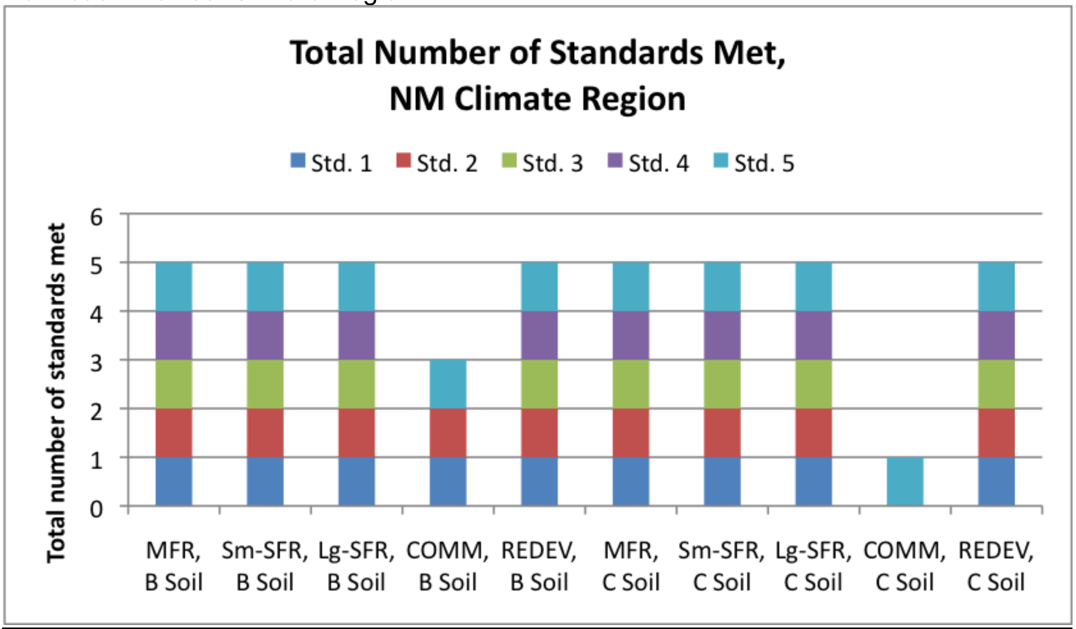


Figure 4d. Ability to Meet Potential Regulatory Standards with Basic/Full ARCD Practices for Southwest Climate Region

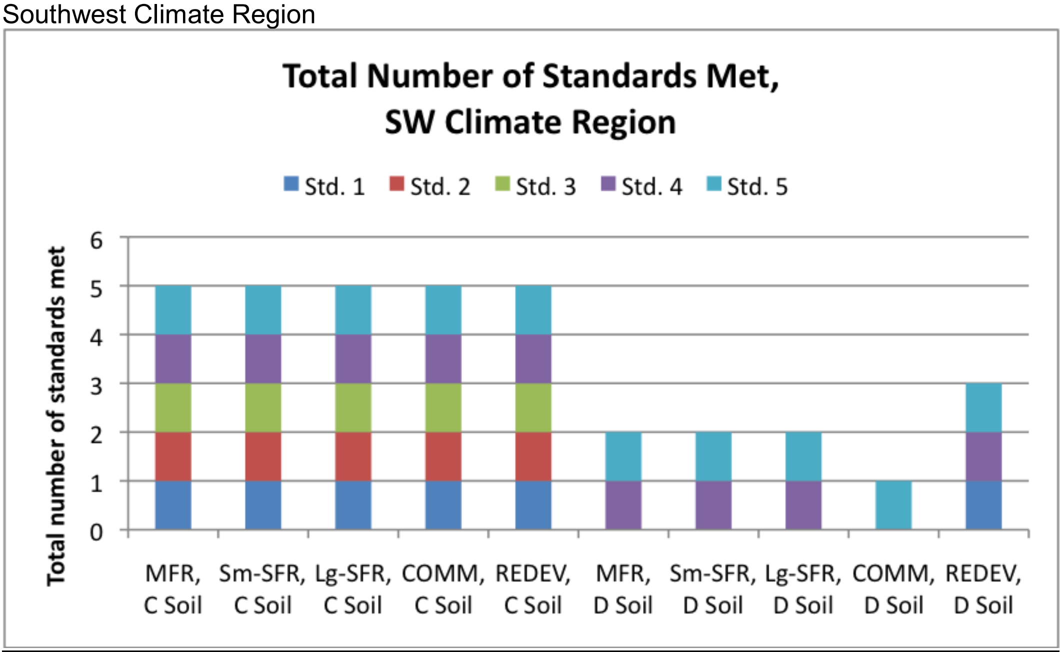
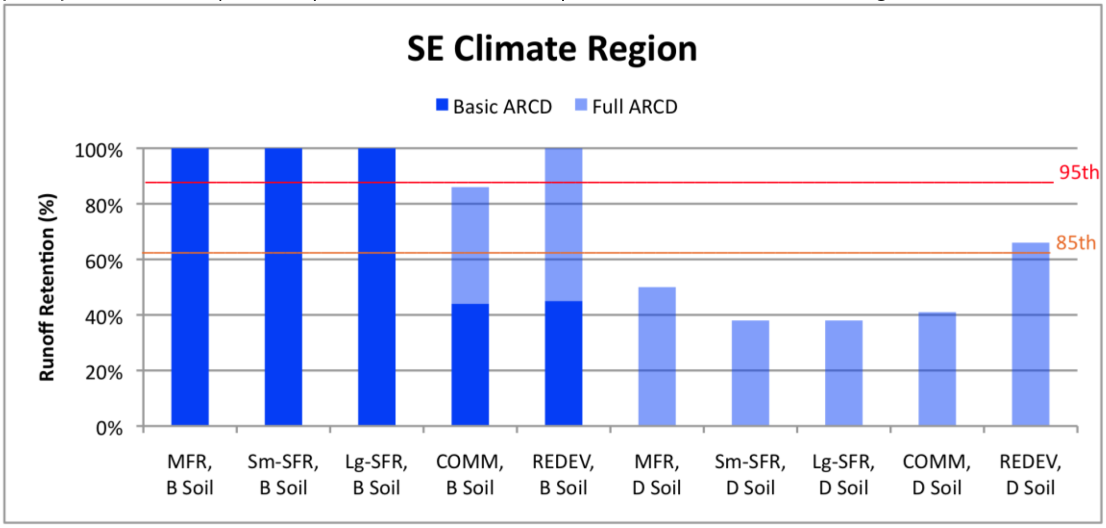


Figure 5a. Percentage of Runoff Retained Relative to Standards 1 (85th Percentile, 24-hour precipitation event) and 2 (95th Percentile event) for Southeast Climate Region



MFR—multi-family residential, Sm-SFR—small single-family residential, Lg-SFR--large single-family residential, COMM—retail commercial, REDEV—redevelopment. Standard (Std.) 1—Retain the runoff produced by the 85th percentile, 24-hour precipitation event; Standard 2—the 95th percentile, 24-hour precipitation event; Standard 3—90 percent of the average annual post-development runoff volume; Standard 4—the difference between the post- and pre-development average annual runoff volumes; and, Standard 5—the difference between the post- and pre-development runoff volumes for all events up to and including the 85th percentile, 24-hour precipitation event

Figures 5a-d show the percentage of runoff that can be retained for each development type, in each region, using either Basic or Full ARCD practices, in comparison with Standard 1 (retention of the 85th percentile, 24-hour precipitation event) and Standard 2 (retention of the 95th percentile, 24 hour event). Even where Standards 1 and 2 cannot be met in full, ARCD practices can still result in substantial compliance, and retention of significant runoff volume.

Figure 5b. Percentage of Runoff Retained Relative to Standards 1 (85th Percentile, 24-hour precipitation event) and 2 (95th Percentile event) for South Central Climate Region

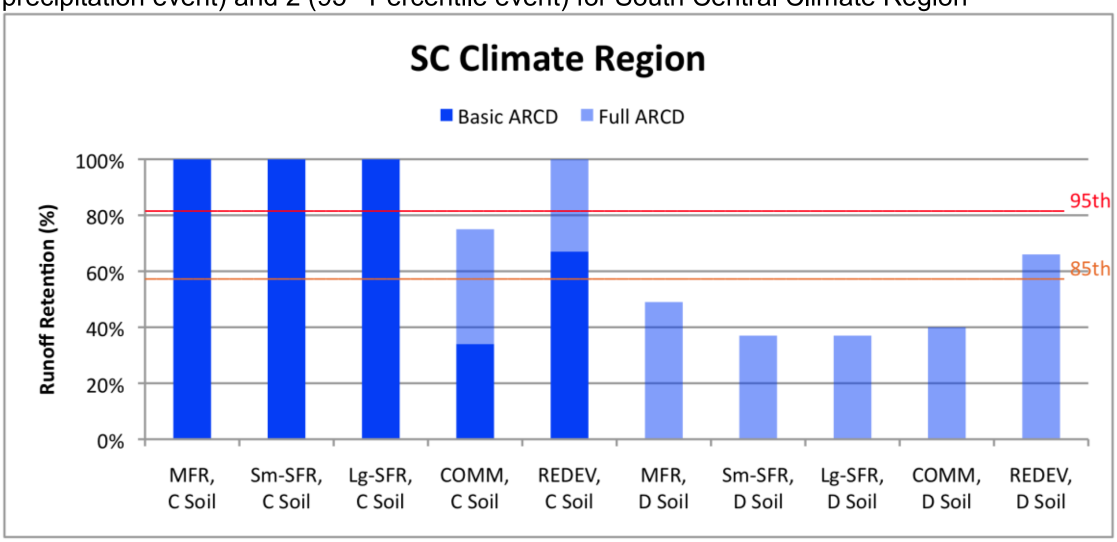


Figure 5c. Percentage of Runoff Retained Relative to Standards 1 (85th Percentile, 24-hour precipitation event) and 2 (95th Percentile event) for Northeast-Midwest Region

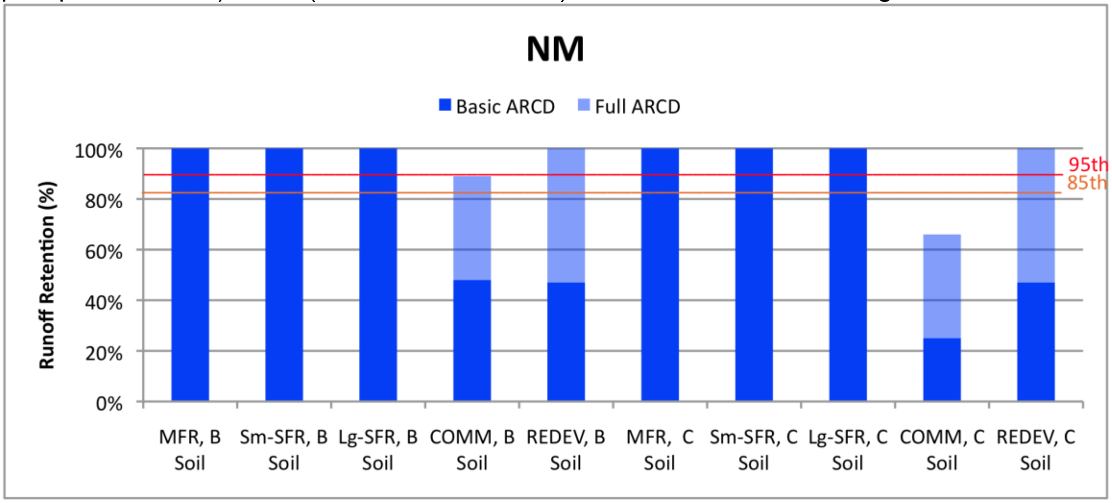
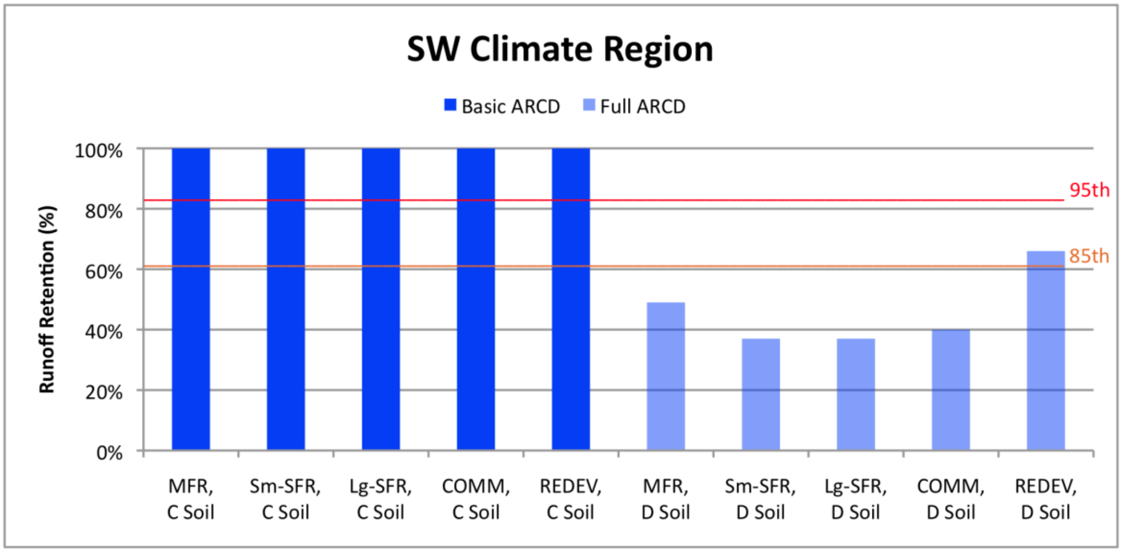


Figure 5d. Percentage of Runoff Retained Relative to Standards 1 (85th Percentile, 24-hour precipitation event) and 2 (95th Percentile event) for Southwest Region



Effectiveness of Standards in Environmental Protection

Standard 3 (retain 90 percent of the average annual post-development runoff volume) would be the most protective standard. Meeting or coming as close as possible to meeting, but not exceeding, this standard is estimated to lead to 66-90 percent runoff retention and pollutant loading reduction on B and C soils and 37-66 percent on D soil. Standard 2 (retain the runoff produced by the 95th percentile, 24-hour precipitation event) would yield only slightly less protection with B and C soils and, with D soil, retention and loading reduction equivalent to standard 3.

Standards 4 and 5, based on the differential between pre- and post-development runoff volume, are highly inconsistent in retaining runoff and reducing pollutants, in that they are relatively protective where pre-development runoff is estimated to be very low relative to post-development flow, but result in progressively lower retention and pollutant loading reduction as pre- and post-development volumes converge, such as in several cases on D soils. Standard 5 is especially weak in this regard. The potentially low level of retention and pollutant loading reduction renders these standards based on the change in pre- versus post-development runoff volume poor candidates for national application, at least as formulated in these terms.

Fully meeting standard 1 (retain the runoff produced by the 85th percentile, 24-hour precipitation event) would yield runoff retention and pollutant mass reduction ranging from 58 to 81 percent, depending on climate region. This level of inconsistency decreases the utility of this standard for widespread use. Standard 2, based on the 95th percentile event, is much better in this respect, with variability in runoff retention and loading reduction across the nation in the much narrower 82-89 percent range. However, standard 1 remains more consistent across regions, and more protective of water quality for development on D soils than either standard 4 or 5, and is preferable to those standards in this regard.

In summary, standards 2 and 3 are clearly superior to the other three options. Standard 3 is entirely consistent from place to place in degree of environmental protection, and standard 2 does not deviate much. Analysis of the five development cases on two soil groups in each of four regions demonstrated the two standards are virtually identical in the runoff retention and pollutant loading reduction they would bring about.

Management or Runoff in Excess of Standards Requirements

All of the analysis reported above assumed that any remaining runoff after the application of ARCD and meeting, or coming as close as possible to meeting a standard, would discharge with no treatment. In fact, additional treatment could further decrease pollutant loadings. Treatment without further runoff retention could be accomplished by many conventional or ARCD methods designed to lower contaminant concentrations. The most effective of the alternatives is probably bioretention discharging non-retained runoff either on the surface or through an underdrain, assumed in the analysis conducted for this study according to the methods cited above. Treatment of all remaining runoff with underdrained bioretention cells where space remains but all infiltration capacity is used can raise the pollutant removals given in Table 16 to the levels in Table 17. These estimates apply to the four pollutants considered, TSS and total copper, zinc, and phosphorus. Space would most likely be available in the three MFR and SFR cases but not the COMM and REDEV scenarios.

While there is substantial variability in these results, they demonstrate that discharging effluent of relatively consistent, high quality can be accomplished with a comprehensive ARCD strategy. This strategy would embrace, first, retaining as much urban runoff as possible and then utilizing treatment based on soil and vegetative media to capture contaminants from the remainder.

Table 17. Estimated Pollutant Loading Reduction Benefits of Bioretention Treatment of Runoff Remaining After ARCD Implemented to Meet or Approach Standards

Range of Table 16 Values (%)	Approximate Pollutant Removal Increase (%)	Total Estimated Pollutant Removal Range (%)
35-45	30-45	65-90
45-55	25-35	70-90
55-65	20-30	75-95
65-75	15->20	80->95
75-85	10->15	85->95
>85	5->10	90->95

SUMMARY AND CONCLUSIONS

STUDY DESIGN

This study was performed to investigate the degree to which low-impact development ARCD practices can meet or exceed the requirements of various potential stormwater management facility design standards and the resulting environmental benefits. The investigation was performed by estimating the stormwater retention possible with full application of ARCD practices to five land use cases in four representative climatic regions in the United States on two prominent soil types in each region. Retention is defined as preventing the conversion of precipitation to surface runoff. Retaining runoff from impervious and pollutant generating pervious surfaces prevents the introduction of urban runoff pollutants to receiving waters as well as reduces runoff volume to prevent stream channel and habitat damage, flooding, and loss of groundwater recharge. Infiltrating bioretention was first applied in the analysis of each case, a strategy termed Basic ARCD. When Basic ARCD could not fully retain post-development runoff, a Full ARCD strategy was added, involving roof runoff harvesting in the most impervious development cases and roof water dispersion in those with substantial pervious area. Benefits were assessed with respect to reduction of the annual average surface runoff volume from the quantity estimated without any stormwater management practices, and associated maintenance of pre-development groundwater recharge and water quality improvement through preventing discharge to receiving waters of pollutants generated with developed land uses.

A number of conservative assumptions were built into the analysis to ensure that the capabilities and benefits of ARCD would not be over-estimated. In summary, these assumptions are:

- No retention credit for evapotranspiration in the Basic ARCD strategy, although generally a substantial amount would occur, and consideration of evapotranspiration only for roof runoff in the Full ARCD strategy;
- Letting aside many available ARCD practices and site design principles that could be employed to reduce the runoff quantity, and the pollutants it transports, by reducing impervious surface area or directing the runoff to bioretention, harvesting, and dispersion facilities;
- The assumption of no infiltration on hydrologic soil group D soils, although some infiltration occurs at finite rates even on clay;
- Application of a safety factor to estimated infiltration rates;
- Minimum bioretention cell depths, so that these facilities would not be disruptive to site design and could be put to other uses;
- Requiring a 48-hour drawdown time for bioretention, instead of the 72-hour maximum;
- An analysis to guard against groundwater mounding under bioretention cells, with conservative assumptions for horizontal and vertical hydraulic conductivity rates; and
- An analysis demonstrating that doubling topographic slope changes results by only a few percent.

CAPABILITIES OF FULL ARCD APPLICATION

Comparison of estimated runoff production in the pre- and post-development states demonstrated that the majority of the infiltration that would recharge groundwater in the undeveloped state would be lost to surface runoff after development with no stormwater management practices. These losses would approach 90 percent in the most impervious developments. These observations apply in in all climate regions and with the full range of soil conditions.

Basic ARCD could retain all post-development runoff and pre-existing groundwater recharge, as well as attenuate all pollutant transport, in the three residential cases on B soils in the two climate regions where these soils were analyzed. Bioretention cells to accomplish this retention would use from less than one-fourth to just over one-third of the available pervious area for infiltration. Taking all available pervious area for the more highly impervious COMM and REDEV cases, bioretention would retain about 45 percent of the runoff and pollutants generated and save about 40 percent of the pre-development recharge. Adding Full ARCD measures in these cases would approximately double retention and pollutant reduction for the retail commercial land use and raise it to 100 percent for the redevelopment. Groundwater recharge would not increase, however, because the additional retention is accomplished by harvesting or dispersion.

In the three regions having C soils, Basic ARCD can again retain all runoff and reduce urban runoff pollutant mass loading to zero for the MFR and Sm-SFR and Lg-SFR residential cases, although generally requiring more of the available pervious area to do so than in B soil cases. The effect of lower rainfall is evident in the South Central and, especially, the Southwest regions. In the latter location, not only the residential cases but also the COMM and REDEV scenarios can achieve full runoff and groundwater recharge retention and pollutant loading attenuation with Basic ARCD on C soil. Full ARCD can approximately double runoff retention and pollutant removal from the Basic ARCD level for the COMM case and extend these measures to 100 percent for the redevelopment.

For development on the D soils in all climate regions, use of roof runoff management techniques was estimated to increase runoff retention and pollutant reduction from zero to between about one-third to two-thirds of the post-development runoff generated, depending on the land use case. These strategies would offer little groundwater recharge benefit with this soil condition, but would still have the potential to significantly reduce runoff volume and pollutant loading.

Therefore, taking the greatest advantage of what ARCD offers is expected to retain the great majority of post-development runoff and pre-development groundwater recharge. This strategy would also prevent the addition to receiving waters of all or almost all pollutant mass that would otherwise discharge from a range of urban developments on B and C soils. With D soils, Full ARCD can accomplish runoff retention and loading reductions approaching or somewhat exceeding 50 percent, and opportunities to use ARCD practices or site design principles not modeled in this analysis can further increase runoff retention volume.

ABILITY TO MEET STANDARDS

ARCD methods were assessed for their ability to meet five potential regulatory standards, the first two pertaining to retention of the 85th and 95th percentile, 24-hour precipitation events, the third to retain 90 percent of the post-development runoff, and the last two to retain the difference between the post- and pre-development runoff, the final standard capped at the 85th percentile, 24-hour event. The projected ability to meet the five standards varies mostly in relation to soil type (B or C versus D) and the relative imperviousness of development, and much less across climate regions, except for the relatively arid Southwest.

The only standards that cannot be fully met on B and C soils by the ARCD methods considered are standards 2-4 for the COMM case. Of the 125 standards assessments, ARCD practices are projected to meet 113 (90.4 percent) with B and C soils. The ability to meet these standards is much reduced on D soils. Only standards 1 (85^{th} percentile, 24-hour precipitation event, and 4 and 5 (related to the difference between the post- and pre-development runoff) can be met occasionally and under limited conditions using Full ARCD methods. However, even on D soils, all cases for Standard 1 were able to retain greater than 50 percent of the required runoff volume.

Standard 3 (retain 90 percent of the average annual post-development runoff volume) would be the most environmentally protective standard. Meeting or coming as close as possible to meeting, but not exceeding, this standard was estimated to lead to 66-90 percent runoff retention and pollutant loading reduction on B and C soils and 37-66 percent on D soil. Standard 2 (retain the runoff produced by the 95^{th} percentile, 24-hour precipitation event) would yield equivalent protection on D soils and only slightly less protection with B and C soils.

Standards 4 and 5, based on the differential between pre- and post-development runoff volume, are very inconsistent in retaining runoff and reducing pollutants. They are highly protective where pre-development runoff is estimated to be very low relative to post-development flow, and then to result in progressively lower retention and loading reduction as pre- and post-development volumes converge. Standard 5 is especially weak in this regard. This inconsistency makes these standards poor candidates for national application, at least as formulated in these terms.

Fully meeting standard 1 (retain the runoff produced by the 85^{th} percentile, 24-hour precipitation event) would yield runoff retention and pollutant mass reduction ranging from 58 to 81 percent, depending on climate region. This level of inconsistency decreases the utility of this standard to some degree. Standard 2, based on the 95^{th} percentile event, is much better in this respect, with variability in runoff retention and loading reduction across the nation in the much narrower 82-89 percent range. However, standard 1 remains more consistent across regions, and more protective of water quality for development on D soils than either standard 4 or 5, and is preferable to those standards in this regard.

In summary, standards 2 and 3 are clearly superior to the other three options. Standard 3 is entirely consistent from place to place in degree of environmental protection, and standard 2 does not deviate much. Analysis of the five development cases on two soil groups in each of four regions demonstrated the two standards are virtually identical in the runoff retention and pollutant loading reduction they would bring about.

All five standards are based on some stipulated runoff retention. Pollutant mass loading reduction is at least equal to the amount of retention that occurs. It is possible to decrease loadings further by treating excess runoff. Analysis showed that subjecting that runoff to bioretention treatment before discharge could reduce loadings of TSS and total copper, zinc, and phosphorus by at least two-thirds and as much as over 95 percent. This conclusion applies to all climate regions and soil types for land use cases where space is available for the additional bioretention cells. The three residential cases are in this group but not the COMM or REDEV cases, where all pervious land would have already been used for retentive or roof water dispersion practices.

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ATTACHMENT A

POLLUTANT CONCENTRATIONS FOR URBAN SOURCE AREAS (HERRERA ENVIRONMENTAL CONSULTANTS, INC. UNDATED)

Source Area	Study	Location	Sample Size (n)	TSS (mg/L)	TCu (µg/L)	TPb (µg/L)	TZn (µg/L)	TP (mg/L)	Notes
Roofs									
Residential	Steuer, et al. 1997	MI	12	36	7	25	201	0.06	2
Residential	Bannerman, et al. 1993	WI	~48	27	15	21	149	0.15	3
Residential	Waschbusch, et al. 2000	WI	25	15	n.a.	n.a.	n.a.	0.07	3
Residential	FAR 2003	NY		*19*	*20*	*21*	*312*	*0.11*	4
Residential	Gromaire, et al. 2001	France		*29*	*37*	*493*	*3422*	*n.a.*	5
Representative Residential Roof Values				**25**	**13**	**22**	**159**	**0.11**	
Commercial	Steuer, et al. 1997	MI	12	24	20	48	215	0.09	2
Commercial	Bannerman, et al. 1993	WI	~16	15	9	9	330	0.20	3
Commercial	Waschbusch, et al. 2000	WI	25	18	n.a.	n.a.	n.a.	0.13	3
Representative Commercial Roof Values				**18**	**14**	**26**	**281**	**0.14**	
Parking Areas									
Res. Driveways	Steuer, et al. 1997	MI	12	157	34	52	148	0.35	2
Res. Driveways	Bannerman, et al. 1993	WI	~32	173	17	17	107	1.16	3
Res. Driveways	Waschbusch, et al. 2000	WI	25	34	n.a.	n.a.	n.a.	0.18	3
Driveway	FAR 2003	NY		*173*	*17*		*107*	*0.56*	4
Representative Residential Driveway Values				**120**	**22**	**27**	**118**	**0.66**	
Comm./ Inst. Park. Areas	Pitt, et al. 1995	AL	16	110	116	46	110	n.a.	1
Comm. Park. Areas	Steuer, et al. 1997	MI	12	110	22	40	178	0.2	2
Com. Park. Lot	Bannerman, et al. 1993	WI	5	58	15	22	178	0.19	3
Parking Lot	Waschbusch, et al. 2000	WI	25	51	n.a.	n.a.	n.a.	0.1	3
Parking Lot	Tiefenthaler, et al. 2001	CA	5	36	28	45	293	n.a.	6
Loading Docks	Pitt, et al. 1995	AL	3	40	22	55	55	n.a.	1
Highway Rest Areas	CalTrans 2003	CA	53	*63*	*16*	*8*	*142*	*0.47*	7

Park and Ride Facilities	CalTrans 2003	CA	179	*69*	*17*	*10*	*154*	*0.33*	7
Comm./ Res. Parking	FAR 2003	NY		*27*	*51*	*28*	*139*	*0.15*	4
Representative Parking Area/Lot Values				**75**	**36**	**26**	**97**	**0.14**	
Landscaping/Lawns									
Landscaped Areas	Pitt, et al. 1995	AL	6	33	81	24	230	n.a.	1
Landscaping	FAR 2003	NY		*37*	*94*	*29*	*263*	n.a.	4
Representative Landscaping Values				**33**	**81**	**24**	**230**	**n.a.**	
Lawns - Residential	Steuer, et al. 1997	MI	12	262	n.a.	n.a.	n.a.	2.33	2
Lawns - Residential	Bannerman, et al. 1993	WI	~30	397	13	n.a.	59	2.67	3
Lawns	Waschbusch, et al. 2000	WI	25	59	n.a.	n.a.	n.a.	0.79	3
Lawns	Waschbusch, et al. 2000	WI	25	122	n.a.	n.a.	n.a.	1.61	3
Lawns - Fertilized	USGS 2002	WI	58	n.a.	n.a.	n.a.	n.a.	2.57	3
Lawns - Non-P Fertilized	USGS 2002	WI	38	n.a.	n.a.	n.a.	n.a.	1.89	3
Lawns - Unfertilized	USGS 2002	WI	19	n.a.	n.a.	n.a.	n.a.	1.73	3
Lawns	FAR 2003	NY	3	*602*	*17*	*17*	*50*	*2.1*	4
Representative Lawn Values				**213**	**13**	**n.a.**	**59**	**2.04**	

Notes:

Representative values are weighted means of collected data. Italicized values were omitted from these calculations.

1 - Grab samples from residential, commercial/institutional, and industrial rooftops. Values represent mean of DETECTED concentrations

2 - Flow-weighted composite samples, geometric mean concentrations

3 - Geometric mean concentrations

4 - Citation appears to be erroneous - original source of data is unknown. Not used to calculate representative value

5 - Median concentrations. Not used to calculate representative values due to site location and variation from other values.

6 - Mean concentrations from simulated rainfall study

7 - Mean concentrations. Not used to calculate representative values due to transportation nature of land use.

FILED
LOS ANGELES SUPERIOR COURT
MAR 24 2005
JOHN A. CLARKE, CLERK
BY E. SABALBURO, DEPUTY

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF LOS ANGELES - CENTRAL CIVIL WEST COURTHOUSE

In Re LOS ANGELES COUNTY MUNICIPAL STORM WATER PERMIT LITIGATION

Lead Case No. **BS 080548**
Related Cases: BS 080753, BS 080758 BS 080791, BS 080792, and 080807
Judge: Hon. Victoria Gerrard Chaney

STATEMENT OF DECISION FROM PHASE I TRIAL ON PETITIONS FOR WRIT OF MANDATE

Statement of Decision from Phase I Trial
Hearing: January 7, 2005
Ruling: March 16, 2005
Department: 324-Central Civil West
Date Actions Filed: January 15 & 17, 2003

On May 19-20, 2004, trial was held on Phase I of this bifurcated action, known as *In the Matter of the Los Angeles County Municipal Stormwater Permit*, which involves five coordinated Petitions for Writ of Mandate filed by Petitioners County of Los Angeles and the Los Angeles County Flood Control District (County Petitioners); Petitioners the Cities of Arcadia, Baldwin Park, Bell Gardens, Bellflower, Cerritos, Claremont, Commerce, Covina, Diamond Bar, Downey, Gardena, Hawaiian Gardens, Irwindale, Lawndale, Montebello, Paramount, Pico Rivera, Pomona, Rosemead, San Gabriel, Santa Fe Springs, Sierra Madre, Signal Hill, South Pasadena, Temple City, Vernon, Walnut, West Covina, Whittier, Building Industry Legal Defense Foundation, and Construction Industry Coalition on Water Quality

(Arcadia Petitioners); Petitioners Cities of Monrovia, Norwalk, Rancho Palos Verdes, Artesia, Beverly Hills, Carson, La Mirada, Westlake Village, Agoura Hills, Hidden Hills, San Fernando, and San Marino (Monrovia Petitioners); Petitioner City of Alhambra (Alhambra); and Petitioners Los Angeles County Economic Development Corporation and the Cities of Industry, Lakewood, Santa Clarita and Torrance (LAEDC Petitioners) against the Regional Water Quality Control Board, Los Angeles Region (Regional Board). The Natural Resources Defense Council, Santa Monica Baykeeper, and Heal the Bay (Intervenors) intervened as Respondents in Intervention in support of the Permit.

After full briefing and oral argument, the Court, the Honorable Victoria Gerrard Chaney presiding, issues the following Statement of Decision on the Phase I issues. All parties were present and represented by counsel. Howard Gest appeared on behalf of the County Petitioners; Rufus C. Young and Amy Morgan appeared for the Alhambra and LAEDC Petitioners; Richard Montevideo and Peter Howell appeared for the Arcadia Petitioners; John J. Harris and Evan J. McGinley appeared for the Monrovia Petitioners; Jennifer Novak and Helen Arens, Deputy Attorneys General appeared for the Regional Board; David Beckman, Anjali Jaiswal and Leslie Mintz appeared for the Intervenors. This Statement of Decision applies only to the Phase I issues presented to this Court. All remaining issues are addressed in the Phase II Statement of Decision.

Phase I of this bifurcated proceeding involved the following issues, as framed in the Joint Statement Regarding Briefing and Hearing Schedule, filed on March 2, 2004:

1. Petitioners' allegations that Part 2 of the Permit ("Receiving Water Limitations") is ambiguous, arbitrary, unsupported by the Record, and contrary to the "good faith" safe harbor intentions of the Respondent and renders compliance with the Permit impossible and impracticable;

2. Petitioners' allegations that the Permit exceeds the Respondent's authority under the federal Clean Water Act and California's Porter-Cologne Water Quality Act by imposing requirements that go beyond the Clean Water Act's "maximum extent

practicable" ("MEP") standard and/or the Porter-Cologne Act's "reasonably achievable" standard;

3. Certain Petitioners' allegations that the Permit unlawfully regulates discharges "into", as opposed to only "from", the municipal separate storm sewer system contrary to the Clean Water Act and without authority under the Porter-Cologne Act;

4. Petitioners' allegations that Respondent acted without authority by adopting Permit terms that unlawfully direct Petitioners to modify their General Plans and/or their CEQA guidelines, and that unlawfully compel Petitioners to review development projects in a manner that is contrary to or different from the process provided for by the California Legislature, with Respondent violating the Separation of Powers doctrine under the California Constitution;

5. Certain Petitioners' allegations that the Permit unlawfully interferes with their land use authority; and

6. Petitioners' allegations that the Permit was adopted in violation of CEQA, as Respondent failed to comply with the environmental review requirements of CEQA. (To what extent was the Respondent required to comply with CEQA in adopting the Permit and did the Respondent so comply.)

Holding

With some caveats, the Court denies the petitions for writ of mandate as they relate to the Phase I issues.

To obtain a writ of mandate under Code of Civil Procedure section 1094.5, Petitioners must prove that Respondent, the Regional Board: 1) proceeded without or in excess of jurisdiction; 2) issued its Permit without first holding a fair hearing; or 3) prejudicially abused its discretion. Abuse of discretion is established if the Respondent: a) has not proceeded in a manner required by law; b) the Permit is not supported by findings; or c) the findings are not supported by the evidence.

Petitioners failed to demonstrate that Respondent exceeded its jurisdiction.

Petitioners do not appear to argue that the Permit was issued without a fair hearing. If this argument were made, 80,000 pages of the administrative record ("the Record") and approximately 50 meetings between Regional Board staff and interested parties would confute the argument.

Neither have Petitioners demonstrated that Respondent failed to proceed in a manner required by law, that the Permit is unsupported by the findings, or that the findings are unsupported by the evidence. Therefore, the Court finds no prejudicial abuse of discretion.

Permit Part 2: Receiving Water Limitations

Petitioners assert several arguments with respect to Part 2 of the Permit, Receiving Waters Limitations. In particular, Petitioners assert that subparts 2.1, 2.2, 2.3, and 2.4 of Part 2 create ambiguity, that Part 2 must include a "safe harbor" provision, and that the Permit, including Part 2, unlawfully exceeds the MEP standard.

The Permit cannot be read in a vacuum. In interpreting the Permit the Court looks to the content of Part 2, other language and provisions in the Permit, other related statutes and regulations, and the technical and specialized nature of NPDES permits together with the expertise of those who implement them. (See *Department of Alcoholic Beverage Control v. Alcoholic Beverage Control Appeals Bd.* (2003) 109 Cal.App.4th 1687, 1696; see also *Northwest Environmental Advocates v. Portland* (9th Cir. 1995) 56 F.3d 979, 982; *United States v. Weitzenhoff* (9th Cir. 1994) 35 F.3d 1275, 1289.)

The terms of the Permit are governed by 33 U.S.C. section 1342, subdivision (p)(3)(B) of the Clean Water Act, which includes the "requirement to effectively prohibit non-stormwater discharges into the storm sewers"; the Maximum Extent Practicable standard[1]; and the separate

[1] See Permit at 57 citing (*In the Matter of the Petitions of the Cities of Bellflower et al.* (Oct. 5, 2000) SWRCB WQ 2000-11 at 20 (R007511); see Memorandum from Elizabeth Miller Jennings, Senior Staff Counsel, SWRCB, *Definition of Maximum Extent Practicable* (Feb. 11, 1993) at 3 (R0028353); 40 C.F.R. §122.26(d)(2)(iv); *NRDC v. Costle* (D.C. Cir. 1977) 568 F.2d 1369, 1375; *NRDC v. U.S. EPA* (9th Cir. 1992) 966 F.2d 1292, 1296, 1308; *Browner* 191 F.3d at

authority of the Regional Board to require "such other provisions" necessary to meet water quality standards. The Permit is governed also by the Porter-Cologne Act section 13263, to the extent it is not inconsistent with federal law; and Part 2 should be interpreted in light of the findings of experts, including the Regional Board,[2] precedential orders,[3] and related Clean Water Act provisions, such as those that provide for the adoption of TMDLs.[4]

Pursuant to these authorities and guides, the Court rejects Petitioners' assertion that the MEP standard is the sole standard that applies to municipal storm water discharges and their related contention that MEP is a substantive upper limit on requirements that can be imposed to meet water quality standards. In *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159 (*Defenders of Wildlife*), the Ninth Circuit noted: "Under that discretionary provision [of Section 402(p)(3)(B)], the EPA has the authority to determine that ensuring strict compliance with state water-quality standards is necessary to control pollutants. The EPA also has the authority to require less than strict compliance with state water-quality standards." (191 F.3d at p. 1166.) The Regional Board, which is authorized to enforce the Clean Water Act pursuant to Water Code

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1168-67 (permitting authority's broad discretion to specify BMPs and determine whether MEP is satisfied).

[2] See, e.g., Long Beach Municipal Stormwater Permit (Los Angeles RWQCB Order 99-060 at 6-7 (R0008599-600); Ventura County Municipal Stormwater Permit (Los Angeles RWQCB Order 00-108) at 9 (R0008753); Caltrans Stormwater Permit (State Board 99-06) at 10-11 (R0003225); Ltr from Alexis Strauss, Acting Director, Division of Water, EPA Region IX (Mar. 17, 1998) at 2 (R0008582); 61 Fed.Reg. 43,761 *EPA Interim Permitting Approach*; Memorandum from Michael A.M. Lauffer, Staff Counsel, SWRCB, *Legal Issues Concerning Renewal of Order 96-054* (Nov. 9, 2001) at 12 (R0007374); Memorandum from Regional Board Staff for Nov. 29, 2001 Meeting at A.9-A.10 (R0006796-97).

[3] See, e.g., *Own Motion Review of the Petition of Environmental Health Coalition* SWRCB WQ 98-01 at 5 (R0001973) amended by *Own Motion Review of the Petition of Environmental Health Coalition* SWRCB WQ 99-05 at 1-2 (R0001965-66) ("as a precedent decision, the following receiving water limitation language shall be included in future municipal storm water permits" without a safe harbor) (R0001965-66); *In the Matter of the Petitions of BIA*, SWRCB WQ 2001-15 at 5-7 (R0007530-32); see also *In the Matter of the Petition of Citizens for a Better Environment, et al.* SWRCB order 91-03 at 36 (R0066466).

[4] See Fact Sheet 14-15 (R0008047-48); 40 C.F.R. § 122.44(a)(1) (TMDL implementation in stormwater management plans), 40 C.F.R. § 130.6(c)(1); Cal. Water Code § 13263.

sections 13370 and 13377, can also require compliance with water quality standards. (See *Building Industry Association of San Diego County v. State Water Resources Control Board* (2004) 124 Cal. App. 4th 866 (*Building Industry Association*) [rejecting the claim that the MEP standard is the exclusive measure that may be applied to municipal storm sewer discharges].)

It seems clear that the Regional Board followed these principles when it established subparts 2.1 and 2.2 as the basic receiving water requirements for Los Angeles area waters and subparts 2.3 and 2.4 as the procedure the Board intends to implement to resolve any violations those requirements. (See *Building Industry Association*, *supra*, 124 Cal.App.4th at p. 890 ["Although the Permit allows the regulatory agencies to enforce the water quality standards during this process, the Water Boards have made clear in this litigation that they envision the ongoing iterative process as the centerpiece to achieving water quality standards."]; see generally *Defenders of Wildlife*, *supra*, 191 F.3d 1159; *NRDC v. Costle* (D.C. Cir. 1977) 568 F.2d 1369, 1375; *NRDC v. U.S. EPA* (9th Cir. 1992) 966 F.2d 1292, 1296, 1308.)

Under this process, the first step to correct water quality violations that occur, even if a permittees' SQMP has been designed to achieve standards and BMPs have been timely implemented, is set forth in subpart 2.3, the "iterative" process. Should that not be sufficient, the parties would move to subpart 2.4, Best Management Practices (BMP) requirements. The process requires cooperation from the Regional Board, State Board and local government entities and impliedly requires that all parties work together in good faith.

This reading is consistent with the requirements of the Clean Water Act generally and section 402 specifically, as well as the Porter-Cologne Act. (See 33 U.S.C. § 1342(p)(3)(B)(iii); 33 U.S.C. §§ 1341(a)(1)-(2), 1342(a)(2), 1342(p)(3)(B)(ii); 40 C.F.R. 122.4(d); Cal. Water Code §§ 13000, 13263(a).) It is also consistent with State Board orders WQ 2001-15 and WQ 99-05 and the Francine Diamond letter, found at Exhibit B to Petitioners' Request for Judicial Notice.

Reading the Receiving Waters Limitations language in this manner, there is no tension between the subparts and no ambiguity.

Petitioners assert that the Regional Board was required under the Porter-Cologne Act and CEQA to consider certain factors when issuing the Permit, including economics, reasonably achievable water quality conditions, potential and environmental impacts, alternatives to the proposed requirements and mitigation measures for any requirements adopted. In a later section of this Statement of Decision and in the Statement of Decision from Phase II of trial the Court rejects these arguments but finds that in any event the Regional Board met any such obligations by considering these factors in addressing the MEP standard. In addition, where applicable, the Total Maximum Daily Load (TMDL) procedures allow for correction of water quality problems in a graded manner over a period of years. The TMDL procedures provide some protection from unreasonable enforcement by the Regional Board.

In sum, the Regional Board acted within its authority when it included Parts 2.1 and 2.2 in the Permit without a "safe harbor," whether or not compliance therewith requires efforts that exceed the "MEP" standard. *(Defenders of Wildlife*, supra, 191 F.3d 1159; *Building Industry Association* 124 Cal. App. 4th at p. 884.) In so concluding, the Court gives deference to State Board order 99-05, a precedential decision under Government Code section 11425.60, and notes the EPA's objection to specific safe harbor language. (See *Own Motion Review of the Petition of Environmental Health Coalition* SWRCB WQ 99-05 at 1-2 (R0001965-66); see also Letter from Alexis Strauss, Acting Director, Division of Water, EPA Region IX (Mar. 17, 1998) at 2 (R0008582).) The Court emphasizes the importance of good faith on the part of all parties in implementing Part 2.

<u>Maximum Extent Practicable Standard</u>

Further, Petitioners assert that the Permit cannot go beyond the maximum extent practicable ("MEP") standard under the Clean Water Act and this Permit is inconsistent with the MEP standard. As noted, even if the Permit did exceed the MEP standard, the Regional Board was within its authority in requiring more stringent standards. However, the Court finds that the administrative record contains significant evidence showing that the terms of the Permit taken, as a whole, constitute the Regional Board's definition of MEP, including, but not limited to, the challenged Permit provisions. There is significant evidence in the administrative record that the Regional Board looked to both other states and jurisdictions, and conducted its own independent studies regarding various methods for compliance with MEP.[5] This Court specifically finds that the Regional Board conducted considerable research and review to ensure that the best management practices ("BMPs") were available and reasonable.[6] For example, the administrative record contains *The Fundamentals of Urban Runoff Management: Technical and Institutional Issues*, which demonstrated an effective and available method for removing

[5] See, e.g., Permit at 14 (development and redevelopment activities); Permit at 18 (implementation of all BMPs in SQMP); Final Fact Sheet/Staff Report (Dec. 13, 2001) ("Fact Sheet") at 15-17 (public education and participation) (R0008048-50); Fact Sheet at 19-25 (industrial/commercial program and inspections) (R0008052-58); Fact Sheet at 38-40 (public agency activity) (R0008071-73); Fact Sheet at 40-45 (development and redevelopment activity) (R0008073-78); Long Beach Municipal Stormwater Permit (Los Angeles RWQCB Order 99-060 (R0008599-600); Ventura County Municipal Stormwater Permit (Los Angeles RWQCB Order 00-108) (R0008753); Caltrans Stormwater Permit (State Board 99-06) at 10-11 (R0003225).Comparison of Permit with Orange County and Santa Clara Permit (R0031402); Orange County Permit Proposed Monitoring Program (R0054938); Riverside Permit (R0055287-88); Denver Urban Stormwater Drainage Manual (R0056744-46); San Francisco BMPs (R0057414); Watershed Ordinance for Austin, TX (R0058074); Orange County DAMP (R0058399); San Bernardino Permit (R0061460); Ventura Permit (R0061493); Fresno Permit (R0061511); Sacramento Permit (R0061585); San Francisco Bay Area Permit (R0061636); Santa Cruz Region Permit (R0061652); Sarasota Permit (R0061666); Tulsa Permit (R0061773); Anchorage Permit (R0061805) (New York State Stormwater Management Design Manual (R0009514); Virginia Stormwater Management Manual (R0009529).

[6] See, e.g., Allison, Robin, Effectiveness of Two Storm Water Trash Trapping Systems (R0068962-63); Leecaster, Molly K., Assessment of Efficient Sampling Designs for Urban Stormwater Monitoring (R0022854-60); Radulescu, Dan, Storm Water Quality Task Force BMP Guide for Retail Gasoline Outlets (Nov. 2001) (R0007546-50); Radulescu, Dan, Retail Gasoline Outlets: New Development Design Standards for Mitigation of Storm Water Impacts (Dec. 2001) (R0007598-607); Dallman, Suzanne, Storm Water: Asset not Liability (Dec. 3, 1999) (R0068878-913); Pitt, Robert, Illicit Discharge Detection and Elimination (May 2001) (R0011273); Swamikannu, Xavier, SUSMPs Presentation to the Regional Board (Jan. 26, 2000) (R0068726-40); Othmer, Edward F., Performance Evaluation of Structural BMPs: Drain Inlet Inserts (R0007566-78); Los Angeles County Requirements, Section Three (R0068875-77); Schueler, Thomas, R., Better Site Design: Changing Development Rules to Protect the Environment (1999) (R0068693-95); A Guide to Better Site Planning (R0068868-73); Urban Runoff: New Development Management Measure (R0068713-22); Ferguson, Bruce K., Stormwater Infiltration (R0068914-15); Horner, Richard R., Fundamentals of Urban Runoff Management: Technical and Institutional Issues (Aug. 1994) (R0068930-61); Ltr from NRDC to Regional Board re: SUSMPs (Jan. 14, 2000) (R0068840-61).

pollutants. (Horner, R., *Fundamentals of Urban Runoff Management: Technical and Institutional Issues* (Aug. 1994) (R0068930).) The administrative record also shows that the Regional Board considered State Board order 2000-11, which held that the Standard Urban Stormwater Mitigation Plans ("SUSMPs") "are consistent with MEP and therefore are federally mandated." (*In Re Cities of Bellflower, et al.* (2000) SWRCB Order 2000-11 (R0007506).) Additional challenges to the SUSMPs are rejected in the Statement of Decision from Phase II of trial in deciding Issue 6.

The Court finds that there was no issue of impossibility. The administrative record demonstrates that there are (1) BMPs available to meet the terms of the Permit consistent with the MEP standard, and (2) that those BMPs are reasonable. The administrative record supports the conclusion that the research and review were conducted by the Respondent.[7]

This Court finds based on the administrative record that the Regional Board made considerable findings regarding (1) the positive effects of storm water management and (2) the cost of potential programs and BMPs. (See e.g. Permit at 2-4, 8-10, 12-14; Fact Sheet at 3-7 (R0008036-40).) The Regional Board considered the history of implementation costs, both in prior permits for Petitioners and costs in other states.[8]

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[7] See *supra* notes 7 and 8; see also Addendum (consideration of EPA documents).

[8] See, e.g., Yamaguchi, Marianne, *Comparative Cost of the LA County Storm Water Management Program* (June 10, 1996) (R0031426-30; R0031431-44); Regional Board, Slide Presentation of MS4 Permit (Dec. 13, 2001) (R0007660); SUSMPs, *BMP Cost Estimates* (Nov. 30, 1999) (R0068731-33); Santa Monica Bay Tourism and Recreational Beach Use (1994) (R0031447); Los Angeles 1998 Economic and Demographic Info. (1998) (R0010984-85); Permit Costs, City of Manhattan Beach (June 17, 1996) (R0031445); U.S. EPA, *Economic Benefits of Runoff Controls* (Sept. 1995) (R0010711-12); U.S. EPA, *Data Summary of Urban Stormwater Best Management Practices* (Aug. 1999) (R0010735-36); *Cost and Benefits of Storm Water BMPs* (Sept. 14, 1998) (R0073087-135); U.S. EPA, *Economic Analysis of the Storm Water Phase II Rule* (Aug. 1, 1997) (R0010281-82); U.S. EPA, *Liquid Assets: A Summertime Perspective on the Importance of Clean Water to the Nation's Economy* (May 1996) (R0066961); The Role of Metropolitan Areas in the National Economy (R0011017); *The Benefits of Better Site Design in Commercial Development* (R0011499-508); Billingsley, Janice, *Study Nails Building Costs* (Sept. 4, 2000) (R0010703); U.S. Dept. of Commerce, *Economic Valuation of Natural Resources: A Handbook for Coastal Resource Policymakers* (June 1995)

CEQA Compliance

Several Petitioners assert that the Court should invalidate the action of the Regional Board on the grounds that the Regional Board failed to comply with the California Environmental Quality Act (CEQA), and failed to conduct the necessary environmental review required by CEQA. They acknowledge that in issuing a National Pollutant Discharge Elimination System (NPDES) permit, the Regional Board is exempt from complying with CEQA's requirement to prepare Environmental Impact Reports or negative declarations. (See Wat. Code, § 13389; Cal. Code of Regs., Title 14, § 15263; *Committee for a Progressive Gilroy v. State Water Resources Control Board* (1987) 192 Cal.App.3d 847, 862.) Petitioners allege that the Regional Board was to comply with the "policy" requirements of CEQA, pointing to Public Resources Code sections 21000 and 21001.

The Court rejects the argument that the Regional Board violated CEQA. The Court agrees with the Regional Board that the issuance of the subject Permit was exempt from all aspects of CEQA. The Court acknowledges the State Board's finding that complying with CEQA's "policy" provisions means that in adopting the Permit, the Regional Board should consider any environmental reports or similar documents submitted during the adoption process. (See State Board Orders WQ 75-8 & 84-7, attached to Petitioners' Request for Judicial Notice as Exhibits D & E.) This interpretation of CEQA is consistent with the Legislature's stated intent that the environmental review documents contain the discussion of any adverse environmental impacts, alternatives, mitigation possibilities, etc. (Pub. Resources Code, §§ 21002.1, 21003.1;

(R0042398); Griffin, Adrian, *Economic Issues in Water Quality Regulation* (R0010706-07); U.S. Conference of Mayors, *U.S. Metro Economies: The Engines of America's Growth* (July 2001) (R0010916, R0010918); Washington State Dept. of Transport. and Ecology, *Cost Analysis, Washington Dept. of Ecology Year 2001* (Aug. 30, 2001) (R0010780); Virginia Dept. of Conservation and Recreation, *The Economic Benefits of Protecting Virginia's Streams, Lakes, and Wetlands* (Oct. 2001) (R0010880-85; R0010909-11).

cf. Cal. Code of Regs., title 14, § 15063.) CEQA requires public agencies to generate sufficiently informative documents so that decisions are made with full consideration of the environmental consequences. (*Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 392.) This makes the environmental impact report the "heart" of CEQA, (*Sierra Club v. State Bd. of Forestry* (1994) 7 Cal.4th 1215, 1229 [citation omitted]). Petitioners' arguments cannot be accepted because they would render the Regional Board's exemption from this requirement illusory. Petitioners have not argued that the Regional Board failed to consider existing environmental documents as provided in State Board orders 75-8 and 84-7. The Court finds that the Regional Board had before it and considered the necessary information concerning the environment.

In addition, having found the Permit is consistent with the Clean Water Act with respect to the MEP standard and other Phase I issues, the Court respectfully disagrees with Petitioners' contention that the Permit goes "far beyond" the Clean Water Act's mandates. Also, a finding that the Permit's adoption was not bound by these CEQA reporting requirements is consistent with Congress' intent to streamline environmental regulation. (See 33 U.S.C. § 1371, subd. (c); *Pacific Legal Foundation v. Quarles* (C.D. Cal. 1977) 440 F.Supp 316, 320-21 & fn. 2.) Under the Porter-Cologne Act, a California-issued NPDES permit must be consistent with federal law and intent. (See Wat. Code, §§ 13370, 13372; *Pacific Water Conditioning v. City Council of Riverside* (1977) 73 Cal.App.3d 546, 556.)

The Court therefore finds that in adopting the Permit, the Regional Board did not act in a manner that was contrary to law, outside the scope of its authority or without the support of the weight of evidence in the record with respect to Petitioners' CEQA violation claim.

CEQA Amendment Claim

Turning next to Petitioners' claim that the Permit violates the separation of powers and unlawfully "amends" the CEQA process, the Court finds that Petitioners have not met their burden under section 1094.5. Petitioners' argument rests on the belief that CEQA occupies the field of environmental review. Petitioners present no authority to demonstrate this alleged legislative intent.

Public Resources Code section 21003 demonstrates that the Legislature intended CEQA to be *an* environmental review process, not the *only* one. When more than one review occurs, these should be coordinated as much as possible. The plain language of this statute supports this reading. Given the powers vested in the Regional Board to implement water quality control and coordination under the Porter-Cologne Act, the Regional Board can require additional environmental reviews consistent with this authority and it can specify and require actions to ameliorate the impacts of polluted runoff without offending CEQA. (See, e.g., Pub. Resources Code, § 21174; *Bozung v. Local Agency Formation Com.* (1975) 13 Cal.3d 263, 274.)

The Court also finds that the equitable doctrines of estoppel, laches and waiver apply here. When applying for their 1996 permit, the permittees advised the Regional Board that much of their storm water consideration could be "channeled" through the compliance effort of CEQA. (R0060482.) They proposed coordination with their existing CEQA processes, finding that the CEQA checklist to assess initial studies could also indirectly address potential impacts to storm water, with additions to the form. (R0060482, 0060555, 0060629.) The 1996 permit therefore included a requirement that permittees amend their CEQA review process to include storm water considerations. (R0008514.) Indeed, it imposed a deadline of 1998 to develop CEQA guidelines and 1999 to incorporate them into the permittees' internal procedures. (R008514, R008510.)

Yet none of these Petitioners availed themselves of the right to challenge this provision to the State Board under Porter-Cologne Act section 13320. At argument, Petitioners represented that they complied with the 1996 permit's requirements. In addition, when applying for the subject Permit, they proposed that this provision be added to the Permit. (R0000032.) This conduct is inconsistent with their current position. The equitable doctrines of waiver, laches and estoppel can apply to municipalities. (See, e.g., *City of Los Angeles v. County of Los Angeles* (1937) 9 Cal.2d 624, 628, 630; *Pettitt v. City of Fresno* (1973) 34 Cal.App.3d 813, 820.) The Court is satisfied under these facts that those doctrines apply here to bar Petitioners' claims on this issue.

General Plan Amendment Claim

Along a similar vein, Petitioners argue that the Permit, specifically the sections on new development and redevelopment and General Plans, constitutes land use planning, infringing upon the municipalities' land use authority. The Court respectfully disagrees with the Alhambra and LAEDC Petitioners and follows *California Coastal Commission v. Granite Rock* (1987) 480 U.S. 572 [107 S.Ct. 1419] holding that an environmental regulation is not a land use regulation. The Court finds that these are environmental regulations that do not dictate the manner in which the permittees are to use the land. Instead, while there may be some limitations, this court finds these sections represent environmental regulations, not land use regulations. These regulations are clearly for the greater good. The Permit itself notes that the Regional Board did not intend the Permit to restrict or control local land use decision-making authority, but contemplated that while permittees exercised that authority, they fulfilled Clean Water Act requirements to reduce the discharge of pollutants from new development and redevelopment activities. (Permit, at p. 14.)

In addition, the cases which Petitioners cite regarding land use planning stand for the general proposition that land use planning falls within the authority of local governments and agencies. Yet even then, land use planning must be consistent with general laws. The California Constitution Article 11 section 7 states that a county or city may not enact laws that conflict with general laws. This position is further supported by the case of *City of Los Angeles v. State of California* (1982) 138 Cal.App.3d 526, 532 for matters of statewide concern. The Porter-Cologne Act contains the Legislature's finding that water quality is a matter of statewide concern, requiring a statewide program administered at a regional level. (See, e.g., Wat. Code, § 13000; see also generally *Southern California Edison v. State Water Resources Control Board* (1981) 116 Cal.App.3d 751, 758.) 33 U.S.C. section 1251 has a companion policy statement in the Clean Water Act, where Congress found that water quality is a matter of federal concern.

In this connection, the Court disagrees with the Arcadia Petitioners that the Regional Board cannot act on behalf of the State Board. The Porter-Cologne Act sections 13001 and 13225 clearly authorize a regional board to act on behalf of the State Board. Additionally, it makes more sense to allow a regional board to act on behalf of the State Board because a regional board would be more aware of the specific problems in its area/region of the state as compared to the State Board. If permittees and other interested parties had to deal with one large board, as opposed to larger regional boards, then there would not necessarily be specialists in the particular problems of that region, such as clay soil, mountains or other unique features not occurring in different regions. (*e.g.* Northern California, the farming communities, Central California, and Los Angeles County metropolis are unique.) Allowing regional boards provides greater efficiency by processing the permits more expeditiously by specialists in specific areas.

Porter-Cologne Act section 13001 gives the Water Board primary responsibility to control and coordinate water quality, with a broad grant of authority. However, Porter-Cologne

Act section 13225 empowers the Regional Board with regional duties and obligations to prevent and abate problems and set water policies which deal with water pollution and nuisances. Porter-Cologne Act section 13240 allows for the adoption of plans by the Regional Board, which clearly gives the Regional Board authority to act in this instance, and Porter-Cologne Act section 13002 gives the Regional Board authority over local government entities.

The Court also finds that the equitable doctrines of waiver, laches and estoppel do apply to bar Petitioners' land use allegations. This finding is based on Petitioners' own actions and proposals, as well as the 1996 permit. As early as 1995, the permittees submitted an application for the 1996 permit in which they indicated that their General Plans were the legal "backbone" for the planning process and all development approvals must be consistent with the policies, objectives and principles set forth in the General Plan. They further offered: "Discussion of stormwater issues in the General Plan could greatly enhance the awareness of the issues and encourage full assessment of possible adverse impacts on stormwater quality as the result of new and redevelopment." (R0060556.) The 1996 permit, at section 3(b) included a requirement that each permittee include watershed and storm water management considerations whenever the relevant portions of its General Plan were amended. (R0008514.) None of the parties before the Court today challenged, either administratively or judicially, this requirement in the 1996 permit.

Petitioners argue that they were not required to challenge this provision in the 1996 permit but were entitled to simply tolerate it. However, as with the CEQA arguments, their current position regarding land use are contradicted by the fact that when applying for the current permit, they specifically requested inclusion of this provision. In their proposed permit, they included a requirement similar to the one found in the 1996 permit and virtually identical to the one that the Regional Board eventually included in the challenged Permit. (See R00000032, Permit at p. 41.) Respondent and Intervenors have noted that prior permits and the permittees' application for a permit serve as the basis for drafting and adopting a subsequent permit. In drafting and adopting the subject Permit, the Regional Board considered and relied upon programs implemented and proposed by the permittees. This series of events and actions satisfy the Court that the equitable doctrines of waiver, estoppel and laches apply.

<u>Discharges "Into" and "From" the Storm Drain System</u>

The Court denies the petitions for writ of mandate with respect to the "into" versus "from" argument. First, Respondent and Intervenors have demonstrated that the Clean Water Act itself uses the words "in" or "into," not just "from." (See, e.g., 33 U.S.C. § 1342(p)(3)(B)(ii); 40 C.F.R. § 122.26(d)(1)(ii), 122.26(d)(1)(v)(B), 122.26(d)(2)(iv)(D), 122(d)(2)(iv)(B); 122.26(d)(1)(v), 122.26(d)(2)(iv)(A)(6), 122.26(d)(2)(iv)(A), 122.26(d)(2)(iv)(A)(2).)

Second, the Clean Water Act section 402(p)(3)(B)(ii) prohibits the discharge of non-stormwater "into" storm sewers. (33 U.S.C. 1342(p)(3)(B)(ii).) The administrative record also contains an admission by Petitioners that "the most effective way of dealing with stormwater runoff is to deal with it at the source before it becomes a problem"—before it goes into the system. (Ltr from Executive Advisory Committee (Aug. 6, 2001) (R0004878).) In addition, State Board 2001-15, discuses the "into" versus "from" issue, stating, "It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control." (*In re Building Industry Association of San Diego County, et al.* (2001) SWRCB Order 2001-15 at 10 (R0007535).)

Third, although this Court recognizes that it may not always be possible to prevent something from going into the system, it probably is the cheapest method. If something does not go in, then there is no concern about it coming out the other end. If the contaminant does not enter the system, there is no need to process it at the end of the system. If the system is overloaded at the final point by flood, for example, there are less toxic materials which could then enter the general water system.

Fourth, the Court does not look at the word "in" in quite as restrictive a manner as the Arcadia and Monrovia Petitioners. The Arcadia and Monrovia Petitioners argued that the word "in" only relates to the point of origin, and that this limits petitioner's ability to set regional controls. However, what constitutes "in" depends on at what point one looks at the storm drain system. Analogizing the storm drain system to a tree, any of the junctures between one little leaf, the first little branch, twig, or a slightly larger branch, could be either from or into a regional control or "from" that and "into" the larger system. The Court finds that the Permit's regulation of what goes "into" the storm drain does not take away from the Petitioners' rights and needs to control the process.

Finally, by regulating discharges into the storm drain system, Petitioners have the opportunity to try to deal with it at the source of the contamination, like the car wash example mentioned by the County Petitioners. It would allow Petitioners to review the car wash's activities and stop the point of the contamination, while still permitting Petitioners to deal with the regions. Petitioners could potentially control an area of five square miles at the source and also operate a larger detention basin or treatment facility, as the Arcadia Petitioners referred to as a regional approach. Regulating discharges "into" the storm drain system does not take away from the regional approach as argued by the Arcadia Petitioners. Thus, this Court resolves this issue in favor of the Regional Board and Intervenors.

IT IS SO ORDERED.

Dated: March ~~16,~~ 24 2005

Victoria Chaney

VICTORIA GERRARD CHANEY
JUDGE OF THE SUPERIOR COURT

Addendum
Examples of Regional Board Consideration of US EPA Documents

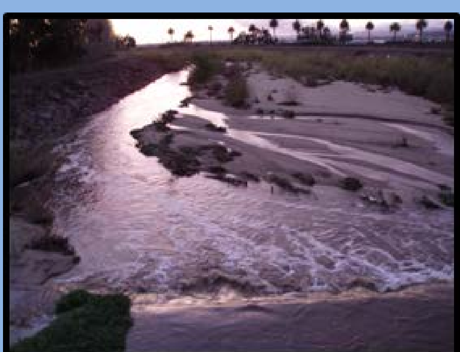
US EPA, *Draft Data Summary for the Construction and Development Industry* (Feb. 2001) (R0020445)
US EPA, *Estuarine and Coastal Marine Waters: Bioassessment and Biocriteria Technical Guidance* (Dec. 2000) (R0022664)
US EPA, *National Conference on Tools for Urban Water Resource Management & Protection* – Proceedings, Chicago, IL. Feb. 7-10, 2000 (July 2000) (R0019356)
US EPA, *Storm Water Phase II Compliance Assistance Guide* (March 2000) (R0010593)
US EPA, *Report to Congress on the Phase II Storm Water Regulations* (Oct. 1999) (R0010418)
US EPA, *Storm Water O&M Fact Sheet: Catch Basin Cleaning* (September 1999) (R0022652)
US EPA, *Storm Water Technology Fact Sheet: Sand Filters* (Sept. 1999) (R0022645)
US EPA, *Storm Water Technology Fact Sheet: Water Quality Inlets* (Sept. 1999) (R0022639)
US EPA, *Storm Water Management Fact Sheet: Record Keeping* (Sept. 1999) (R0017615)
US EPA, *Storm Water Management Fact Sheet: Coverings* (Sept. 1999) (R0017612)
US EPA, *Preliminary Data Summary of Urban Storm Water Best Management Practices* (Aug. 1999) (R0017609)
US EPA, *National Conference on Retrofit Opportunities for Water Resource Protection in Urban Environments* – Proceedings, Chicago, IL, Feb. 9-12, 1998 (July 1999) (R0022320)
US EPA, *Guidance on Storm Water Drainage Wells* (Interim Final) (May 1998) (R0022206)
US EPA, *Economic Analysis of the Storm Water Phase II Proposed Rule: Initial Final Draft*, (Aug. 1, 1997) (R0010281)
US EPA, Seminar Publication: *National Conference on Environmental Problem-Solving with Geographic Information Systems*, Cincinnati, Ohio. Sept. 21-23, 1994 (September 1995) (R0021617)
US EPA, *Economic Benefits of Runoff Controls* (Sept. 1995) (R0010711)
US EPA, Seminar Publication: *National Conference on Urban Runoff Management: Enhancing Urban Watershed Management at the Local, County, and State Level* – March 30-April 2, 1993 – Chicago, IL. (April 1995) (R0015620)
US EPA, *Storm Water Discharges Potentially Addressed by Phase II of The National Pollutant Discharge Elimination System Storm Water Program* - Report to Congress (March 1995) (R0037330)
US EPA, *Storm Water Discharges Potentially Addressed By Phase II of the National Pollutant Discharge Elimination System Storm Water Program* – Report to Congress, (March 1995) (R0015026)
US EPA, *Changing the Course of California's Water* (1995) (R0033798)
US EPA, *NPDES Compliance Inspection Manual* (Sept. 1994) (R0014466)
US EPA, *A State and Local Government Guide to Environmental Program Funding Alternatives* (Jan. 1994) (R0038104)
US EPA, *Guidance Manual for Implementing Municipal Storm Water Management Programs* – Chapters 1-4 (Aug. 17, 1994) (R0013925)
US EPA, Pitt, Robert, Clark, Shirley, and Parmer, Keith, *Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration* (May 1994) (R0022959)
US EPA, *Overview of the Storm Water Program* (Oct. 1993) (R0010064 – 66)
US EPA, Handbook – *Urban Runoff Pollution Prevention and Control Planning* (September 1993) (R0009753 – 54)
US EPA, NPDES Storm Water Program: Question and Answer Document, Volume II (July 1993) (R0008386 – 87)
US EPA, *Coastal Nonpoint Pollution Control Program – Program Development and Approval Guidance* (Jan. 1993) (R0039770); US EPA, *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems – A User's Guide* (Jan. 1993) (R0022861)

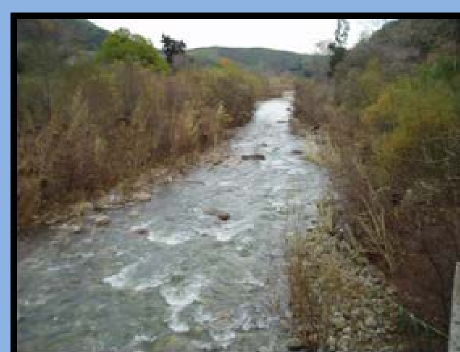
US EPA, *Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems* (Nov. 1992) (R0009927, R0009930 – 33)
US EPA, *Report on The EPA Storm Water Management Program* (Oct. 1992) (R0009871, 73)
US EPA, *Storm Water Management for Industrial Activities -Developing Pollution Prevention Plans and Best Management Practice* (Sept. 1992) (R0043866)
US EPA, *Storm Water Management For Construction Activities – Developing Pollution Prevention Plans and Best Management Practices* (Sept. 1992) (R0043388)
US EPA, *NPDES Storm Water Sampling Guidance Document* (July 1992) (R0037924)
US EPA, *Guidance Manual for the Preparation of NPDES Permit Applications for Storm Water Discharges Associated with Industrial Activity* (April 1991) (R0043657)
US EPA, *Remedial Action, Treatment, and Disposal of Hazardous Waste* – Proceedings of the Sixteenth Annual RREL Hazardous Waste Research Symposium (August 1990) (R0042527)
US EPA, *Contributions of Urban Roadway Usage to Water Pollution* (March 1975) (R0027336)
US EPA, *Urban Runoff Management Information/Education Products* (R0036525)
Federal Register, Part II EPA – *Final Reissuance of National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities; Notice* (October 30, 2000) (R0019785)
Federal Register, Part III EPA – 40 CFR Part 131, *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule* (May 18, 2000) (R0019104)
Federal Register – Part II EPA – 40 CFR Parts 9, 122, 123, and 124, *National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule* (Dec. 8, 1999) (R0018093)
Federal Register – Part III EPA – 40 CFR Part 122, *Interpretative Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems; Final Rule* (Aug. 9, 1996) (R0008344 – 46)
Federal Register – Part XIV EPA – *Final National Pollutant Discharge Elimination System Storm Water Multi-Sector General Permit for Industrial Activities*; Notice (Sept. 29, 1995) (R0016080)
Federal Register – Part II EPA – *Water Pollution Control, NPDES General Permits and Fact Sheets: Storm Water Discharges from Industrial Activity; Notice* (Nov. 19, 1993) (R0008341 – 42)
Federal Register – Part II EPA – 40 CFR Parts 122, 123, and 124, *National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges; Final Rule* (Nov. 16, 1990) (R0008238 – 39)
Letter from Alexis Strauss, Director Water Division, US EPA Region IX to Dennis A. Dickerson, Executive Officer, California Regional Water Quality Control Board, Los Angeles Region (Dec. 19, 2000) (R0008828)
US EPA, *NPDES Program Implementation Review*, California Regional Water Quality Control Board 4, Los Angeles Region (Oct. 1999) (R0018019)
Letter from Alexis Strauss, USEPA Region IX, to Walt Pettit, Executive Director, California State Water Resources Control Board, (Mar. 17, 1998) (R0008581)
Comparison of Los Angeles County Draft Storm Water Permit with Similar Permits in Orange and Santa Clara Counties; EPA Region 9 (June 10, 1996) (R0031402)
Memorandum from Eugene Bromley, EPA Region 9, to Maryann Jones, Storm Water Section, California State Water Resources Control Board, re: Role of Municipalities in Implementation of State General NPDES Permits for Storm Water Associated with Industrial Activity (Dec. 1993) (R0008388)
Memorandum from E. Donald Elliott, USEPA, to Nancy J. Marvel, US EPA Region IX, re: Compliance with Water Quality Standards in NPDES Permits Issued to Municipal Separate Storm Sewer Systems (Jan. 9, 1991) (R0008378)

US EPA, EPA Industry Sector Notebooks on Various Industries, totaling 34 Sector Notebooks, ((R0074054); (R0074257); (R0074442); (R0076608); (R0078502); (R0074609); (R0074743); (R0075090); (R0075259); (R0075769); (R0077054); (R0077213); (R0077805); (R0078059); (R0078280); (R0078820); (R0074847); (R0074938); (R0075397); (R0075526); (R0075641); (R0075930); (R0076085); (R0076222); (R0076369); (R0076508); (R0076775); (R0076909); (R0077411); (R0077524); (R0077661); (R0077944); (R0078209); (R0078378))

Ventura County Technical Guidance Manual for Stormwater Quality Control Measures

Manual Update 2011





Ventura Countywide Stormwater Quality Management Program

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July 13, 2011

Manual Updates: The 2011 TGM may be periodically updated to correct minor errors and unintentional omissions. Additionally, due to the evolving nature of stormwater quality management, the 2011 TGM may also be updated to incorporate new and innovative control measures. 2011 TGM users should ensure that they are referencing the most current edition by checking www.vcstormwater.org or contacting the local permitting agency.

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APPENDICES

1 INTRODUCTION

This *Technical Guidance Manual for Stormwater Quality Measures* (2011 TGM) provides guidance for the implementation of stormwater management control measures in new development and redevelopment projects in the County of Ventura and the incorporated cities therein. These guidelines are intended to improve water quality and mitigate potential water quality impacts. These guidelines have been developed to meet the Planning and Land Development requirements contained in Part 4, Section E of the Los Angeles Regional Water Quality Control Board's (Regional Board) municipal separate storm sewer system (MS4) permit (Order R4-2010-0108) for new development and redevelopment projects.

The Planning and Land Development requirements are not implemented at the discretion of the local permitting agency; they are requirements in Order R4-2010-0108 that must be complied with. The 2011 TGM does not attempt to expand or circumvent these requirements, but rather it provides guidance on how to meet them.

When used in this Manual, the verb "shall" indicates a statement of required, mandatory, or specifically prohibited practice. Statements that are not mandatory, but are recommended practice in typical situations, with allowable deviations if engineering judgment or scientific study indicates them appropriate, are typically stated with the verb "should." In both cases specific options may be provided that are allowable modifications.

1.1 Goals

The 2011 TGM has been prepared by the Ventura Countywide Stormwater Quality Management Program to accomplish the following goals:

- Ensure that new development and redevelopment projects reduce urban runoff pollution to the "maximum extent practicable" (MEP);
- Ensure that the implementation of measures in the 2011 TGM are consistent with Regional Water Quality Control Board Order R4-2010-0108 and other state requirements;
- Provide guidance to developers, design engineers, agency engineers, and planners on the selection and implementation of appropriate stormwater management control measures; and
- Provide maintenance procedures to ensure that the selected stormwater management control measures will be properly maintained to provide effective, long-term pollution control.

1.2 Regulatory Background

In 1972, the Federal Water Pollution Control Act [later referred to as the Clean Water Act (CWA)] was amended to require National Pollutant Discharge Elimination System (NPDES) permits for the discharge of pollutants to waters of the United States from any point source. In 1987, the CWA was amended to require the United States Environmental Protection Agency (USEPA) to establish regulations permitting municipal and industrial stormwater discharges under the NPDES permit program. The USEPA published final regulations regarding stormwater discharges on November 16, 1990. The regulations require that MS4 discharges to surface waters be regulated by a NPDES permit.

The Ventura County Watershed Protection District, County of Ventura, and the cities of Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, San Buenaventura, Santa Paula, Simi Valley, and Thousand Oaks have joined together to form the Ventura Countywide Stormwater Quality Management Program (Program)and are named as co-permittees under a revised countywide municipal NPDES permit for stormwater discharges issued by the Regional Water Quality Control Board in 2010 (Order R4-2010-0108).

Prior to the issuance of Order R4-2010-0108, stormwater discharges from the Ventura County MS4 were covered under the countywide waste discharge requirements contained in three previous MS4 NPDES Permits (Order 09-0057, Order 00-108, and Order No. 94-082).

Under Order R4-2010-0108, the co-permittees are required to administer, implement, and enforce a Stormwater Quality Management Program (Program) to reduce pollutants in urban runoff to the MEP. The Program emphasizes all aspects of pollution control including, but not limited to, public awareness and participation, source control, regulatory restrictions, water quality monitoring, and treatment control.

For the Program to be successful, it is critical to control urban runoff pollution from new development and redevelopment projects during and after construction. Therefore, the co-permittees implemented the Planning and Land Development Program, one element within the Program, to specifically control post-construction urban runoff pollutants from new development and redevelopment projects. The goal of the Planning and Land Development Program is to minimize runoff pollution typically caused by land development and protect the beneficial uses of receiving waters by limiting effective impervious area (EIA) to no more than 5% of the project area and retaining stormwater on site. This goal can be achieved by employing a sensible combination of Site Design Principles and Techniques, Source Control Measures, Retention Best Management Practices (BMPs), Biofiltration BMPs, and Treatment Control Measures to the level required in Order R4-2010-0108.

“Site Design Principles and Techniques,” “Source Control Measures,” “Retention

BMPs," "Biofiltration BMPs," and "Treatment Control Measures," as used in the 2011 TGM refer to BMPs and features incorporated into the design of a new development or redevelopment project, which prevent and/or reduce pollutants in stormwater runoff from the project. These measures are described below:

1) ***Site Design Principles and Techniques*** are a stormwater management strategy that emphasizes conservation and use of existing site features to reduce the amount of runoff and pollutant loading that is generated from a project site.

2) ***Source Control Measures*** limit the exposure of materials and activities so that potential sources of pollutants are prevented from making contact with stormwater runoff.

3) ***Retention BMPs*** are stormwater BMPs that are designed to retain water onsite, and achieve a greater reduction in surface runoff from a project site than traditional stormwater Treatment Control Measures. The term "Retention BMPs" encompasses infiltration, rainwater harvesting[1], and evapotranspiration BMPs. Retention BMPs are preferred and shall be selected over biofiltration BMPs and Treatment Control Measures where technically feasible to do so.

4) ***Biofiltration BMPs*** are vegetated stormwater BMPs that remove pollutants by filtering stormwater through vegetation and soils.

5) ***Treatment Control Measures*** are engineered BMPs that provide a reduction of pollutant loads and concentrations in stormwater runoff.

Applicable projects (Section 1.4) must reduce Effective Impervious Area (EIA) to less than or equal to five percent (≤5%) of the total project area, unless infeasible. Impervious surfaces are rendered "ineffective" if the design storm volume is fully retained onsite using Retention BMPs. Biofiltration BMPs may be used to achieve the 5% EIA standard if Retention BMPs are technically infeasible (see Section 3.2).

The 2011 TGM contains guidance for the design and implementation of all of these types of stormwater management control measures for new development and redevelopment projects. In addition to the requirements of Order R4-2010-0108, owners and developers of some of the sites in the County may also be subject to the State of California's general permit for stormwater discharge from industrial activities (Industrial General Permit) and general permit for stormwater discharge from construction activities (Construction General Permit). The stormwater management control measures provided in the 2011 TGM may also assist the owner or developer in meeting the requirements of the State's construction and industrial permits. The stormwater management staffs of the governing co-permittee agencies are available to provide assistance regarding all of the State stormwater permit

[1] Rainwater harvesting is a BMP that stores and uses rainwater or stormwater runoff. This is consistent with the use of the term "reuse" contained in Order R4-2010-0108.

requirements.

1.3 Impacts of Land Development

The Cities and County of Ventura have separate stormwater and sanitary sewer conveyance systems. Land development typically creates an increase in impervious surfaces, which increases the amount of runoff and pollutants entering stormwater conveyance systems. Pollutants that enter the conveyance system in stormwater are typically transported directly to receiving waters (i.e. local channels, rivers, and the ocean), and are not treated in a wastewater treatment plant. Pollutants in untreated stormwater runoff from impervious surfaces that drains to streets and enters storm drains directly contribute to water pollution.

Typically, as stormwater runs over impervious surfaces (e.g., rooftops, roadways, and parking lots), it:

- Does not infiltrate or evapotranspire, which increases runoff volumes, velocities, and flow rates;
- Moves more quickly, which increases runoff velocities; and
- Entrains (i.e., accumulates) pollution and sediment, which increases nutrients, bacteria, and other pollutant concentrations in receiving waters (i.e., local channels, rivers, and the ocean).

The impacts of these alterations due to development may include:

- Increased concentrations of nutrients, toxic pollutants, and bacteria in surface receiving waters, including adjacent land and habitat (e.g., beaches) creeks, estuaries, and storm drain outlets.
- Increased flooding due to higher peak flow rates and runoff volumes produced by a storm.
- Decreased wet season groundwater recharge due to a decreased infiltration area.
- Increased dry season groundwater recharge due to outdoor irrigation with potable or reclaimed water.
- Introduction of baseflows in ephemeral streams due to surface discharge of dry weather urban runoff.
- Increased stream and channel bank instability and erosion due to increased runoff volumes, flow durations, and higher stream velocities ("hydromodification impacts"); and

- Increased stream temperature due to loss of riparian vegetation as well as runoff warmed by impervious surfaces, which decreases dissolved oxygen levels and makes streams inhospitable to some aquatic life requiring cooler temperatures for survival.

1.4 Stormwater Management Principles

Stormwater management principles such as Integrated Water Resource Management (IWRM) and Low Impact Development (LID) can be used to help mitigate the impacts of development. These principles are described below.

The emergence of LID falls under the umbrella of the over-arching concept of IWRM. IWRM is a process which promotes the coordinated development and management of water, land, and related resources. IWRM links traditional development topics such as land use, water supply, wastewater treatment/reclamation, flood control/drainage, water quality, and hydromodification management into a cohesive hydrologic system that recognizes their interdependencies and minimizes their potentially negative effects on the environment. An example of IWRM includes recharging groundwater with reclaimed wastewater to support the water supply. Another example is combining stormwater treatment, hydromodification control, and flood control in a single regional infiltration basin that recharges groundwater, incorporates recreation, and provides habitat. Another example is using Smart Growth principles to help reduce the environmental footprint while still accommodating growth.

Generally, the 2011 TGM advises to first design for the largest hydrologic controls (such as matching post development 100-year flows with pre-project 100-year flows for flood mitigation requirements), according to the appropriate City or County drainage requirements (not included in the 2011 TGM). Secondly, the 2011 TGM advises to check if flood mitigation will reduce or satisfy the stormwater management requirements (as set forth in the 2011 TGM). If it does not, then add more controls as necessary. Flood mitigation may provide the necessary sediment and pollution control, thereby reducing maintenance requirements for the stormwater management BMPs. A sequence of hydrologic controls should be considered, such as site design, flood drainage mitigation, and Retention BMPs. Biofiltration BMPs and Treatment Control Measures can be considered where the use of Retention BMPs is technically infeasible. Each of these controls will have an influence on stormwater runoff from the new development or redevelopment project.

Similar to Source Control Measures, which prevent pollutant sources from contacting stormwater runoff, Retention BMPs use techniques to infiltrate, store, use, and evaporate runoff onsite to mimic pre-development hydrology, to the extent feasible. The goal of LID is to increase groundwater recharge, enhance water quality, and prevent degradation of downstream natural drainage channels. This goal may be accomplished with creative site planning and with incorporation of localized, naturally functioning BMPs into the project. Implementation of Retention BMPs will reduce the size of additional Hydromodification Control Measures that may be required for a new development or redevelopment project, and, in many circumstances, may be used to satisfy all stormwater management requirements.

1.5 Applicability

The following projects and associated triggers, contained in subpart 4.E.II of Order R4-2010-0108, are subject to the requirements and standards laid out in the 2011 TGM.

Note that some of the project triggers are based on *total altered surface area* and others on *impervious surface area*, which is an intentional requirement in the MS4 Permit.

New Development Projects

Development projects subject to conditioning and approval for the design and implementation of post-construction stormwater management control measures, prior to completion of the project(s), are:

1) All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.

2) Industrial parks with 10,000 square feet or more of total altered surface area.

3) Commercial strip malls with 10,000 square feet or more of impervious surface area.

4) Retail gasoline outlets with 5,000 square feet or more of total altered surface area.

5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of total altered surface area.

6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.

7) Streets, roads, highways, and freeway construction of 10,000 square feet or more of impervious surface area (see Section 2 for specific requirements).

8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) of 5,000 square feet or more of total altered surface area.

9) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:

    a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and

b. Create 2,500 square feet or more of impervious surface area.

10) Single-family hillside homes (see Section 2 for specific requirements).

Redevelopment Projects

Redevelopment projects subject to conditioning and approval for the design and implementation of post-construction stormwater management control measures, prior to completion of the project(s), are redevelopment projects in categories 1 through 10 above that meet the threshold identified below:

- Land-disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site.

Additionally:

1) Projects where redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to the post development stormwater quality control requirements of Board Order 00-108, shall mitigate the entire redevelopment project area.

2) Projects where redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was subject to the post development stormwater quality control requirements of Board Order 00-108, must mitigate only the altered portion of the redevelopment project area and not the entire project area.

3) Projects where redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development must mitigate only the altered portion of the redevelopment project area and not the entire project area.

Land-disturbing activity that results in the creation or addition or replacement of less than 5,000 square feet of impervious surface area on an already developed site, or that results in a decrease in impervious area which was subject to the post-development stormwater quality control requirements of Board Order 00-108, is not subject to mitigation unless so directed by the local permitting agency.

Redevelopment does not include routine maintenance activities that are conducted to maintain the original line and grade, hydraulic capacity, or original purpose of the facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways, that does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Agencies' flood control, drainage, and wet utilities projects that maintain original line and grade or hydraulic capacity are considered routine maintenance. Redevelopment also does not include the repaving of existing roads to maintain original line and grade.

Existing single-family dwelling and accessory structure projects are exempt from the redevelopment requirements unless the project creates, adds, or replaces 10,000 square feet of impervious surface area.

Effective Date

The new development and redevelopment requirements contained in Part 4, Section E of Board Order R4-2010-0108 (the "Order") shall become effective 90 calendar days after the Regional Water Quality Control Board Executive Officer approves the 2011 TGM (the "Effective Date"). After the Effective Date, all applicable projects, except those identified below, must comply with the new development and redevelopment requirements contained in Part 4, Section E of the Order.

The new development and redevelopment requirements contained in Part 4, Section E of the Order shall not apply to the projects described in paragraphs 1 through 5 below. Projects meeting the criteria listed in paragraphs 1 through 5 below shall instead continue to comply with the performance criteria set forth in the 2002 Technical Guidance Manual for Stormwater Quality Control Measures under Board Order 00-108:

1) Projects or phases of projects where the project's applications have been "deemed complete for processing" (or words of equivalent meaning), including projects with ministerial approval, by the applicable local permitting agency in accordance with the local permitting agency's applicable rules prior to the Effective Date; or

2) Projects that are the subject of an approved Development Agreement and/or an adopted Specific Plan; or an application for a Development Agreement and/or Specific Plan where the application for the Development Agreement and/or Specific Plan has been "deemed complete for processing" (or words of equivalent meaning), by the applicable local permitting agency in accordance with the local permitting agency's applicable rules, and thereafter during the term of such Development Agreement and/or Specific Plan unless earlier cancelled or terminated; or

3) All private projects in which, prior to the Effective Date, the private party has completed public improvements; commenced design, obtained financing, and/or participated in the financing of the public improvements; or which requires the private party to reimburse the local agency for public improvements upon the development of such private project; or

4) Local agency projects for which the governing body or their designee has approved initiation of the project design prior to the Effective Date; or

5) A Tentative Map or Vesting Tentative Map deemed complete or approved by the local permitting agency prior to the Effective Date, and subsequently a Revised Map is submitted, the project would be exempt from the 2011 TGM provisions if the revisions substantially conform to original map design, consistent with

Subdivision Map Act requirements. Changes must also comply with local and state law.

The intent of these guidelines is to ensure that projects for which the applications have been deemed "complete" or the applicants have worked with local permitting agency staff to develop a final, or substantially final, drainage concept and site layout that includes water quality treatment based upon the performance criteria set forth in the 2002 Technical Guidance Manual for Stormwater Quality Control Measures prior to the Effective Date, are not required to redesign their proposed projects for purposes of complying with the new development and redevelopment requirements contained in Part 4, Section E of Board Order R4-2010-0108.

In addition, any project, phase of a project, or individual lot within a larger previously-approved project, where the application for such project has been "deemed complete for processing" (or words of equivalent meaning) that does not have a final or substantially final drainage concept as determined by the local permitting agency or a site layout that includes water quality treatment must comply with the performance standards set forth in the 2011 TGM.

1.6 Organization of the 2011 TGM

The 2011 TGM is divided into seven sections and nine appendices:

Section 1	Introduction
Section 2	Stormwater Management Standards
Section 3	Site Assessment and BMP Selection
Section 4	Site Design Principles & Techniques
Section 5	Source Control Measures
Section 6	Retention BMPs, Biofiltration BMPs, and Treatment Control Measure Design
Section 7	Operation and Maintenance Planning
Appendix A	Glossary of Terms
Appendix B	Maps: Watersheds Delineation, Existing Urban Areas, Environmentally Sensitive Areas, and 85th Percentile Rainfall Depth
Appendix C	Site Soil Type and Infiltration Testing

2 STORMWATER MANAGEMENT STANDARDS

2.1 Introduction

This section outlines the design process to comply with stormwater control requirements. A flowchart is presented in Figure 2-1 to illustrate a step-by-step process for incorporating these stormwater management control measures.

The selection of appropriate stormwater management control measures should be a collaborative effort between the project proponent and the local permitting agency staff. It is recommended that discussions between project planners, engineers, and local permitting agency staff regarding selection of stormwater management control measures occur very early in the design process.

2.2 Step 1: Determine Project Applicability

New development and redevelopment projects meeting the applicability criteria contained in Section 4.E.II of Order R4-2010-0108 [presented in Section 1.5 of the 2011 TGM] must include control measures specified in the 2011 TGM. These projects should be designed to meet the performance criteria described in the steps below.

Separate requirements exist for three types of projects:

- Projects located within a Redevelopment Project Area Master Plan (RPAMP);
- Single Family Hillside Homes; and
- Roadway Projects.

The requirements for these three project types are described in further detail in the substeps below. Projects that are not applicable are still subject to stormwater agency review, especially for flood drainage requirements. Stormwater management control measures may be required by the governing agency for inapplicable projects, depending on the potential discharge of pollutants in stormwater runoff, impairments in receiving water, or other special conditions that would require increased protection.

Step 1a: Determine RPAMP Eligibility

If a project is located within the boundary of a Redevelopment Project Area Master Plan (RPAMP), the stormwater management requirements in the RPAMP take precedence over the control measures and performance criteria specified in this 2011 TGM. A stormwater agency may apply to the Regional Water Quality Control Board for approval of a RPAMP in consideration of exceptional site constraints that inhibit site-by-site or project-by-project implementation of post-construction requirements.

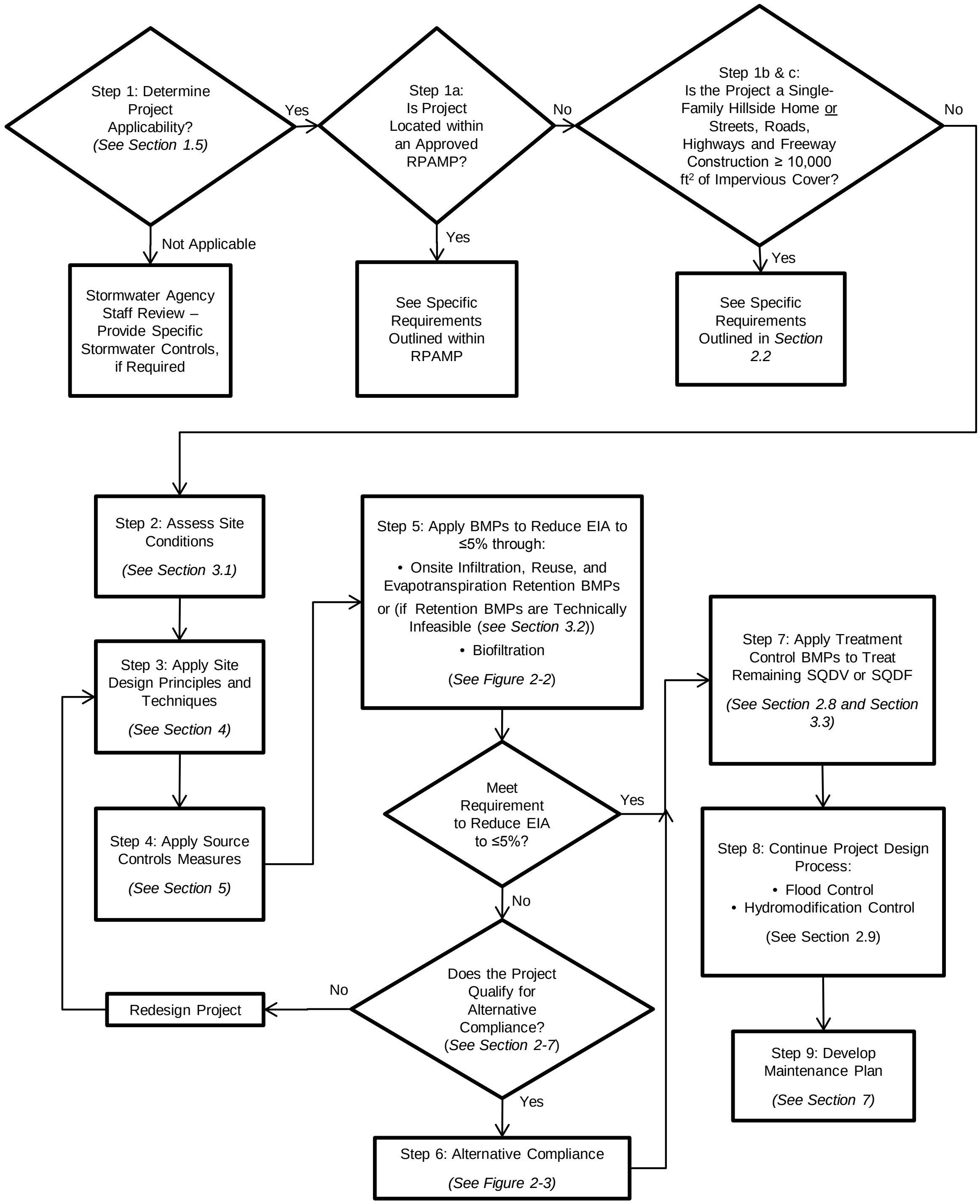


Figure 2-1: Stormwater Management Control Measures Design Decision Flowchart

Step 1b: Single-Family Hillside Homes

Single-family hillside home projects have specific requirements separate from other new development and redevelopment project categories. These requirements only apply to single-family hillside homes that disturb less than 1 acre and that add less than 10,000 square feet of impervious surface area. If the project is equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area, then project must comply with Steps 2 through 9.

According to Order R4-2010-0108, a hillside is defined as:

> *"Property located in an area with known erosive soil conditions, where the development will result in grading on any slope that is 20% or greater or an area designated by the Municipality under a General Plan or ordinance as a 'hillside area.'"*

The measures presented in this substep comprise the performance standard for single-family hillside home new development and redevelopment projects and apply to the entire lot (additional information on these measures may be found in Section 4 and Section 5).

Conserve Natural Areas

Each project site possesses unique topographic, hydrologic and vegetative features, some of which are more suitable for development than others. Locating development on the least sensitive portion of a site and conserving naturally vegetated areas can minimize environmental impacts in general and stormwater runoff impacts in particular.

The following measures are required and should be included in the lot layout, consistent with applicable General Plan and Local Area Plan policies and if appropriate and feasible with the given site conditions:

1) Concentrate or cluster improvements on the least-sensitive portions of the lot and leave the remaining land in a natural undisturbed state; at a minimum, sensitive portions of the lot should include areas covered under Clean Water Act Section 404 such as riparian areas and wetlands;

2) Limit clearing and grading of native vegetation on the lot to the minimum area needed to build the home, allow access, and provide fire protection; and

3) Maximize trees and other vegetation at the site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought-tolerant plants.

Protect Slopes and Channels

Erosion of slopes and channels can be a major source of sediment and associated pollutants such as nutrients, if not properly protected and stabilized.

Slope Protection

Slope protection practices must conform to local permitting agency erosion and sediment control standards and design requirements. The post-construction design criteria described below are intended to enhance and be consistent with these local standards.

1) Slopes must be protected from erosion by safely conveying runoff from the tops of slopes.

2) Slopes must be vegetated by first considering the use of native or drought-tolerant species.

Channel Protection

The following measures should be implemented to provide erosion protection to unlined receiving streams on the lot. Activities and structures must conform to applicable permitting requirements, standards, and specifications of agencies with jurisdiction (i.e., U.S. Army Corps of Engineers, California Department of Fish and Game, or Regional Water Quality Control Board).

1) Use natural drainage systems to the maximum extent practicable, but minimize runoff discharge to the maximum extent practicable.

2) Stabilize permanent channel crossings.

3) Install energy dissipaters, such as rock riprap, at the outlets of storm drains, culverts, conduits or channels that discharge into unlined channels.

Provide Storm Drain System Stenciling and Signage

Storm drain message markers or placards are required at all storm drain inlets within the project boundary. The signs should be placed in clear sight facing anyone approaching the inlet from either side. All storm drain inlet locations must be identified on the development site map.

Some local agencies within the County have approved storm drain message placards for use. Consult local permitting agency stormwater staff to determine specific requirements for placard types and installation methods.

Divert Roof Runoff and Surface Flows to Vegetated Area(s) or Collection System(s), Unless the Diversion Would Result in Slope Instability

Diverted Roof Runoff
City of Santa Barbara

Disconnecting downspouts divert water from roof gutters to (1) vegetated pervious areas of the site in order to allow for infiltration, storage, evapotranspiration (i.e., evaporation and uptake of water by plants), and treatment, or (2) a rainwater collection system (e.g., a rain barrel or a cistern). Disconnected downspouts differ from conventional downspout systems that provide a direct connection of roof runoff to stormwater conveyance systems (storm drains), which quickly collect and convey stormwater away from the site. "Flow spreading" is a technique used to spread runoff from rooftops, sidewalks, patios, and driveways out over a vegetated pervious area, rather than concentrating and conveying the runoff directly to a stormwater conveyance system.

Dispersion methods include splash blocks, gravel-filled trenches, or other methods which serve to spread runoff over vegetated pervious areas. Sheet flow dispersion is the simplest method and can be used for any impervious or pervious surface that is graded so as to avoid concentrating flows. Because flows are already dispersed as they leave the surface, they only need to traverse through a narrow band of adjacent vegetation for the runoff to be effectively attenuated and treated.

The following requirements apply to runoff diversion:

- Vegetated flowpaths for the diverted flows should be at least 25 feet in length, measured from the diversion location to the downstream property line, structure, steep slope, stream, wetland, or impervious surface. The vegetated flowpath must be covered with well-established lawn or pasture, landscaping with well-established groundcover, or native vegetation with natural groundcover. The groundcover should be dense enough to help disperse and infiltrate flows and to prevent erosion.

- If the vegetated flowpath (measured as defined above) is less than 25 feet, a perforated stub-out connection may be used in lieu of downspout dispersion. A perforated stub-out connection is a length of perforated pipe within a gravel-filled trench that is placed between roof downspouts and a stub-out to the local drainage system. A perforated stub-out may also be used where implementation of downspout dispersion might cause erosion or flooding problems, either onsite or on adjacent lots. This provision might be appropriate, for example, for lots where dispersed flows might pose a potential hazard for lower lying lots or adjacent offsite lots. Location of the connection should be selected to allow a maximum amount of runoff to infiltrate into the ground (ideally a dry location on the site that is relatively well drained). To facilitate maintenance, the perforated pipe portion of the system should not be located under impervious or heavily compacted (e.g., driveways and parking areas) surfaces. The use of a perforated stub-out in lieu of downspout dispersion may be determined by the Local permitting agency.

- In general, if the ground is sloped away from the foundation and there is adequate vegetation and area for effective dispersion, splash blocks will adequately disperse stormwater runoff. If the ground is fairly level, if the structure includes a basement, or if foundation drains are proposed, splash blocks with downspout extensions may be a better choice because the discharge point is moved away from the foundation. Downspout extensions may include piping to a splash block/discharge point a considerable distance from the downspout, as long as the runoff can travel through a well-vegetated area as described above.

- No erosion or flooding of downstream properties may result.

- Runoff discharged towards steep slopes or landslide hazard areas, including perforated stub-out connections, must be evaluated by a geotechnical engineer or qualified geologist. The discharge point may not be placed on or above slopes greater than 20% or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and jurisdiction approval.

- For sites with septic systems, the discharge point must be down gradient of the drainfield primary and reserve areas. This requirement can be waived by the jurisdiction's permit review staff if site topography clearly prohibits flows from intersecting with the drainfield.

Step 1c: Roadway Projects

Roadway projects have specific requirements separate from other new development and redevelopment project categories. The measures presented in this substep comprise the performance standard for street, roadway, highway, and freeway projects. Section 4.E.II of Order R4-2010-0108 requires street, roadway, highway, and freeway projects that construct 10,000 square feet or more of impervious surface area, to incorporate USEPA guidance regarding *Managing Wet Weather with Green Infrastructure: Green Streets* to the maximum extent practicable.

The following requirements apply to the impervious area within the right-of-way associated with public streets, roads, highways, and freeways projects and the streets that are part of a larger private project. These requirements do not apply to routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility, or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways, which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Agencies' flood control, drainage, and wet utilities projects that maintain original line and grade or hydraulic capacity are considered routine maintenance. Also, the requirements do not apply to the repaving of existing roads to maintain original line and grade.

Minimum requirements for the impervious area within the right-of-way associated with streets, roads, highways, and freeways are as follows:

1) Provide Retention BMPs or Biofiltration BMPs sized to capture and treat the Stormwater Quality Design Volume (SQDV) or the Stormwater Quality design Flow (SQDF) (see Step 7 for guidance on calculating the SQDV and SQDF).

   Additional Treatment Control Measures may be integrated into roadway projects if they are used in a treatment train approach with Retention BMPs or Biofiltration BMPs to address the pollutants of concern (see Section 3.3).

2) Projects should apply the following measures to the maximum extent practicable and as specified in the local permitting agency's codes:

   - Minimize street width to the appropriate minimum width for maintaining traffic flow and public safety;
   - Use porous pavement or pavers for low traffic roadways, on-street parking, shoulders or sidewalks; and
   - Add tree canopy by planting or preserving trees and shrubs.

2.3 Step 2: Assess Site Conditions

The next step is to collect site information that is critical for the selection and implementation of Retention BMPs, Biofiltration BMPs, and Treatment Control Measures. The following information should be documented: topography, soil type and geology, groundwater, geotechnical considerations, offsite drainage, existing utilities, and Environmentally Sensitive Areas. In addition, soil and infiltration testing should be conducted. Detailed guidance on assessing site conditions can be found in Section 3.1.

2.4 Step 3: Apply Site Design Principles and Techniques

The third step is to apply Site Design Principles & Techniques (see Section 4). The implementation of LID requires an integrated approach to site design and stormwater management. Traditional approaches to stormwater management planning within the site planning process are not likely to achieve the LID performance standard of the MS4 Permit. The use of the site planning techniques presented in Section 4 (Site Design Principles & Techniques) will help generate a more hydrologically functional site, maximize the effectiveness of Retention BMPs, and integrate stormwater management throughout the site.

The following criteria should be considered during the early site planning stages:

- Retention BMPs should be considered as early as possible in the site planning process. Hydrology should be a key principle that is integrated into the initial site assessment planning phases. Where flexibility exists, conceptual drainage plans should attempt to route water to areas suitable for Retention BMPs.

- A multidisciplinary approach at the initial phases of the project is recommended and should include planners, engineers, landscape architects, and architects.

- Individual Retention BMPs should be distributed throughout the project site as feasible and may influence the configuration of roads, buildings and other infrastructure.

- The project must demonstrate disconnection of impervious surface such that the 5% EIA requirement is achieved. If fully meeting the 5% EIA requirement using Retention BMPs is not technically feasible, the project must still utilize Retention BMPs to the maximum extent practicable.

- Flood and hydromodification control should be considered early in the design stages. Even sites with Retention BMPs will still have runoff that occurs during large storm events, but Retention facilities can have flood and hydromodification control benefits. It may be possible to simultaneously address flood and hydromodification control requirements through an integrated water resources management approach.

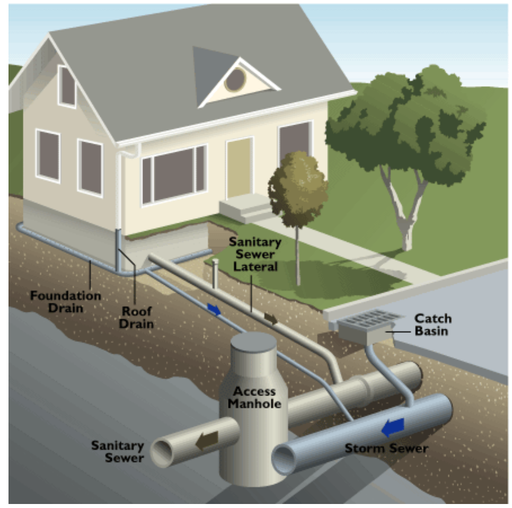
Perhaps the most important aspect of site planning is allowing sufficient space for Retention BMPs in areas that can physically accept runoff. A simple rule of thumb is to allow 3 to 10 percent of the tributary impervious area (depending on how well the soils drain and then allow for more area with less infiltrative soils) for infiltration BMPs and 3 to 5 percent for biofiltration in preliminary design to achieve the 5% Effective Impermeable Area (EIA) standard.

2.5 Step 4: Apply Source Control Measures

All applicable projects must implement applicable Source Control Measures. Source Control Measures are operational practices that reduce potential pollutants at the source. They typically do not require maintenance or significant construction. Guidance on Source Control Measures can be found in Section 5.

2.6 Step 5: Apply BMPs to Reduce EIA to ≤5%

According to Order R4-2010-0108, Applicable projects must reduce Effective Impervious Area (EIA) to less than or equal to five percent (≤5%) of the total project area, unless infeasible. Impervious surfaces are rendered "ineffective" if the design storm volume is fully retained onsite using either infiltration, rainwater harvesting, and/or evapotranspiration Retention BMPs. Biofiltration BMPs may be used to achieve the 5% EIA standard if Retention BMPs are technically infeasible (see Section 3.2). This section and Figure 2-2 describe the process for reducing EIA to ≤5%. Refer to Section 2.7 if Retention BMPs and/or Biofiltration BMPs cannot feasibly be used to meet the 5% EIA standard (see Section 3.2).



Effective Impervious Area
Victoria, BC Capital Regional District

Step 5a: Calculate Allowable EIA

EIA is defined as impervious area that is hydrologically connected via sheet flow over a hardened conveyance or impervious surface without any intervening medium to mitigate flow volume. Connected impervious areas efficiently transport runoff without allowing infiltration. Often in urban areas, runoff from connected impervious surfaces is immediately directed into a stormwater conveyance system where it is further connected and efficiently transported to an outfall (stormwater conveyance system outlet). For example, in this illustration, the rooftop is directly connected via a roof drain and underground solid drain pipe to the storm drain in the street (Note that the sanitary sewer is separate from the storm sewer). The roadway drains to the storm drain through the catch basin. The roof area and roadway area would be considered EIA.

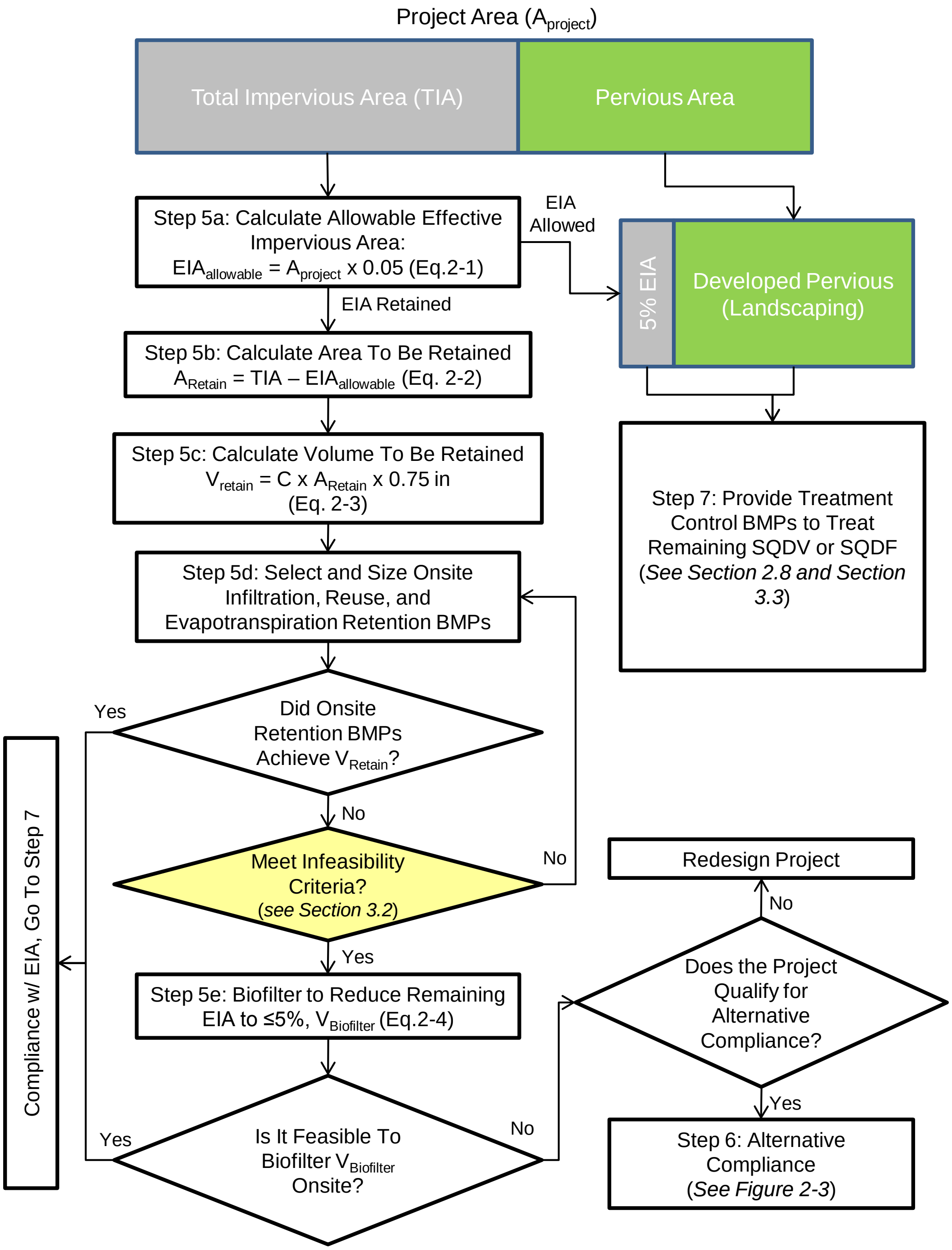


Figure 2-2: Apply BMPs to Reduce EIA to ≤5% Process Flow Chart

> "Impervious surface" is a man-made hard surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, rooftops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, compacted gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater. Open, uncovered retention/detention facilities and exposed bedrock shall not be considered as impervious surfaces for purposes of determining EIA retention volume.

The allowable EIA for a project site should be calculated as follows:

$$EIA_{allowable} = (A_{project})*(\%_{allowable}) \qquad \text{(Equation 2-1)}$$

Where:

$EIA_{allowable}$ = the maximum impervious area from which runoff can be treated and discharged offsite [and not retained onsite] (acres)

$A_{project}$ = the total project area (acres).

> "Total project area" (or "gross project area") for new development and redevelopment projects is defined as the disturbed, developed, and undisturbed portions within the project's property (or properties) boundary, at the project scale submitted for first approval. Areas proposed to be permanently dedicated for open space purposes as part of the project are explicitly included in the "total project area." Areas of land precluded from development through a restrictive covenant, conservation easement, or other recorded document for the permanent preservation of open space prior to project submittal shall not be included in the "total project area."

$\%_{allowable}$ = 5 percent

Step 5b: Calculate Impervious Area to be Retained

The impervious area from which runoff must be retained onsite is the total impervious area minus the $EIA_{allowable}$, which should be calculated as follows:

$$A_{Retain} = TIA - EIA_{allowable} = (IMP*A_{project}) - EIA_{allowable} \qquad \text{(Equation 2-2)}$$

Where:

A_{Retain} = the drainage area from which runoff must be retained (acres)

TIA = total impervious area (acres)

$EIA_{allowable}$	=	the maximum impervious area from which runoff can be treated and discharged offsite [and not retained onsite] (acres).
IMP	=	imperviousness of project area (%)/100
$A_{project}$	=	the total project area (acres)

Step 5c: Calculate the Volume to be Retained (SQDV)

All Retention BMPs used to render impervious surfaces "ineffective" should be properly sized to retain the volume of water that results from the water quality design storm. The design storm volume, referred to in the TGM as the Stormwater Quality Design Volume (SQDV) shall be calculated using the following four allowable methodologies:

1) The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area using a 48 to 72-hour draw down time, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

2) The volume of annual runoff based on unit basin storage water quality volume to achieve 80 percent or more volume treatment; or

3) The volume of runoff produced from a 0.75 inch storm event; or

4) Eighty (80) percent of the average annual runoff volume using an appropriate public domain continuous flow model [such as Storm Water Management Model (SWMM) or Hydrologic Engineering Center – Hydrologic Simulation Program – Fortran (HEC-HSPF)], using the local rainfall record and relevant BMP sizing and design data.

Note: Examples used throughout the 2011 TGM use the 0.75 inch storm event (Methodology #3).

EXAMPLE 2-1: EIA CALCULATION

Given: 10 acre total project area, 55% impervious, 25% landscaped, 20% undisturbed, percent allowable EIA = 5%.

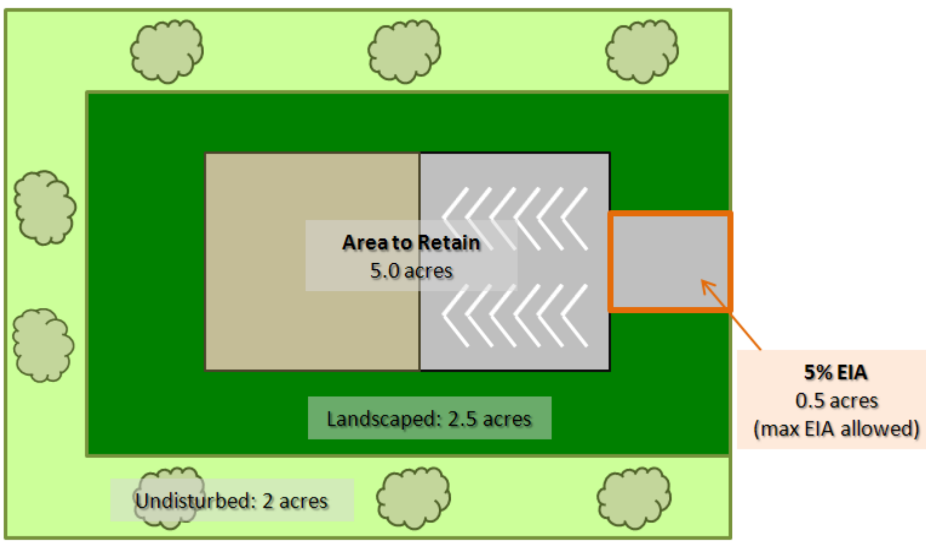
$EIA_{allowable} = 10 * 0.05 = 0.5$ acres

$A_{Retain} = (0.55*10) – 0.5 = 5.0$ acres

$A_{treatment} = (0.25*10) + 0.5 = 3.0$ acres

The maximum EIA allowed for the site is 0.5 acres, from which the generated runoff must be treated prior to discharge, in addition to the runoff from the 2.5 acres landscaped area, up to the design storm volume or flow rate. The runoff volume generated from the remaining 5 acre impervious area (A_{Retain}) must be retained onsite via infiltration, rainwater harvesting, and/or evapotranspiration Retention BMPs.

$A_{treatment}$ equals the EIA allowed for the site plus the landscaped area.



Note: graphic not to scale; for illustration purposes only

The runoff volume that is to be retained onsite should be calculated using Equation 2-3 below:

$$V_{Retain} = C*(0.75/12)*A_{retain} \quad \text{(Equation 2-3)}$$

Where:

V_{Retain} = the stormwater quality design volume (SQDV) that must be retained onsite (ac-ft)

C	=	runoff coefficient (equals 0.95 for impervious surfaces)
0.75	=	the design rainfall depth (in) [based on SQDV sizing method 3]
A_{Retain}	=	the drainage area from which runoff is retained (acres), calculated using Equation 2-2

EXAMPLE 2-2: RETENTION VOLUME CALCULATION

Given: A_{Retain} = 5.0 acres (from Example 2-1); runoff coefficient (C) = 0.95

$$V_{Retain} = 0.95*(0.75/12)*5.0 \text{ acres} = 0.3 \text{ acre-feet}$$

The project must retain at least 0.3 acre-feet of runoff from impervious surfaces using Retention BMPs.

Step 5d: Select and Size Onsite Retention BMPs to Achieve 5% EIA

The next step is to select and size Retention BMPs, based on the site assessment design, and constraints. Section 3-4 provides guidance on the selection of Retention BMPs. The project must demonstrate disconnection of impervious area such that the 5% EIA requirement is achieved.

Step 5e: Select and Size Biofiltration BMPs to Reduce EIA to ≤5%

Retention BMPs shall be used onsite to the maximum extent practicable. Pretreatment BMPs shall be provided for all infiltration BMPs and other Retention BMPs as needed (see Section 6.1).

New development and redevelopment projects that demonstrate technical infeasibility for reducing EIA to ≤5% using Retention BMPs are eligible to use Biofiltration BMPs to achieve the EIA performance standard.

The project applicant shall demonstrate technical infeasibility by submitting a site-specific analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect. Section 3.2 discusses technical feasibility screening criteria. Projects that cannot demonstrate technical infeasibility shall meet the requirement to reduce EIA to ≤5% using Retention BMPs. Otherwise project applicants must examine other options for meeting the requirements, such as redesigning the site.

Volume-based biofiltration BMPs shall be sized to treat 1.5 times the volume not retained using Retention BMPs.

The onsite biofiltered volume ($V_{Biofilter}$), should be calculated as follows:

$$V_{Biofilter} = (V_{Retain} - V_{Achieved}) * 1.5 \qquad \text{(Equation 2-4)}$$

Where:

$V_{Biofilter}$ = the volume that must be captured and treated in a Biofiltration BMP (ac-ft)

V_{Retain} = the stormwater quality design volume (SQDV) that must be retained (ac-ft) (established in Step 5c)

$V_{Achieved}$ = the volume retained onsite using Retention BMPs (ac-ft)

EXAMPLE 2-3: BIOFILTRATION VOLUME CALCULATION

Given: V_{Retain} = 0.3 ac-ft (from Example 2-2); $V_{Achieved}$ = 0.25 ac-ft

$$V_{Biofilter} = (0.3 – 0.25) * 1.5 = 0.075 \text{ ac-ft}$$

If the project applicant has demonstrated technical infeasibility, the remaining EIA requirement may be met by biofiltering 1.5 times the remaining V_{Retain}. In this case, the Biofiltration BMP must be sized to treat 0.075 ac-ft.

If the project applicant has demonstrated technical infeasibility, the remaining EIA requirement may also be satisfied with flow-based Biofiltration BMPs. Flow-based Biofiltration BMPs shall be sized for the remaining drainage area from which runoff must be retained (A_{Retain}) using the methodology described in Section 2.8, Stormwater Quality Design Flow, with a rainfall intensity that varies with time of concentration for the catchment tributary to the flow-based Biofiltration BMP, according to Table 2-1.

Table 2-1: Flow-Based Biofiltration BMP Design Intensity for 150% Sizing

Time of Concentration, minutes	Design Intensity for 150% Sizing, in/hr
30	0.24
20	0.25
15	0.28
10	0.31
5	0.35

Time of concentration should be determined using the methodology provided in the Ventura County Hydrology Manual.

2.7 Step 6: Alternative Compliance

Certain new development and redevelopment project types are eligible for alternative compliance measures if onsite Retention BMPs and/or Biofiltration BMPs cannot feasibly be used to meet the 5% EIA standard (see Section 3.2). Such projects include:

1) Redevelopment projects (as defined in Section 1.5).

2) Infill projects. Infill projects meet the following conditions:

    a. The project is consistent with applicable general plan designation, and all applicable general plan policies, and applicable zoning designation and regulations;

    b. The proposed development occurs on a project site of no more than five acres substantially surrounded by urban uses;

    c. The project site has no value as habitat for endangered, rare, or threatened species;

    d. Approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality; and

    e. The site can be adequately served by all required utilities and public services (modified from State Guidelines § 15332).

3) Smart Growth projects. Smart Growth projects are defined as new development and redevelopment projects that occur within existing urban areas[2] (see maps in Appendix B) designed to achieve the majority of the following principles[3]:

    a. Create a range of housing opportunities and choices;

    b. Create walkable neighborhoods;

    c. Mix land uses;

---

[2] Existing urban areas and corresponding maps in Appendix B are based on the cities' City Urban Restriction Boundaries (CURB) lines and in the case of the unincorporated County, the Existing Community designation. These boundaries are a growth management tool intended to channel growth and protect agricultural and open-space land. The 2011 TGM utilizes existing urban areas (as defined in Appendix B) to provide parameters around eligibility for alternative compliance in two areas: 1) Smart Growth and 2) low income housing projects.

[3] Adapted from the Smart Growth Network's Smart Growth Principles in cooperation with the U.S. Environmental Protection Agency.

d. Preserve open space, natural beauty, and critical areas;

   i. Farmland preservation may also be considered for projects occurring outside existing urban areas (as defined by the Appendix B maps).

e. Provide a variety of transportation choices;

   i. Includes transit oriented development (development located within an average 2,000 foot walk to a bus or train station).[4]

f. Strengthen and direct development towards existing communities (as defined by Appendix B maps); and

g. Take advantage of compact building design.

The City or County Planning Division in which a project is proposed will ultimately determine whether a project meets these Smart Growth criteria.

4) Pedestrian/bike trail projects:

- ✓ Located along side of a road and
- ✓ Where right-of-way width is inadequate for the implementation of Retention and/or Biofiltration BMPs.

5) Agency flood control, drainage, and wet utilities projects:

- ✓ Located within waterbody and is therefore not increasing functional impervious cover; or
- ✓ Located on top of a narrow flood control feature (such as a levee) and space is unavailable for the implementation of Retention and/or Biofiltration BMPs; or
- ✓ Where the integrity of the flood control feature (such as a dam or levee) may be compromised through Retention and/or Biofiltration BMPs (e.g., infiltration of stormwater is not appropriate in a levee).

6) Historical preservation projects:

- ✓ Where the extent of the designated preservation area restricts the amount of land available for the implementation of Retention BMPs.

[4] Calthorpe, P. (1993), "The next American metropolis: Ecology, community, and the American dream", New York: Princeton Architectural Press.

7) Low income housing projects that occur within existing urban areas (as defined by the maps provided in Appendix B):

   - ✓ Where density requirements restrict the amount of land available for the implementation of Retention BMPs and/or

   - ✓ Where project financing constraints restrict the amount of land available for the implementation of Retention BMPs.

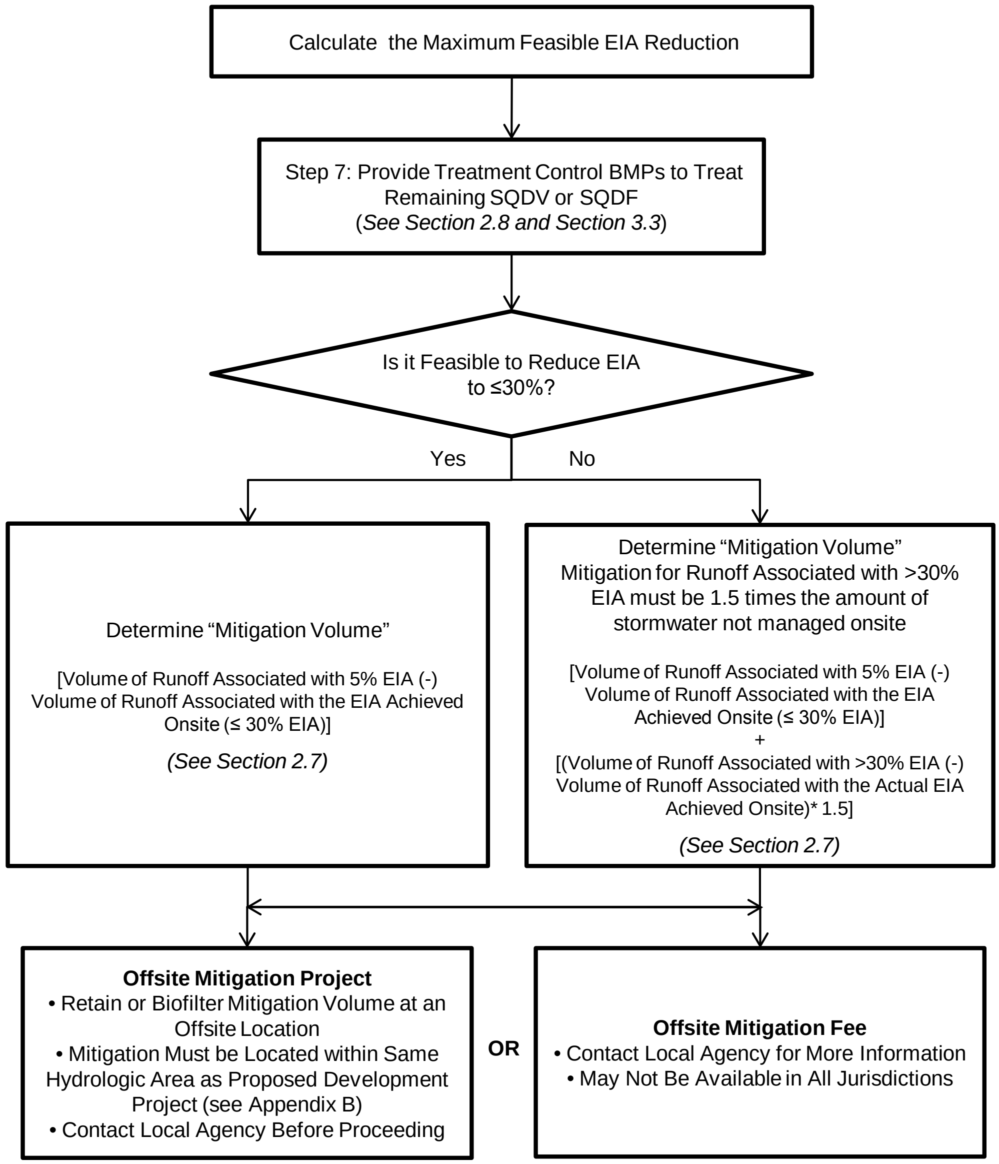


Figure 2-3: Alternative Stormwater Management Control Measures Compliance Decision Flow Chart

Projects in these categories must demonstrate that full compliance with the 5% EIA standard using Retention BMPs and Biofiltration BMPs is infeasible prior to moving to the alternative compliance flowchart (Figure 2-3) and selecting an offsite mitigation alternative. Section 3.2 provides infeasibility criteria.

Stormwater runoff from impervious surfaces and developed pervious surfaces that is not fully retained onsite (up to the SQDV) shall be mitigated using Treatment Control Measures [Chapter 6] selected per the BMP selection process outlined in Section 3.3, in addition to offsite alternative compliance measures.

Alternative compliance may be met through two options:

- Offsite mitigation project; or
- Offsite mitigation fee.

In either case, the Project applicant must contact the local approval agency before proceeding with Alternative Compliance.

Mitigation Volume

Projects requesting alternative compliance must demonstration that EIA has been reduced to the maximum extent practicable. Additionally, the SQDV or SQDF from all directly connected impervious area and the developed pervious project area must be captured and treated within the project site.

Alternative compliance options will be based on the "mitigation volume." The mitigation volume is the difference between the volume of runoff associated with 5% EIA and the volume of runoff associated with the actual EIA achieved onsite less than or equal to 30% (≤30%) EIA. The offsite mitigation requirement for EIA in excess of 30% (>30%) is 1.5 times the amount of stormwater not managed onsite.

Projects Feasible to Reduce EIA to ≤ 30%

1) Determine the volume of runoff that is retained and biofiltered onsite ($V_{Ret/Bio}$), using Equation 2-5 below:

$$V_{Ret/Bio} = (V_{Achieved} + (V_{Biofiltered}/1.5)) \qquad \text{(Equation 2-5)}$$

Where:

$V_{Ret/Bio}$ = the total volume of runoff retained and/or biofiltered onsite using Retention and Biofiltration BMPs

$V_{Achieved}$ = the runoff volume retained onsite using Retention BMPs as calculated in Equation 2-4

$V_{Biofiltered}$ = the runoff volume biofiltered onsite

2) Determine the Mitigation Volume ($V_{Mitigation}$), using Equation 2-6 below:

$$V_{Mitigation} = V_{Retain} - V_{Ret/Bio} \qquad \text{(Equation 2-6)}$$

Where:

$V_{Mitigation}$ = the volume of runoff that must be mitigated offsite

V_{Retain} = the SQDV that must be retained onsite per the 5% EIA requirement calculated in Equation 2-3

$V_{Ret/Bio}$ = the total volume of runoff retained and/or biofiltered onsite using Retention and Biofiltration BMPs calculated in Equation 2-5

EXAMPLE 2-4: ≤30% EIA OFFSITE MITIGATION VOLUME CALCULATION

Given: V_{Retain} = 0.3 ac-ft (from Example 2-2); $V_{Retained}$ = 0.25 ac-ft; $V_{Biofiltered}$ = 0.06 ac-ft

1) Calculate volume of runoff retained and biofiltered onsite ($V_{Ret/Bio}$).

$V_{Ret/BioBio}$ = 0.25 + (0.06/1.5) = 0.29 ac-ft [See Equation 2-5]

2) Calculate Mitigation Volume: ($V_{Mitigation}$):

$V_{Mitigation}$ = 0.3– 0.29 = 0.01 acre-feet [See Equation 2-6]

The required offsite mitigation volume is 0.01 ac-ft.

In addition, the SQDV or SQDF from the EIA (0.5 acres) and the developed pervious area (10 acres *25% = 2.5 acres) must be captured and treated in an approved Treatment Control Measure.

SQDV (acre-feet) = C*(0.75/12)*3 acres

OR

SQDF (cfs) = C * 0.20 in/hr * 3 acres

Note: Per Order R4-2010-0108, several options exist to determine the SQDV and SQDF. Examples used throughout the 2011 TGM use the 0.75 inch storm event (SQDV Methodology #3) for the SQDV and 0.2 inches per hour intensity for the SQDF (SQDF Methodology #1). For these examples, the 10-acre project site is assumed to be in a location where the 85th percentile storm event is equal to 0.75 inches.

Projects with EIA > 30%

For the scenario where the effective impervious area of the project is greater than 30% due to infeasibility, the runoff volume associated with the effective impervious area up to 30% must be mitigated offsite at a one-to-one ratio and the runoff volume associated with the effective impervious area greater than 30% must be mitigated off-site at 1.5 times the volume.

1) Determine the area of the impervious portion of the drainage area from which runoff is retained or biofiltered at 30% EIA ($A_{30\%EIA}$), using Equation 2-7 below:

$$A_{30\%EIA} = (IMP*A_{project}) - (30\%*A_{project}) \qquad \text{(Equation 2-7)}$$

Where:

$A_{30\%EIA}$ = the impervious portion of the drainage area from which runoff would have been retained or biofiltered at 30% EIA (acres)

IMP = total imperviousness of project area (%)/100

$A_{project}$ = the total project area (acres)

2) Determine the total volume that would have been retained or biofiltered onsite at 30% EIA ($V_{30\%EIA}$), using Equation 2-8 below:

$$V_{30\%EIA} = C^*(0.75/12)^*A_{30\%EIA} \quad \text{(Equation 2-8)}$$

Where:

$V_{30\%EIA}$ = the stormwater quality design volume (SQDV) retained or biofiltered at 30% EIA (note: for the purposes of this calculation, the biofiltered volume does not include the 1.5 multiplier)

C = runoff coefficient [equals o.95 for impervious surfaces]

0.75 = the design rainfall depth (in) [based on SQDV sizing method 3]

$A_{30\%EIA}$ = the impervious area from which runoff would have been retained or biofiltered at 30% EIA (acres) [See Equation 2-7]

3) Determine the impervious area from which runoff is actually retained ($A_{ActualEIA}$). This is the total amount of impervious area that drains to properly sized Retention or Biofiltration BMPs.

$$A_{ActualEIA} = (IMP^*A_{project}) - (EIA\%^*A_{project}) \quad \text{(Equation 2-9)}$$

Where:

$A_{ActualEIA}$ = the impervious portion of the drainage area from which runoff is retained or biofiltered using the actual EIA achieved on-site (acres)

IMP = total imperviousness of project area (%)/100

$A_{project}$ = the total project area (acres)

EIA% = percent EIA actually achieved on-site

4) Determine the volume that is actually retained onsite ($V_{ActualEIA}$), using Equation 2-10 below:

$$V_{ActualEIA} = C*(0.75/12)*A_{AcutalEIA} \qquad \text{(Equation 2-10)}$$

Where:

$V_{AcutalEIA}$ = the stormwater quality design volume (SQDV) that is retained and/or biofiltered onsite C = runoff coefficient [equals o.95 for impervious surfaces]

0.75 = the design rainfall depth (in) [based on SQDV sizing method 3]

$A_{ActualEIA}$ = the area associated with the Actual EIA achieved onsite, (i.e., the area from which runoff is retained or biofiltered (acres) [See # 3 above]

Determine the Mitigation Volume for 30% EIA using Equation 2-11 below:

$$V_{Mitigation30\%} = V_{Retain} - V_{30\%EIA} \qquad \text{(Equation 2-11)}$$

Where:

$V_{Mitigation30\%}$ = the mitigation volume for Project site with 30% EIA

V_{Retain} = the SQDV that must be retained onsite per the 5% EIA requirement, calculated using Equation 2-3

$V_{30\%EIA}$ = the runoff that would have been retained and/or biofiltered at 30% EIA (note: for the purposes of this calculation, the biofiltered volume does not include the 1.5 multiplier), calculated using Equation 2-8

Determine the Mitigation Volume for >30% (EIA $V_{Mitigation>30\%}$), using Equation 2-12 below:

$$V_{Mitigation>30\%} = (V_{30\%EIA} - V_{ActualEIA})*1.5 \qquad \text{(Equation 2-12)}$$

Where:

$V_{Mitigation>30\%}$ = the mitigation volume for >30% EIA

$V_{30\%EIA}$ = the stormwater quality design volume (SQDV) retained or biofiltered at 30% EIA (note: for the purposes of this calculation, the biofiltered volume does not include the 1.5 multiplier)

$V_{ActualEIA}$ = the stormwater quality design volume (SQDV) that is actually retained and/or biofiltered onsite, calculated using Equation 2-9

Determine the Total Mitigation Volume ($V_{MitigationTotal}$), using Equation 2-13 below:

$$V_{MitigationTotal} = V_{Mitigation>30\%} + V_{Mitigation30\%} \qquad \text{(Equation 2-13)}$$

Where:

$V_{MitigationTotal}$ = the total mitigation volume for 30% EIA

$V_{Mitigation>30\%}$ = the mitigation volume for >30% EIA, calculated using Equation 2-11

$V_{Mitigation30\%}$ = the mitigation volume for 30% EIA calculated using Equation 2-10.

EXAMPLE 2-5: >30% EIA OFFSITE MITIGATION CALCULATION

Given: 40% EIA; 10 acre total project area, 55% impervious, 25% landscaped, 20% undisturbed; runoff coefficient (C) = 0.95; V_{Retain} = 0.3 ac-ft

1) Determine impervious area retained or biofiltered onsite at 30% EIA
   $A_{30\%EIA}$ = ((55/100)*10) – ((30/100)*10) = 2.5 acres [See Equation 2-7]

2) Determine the volume that is retained or biofiltered onsite at 30% EIA
   $V_{30\%EIA}$ = 0.95*(0.75/12)*2.5 = 0.15 ac-ft [See Equation 2-8]

3) Determine the impervious area from which runoff is actually retained
   $A_{ActualEIA}$ = ((55/100)*10) – ((40/100)*10) = 1.5 acres [See Equation 2-9]

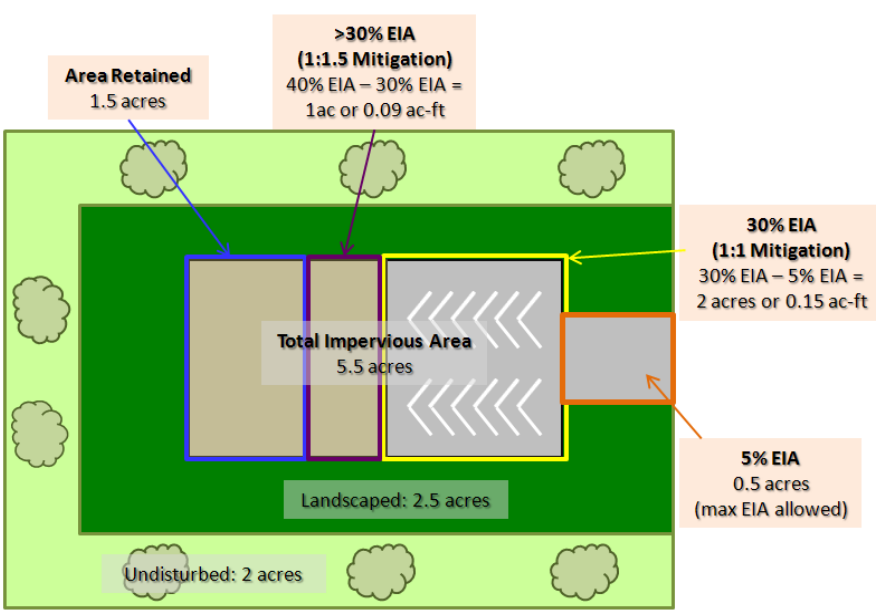
4) Determine the volume that is actually retained or biofiltered onsite
   $V_{ActualEIA}$ = 0.95*(0.75/12)*1.5 = 0.09 ac-ft [See Equation 2-10]

5) Determine Mitigation Volume for 30% EIA
   $V_{Mitigation30\%}$ = 0.3 – 0.15 = 0.15 ac-ft [See Equation 2-11]

6) Determine Mitigation Volume for >30%
   $V_{Mitigation>30\%}$ = (0.15-0.09) *1.5 = 0.09 ac-ft [See Equation 2-12]

7) Determine the Total Mitigation Volume
   $V_{MitigationTotal}$ = 0.15 + 0.09 = 0.24 ac-ft [See Equation 2-13]

The required offsite mitigation volume is 0.24 ac-ft



Selecting Offsite Mitigation Projects

Project applicants may identify offsite mitigation projects. Project applicants are responsible for completing offsite mitigation projects that will achieve equivalent volume and pollutant load reduction using Retention and/or Biofiltration BMPs sized for the mitigation volume. Offsite mitigation projects must adhere to the following criteria:

- Offsite mitigation projects must be located within the same hydrologic area (see map in Appendix B)
- Offsite mitigation projects must be completed as soon as possible and at the latest, within 4 years of the certificate of occupancy for the original project.

Examples of Offsite Mitigation Projects

Mitigation projects should target urbanized areas that were developed without stormwater mitigation. All projects must be approved by the local permitting agency and must adhere to the BMP Selection Criteria presented in Section 3.3 of the 2011 TGM. Potential project types may include:

- Convert a convex parking lot landscaped island into a depressed bioretention area designed to retain parking lot runoff.
- Convert a traditionally-paved parking lot into porous pavement.
- Modify an existing detention pond into a retention pond.
- Install bioretention in bump-outs, in parkways, or in roadway medians.
- Install bioretention in sidewalk areas to infiltrate roof, sidewalk, and/or roadway runoff. Sidewalks must be wide enough to permit foot traffic around bioretention area.
- Incorporate infiltration BMPs into landscaped areas that collect runoff from impervious surfaces.
- Regional BMPs.

Offsite Mitigation Fee

In some cases, Alternative Compliance may be achieved through an Offsite Mitigation Fee. A list of offsite mitigation projects available for funding will be identified by the Approval Agencies. Applicants should contact their local Approval Agency for more information. The Offsite Mitigation Fee may not be available in all jurisdictions.

2.8 Step 7: Apply Treatment Control Measures

Stormwater runoff from EIA and developed pervious surfaces shall be mitigated using Retention BMPs, Biofiltration BMPs, or Treatment Control Measures [Chapter 6] selected per the BMP selection process outlined in Section 3.3. Biofiltration BMPs and Treatment Control Measures may be sized to meet the Stormwater Quality Design Volume (SQDV) or the Stormwater Quality Design Flow (SQDF). Treatment Control Measures should be designed in adherence with the guidance provided in Section 6 of the 2011 TGM in order to assure a level of pollutant removal comparable to those listed in Attachment "C" of Order R4-2010-0108 (also provided in Appendix D.1).

Projects that are eligible for Offsite Mitigation must still provide treatment for all impervious surfaces and developed pervious areas using Treatment Control Measures sized to meet the SQDV or SQDF on site. Treatment Control Measures must be selected per the BMP selection process outlined in Section 3.3.

Stormwater Quality Design Volume (SQDV)

Volume-based Treatment Control Measures must be sized to capture and treat the runoff volume from the water quality design storm. The SQDV shall be calculated using the following four allowable methodologies:

1) The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area using a 48 to 72-hour draw down time, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

2) The volume of annual runoff based on unit basin storage water quality volume to achieve 80 percent or more volume treatment; or

3) The volume of runoff produced from a 0.75 inch storm event; or

4) Eighty (80) percent of the average annual runoff volume using an appropriate public domain continuous flow model [such as Storm Water Management Model (SWMM) or Hydrologic Engineering Center – Hydrologic Simulation Program – Fortran (HEC-HSPF)], using the local rainfall record and relevant BMP sizing and design data.

The allowable design storm calculation methodology for Treatment Control Measures, per Order R4-2010-0108, is determined by the total project disturbed land area, as summarized in Table 2-2 below.

Table 2-2: Allowed Design Storm Methodology Based on Project Size

Project Size (Disturbed Land Area[1])	Allowed Design Storm Methodology
Less than 5 acres	(1), (2), (3), or (4)
5 acres - 50 acres	(1), (2), or (4)
More than 50 acres	(4)

[1] "Disturbed Area" means any area that is altered as a result of land disturbance, such as clearing, grading, grubbing, stockpiling or excavation.

Instructions for calculating the SQDV based on method (3), the volume of runoff produced from a 0.75 inch storm event, are provided below. Instructions for calculating the SQDV for methods (1), (2), and (4) are provided in Appendix E. Note that Biofiltration BMPs must be sized to treat 1.5 times the volume not retained using Retention BMPs as indicated in Step 5e.

Calculation Procedure

1) Determine the area from which runoff must be retained or captured and treated ($A_{project}$).

2) Determine the runoff coefficient (C), using Equation 2-13 below:

$$C = 0.95*imp + C_p\ (1\text{-}imp) \qquad \text{(Equation 2-13)}$$

Where:

C	=	runoff coefficient (equals 0.95 for impervious surfaces)
imp	=	impervious fraction of watershed
C_p	=	pervious runoff coefficient, determined based on soil type using table below [see Ventura County Hydrology Manual (2006)]:

Table 2-3: Ventura Soil Type Pervious Runoff Coefficients

Ventura Soil Type (Soil Number)	C_p value
1	0.15
2	0.10
3	0.10
4	0.05
5	0.05
6	0
7	0

3) Determine the stormwater runoff design volume (SQDV), using Equation 2-14 below:

$$SQDV = C*(0.75/12)*A_{project} \qquad \text{(Equation 2-14)}$$

Where:

SQDV	=	the stormwater quality design volume (acre-feet)
C	=	runoff coefficient, calculated by Equation 2-13
0.75	=	the design rainfall depth (in) [based on sizing method (3)]Atrib
$A_{project}$	=	drainage area of the tributary catchment (acres)

Stormwater Quality Design Flow (SQDF)

For the purposes of the 2011 TGM, instructions for calculating the SQDF based on method (1), the flow of runoff produced from a rainfall event equal to at least 0.2 inches per hour intensity, are provided below. Instructions for calculating the SQDF for methods (2), and (3) are provided in Appendix E. Note that flow-based Biofiltration BMPs used to achieve 5% EIA must be sized per the design intensity specified in Table 2-1.

Calculation Procedure

1) Determine the drainage area from which the flow-based BMP will be receiving runoff ($A_{project}$).

2) Calculate the runoff coefficient (C), using Equation 2-13.

3) Calculate the SQDF using Equation 2-15 below:

$$SQDF = C*I*A_{project} \quad \text{(Equation 2-15)}$$

Where:

SQDF	=	flow in cubic feet per second (cfs)
C	=	runoff coefficient, calculated by Equation 2-13 above
I	=	average rainfall intensity (inches/hour) for a duration equal to the time of concentration of the watershed [equal to 0.2 in/hr for method (1); see also Table 2-1:]
$A_{project}$	=	drainage area of the tributary catchment (acres)

2.9 Step 8: Continue Project Design Process: Flood Control and Hydromodification Requirements

The project applicant should continue with the design process to address additional requirements including flood control and hydromodification control criteria.

Step 8a: Flood Control Requirements

Applicants shall comply with Ventura County and local approval agency regulations on floodplain and floodway management.

Step 8b: Hydromodification (Flow/Volume/Duration) Control Criteria

Projects meeting the applicability criteria contained in Section 4.E.II of Order R4-2010-0108 (presented in Section 1.5 of the 2011 TGM) are required to implement hydrologic control measures to prevent accelerated erosion and to protect stream habitat in downstream natural drainage systems. Natural drainage systems are defined as unlined or unimproved (not engineered) creeks, streams, rivers and their tributaries.

Exemptions

The following new development and redevelopment projects are exempt from the hydromodification control criteria:

1) Single-family structures, unless such projects disturb one acre or more of land or create, add, or replace 10,000 square feet or more of impervious surface area.

2) All projects that disturb less than one acre.

3) Projects that are replacement, maintenance, or repair of an Agency's existing flood control facility, storm drain, or transportation network.

4) Redevelopment projects in existing urban areas [see maps in Appendix B] that do not increase the effective impervious area or decrease the infiltration capacity of pervious areas compared to the pre-developed condition.

5) Projects that have any increased discharge directly or via a storm drain to a sump, lake, area under tidal influence, into a waterway that has a 100-year peak flow (Q100) of 25,000 cubic feet per second (cfs) or more, or other receiving water that is not susceptible to hydromodification impacts.

6) Projects that discharge directly or via a storm drain into concrete or improved (not natural) channels (e.g., rip rap, sackcrete, etc.), which, in turn, discharge into receiving water that is not susceptible to hydromodification impacts (as in #5 above).

Hydromodification Control Measures

The purpose of Hydromodification Control Measures is to minimize changes in post-development stormwater runoff discharge rates, velocities, and durations by maintaining within a certain tolerance, the project's pre-developed stormwater runoff flow rates and durations.

Hydromodification Control Measures may include onsite, subregional, or regional Hydromodification Control Measures, Retention BMPs, or stream restoration measures. Preference must be given to onsite Retention BMPs and Hydromodification Control Measures. In-stream restoration measures may not adversely affect the beneficial uses of natural drainage systems.

The Southern California Stormwater Monitoring Coalition (SMC) is developing a regional methodology to eliminate or mitigate the adverse impacts of hydromodification as a result of urbanization, including hydromodification assessment and management tools. The Program will develop and implement watershed-specific Hydromodification Control Plans (HCPs) after the completion of the SMC study. Until the completion of the HCPs, the Interim Hydromodification Control Criteria, described below, apply to applicable, non-exempt new development and redevelopment projects.

Interim Hydromodification Control Criteria

1) Projects disturbing less than 50 acres must comply with the Stormwater Management Standards contained in the 2011 TGM (i.e., a combination of Retention BMPs, Biofiltration BMPs, and/or Treatment Control Measures).

2) Projects disturbing 50 acres or greater must develop and implement a Hydromodification Analysis Study (HAS) that demonstrates that post development conditions are expected to approximate the pre-developed erosive

effect of sediment transporting flows in receiving waters. The HAS must lead to the incorporation of project design features intended to approximate, to the extent feasible, an Erosion Potential value of 1, or any alternative value that can be shown to be protective of the natural drainage systems from erosion, incision, and sedimentation that can occur as a result of flow increases from impervious surfaces and damage stream habitat in natural drainage systems. The methodology for calculating Erosion Potential is provided in Appendix E of Order R4-2010-0108. Project proponents must work with their local permitting authority to ensure that the HAS is correctly prepared.

2.10 Step 9: Develop Maintenance Plan

The Ventura Countywide Stormwater Quality Management Program (Program) requires the submittal of a Maintenance Plan and execution of a Maintenance Agreement with the owner/operator of any stormwater control that requires maintenance including Site Design Principles and Techniques (Section 4); Source Control Measures (Section 5; and Retention BMPs, Biofiltration BMPs, and Treatment Control Measures (Section 6). Maintenance Plans must include guidelines for how and when inspection and maintenance should occur for each control. Section 7 and Appendices H and I provide additional information and guidance on compliance with maintenance requirements.

3 SITE ASSESSMENT AND BMP SELECTION

3.1 Assessing Site Conditions and Other Constraints

Assessing a site's potential for implementation of Retention BMPs, Biofiltration BMPs, and Treatment Control Measures requires both the review of existing information and the collection of site-specific measurements. Available information regarding site layout and slope, soil type, geotechnical conditions, and local groundwater conditions should be reviewed as discussed below. In addition, soil and infiltration testing should be conducted to determine if stormwater infiltration is feasible and to determine the appropriate design infiltration rates for infiltration-based treatment BMPs.

Site Conditions

Topography

The site's topography should be assessed to evaluate surface drainage and topographic high and low points, as well as to identify the presence of steep slopes that qualify as Hillside Locations. All of these conditions have an impact on what type of Retention BMPs, Biofiltration BMPs, and Treatment Control Measures will be most beneficial for a given project site. Stormwater infiltration is more effective on level or gently sloping sites. Flows on slopes steeper than 15% may runoff as surface flows, rather than infiltrate into the ground. On hillsides, infiltrated runoff may daylight or resurface a short distance downslope, which could cause slope instability depending on the soil or geologic conditions. See the Geotechnical Considerations section below.

Soil Type and Geology

The site's soil types and geologic conditions should be determined to evaluate the site's ability to infiltrate stormwater and to identify suitable, as well as unsuitable, locations for infiltration-based BMPs (e.g., infiltration basins and trenches, bioretention without an underdrain, permeable pavement, and drywells). Using the Soil Survey completed by the Soil Conservation Service (SCS) (now identified as the Natural Resource Conservation Service [NRCS]) of the U. S. Department of Agriculture in April 1970, soils in Ventura County were grouped into seven hydrologically homogeneous families [see Ventura County Hydrology Manual (2006); also see Appendix B]. Two families were assigned to each of the NRCS Hydrologic Soil Groups A, B, and C; while only one family was considered appropriate for NRCS Hydrologic Soil Group D [for further information, see http://soils.usda.gov/]:

- Group A soils are typically sands, loamy sands, or sandy loams. Group A soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep and well to excessively drained sands or gravels and have a high rate of water transmission. Ventura County soil numbers 6 and 7 are Group A soils.

- Group B soils are typically silty loams or loams. They have a moderate infiltration rate when thoroughly wetted and consist chiefly of moderately deep to deep and moderately well to well drained soils with moderately fine to moderately coarse texture. Ventura County soil numbers 4 and 5 are Group B soils.

- Group C soils are typically sandy clay loams. They have low infiltration rates when thoroughly wetted, consist chiefly of soils with a layer that impedes downward movement of water, and/or have moderately fine to fine soil structure. Ventura County soil numbers 2 and 3 are Group C soils.

- Group D soils are typically clay loams, silty clay loams, sandy clays, silty clays, or clays. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with high swelling potential, permanent high water table, claypan or clay layer at or near the surface, and/or shallow soils over nearly impervious material. Ventura County soil number 1 is a Group D soil.

Infiltration-based BMPs should be feasible in areas mapped with Ventura County Soil Numbers 4 through 7. If site-specific data is available, then soils with infiltration rates of 0.5 in/hr or greater are considered feasible for infiltration. Infiltration-based BMPs should not be designed for sites mapped with Ventura County Soil Numbers 1 through 3 (unless site specific testing is performed and shows an infiltration rate greater than 0.5 in/hr) or with site-specific infiltration rates less than 0.5 in/hr.

Locations where soils are mapped with Ventura Hydrology Manual Soil Number 3, or where a site-specific analyses show that the soils have an infiltration rate of 0.3 to 0.5 inches per hour, and no other infiltration-related infeasibility criteria apply, shall use a Bioinfiltration BMP (or Rainwater Harvesting). Bioinfiltration is an adaption of the Bioretention with an Underdrain BMP in which the underdrain is raised above the gravel storage layer in order to promote infiltration but allow release of biotreated runoff to the storm drain when infiltration capacity is reached.

Early identification of soil types throughout the project footprint can reduce the number of test pit investigations and infiltration tests needed. Early identification reduces the number of potential test sites to locations with those that are most likely to be amenable to infiltration. Guidance for conducting test pit investigations and infiltration tests is provided in Appendix C.

Project applicants should review available geologic or geotechnical reports on local geology to identify relevant features such as depth to bedrock, rock type, lithology, faults, and hydrostratigraphic or confining units. These geologic investigations may also identify shallow water tables and past groundwater issues that are important for BMP design (see below).

Groundwater Considerations

Site groundwater conditions should be considered prior to Retention BMP, Biofiltration BMP, and Treatment Control Measure siting, selection, sizing, and design. The depth to groundwater beneath the project during the wet season may preclude infiltration, since five feet of separation to the seasonal high ground water level and mounded groundwater level is required. Depth to seasonal high groundwater level shall be estimated as the average of the annual minima (i.e., the shallowest recorded measurements in each water year, defined as October 1 through September 30) for all years on record. If groundwater level data are not available or not considered to be representative, seasonal high groundwater depth can be determined by redoximorphic analytical methods combined with temporary groundwater monitoring for November 1 through April 1 at the proposed project site.

In areas with known groundwater pollution, infiltration may need to be avoided, as it could contribute to the movement or dispersion of groundwater contamination. Areas with known groundwater impacts include sites listed by the Los Angeles Regional Water Quality Control Board's Leaking Underground Storage Tanks (LUST) program and Site Cleanup Program (SCP). The California State Water Resources Control Board maintains a database of registered contaminated sites through their 'Geotracker' Program. Registered contaminated sites can be identified in the project vicinity when the site address is typed into the "map cleanup sites" field.

Mobilization of groundwater contaminants may also be of concern where contamination from natural sources is prevalent (e.g., marine sediments, selenium rich groundwater, to the extent that data is available). Infiltration on sites with contaminated soils or groundwater that could be mobilized or exacerbated by infiltration is not allowed, unless a site-specific analysis determines the infiltration would be beneficial. A site-specific analysis may be conducted where groundwater pollutant mobilization is a concern to allow for infiltration-based BMPs.

Research conducted on the effects of stormwater infiltration on groundwater by Pitt et al. (1994) indicate that the potential for contamination due to infiltration is dependent on a number of factors, including the local hydrogeology and the chemical characteristics of the pollutants of concern. Chemical characteristics that influence the potential for groundwater impacts include high mobility (low absorption potential), high solubility fractions, and abundance of pollutants in urban runoff. As a class of constituents, trace metals tend to adsorb onto soil particles and are filtered out by the soils. This has been confirmed by extensive data collected beneath stormwater detention/retention ponds in Fresno (conducted as part of the Nationwide Urban Runoff Program (Brown & Caldwell, 1984)) that showed that trace metals tended to be adsorbed in the upper few feet in the bottom sediments. Bacteria are also filtered out by soils. More mobile and soluble pollutants, such as chloride and nitrate, have a greater potential for impacting groundwater.

Where soils have very high infiltration rates, groundwater quality may be impacted by infiltration BMPs. Prior to the use of infiltration basins and subsurface infiltration BMPs in areas with high infiltration rates, consult with the local regulatory agencies to identify if unconfined aquifers are located beneath the project to determine the appropriateness of infiltration-based BMPs. In areas underlain by unconfined aquifers with designated beneficial groundwater uses (e.g. drinking water supply), the application of infiltration BMPs should be limited to those that provide significant pretreatment to ensure groundwater is protected from pollutants of concern.

Geotechnical Considerations

Water infiltration can cause geotechnical issues, including: (1) settlement through collapsible soil, (2) expansive soil movement, (3) slope instability, and (4) increased liquefaction hazard. Stormwater infiltration temporarily raises the groundwater level near the infiltration facility, such that the potential geotechnical conditions are likely to be of greatest significance near the infiltration area and decrease with distance. A geotechnical investigation should be performed for the infiltration facility to identify potential geotechnical issues and geological hazards that may result from infiltration.

In general, infiltration-based BMPs must be set back from building foundations or steep slopes. Increased water pressure in soil pores reduces soil strength. Decreased soil strength can make foundations more susceptible to settlement and slopes more susceptible to failure. Recommendations for each site should be determined by a licensed geotechnical engineer based on soils boring data, drainage patterns, and the current requirements for stormwater treatment. Implementing the geotechnical engineer's requirements is essential to prevent damage from increased subsurface water pressure on surrounding properties, public infrastructure, sloped banks, and even mudslides.

Collapsible Soil

Typically, collapsible soil is observed in sediments that are loosely deposited, separated by coatings or particles of clay or carbonate, and subject to saturation. Stormwater infiltration will result in a temporary rise in the groundwater elevation. This rise in groundwater could change the soil structure by dissolving or deteriorating the intergranular contacts between the sand particles, resulting in a sudden collapse, referred to as hydrocollapse. This collapse phenomenon generally occurs during the first saturation episode after deposition of the soil, and repeated cycles of saturation are not likely to result in additional collapse. It is important to evaluate the potential for hydrocollapse during the geotechnical investigation.

The magnitude of hydrocollapse is proportional to the thickness of the soil column where infiltration is occurring. In most instances, the magnitude of hydrocollapse will be small. Regardless, the geotechnical engineer should evaluate the potential effects of hydrocollapse from large infiltration facilities on nearby structures and roadways. Typically, a network of surface settlement monuments is installed around the infiltration site, along adjacent roadways, and in neighboring developments to evaluate if hydrocollapse has occurred. These monuments are typically monitored prior to infiltrating stormwater, monthly during the first year of operation of the facility, then yearly thereafter for a period of approximately five years.

Expansive Soil

Expansive soil is generally defined as soil or rock material that has a potential for shrinking or swelling under changing moisture conditions. Expansive soils contain clay minerals that expand in volume when water is introduced and shrink when the water is removed or the material is dried. When expansive soil is present near the ground surface, a rise in groundwater from infiltration activities can introduce moisture and cause these soils to swell. Conversely, as the groundwater surface falls after infiltration, these soils will shrink in response to the loss of moisture in the soil structure. The effects of expansive soil movement (swelling and shrinking) will be greatest on near surface structures such as shallow foundations, roadways, and concrete walks. Basements or below-grade parking structures can also be affected as additional loads are applied to the basement walls from the large swelling pressures generated by soil expansion. A geotechnical investigation should identify if expandable materials are present near the proposed infiltration facility, and if they are, evaluate if the infiltration will result in wetting of these materials. See Appendix B, Map B-14 (expansive soil potential map).

Slopes

Slopes near the infiltration facility can be affected by the temporary rise in groundwater. The presence of a water surface near a slope can substantially reduce the stability of the slope from a dry condition. A groundwater mounding analysis should be performed to evaluate the rise in groundwater around the facility. If the computed rise in groundwater approaches nearby slopes, then a separate slope stability evaluation should be performed to evaluate the implications of the temporary groundwater surface. The geotechnical and groundwater mounding evaluations should identify the duration of the elevated groundwater and assign factors of safety consistent with the duration (e.g., temporary or long-term conditions).

Liquefaction

Seismically-induced soil liquefaction is a phenomenon in which saturated granular materials, typically possessing low to medium density, undergo matrix rearrangement, develop high pore water pressure, and lose shear strength due to cyclic ground motions induced by earthquakes. This rearrangement and strength loss is followed by a reduction in bulk volume. Manifestation of soil liquefaction can include loss of bearing capacity for foundations, surface settlements, and tilting in level ground. Soil liquefaction can also result in instabilities and lateral spreading in embankments and areas of sloping ground.

Saturation of the subsurface soils above the existing groundwater table may occur as a result of stormwater infiltration. A groundwater mounding analysis should also evaluate the duration of mounding, as a lengthy duration or long-term rise in groundwater will need to be considered in the evaluation of liquefaction. If the granular soils are sufficiently dense, it is unlikely that liquefaction will be of concern, regardless of the groundwater mounding. If analyses indicate that the potential for liquefaction may be increased from stormwater infiltration, then the analyses will need to evaluate the liquefaction-induced settlement of structures, lateral spreading, and other surface manifestations. See Appendix B, Map B-14 (liquefaction potential map).

Managing Offsite Drainage

Locations and sources of offsite run-on onto the site should be identified early in the design process. Offsite drainage should be considered when determining appropriate BMPs so that drainage can be managed. Concentrated flows from offsite drainage may cause extensive erosion, if not properly conveyed through or around the project site or otherwise managed. By identifying the locations and sources of offsite drainage, the volume of water running onto the site may be estimated and factored into the siting and sizing of onsite BMPs. Vegetated swales or storm drains may be used to intercept, divert, and convey offsite drainage through or around a site to prevent flooding or erosion that might otherwise occur.

Existing Utilities

Existing utility lines that are onsite will limit the possible locations of certain BMPs. For example, infiltration BMPs should not be located near utility lines where the increased amount of water could damage the utilities. Stormwater should be directed away from existing underground utilities. Project designs that require the relocation of existing utilities should be avoided, if possible.

Environmentally Sensitive Areas

The presence of Environmentally Sensitive Areas (ESAs) may limit the siting of certain BMPs. ESA's are typically delineated by and fall under the regulatory oversight of state or federal agencies such as the U.S. Army Corp of Engineers (USACE), California Department of Fish and Game, U.S. Fish and Wildlife Service, or the California Environmental Protection Agency. BMPs should be selected and sited to avoid adversely affecting an ESA. The Ventura County ESA map (ESA as defined in Order R4-2010-0108) is provided in Appendix B or may be obtained from the local permitting authority.

3.2 Technical Feasibility Screening

To use biofiltration BMPs and alternative compliance measures, the project applicant should demonstrate that compliance with the requirement to reduce EIA to ≤5% using Retention BMPs is technically infeasible by submitting a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer and/or geologist. Projects seeking to use alternative compliance measures must demonstrate EIA has been reduced to the maximum extent practicable. Project applicants should contact their local Approval Agency to determine if additional infeasibility criteria apply. Technical infeasibility may result from conditions including the following:

1) Locations where seasonal high groundwater or mounded groundwater beneath an infiltration BMP is within 5 feet of the bottom of the infiltration BMP.

2) Locations on the project site where soils are mapped with Ventura Hydrology Manual Soil Numbers 1-2 or site-specific analyses show that the soils have an infiltration rate less than 0.3 inches per hour. Locations where soils are mapped with Ventura Hydrology Manual Soil Number 3, or where a site-specific analyses show that the soils have an infiltration rate of 0.3 to 0.5 inches per hour, and no other infiltration-related infeasibility criteria apply, shall use a Bioinfiltration BMP or Rainwater Harvesting (if feasible) to achieve the 5% EIA requirement.

3) Locations on the project site within 100 feet of a groundwater well used for drinking water, non-potable wells, drain fields, and springs; locations less than 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project; and locations less than eight feet from building foundations or an alternative setback established by the geotechnical expert for the project.

4) Locations where pollutant mobilization is a documented concern, unless a site-specific analysis determines that infiltration would not be detrimental. Portions of brownfield development sites may be eligible for alternative compliance where pollutant mobilization is a concern.

5) Locations with potential geotechnical hazards established by the geotechnical professional for the project.

6) Projects with high-risk areas such as service/gas stations, truck stops, and heavy industrial sites, unless a site-specific evaluation demonstrates that:

   - Treatment is provided to address pollutants of concern, and/or

   - High risks areas are isolated from stormwater runoff or infiltration areas with little chance of spill migration.

7) Locations where reduction of surface runoff may potentially impair beneficial uses of the receiving water as documented in a site-specific study (e.g., California Environmental Quality Act (CEQA) analysis) or watershed plan.

8) Location where an increase in infiltration over natural conditions could potentially cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes, as confirmed through a site-specific study.

9) Green roofs are not required to be considered for all project locations and types; this evapotranspiration BMP is considered optional subject to the approval of the permitting authority.

10) Projects that do not provide sufficient demand for harvested stormwater such that the system provides 80% capture with a 72 hour drawdown time considering all "allowable and reliable demand."

    a. Allowable and reliable demand is defined as the rate of use of harvested water under average wet season conditions (November through March), from sources meeting the following criteria:

        - The use is permitted by building codes and health codes without requiring disinfection and fine filtration.
        - The use is reliable on a seasonal basis, such that the lowest weekly demand on an average annual basis is no less than 2/7th of the wet season average. *Intent: Under worst-case conditions, the demand should still be sufficient to use the entire tank volume within a week.*
        - Where a reliable use is present on the site that is not permitted by building codes and/or health codes, a variance has been sought to allow use without disinfection and fine filtration.
        - The use does not conflict with mandatory use of reclaimed water. It is assumed that uses do not conflict unless water balance calculations are provided to demonstrate the contrary.
        - The estimated use rates are consistent with requirements for low water use landscaping requirements under local and statewide ordinance (including California Assembly Bill 1881).

11) BMPs that are not allowable per current federal, state or local codes are considered infeasible. Local codes will be updated by mid-2012 as required in Order R4-2010-0108 (Provision III.D).

12) The following project types where the density and/or nature of the project would create significant difficulty for compliance with the requirement to reduce EIA to ≤5%:

    a. Redevelopment projects (as defined in Section1.5).

    b. Infill projects that meet the following conditions:

        i. The project is consistent with applicable general plan designation, and all applicable general plan policies, and applicable zoning designation and regulations;

ii. The proposed development occurs on a project site of no more than five acres substantially surrounded by urban uses;

iii. The project site has no value as habitat for endangered, rare, or threatened species;

iv. Approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality; and

v. The site can be adequately served by all required utilities and public services (modified from State Guidelines § 15332).

c. Smart Growth projects, which are defined as new development and redevelopment projects that occur within existing urban areas (see maps in Appendix B) designed to achieve the majority of the following principles :

i. Create a range of housing opportunities and choices;

ii. Create walkable neighborhoods;

iii. Mix land uses;

iv. Preserve open space, natural beauty, and critical areas;

1. Farmland preservation may also be considered for projects occurring outside existing urban areas (as defined by the Appendix B maps).

v. Provide a variety of transportation choices;

vi. Includes transit oriented development (development located within an average 2,000 foot walk to a bus or train station).

vii. Strengthen and direct development towards existing communities (as defined by Appendix B maps); and

viii. Take advantage of compact building design.

The City or County Planning Division in which a project is proposed will ultimately determine whether a project meets these Smart Growth criteria.

13) Pedestrian/bike trail projects:

✓ Located along side of a road and

✓ Where right-of-way width is inadequate for the implementation of Retention and/or Biofiltration BMPs.

14) Agency flood control, drainage, and wet utilities projects:

- ✓ Located within waterbody and is therefore not increasing functional impervious cover; or
- ✓ Located on top of a narrow flood control feature (such as a levee) and space is unavailable for the implementation of Retention and/or Biofiltration BMPs; or
- ✓ Where the integrity of the flood control feature (such as a dam or levee) may be compromised through Retention and/or Biofiltration BMPs (e.g., infiltration of stormwater is not appropriate in a levee).

15) Historical preservation projects:

- ✓ Where the extent of the designated preservation area restricts the amount of land available for the implementation of Retention BMPs.

16) Low income housing projects that occur within existing urban areas (as defined by the maps provided in Appendix B):

- ✓ Where density requirements restrict the amount of land available for the implementation of Retention BMPs and/or
- ✓ Where project financing constraints restrict the amount of land available for the implementation of Retention BMPs.

Determining Maximum Volume Feasibly Infiltrated and/or Biofiltered

Site conditions and constraints may make it infeasible to fully retain stormwater to achieve ≤ 5% EIA using Retention BMPs. In such cases, stormwater runoff must be retained to the maximum extent practicable and then the remaining volume must be multiplied by 1.5 and biofiltered to the maximum extent practicable. If SQDV still remains, it may be addressed in an alternative compliance program. This section provides narrative and numeric criteria for determining the "maximized" volume for Infiltration BMPs and Biofiltration BMPs. The term "maximized" refers to the volume that is determined, on a case-by-case basis, to be consistent with the maximum extent practicable standard.

Criteria for Maximizing Infiltration Volume

Volume can be considered to be maximized in infiltration BMPs when all of the following conditions are met, or when adjustments to the site/BMP plan to meet any one of these criteria results in achievement of the ≤5% EIA performance standard:

1) BMPs are designed to the maximum depth allowed by design standards, but are not required to exceed the depth that infiltrates within 48 hours at the design percolation rate. *Explanation: Deeper BMPs provide more volume per footprint*

area, therefore it is more feasible to retain stormwater in deeper BMPs than shallower BMPs. However, because of the nature of sequential storms in Southern California, the volume provided in excess of that which drains within 48 hours provides significantly diminishing value.

2) All practicable methods are employed to enhance the design percolation rate, including:

   - Use of soil amendments to native soil below infiltration BMPs, and
   - Provision of pretreatment to reduce the allowable factor of safety, and
   - Additional site investigation to reduce uncertainty in infiltration rate and allow the use of a lower factor of safety.

3) Good site practices have been integrated to provide the maximum pervious area feasible for infiltration BMPs, and infiltration BMPs have been configured to make use of this area. Table 3-1 provides recommended percentages of a site, by project type, that should be feasible to dedicate to infiltration BMPs (where technically feasible) within pervious areas. If the project has not provided this portion of the project site for infiltration BMPs (where technically feasible), an attempt should be made to improve site design to provide more pervious area until it is either infeasible to provide more pervious area or EIA is reduced to ≤5%. The minimum percent of parking lot pavement area considered feasible to dedicate to permeable pavement (where technically feasible) is 20%; this does not apply to parking lots that anticipate heavy truck traffic such as truck stops and heavy industrial areas. The criteria provided in Table 3-1 are guidance; each project will be individually evaluated by the local permitting authority to determine if good site practices have been integrated into the project to provide the maximum pervious area feasible for siting infiltration BMPs.

Criteria for Maximizing Biofiltration Volume

Biofiltration BMPs can be used downstream of a Retention BMP that has been "maximized" (e.g., a planter box treating overflow from a cistern) or can be designed to provide both "maximized" retention and "maximized" biofiltration in the same BMP (e.g., a bioretention area with an underdrain, where retention volume is provided in a gravel layer or other subsurface reservoir below the underdrain).

Volume can be considered to be maximized in Biofiltration BMPs when all of the following conditions are met, or when adjustments to the site design and BMP plan to meet any one of these criteria results in achievement of the ≤5% EIA performance standard:

1) Drain time and/or treatment rate of the Biofiltration BMP is consistent with design guidance contained in Section 6 of the 2011 TGM.

2) Good site practices have been integrated to provide the maximum area feasible for Biofiltration BMPs, and BMPs have been configured to make use of this area. Table 3-1 provides recommended percentages of a site that are feasible to be dedicated to Biofiltration BMPs by project type. If the project has not provided these portions of the project site for siting Biofiltration BMPs, an attempt should be made to improve site design to provide more area until it is either infeasible to provide more area or EIA is reduced to ≤5%. The criteria provided in Table 3-1 are guidance; each project will be individually evaluated by the local permitting authority to determine if good site practices have been integrated into the project to provide the maximum pervious area feasible for siting Biofiltration BMPs.

If a Biofiltration BMP also includes a retention component (e.g., storage volume in a swale in amended soil below the surface discharge elevation or storage below the underdrain of a bioretention area), the maximized retention volume is determined as the volume of water that can be infiltrated or evapotranspired within 48 hours after the Biofiltration BMP has emptied. This criterion should be used to establish the depth of the retention layer (i.e., the depth of amended soil below the swale or the size of the storage below underdrains in the bioretention area).

Table 3-1: Recommended Criteria for Percent of Site Feasible to Dedicate to BMPs

Project Type		Percent of Site[1]
New Development	SF/MF Residential < 7 du/ac	10
	SF/MF Residential 7 – 18 du/ac	7
	SF/MF Residential > 18 du/ac	5
	Mixed Use, Commercial, Institutional/Industrial w/ FAR < 1.0	10
	Mixed Use, Commercial, Institutional/Industrial w/ FAR 1.0 – 2.0	7
	Mixed Use, Commercial, Institutional/Industrial w/ FAR > 2.0	5
	Podium (parking under > 75% of project)	3
	Projects with zoning allowing development to lot lines	2
	Transit Oriented Development	5
	Parking	5

Project Type		Percent of Site[1]
Redevelopment	SF/MF Residential < 7 du/ac	5
	SF/MF Residential 7 – 18 du/ac	4
	SF/MF Residential > 18 du/ac	3
	Mixed Use, Commercial, Institutional/Industrial w/ FAR < 1.0	5
	Mixed Use, Commercial, Institutional/Industrial w/ FAR 1.0 – 2.0	4
	Mixed Use, Commercial, Institutional/Industrial w/ FAR > 2.0	3
	Podium (parking under > 75% of project)	2
	Projects with zoning allowing development to lot lines	1
	Transit Oriented Development	3
	Projects in Historic Districts	3

Key: SF = Single Family, MF = Multi Family, du/ac = dwelling units per acre, FAR = Floor Area Ratio = ratio of gross floor area of building to gross lot area.

[1] If subsurface BMPs are used, dedicated area may have other surface land uses which do not structurally impact the subsurface BMP (see INF-6: Proprietary Infiltration).

3.3 Treatment Control Measure Selection Guidance

Treatment Control Measure selection criteria contained in Order R4-2010-0108 include the following:

- Treatment Control Measures shall be selected based on the primary class of pollutants likely to be discharged from the project (e.g., metals from an auto repair shop).

- For projects that discharge to an impaired waterbody and whose discharges contain the pollutant causing impairment, the project shall select Treatment Control Measures from the top three performing BMP categories, or alternative BMPs that are designed to meet or exceed the performance of the highest performing BMP, for the pollutant causing impairment.

Primary Class of Pollutants

Pollutants in stormwater runoff are typically related to land use activities, which means that the proposed project's site uses provide some indication of the pollutants that will be generated in the site's runoff. Table 3-2 identifies pollutants of concern based on typical land use activities that may be present on a project site.

Table 3-2: Land Uses and Associated Pollutants

Class of Pollutant	Potential Land Use and Activities Sources
Sediment (TSS and Turbidity)	Streets, driveways, roads, landscaped areas, construction activities, soil erosion (channels and slopes)
Nutrients	Landscape fertilizers, atmospheric deposition, automobile exhaust, soil erosion, animal waste, detergents
Metals/Metalloids	Automobiles, bridges, atmospheric deposition, industrial areas, soil erosion, metal surfaces, combustion processes
Pesticides	Landscaped areas, roadsides, utility right-of-ways
Organic Materials/ Oxygen Demanding Substances	Landscaped areas, animal wastes, industrial wastes
Oil and Grease/ Organics Associated with Petroleum	Roads, driveways, parking lots, vehicle maintenance areas, gas stations, automobile emissions, restaurants
Bacteria and Viruses	Lawns, roads, leaky sanitary sewer lines, sanitary sewer cross-connections, animal waste (domestic and wild), septic systems, homeless encampments, sediments/biofilms in stormwater conveyance system
Trash and Debris (Gross Solids and Floatables)	Commercial areas, roadways, schools, trash receptacles/storage/disposal

Adapted from US EPA, 1999 (Preliminary Data Summary of Urban Stormwater BMPs)

Impaired Waterbodies

When designated beneficial uses of a particular receiving water body are being compromised by water quality for a specific or multiple pollutants, Section 303(d) of the CWA requires identifying and listing that water body as "impaired".

Table 3-3 below lists the categories of pollutants and specific pollutants that are included on the 2010 303(d) list for Ventura County. Project proponents should consult the most recent 303(d) list to identify whether the project's receiving waterbody is listed as impaired. The most recent 303(d) list is located on the State Water Resources Control Board website (click on water issues/programs/water quality assessment).

Table 3-3: Ventura County 2010 303(d)-listed Water Quality Pollutants

Class of Pollutant	Specific Pollutants		
Sediment (TSS and Turbidity)	Sedimentation/Siltation		
Nutrients	Ammonia Nitrate and Nitrite Nitrate Nitrogen	Organic Enrichment/ Low Dissolved Oxygen	Algae Eutrophic
Metals/Metalloids	Boron Copper Copper, Dissolved	Lead Mercury Nickel	Selenium Zinc
Pesticides	ChemA (tissue) Chlordane Chlordane (tissue & sediment) Chlordane (tissue) Chlorpyrifos Chlorpyrifos (tissue) DDT DDT (sediment) DDT (tissue & sediment)	DDT (tissue) Diazinon Dieldrin Dieldrin (tissue) Organophosphorous Pesticides Toxaphene Toxaphene (tissue & sediment) Toxaphene (tissue)	
Trash and Debris (Gross Solids and Floatables)	Trash and Debris		
Other Organics	PCBs		
Bacteria and Viruses	Coliform Bacteria	Indicator Bacteria	
Salinity	Chloride		
Toxicity	Sediment Toxicity	Toxicity	
Miscellaneous	pH	Scum/Foam - unnatural	Sulfates

Once the classes of pollutants likely to be discharged from the project have been identified for projects that do not discharge to an impaired waterbody, any Treatment Control Measures listed in Table 3-4 that addresses the primary pollutant class may be selected. If more than one pollutant class is identified, then sediment shall be the primary pollutant class.

For projects that discharge to an impaired waterbody and whose discharges contain the pollutant causing impairment, the project shall select Treatment Control Measures from the top three BMPs listed for that class of pollutant in Table 3-4, or alternative BMPs that are designed to meet or exceed the performance of the highest performing Treatment Control Measure, for the pollutant causing impairment. Many receiving water impairments are due to legacy pollutants from past land use activities (e.g., DDT from historical farming or PCBs from historical industrial activities), where the primary sources are contaminated soils and sediment. For these pollutants, site clean-up, erosion and sediment controls during construction, slope stabilization measures, and placement of impervious surfaces will address the legacy pollutants.

Table 3-4: Treatment Control Measures for Addressing Pollutants of Concern

Class of Pollutant	Recommended BMPs (in Order of Performance)
Sediment	1. Retention BMPs (Infiltration, Rainwater Harvesting, and Evapotranspiration BMPs) 2. Any of the following BMPs(equivalent performance): a. Biofiltration BMPs b. Wet Detention Basin c. Constructed Wetland d. Sand Filter/Cartridge Media Filter 3. Dry Extended Detention Basin
Metals / Metalloids	1. Retention BMPs (Infiltration, Rainwater Harvesting, and Evapotranspiration BMPs) 2. Any of the following BMPs (equivalent performance): a. Constructed Wetland b. Biofiltration BMPs c. Wet Detention Basin d. Sand Filter/Cartridge Media Filter 3. Dry Extended Detention Basin
Nutrients[1]	1. Retention BMPs (Infiltration, Rainwater Harvesting, and Evapotranspiration BMPs) 2. Any of the following BMPs (equivalent performance): a. Bioinfiltration b. Wet Detention Basin c. Constructed Wetland 3. Any of the following BMPs (equivalent performance): a. Biofiltration BMPs 4. Any of the following (equivalent performance): a. Sand Filter/Cartridge Media Filter b. Dry Extended Detention Basin
Pesticides[2]	1. Source controls, erosion controls 2. Retention BMPs (Infiltration, Rainwater Harvesting, and Evapotranspiration BMPs) 3. Any of the following BMPs (equivalent performance): a. Biofiltration BMPs b. Wet Detention Basin c. Constructed Wetland d. Sand Filter/Cartridge Media Filter 4. Dry Extended Detention Basin

Class of Pollutant	Recommended BMPs (in Order of Performance)
Pathogens	1. Retention BMPs (Infiltration, Rainwater Harvesting, and Evapotranspiration BMPs) 2. Any of the following BMPs (equivalent performance): a. Bioretention with Underdrain b. Wet Detention Basins c. Proprietary Biofiltration 3. Sand Filter/Cartridge Media Filter
Trash and Debris	1. Gross Solids Removal BMPs (should be combined with a Retention BMP, Biofiltration BMP, or Treatment Control Measure) 2. Any Retention BMP, Biofiltration BMP, or Treatment Control Measure designed to incorporate a trash capture device (e.g., a trash screen)

[1]Performance is based on removal of nitrogen compounds. For performance of BMPs in removing phosphorous, see sediment pollutant class as they are largely associated with particulates.
[2]Performance data is not available for this pollutant class, but as they are largely associated with particulates, BMP selection should be similar to the sediment pollutant class.

An analysis of Biofiltration BMP and Treatment Control Measure performance from the ASCE International Stormwater BMP Database [1999-2008] is provided in Appendix D. These performance data summaries are occasionally revised. Updated analyses of Biofiltration BMP and Treatment Control Measure performance may be found on the ASCE International Stormwater BMP Database website. The 2011 TGM assumes that BMPs adhering to the design guidance provided in Section 6 will have a level of pollutant removal performance comparable to those listed in Attachment C in Order R4-2010-0108 (also provided in Appendix D.1).

Proprietary BMPs should meet or exceed the performance standards listed in Attachment C in Order R4-2010-0108 and provided in Appendix D.

The data contained in the Stormwater BMP Database indicate that wet detention basins, constructed wetlands, sand filters, and biofilters are among the best performing BMPs for the typical pollutants of concern in urban runoff. This conclusion is consistent with the treatment processes typically provided by these BMP types (e.g., filtration, sedimentation, adsorption, and biological processes).

Wet detention basins (wetponds) and constructed wetlands are attractive solutions both from a treatment process and observed performance perspective. However, these systems require significant base flow to maintain their permanent pools and to avoid creating stagnant conditions and vector concerns. Therefore, these BMPs are often infeasible in locations where water conservation during dry weather is a significant concern. If a regional Treatment Control Measure is desired, infiltration basins and dry extended detention basins may be more feasible in Ventura County. However, these BMPs may need additional treatment train components (e.g., pre- or post-treatment) to adequately address the entire list of pollutants of concern and provide reliable and consistent performance, in addition to significant space requirements. BMP designs for each pollutant category that incorporate dense vegetation and promote extended contact with or filtration through soils are encouraged, consistent with the BMP selection prioritization requirements in Order R4-2010-0108.

Consideration of Site-Specific Conditions

Ultimately, Retention BMPs, Biofiltration BMPs, and Treatment Control Measures have to be constructed at a physical location and site-specific conditions should be considered during the BMP selection process. Site constraints such as steep slopes, poor draining soils, high ground water tables, unstable or contaminated soils and several other factors can preclude the implementation of certain kinds of Retention BMPs, Biofiltration BMPs, and Treatment Control Measures or design options. Therefore, site-specific conditions must be considered when selecting specific BMPs or Treatment Control Measures to implement. Once candidate BMPs or Treatment Control Measures have been chosen, the selection process should consider the site assessment results for soil characteristics, slopes, groundwater proximity, etc. Table 3-5 below provides general guidance for designers regarding site limitations for the different Retention BMPs, Biofiltration BMPs, and Treatment Control Measures.

Table 3-6 below provides general guidance for designers regarding capital and operation costs for the different Retention BMPs, Biofiltration BMPs, and Treatment Control Measures. BMP costs can also be estimated using the Water Environment Research Foundation (WERF) BMP and LID Whole Life Cost Models. These models are set of spreadsheet tools that help users identify and combine capital costs and ongoing maintenance expenditures in order to estimate whole life costs for stormwater management. The models provide a framework for calculating capital and long-term maintenance costs of individual Retention BMPs, Biofiltration BMPs, and Treatment Control Measures. Models are included for retention ponds, extended detention basins, vegetated swales, permeable pavement, green roofs, large commercial cisterns, and bioretention. Online PDF of user's guide and spreadsheet tools are located here: http://www.werf.org/AM/Template.cfm?Section=Research_Profile&Template=/CustomSource/Research/PublicationProfile.cfm&id=SW2R08.

Table 3-5: BMP Site Suitability Considerations

Important Note to Users: This table should be used to provide general BMP comparisons only and should not replace an evaluation performed by a qualified water quality professional.

BMP	Site Suitability Considerations			
	Tributary Area (Acres) [1]	Site Slope (%)	Depth to Seasonally High or Mounded Groundwater (ft)	Soil Number
Infiltration BMPs: INF-1: Infiltration Basin INF-2: Infiltration Trench INF-3: Bioretention INF-4: Drywell INF-6: Proprietary Infiltration	< 5	< 7[2]	> 5	Not suitable in Soil Numbers 1, 2, and 3 unless percolation testing shows the infiltration rate is greater than 0.5 in/hr
INF-5: Permeable Pavement	< 5	< 5[2,5]	> 2 with underdrains; > 5 without underdrains	Underdrains should be provided for Soil Numbers 1, 2, and 3
ET-1: Green Roof	Equal to roof tributary area	N/A	N/A	N/A
BIO-1: Bioretention with Underdrain	< 5	< 15; planter boxes are generally more suitable for steep slopes[2,3]	> 2 with underdrains; > 5 without underdrains	Underdrains should be provided for Soil Numbers 1, 2, and 3
BIO-2: Planter Box	< 1	< 15[4]	> 2	Any
BIO-3: Vegetated Swale	< 5	< 10 site slope; 0.5 to 6 longitudinal slope of swale [2,3]	> 2 with underdrains; > 5 without underdrains	Any[3]

BMP	Site Suitability Considerations			
	Tributary Area (Acres) [1]	Site Slope (%)	Depth to Seasonally High or Mounded Groundwater (ft)	Soil Number
BIO-4: Vegetated Filter Strip	< 2	< 4 site slope; 2 to 6 longitudinal slope of strip[2]	> 2	Any
BIO-5: Proprietary Biotreatment Devices	The site suitability requirements for specific proprietary devices must be provided by the manufacturer and should be verified by independent sources or assessed by a qualified water quality professional.			
TCM-4: Sand Filter	< 10	< 15[4]	> 2	Any
TCM-5: Cartridge Media Filters	The site suitability requirements for specific proprietary devices must be provided by the manufacturer and should be verified by independent sources or assessed by a qualified water quality professional.			
PT-1: Hydrodynamic Devices	The site suitability requirements for specific proprietary devices must be provided by the manufacturer and should be verified by independent sources or assessed by a qualified water quality professional.			
PT-2: Catch Basin Inserts				

[1] Tributary area is the area of the site draining to the BMP. Tributary areas provided here should be used as a general guideline only. Tributary areas can be larger or smaller as appropriate.

[2] If site slope exceeds that specified or if the system is within 200 ft from the top of a hazardous slope or landslide area (on the uphill side), a geotechnical investigation analysis and report addressing slope stability shall be prepared by a licensed civil engineer. In addition, for swales, if the longitudinal slope exceeds 6%, check dams should be provided.

[3] If system is located within 50 feet of a sensitive steep slope (on the uphill side), within 10 feet from a structure, has a longitudinal slope less than 1.5% (swales), or has poorly drained soils (e.g., silts and clays), underdrains should be incorporated.

[4] If system is fully contained, includes an underdrain system, and overflows to a stormwater conveyance system, then slopes can exceed 15%.

[5] If a gravel base is used for storage of runoff: (1) slopes should be restricted to 0.5% (steeper grades reduce storage capacity) and (2) underdrains should be used if within 50 feet of a sensitive steep slope.

[6] Setbacks apply to systems without underdrains.

Table 3-6: BMP Cost Considerations

BMP Type	Relative Expense[4] (cost/ac-ft[1] or cost/cfs[2])	Construction Costs (per cubic feet)[3,4]	Typical Cost[3] ($/BMP)	Typical Cost[3] Application	Annual Maintenance Cost (% of Construction)[3,4]	Notes
Infiltration Trench	Not included	$4- $50	$45,000	5-ac Commercial Site (65% Impervious)	5%-20%	
Infiltration Basin	$	$1.30 - $18	$15,000	5-ac Commercial Site (65% Impervious)	1% -10%	
Bioretention	Not included	$3- $5.30	$60,000	5-ac Commercial Site (65% Impervious)	5%- 7%	Cost of plants varies. Maintenance costs comparable to cost of typical landscaping.
Swale	$$	$0.25-$0.50	$3,500	5-ac Residential Site (35% Impervious)	5%- 7%	
Filter Strip	$$	$0.00- $1.30	$0- $9,000	5-ac Residential Site (35% Impervious)	$350/ acre/ year (about $0.01/square foot/ year)	
Extended Detention Basin	$$$	$0.50- $1.00	Not included		3 to 6%	Costs vary widely. One 0.3 ac-ft basin was recorded to have cost $160,000[5] $3,132 Annual maintenance costs for per Caltrans[5]
Wet Ponds	$$$	$0.50- $1.00	Not included		3 to 6%	$17,000 Annual maintenance costs for one Caltrans pond[5]
Constructed Wetland	$$$$	$0.60 – $1.25	$125,000	50-Acre Residential Site (35% Impervious)	2%	
Sand Filter	$$$$	$3 - $6	$35,000- $70,000	5-Acre Commercial Site (65% Impervious)		

1 Volume based BMPs

2 Flow based BMPs

3 EPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. Part D, Cost and Benefits Analysis. http://water.epa.gov/scitech/wastetech/guide/stormwater/index.cfm#report

4 CASQA, 2003. New Development and Redevelopment Handbook

5 Figures from Caltrans studies cited in CASQA BMP Handbook.

4 SITE DESIGN PRINCIPLES AND TECHNIQUES

4.1 Introduction

The primary objective of the Site Design Principles and Techniques is to reduce the hydrologic and water quality impacts associated with land development. The benefits derived from this approach include**:**

- Reduced size of downstream Treatment Control Measures and conveyance systems;
- Reduced pollutant loading to onsite Treatment Control Measures and receiving streams; and
- Reduced hydraulic impact on receiving streams.

Site Design Principles and Techniques include the following design features and considerations:

- Site planning;
- Protect and restore natural areas;
- Minimize land disturbance;
- Minimize impervious cover;
- Apply Low Impact Development best management practices (LID BMPs) at various scales: and
- Implement Integrated Water Resource Management Practices.

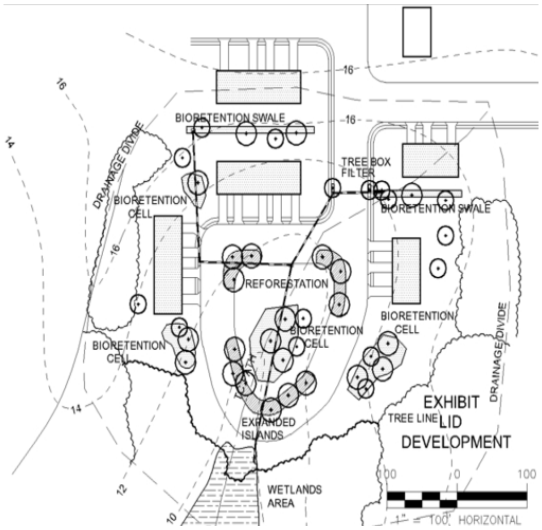
The Site Design Principles and Techniques described in this section are required to be considered for all new development and redevelopment projects subject to conditioning and approval for the design and implementation of post-construction stormwater management control measures (as defined in Section 1.5). They are not required if the project proponent demonstrates to the satisfaction of the City or County that the particular measures are not applicable to the proposed project, or the project site conditions make it infeasible to implement the site design control measure in question. The applicability of specific controls outlined within this section should be confirmed with the local government.

Detailed descriptions and design criteria for each of the Site Design Principles and Techniques are presented in the following section.

4.2 Site Planning

Purpose

LID requires a holistic approach to site design and stormwater management. As such, planners, developers, architects, and engineers should reconsider conventional approaches to stormwater management. The use of site planning techniques presented here will generate a more hydrologically functional site, help to maximize the effectiveness of Retention BMPs, and integrate stormwater management throughout the site.



LID BMPs Integrated within Site Planning Process

Low Impact Development Center, Inc.

Design Criteria

The following criteria should be considered during the early site planning stages:

1) Retention BMPs should be considered as early as possible in the site planning process. Hydrology should be an organizing principle that is integrated into the initial site assessment planning phases.

2) Project applicants should anticipate and plan for the space requirements of Retention and Biofiltration BMPs. Table 4-1 provides general rules of thumb for BMP space requirements.

3) Site planning should use a multidisciplinary approach that includes planners, engineers, landscape architects, and architects at the initial phases of the project.

4) Individual Retention BMPs should be distributed throughout the project site and may influence the configuration of roads, buildings, and other infrastructure.

5) The project must demonstrate disconnection of impervious surface such that the 5% EIA requirement is achieved. If fully meeting the 5% EIA requirement using Retention BMPs is not technically feasible, the project must still utilize Retention BMPs to the maximum extent practicable.

6) Consider flood control early in the design stages. Even sites with Retention BMPs will still have runoff that occurs during large storm events. Look for opportunities to simultaneously address flood control requirements and the requirement to reduce EIA to ≤5% presented in Section 2.

7) Consider the use of alternative building materials instead of conventional materials for new construction and renovation. Several studies have indicated that metal used as roofing material, flashing, or gutters can leach metals into the environment. Avoid the use of roofing, gutters, and trim made of copper and galvanized (zinc) roofs, gutters, chain link fences and siding.

8) Consider 2010 Green Building Code requirements during the site planning stages.

Table 4-1: Rule of Thumb Space Requirements for BMPs[5]

BMP Type	% of Contributing Drainage Area
Infiltration	3 to 10
Rainwater Harvesting (Cistern)	0 to 10
Evapotranspiration (Green Roof)	1 to 1 ratio of impervious cover treated
Biofiltration	3 to 5
Dry Extended Detention Basin	1 to 3
Wet Detention Basin	1 to 3
Sand Filters	0 to 5
Cartridge Media Filter	0 to 5

[5] Modified from Schueler, T., D. Hirschman, M. Novotney, and J. Zielinski. 2007. Urban Stormwater Retrofit Practices. Manual 3 in the Urban Subwatershed Restoration Manual Series. Center for Watershed Protection. Ellicott City, MD.

4.3 Protect and Restore Natural Areas

Purpose

Each project site possesses unique topographic, hydrologic and vegetative features, some of which are more suitable for development than others. Sensitive areas that should be protected and/or restored include streams and their buffers, floodplains, wetlands, steep slopes, and high permeability soils. Additionally, slopes can be a major source of sediment and should be properly protected and stabilized.

Locating development on the least sensitive portion of a site and conserving naturally vegetated areas can minimize environmental impacts in general and stormwater runoff impacts in particular.

Stream Buffer

Larry Walker Associates

Design Criteria

If applicable and feasible for the given site conditions, the following site design features or elements are required and should be included in the project site layout, consistent with applicable General Plan and Local Area Plan policies:

1) Identify and cordon off streams and their buffers, floodplains, wetlands, and steep slopes.

2) Reserve areas with high permeability soils for either open space or Infiltration BMPs.

3) Incorporate existing trees into site layout.

4) Identify areas that may be restored or revegetated either during or post-construction.

5) Identify and avoid and/or stabilize areas susceptible to erosion and sediment loss.

6) Concentrate or cluster development on the least-sensitive portions of a site, while leaving the remaining land in a natural undisturbed state.

7) Slopes must be protected from erosion by safely conveying runoff from the tops of slopes.

    - Slopes should be vegetated by first considering use of native or drought-tolerant species.

- Slope protection practices must conform to local permitting agency erosion and sediment control standards and design standards. The design criteria described in this section are intended to enhance and be consistent with these local standards.

8) Limit clearing and grading of native vegetation at the project site to the minimum amount needed to build lots, allow access, and provide fire protection.

9) Maintain existing topography and existing drainage divides to encourage dispersed flow.

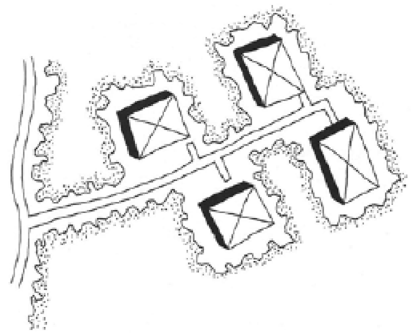
10) Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought-tolerant plants.

11) Promote natural vegetation by using parking lot islands and other landscaped areas. Integrate vegetated BMPs within parking lot islands and landscaped areas.

4.4 Minimize Land Disturbance

Purpose

This control works to protect water quality by preserving some of the natural hydrologic function of the site. By designing a site layout to preserve the natural hydrology and drainageways on the site, it reduces the need for grading the disturbance of vegetation and soils (GSMM, 2001). By siting buildings and impervious surfaces away from steep slopes, drainageways, and floodplains, it limits the amount of grading, clearing and distance and reduces the hydrologic impact. This site design principle has most applicability in greenfield settings, but opportunities may exist in redevelopment and infill projects.



Minimized Clearing and Grading

Greenfield et al., 1991

Existing soils may contain organic material and soil biota that are ideal for storing and infiltrating stormwater. Clearing, grading, and heavy equipment can remove and compact existing soils and, therefore, limit their infiltrative capacity. The design criteria presented below are not intended to supersede compaction requirements associated with building codes.

Design Criteria

1) Delineate and flag the development envelope for the site. Delineating and flagging the development envelope includes a clear indication of the development envelope on the site plan and physical demarcation in the field which can be accomplished using temporary orange construction fencing or flagging. The development envelope can be established by identifying the minimum area needed to build lots; allow access and provide fire protection; and protect and buffer sensitive features such as streams, floodplains, steep slopes and wetlands. Concentrate buildings and paved areas on the least permeable soils, with the least intact habitats.

2) Plan clearing and grading to minimize the compaction of infiltrative soils.

3) Restrict equipment access and storage of construction equipment to the development envelope.

4) Restrict storage of construction equipment within the development envelope.

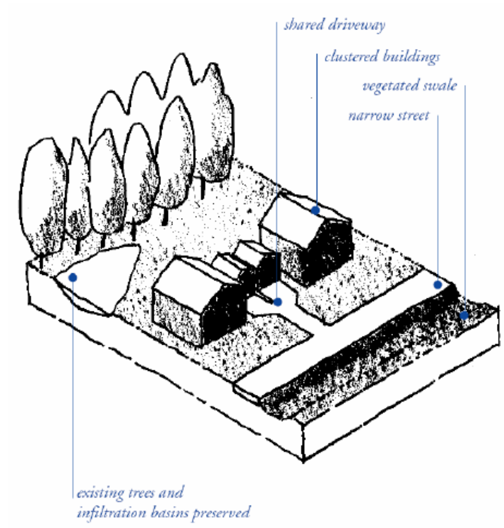
5) Avoid the removal of existing trees and valuable vegetation, as feasible.

6) Consider soil amendments to restore permeability and organic content especially for infill and redevelopment projects to avoid soil disturbance.

4.5 Minimize Impervious Cover

Purpose

The potential for the discharge of pollutants in stormwater runoff from a project site increases as the percentage of impervious area within the project site increases because impervious areas increase the volume and rate of runoff flow. Pollutants deposited on impervious areas tend to be easily mobilized and transported by surface water runoff. Minimizing impervious area through site design is an important means of minimizing stormwater pollutants of concern. In addition to the environmental and aesthetic benefits, a highly pervious site may allow reduction in the size of downstream conveyance and treatment systems, yielding savings in development costs. Reducing impervious area is the most cost effective way of minimizing the effective impervious area (EIA) requirement.



Impervious Cover Minimization

BASMAA, Start at the Source

Design Criteria

Local permitting agency building and fire codes and ordinances determine some aspects of site design. These design strategies are intended to enhance and be consistent with these local codes and ordinances. Minimizing impervious surfaces at every possible opportunity requires integration of many small strategies. Suggested strategies for minimizing impervious surfaces through site design include the following:

1) Use minimum allowable roadway cross sections, driveway lengths, and parking stall widths and lengths.

2) Minimize or eliminate the use of curbs and gutters, and maximize the use of Retention BMPs, where slope and density permit.

3) Use two-track/ribbon alleyways/driveways or shared driveways.

4) Include landscape islands in cul-de-sac streets. Consider alternatives to cul-de-sacs to increase connectivity.

5) Reduce the footprints of building and parking lots. Building footprints may be reduced by building taller.

6) Use permeable pavement to accommodate overflow parking (if overflow parking is needed).

7) Cluster buildings and paved areas to maximize pervious area.

8) Maximize tree preservation or tree planting.

9) Avoid compacting or paving over soils with high infiltration rates (see Minimize Land Disturbance).

10) Use pervious pavement materials where appropriate, such as modular paving blocks, turf blocks, porous concrete and asphalt, brick, and gravel or cobbles.

11) Use grass-lined channels or surface swales to convey runoff instead of paved gutters (see Vegetated Swale in Section 6).

12) Build more compactly in infill and redevelopment site to avoid disturbing natural and agricultural lands. Per capita impacts can be significantly reduced by building more compactly in infill and redevelopment areas.

4.6 Apply LID at Various Scales

Purpose

LID is a decentralized approach to stormwater management that works to mimic the natural hydrology of the site by retaining rainfall onsite. In order to realize the full benefits of water quality protection and runoff volume reduction, LID should be integrated and considered at the regional and watershed scale and the site scale.

Design Criteria

Regional/Watershed

1) Consider Density: Low density development has a greater water resource impact than compact growth on a watershed scale. Higher density development uses less land and produces less impervious cover per capita than low density development (USEPA, 2006). Developments should consider higher densities, but should still adhere to density levels as specified within local zoning requirements.

2) Identify and Preserve Contiguous Open Space: Large contiguous areas of open space can act as a flood control, have an ecological benefit, serve as a buffer for streams and rivers, and provide recreational opportunities (EPA, 2004). Applicants should look for opportunities to link open space preservation with regional open space preservation efforts (such as Save Open Space and Agricultural Resources).

3) Make use of Previously Developed Sites: Redevelopment of existing sites replace impervious cover with impervious cover, reduces the need for greenfield development, and makes use of existing infrastructure.

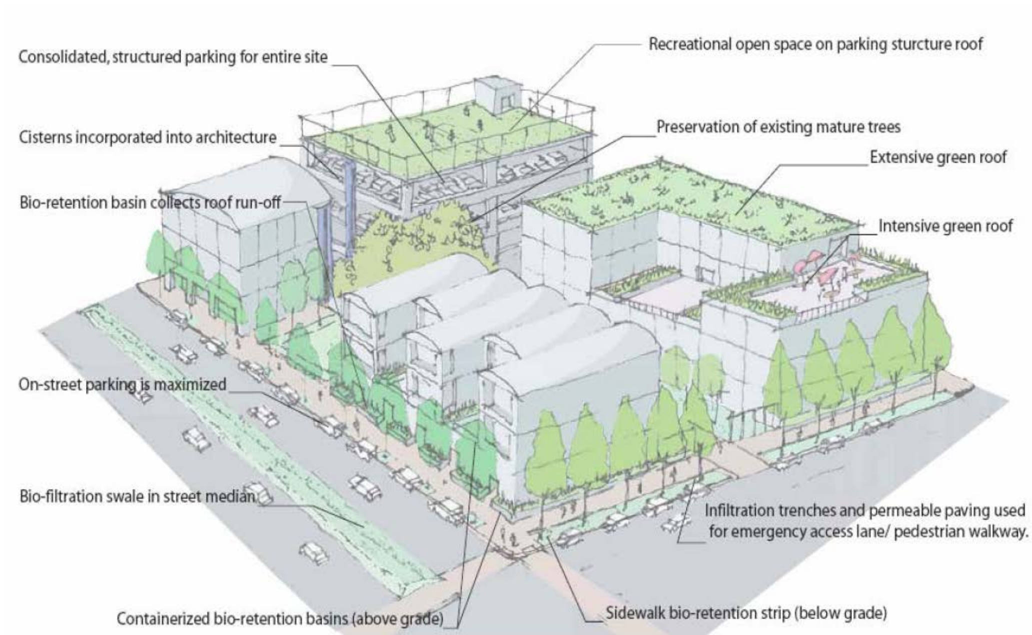
4) Locate Compact Development within Close Proximity to Mass Transit: This maximizes transportation choices, reduces the number of automobile trips, and lessens the water quality impacts associated with transportation and low-density sprawl.

Site

The following design criteria should be considered at the site level in addition to the principles and techniques discussed earlier in this section (e.g., Minimize Impervious Cover).

1) Maintain and Restore Natural Flowpaths for Runoff: Site buildings and impervious surfaces away from steep slopes, drainageways, and floodplains to reduce the amount of necessary clearing and grading and maintain the pre-development hydrology's time of concentration.

2) Maximize Use of Existing Impervious Cover: Assess and take advantage of opportunities to use existing impervious surfaces at the site level to reduce runoff at a watershed scale.



LID BMPs Considered at Various Scales

C. Anderson, Sustainable Urbanism

3) Design Public Spaces and Common Areas to Minimize Stormwater Runoff: Public spaces and common areas can serve as community gathering places but are often composed of impervious cover (e.g., courtyards primarily made up of concrete) (EPA, 2004). Design public spaces and common areas to accommodate both people and stormwater management.

4) Compact Project Design: Compact project design reduces the amount of impervious cover per capita, increases walkability, and decreases water quality impacts associated with transportation. Concentrating development on one portion of the site reduces the amount of lawn, provides more opportunities to preserve open space, and maintains and restores natural flow paths. Additionally, compact design can reduce street and driveway length and as a result, can help to reduce the imperviousness associated with development.

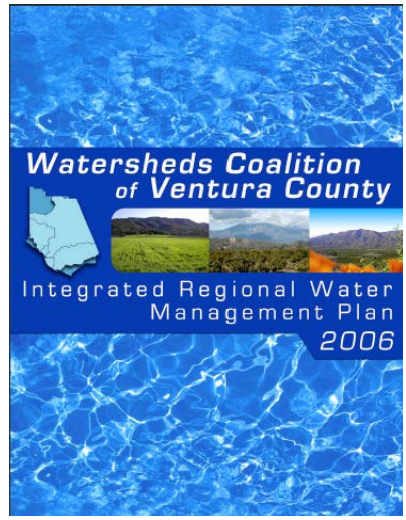
5) Encourage Use of Multiple Modes of Transportation: In addition to density and compact design, additional aspects of site design may encourage the use of multiple modes of transportation:

- Bicycle and pedestrian-friendly streets;
- Well connected sidewalks and streets; and
- Mixed uses that encourage walking.

4.7 Implement Integrated Water Resource Management Practices

Purpose

Integrated Water Resource Management (IWRM) is a process which promotes the coordinated development and management of water, land, and related resources. Order R4-2010-0108 promotes the use of IWRM to help guide the selection of BMPs that conserve water, recharge groundwater, provide recreational opportunities and serve as multiple purpose parks and preserve open space.



Integrated Regional Water Management Plan

Ventura County

Many of the concepts of IWRM are documented in the County's Integrated Regional Water Management Plan (IRWMP). The IRWMP is the product of an intensive stakeholder process and addresses multiple water resource management goals including improved water supply reliability, water recycling, water conservation, recreation and access, flood control, wetlands enhancement and creation, and environmental and habitat protection (Watershed Coalition of Ventura County, 2006).

Design Criteria

The goals of the 2011 TGM and the new development and redevelopment requirements contained within Order R4-2010-0108, complement the goals of the IRWMP. Development projects should strive to select BMPs that meet the following multiple objectives (Watershed Coalition of Ventura County, 2006):

1) Conserve and Augment Water Supplies: Identify and evaluate the opportunities to recharge groundwater and increase water use efficiency. This can be accomplished through infiltration of stormwater runoff and selection of drought-tolerant landscaping.

2) Protect People, Property and the Environment from Adverse Flooding Impacts: Identify opportunities to utilize BMPs that provide both water quality and water quantity benefits. Provide and maintain setbacks from streams and rivers.

3) Protect and Restore Habitat and Ecosystems in Watersheds: Implement the practices identified in Protect and Restore Natural Areas to integrate habitat and stormwater goals. Landscaping selection for stormwater management practices may also further encourage and attract wildlife.

4) Provide Water-related Recreational, Public Access and Educational Opportunities: Integrate recreation and stormwater management by creating multi-functional BMPs and designing courtyards and open spaces that accommodate both people and stormwater runoff. Consider providing educational signs for BMPs located in public spaces, where appropriate.

5 SOURCE CONTROL MEASURES

5.1 Introduction

Source Control Measures are low-technology practices designed to prevent pollutants from contacting stormwater runoff and prevent discharge of contaminated runoff to the storm drainage system. This section addresses site-specific, structural-type Source Control Measures consisting of specific design features or elements. Non-structural type Source Control Measures; such as good housekeeping and employee training, are not included in the 2011 TGM. The project applicant can consult the California Industrial Best Management Practice Manual for this type of practice (SWQTF, 1993). The governing stormwater agency may require additional Source Control Measures not included in the 2011 TGM for specific pollutants, activities, or land uses.

This section describes control measures for specific types of sites or activities that have been identified as potential significant sources of pollutants in stormwater. Each of the measures specified in this section should be implemented in conjunction with appropriate non-structural Source Control Measures to optimize pollution prevention.

The measures addressed in this section apply to both stormwater and non-stormwater discharges. Non-stormwater discharges are the discharge of any substance, such as process wastewater, to the storm drainage system or water body that is not composed entirely of stormwater. Stormwater that is mixed or commingled with other non-stormwater flows is considered non-stormwater. Discharges of stormwater and non-stormwater to the storm drainage system or a water body may be subject to local, state, or federal permitting prior to discharge. The appropriate agency should be contacted prior to any discharge. Discuss the matter with the stormwater staff if you are uncertain as to which agency should be contacted.

Some of the measures presented in this section require connection to the sanitary sewer system. It is prohibited to connect and discharge to the sanitary sewer system without prior approval or obtaining the required permits. Contact the stormwater staff of the governing agency about obtaining sanitary sewer permits within Ventura County. Discharges of certain types of flows to the sanitary sewer system may be cost prohibitive. The designer is urged to contact the appropriate agency prior to completing site and equipment design of the facility.

5.2 Description

Table 5-1 summarizes site-specific Source Control Measures and associated design features specified for various sites and activities. Fact Sheets are presented in this section for each source control measure. These sheets include design criteria established by the Approval Agencies to ensure effective implementation of the required Source Control Measures:

Table 5-1: Summary of Site-Specific Source Control Measure Design Features

Site-Specific Source Control Measure [1]	DESIGN FEATURE OR ELEMENT						
	Signs, placards, stencils	Surfacing (compatible, impervious)	Covers, screens	Grading/berming to prevent run-on	Grading/berming to provide secondary containment	Sanitary sewer connection	Emergency Storm Drain Seal
Storm Drain Message and Signage (S-1)	X						
Outdoor Material Storage Area Design (S-2)		X	X	X	X		X
Outdoor Trash Storage and Waste Handling Area Design (S-3)		X	X	X		X	
Outdoor Loading/Unloading Dock Area Design (S-4)		X	X	X	X		
Outdoor Repair/Maintenance Bay Design (S-5)		X	X	X	X		X
Outdoor Vehicle/Equipment/ Accessory Washing Area Design (S-6)		X	X	X	X	X	X
Fueling Area Design (S-7)		X	X	X	X		X
Parking Lot Design [2]							

1 Refer to Fact Sheets in Section 6 for detailed information and design criteria and Appendix E for BMP sizing worksheets

2 Requirements for proper design of parking lots are covered by requirements for General Site Design Principles and Techniques (see Section 4) and Treatment Control Measures (see Section 6).

5.3 Site-Specific Source Control Measures

S-1: Storm Drain Message and Signage

Purpose

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. This Fact Sheet contains details on the installation of storm drain messages at storm drain inlets located in new or redeveloped commercial, industrial, and residential sites.

Design Criteria

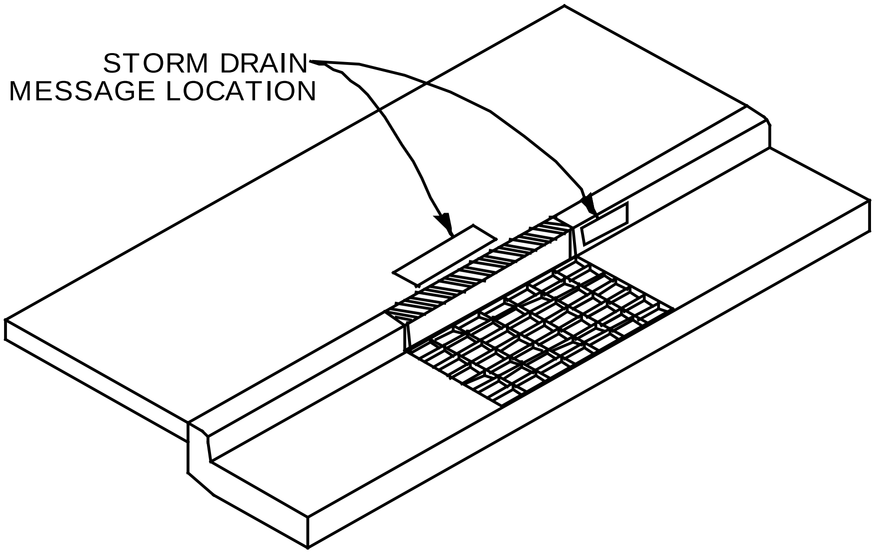
Storm drain messages have become a popular method of alerting the public to the effects of and the prohibitions against waste disposal into the storm drain system. The signs are typically stenciled or affixed near the storm drain inlet. The message simply informs the public that dumping of wastes into storm drain inlets is prohibited and/or the drain discharges to a receiving water.

Storm drain message markers or placards are required at all storm drain inlets within the boundary of the development project. The marker should be placed in clear sight facing anyone approaching the inlet from either side (see Figure 5-1). All storm drain inlet locations must be identified on the development site map.

Some local agencies within the County have approved storm drain message placards for use. Signs with language and/or graphical icons, which prohibit illegal dumping, should be posted at designated public access points along channels and streams within a project area. Consult local permitting agency stormwater staff to determine specific requirements for placard types and installation methods.

Maintenance Requirements

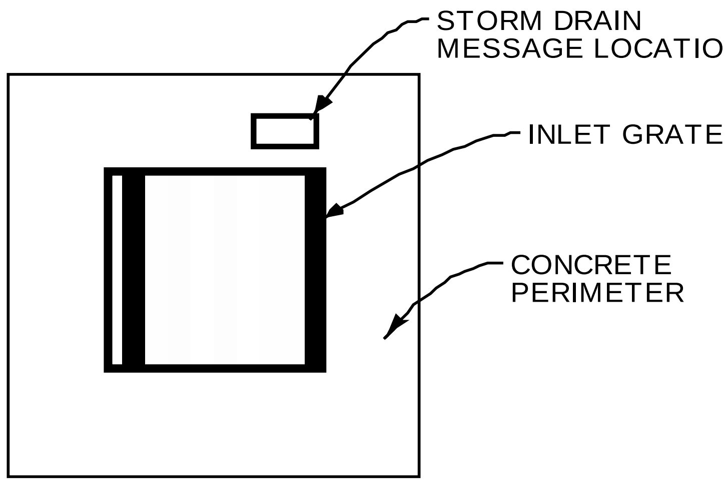
Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association shall enter into a Maintenance Agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards and signs.



CURB TYPE INLET

NOTES:

1. STORM DRAIN MESSAGE SHALL BE APPLIED IN SUCH A WAY AS TO PROVIDE A CLEAR, LEGIBLE IMAGE.
2. STORM DRAIN MESSAGE SHALL BE PERMANENTLY APPLIED DURING THE CONSTRUCTION OF THE CURB AND GUTTER USING A METHOD APPROVED BY THE LOCAL AGENCY.



AREA TYPE INLET

Figure 5-1: Storm Drain Message Location

S-2: Outdoor Material Storage Area Design

Purpose

Materials that are stored outdoors could become sources of pollutants in stormwater runoff if not handled or stored properly. Materials could be in the form of raw products, by-products, finished products, and waste products. The type of pollutants associated with the materials will vary depending on the type of commercial or industrial activity.

Some materials are more of a concern than others. Toxic and hazardous materials must be prevented from coming in contact with stormwater. Non-toxic or non-hazardous materials do not have to be prevented from stormwater contact, but cannot be allowed to runoff with the stormwater. These materials may have toxic effects on receiving waters. Accumulated material on an impervious surface could result in significant debris and sediment being discharged with stormwater runoff causing a significant impact on the rivers or streams that receive the runoff.

Materials may be stored in a variety of ways, including bulk piles, containers, shelving, stacking, and tanks. Stormwater contamination may be prevented by eliminating the possibility of stormwater contact with the material storage areas either through diversion, cover, or capture of the stormwater. Control measures may also include minimizing the storage area. Control measures are site-specific and must meet local permitting agency requirements.

Design Criteria

Design requirements for material storage areas are governed by Building and Fire Codes and by current City or County ordinances and zoning requirements. Source Control Measures described in the Fact Sheet are intended to enhance and be consistent with these code and ordinance requirements. The following design features should be incorporated into the design of a material storage area when storing materials outside could contribute significant pollutants to the storm drain.

Table 5-2: Design Criteria for Outdoor Material Storage Area Design

Source Control Design Feature	Design Criteria
Surfacing	• Construct the storage area base with a material impervious to leaks and spills.
Covers	• Install a cover that extends beyond the storage area, or use a manufactured storage shed for small containers.
Grading/Containment	• Minimize the storage area. • Slope the storage area towards a dead-end sump to contain spills. • Grade or berm storage areas to prevent run-on from surrounding areas. • Direct runoff from downspouts/roofs away from storage areas.

Accumulated Stormwater and Non-stormwater

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

S-3: Outdoor Trash Storage Area Design

Purpose

Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations may be sources of stormwater pollution and include dumpsters, litter control, and waste piles. This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling.

Design Criteria

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local permitting agency ordinances and zoning requirements. The design criteria described in the Fact Sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulations.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria listed below are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection area to obtain established and accepted guidelines for designing trash collection areas. Conflicts or issues should be discussed with the local permitting agency.

The following trash storage area design controls were developed to enhance the local permitting agency codes and ordinances and should be implemented depending on the type of waste and the type of containment.

Table 5-3: Design Criteria for Outdoor Trash Storage Areas

Source Control Design Feature	Design Criteria
Surfacing	• Construct the storage area base with a material impervious to leaks and spills.
Screens/Covers	• Install a screen or wall around trash storage area to prevent offsite transport of loose trash. • Use lined bins or dumpsters to reduce leaking of liquid wastes. • Use water-proof lids on bins/dumpsters or provide a roof to cover enclosure (local permitting agency discretion) to prevent rainfall from entering containers.
Grading/Contouring	• Berm or grade the waste handling area to prevent run-on of stormwater. • Do not locate storm drains in immediate vicinity of the trash storage area.
Signs	• Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Maintenance Requirements

The owner/operator must maintain the integrity of structural elements that are subject to damage (e.g. screens, covers and signs). Maintenance Agreements between the local permitting agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local permitting agency, Maintenance Agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved. Refer to Appendix G and H for further guidance regarding Maintenance Plan Agreements.

S-4: Outdoor Loading/Unloading Dock Area Design

Purpose

Materials spilled, leaked, or lost during loading or unloading may collect on impervious surfaces or in the soil and be carried away by runoff or when the area is cleaned. Rainfall may also wash pollutants from machinery used to load or unload materials. Depressed loading docks (truck wells) are contained areas that can accumulate stormwater runoff. Discharge of spills or contaminated stormwater to the storm drain system is prohibited. This Fact Sheet contains details on specific measures recommended to prevent or reduce pollutants in stormwater runoff from outdoor loading or unloading areas.

Design Criteria

Design requirements for outdoor loading and unloading of materials are governed by Building and Fire Codes, and by current local permitting agency ordinances and zoning requirements. Source Control Measures described in this Fact Sheet are meant to enhance and be consistent with these code and ordinance requirements. Companies may have their own design or access requirements for loading docks. The design criteria listed below are not intended to be in conflict with requirements established by individual companies. Conflicts or issues should be discussed with the local permitting agency.

The following design criteria should be followed when developing construction plans for material loading and unloading areas:

Table 5-4: Design Criteria for Outdoor Loading/ Unloading Areas

Source Control Design Feature	Design Criteria
Surfacing	• Construct floor surfaces with materials that are compatible with materials being handled in the loading/unloading area.
Covers	• Cover loading/unloading areas to a distance of at least 3 feet beyond the loading dock or install a seal or door skirt to be used for all material transfers between the trailer and the building.
Grading/Contouring	• Grade or berm storage the areas to prevent run-on from surrounding areas. • Direct runoff from downspouts/roofs away from loading areas.
Emergency Storm Drain Seal	• Do not locate storm drains in the loading dock area. Direct connections to storm drains from depressed loading docks are prohibited. • Provide means, such as isolation valves, drain plugs, or drain covers, to prevent spills or contaminated stormwater from entering the storm drainage system.

Accumulated Stormwater and Non-stormwater

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces, such as depressed loading docks. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

S-5: Outdoor Repair/Maintenance Bay Design

Purpose

Activities that can contaminate stormwater include engine repair, service, and parking (i.e. leaking engines or parts). Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can severely impact stormwater if allowed to come into contact with stormwater runoff. This Fact Sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff from vehicle and equipment maintenance and repair areas.

Design Criteria

Design requirements for vehicle maintenance and repair areas are governed by Building and Fire Codes, and by current local permitting agency ordinances, and zoning requirements. The design criteria described in this Fact Sheet are meant to enhance and be consistent with these code requirements.

The following design criteria are required for vehicle and equipment maintenance, and repair. All wash water, hazardous and toxic wastes must be prevented from entering the storm drainage system.

Source Control Design Feature	Design Criteria
Surfacing	• Construct the vehicle maintenance/repair floor area with Portland cement concrete.
Covers	• Cover or berm areas where vehicle parts with fluids are stored. • Cover or enclose all vehicle maintenance/repair areas.
Grading/ Contouring	• Berm or grade the maintenance/repair area to prevent run-on and runoff of stormwater or runoff of spills. • Direct runoff from downspouts/roofs away from maintenance/repair areas. • Grade the maintenance/repair area to drain to a dead-end sump for collection of all wash water, leaks and spills. Direct connection of maintenance/repair area to storm drain system is prohibited. • Do not locate storm drains in the immediate vicinity of the maintenance/repair area.
Emergency Storm Drain Seal	• Provide means, such as isolation valves, drain plugs, or drain covers, to prevent spills or contaminated stormwater from entering the storm drainage system.

Accumulated Stormwater and Non-stormwater

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

S-6: Outdoor Vehicle/Equipment/Accessory Washing Area Design

Purpose

Washing vehicles and equipment in areas where wash water flows onto the ground can pollute stormwater. Wash waters are not allowed in the storm drain system. They can contain high concentrations of oil and grease, solvents, phosphates and high suspended solids loads. Sources of washing contamination include outside vehicle/equipment cleaning or wash water discharge to the ground. This Fact Sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff from vehicle and equipment washing areas.

Design Criteria

Design requirements for vehicle maintenance and repair areas are governed by Building and Fire Codes, and by current local permitting agency ordinances, and zoning requirements. The design criteria described in this Fact Sheet are meant to enhance and be consistent with these code requirements.

The following design criteria are required for vehicle and equipment washing areas. All hazardous and toxic wastes must be prevented from entering the storm drain system.

Source Control Design Feature	Design Criteria
Surfacing	• Construct the vehicle/equipment wash area floors with Portland cement concrete.
Covers	• Provide a cover that extends over the entire wash area.
Grading/ Contouring	• Berm or grade the maintenance/repair area to prevent run-on and runoff of stormwater or runoff of spills. • Grade or berm the wash area to contain the wash water within the covered area and direct the wash water to treatment and recycle or pretreatment and proper connection to the sanitary sewer system. Obtain approval from the governing agency before discharging to the sanitary sewer. • Direct runoff from downspouts/roofs away from wash areas. • Do not locate storm drains in the immediate vicinity of the wash area.
Emergency Storm Drain Seal	• Provide means, such as isolation valves, drain plugs, or drain covers, to prevent spills or contaminated stormwater from entering the storm drainage system.

Accumulated Stormwater and Non-stormwater

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

S-7: Fueling Area Design

Purpose

Spills at vehicle and equipment fueling areas can be a significant source of pollution because fuels contain toxic materials and heavy metals that are not easily removed by stormwater treatment devices. When stormwater mixes with fuel spilled or leaked onto the ground, it becomes polluted by petroleum-based materials that are harmful to humans, fish, and wildlife. This could occur at large industrial sites or at small commercial sites such as gas stations and convenience stores. This Fact Sheet contains details on specific measures required to prevent or reduce pollutants in stormwater runoff from vehicle and equipment fueling areas, including retail gas stations.

Design Criteria

Design requirements for fueling areas are governed by Building and Fire Codes and by current local permitting agency ordinances and zoning requirements. The design requirements described in this Fact Sheet are meant to enhance and be consistent with these code and ordinance requirements.

Source Control Design Feature	Design Criteria
Surfacing	• Fuel dispensing areas must be paved with Portland cement concrete. The fuel dispensing area is defined as extending 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assemble may be operated plus 1 foot, whichever is less. The paving around the fuel dispensing area may exceed the minimum dimensions of the "fuel dispensing area" stated above. • Use asphalt sealant to protect asphalt paved areas surrounding the fueling area.
Covers	• The fuel dispensing area must be covered [1], and the cover's minimum dimensions must be equal to or greater than the area within the grade break or the fuel dispensing area, as defined above. The cover must not drain onto the fuel dispensing area.
Grading/ Contouring	• The fuel dispensing area should have a 2% to 4% slope to prevent ponding and must be separated from the rest of the site by a grade break that prevents run-on of stormwater to the extent practicable. • Grade the fueling area to drain toward a dead-end sump. • Direct runoff from downspouts/roofs away from fueling areas. • Do not locate storm drains in the immediate vicinity of the fueling area.

Source Control Design Feature	Design Criteria
Emergency Storm Drain Seal	• Provide means, such as isolation valves, drain plugs, or drain covers, to prevent spills or contaminated stormwater from entering the storm drainage system.

1. If fueling large equipment or vehicles that would prohibit the use of covers or roofs, the fueling island should be designed to sufficiently accommodate the larger vehicles and equipment and to prevent run-on and runoff of stormwater. Grade to direct stormwater to a dead-end sump.

Accumulated Stormwater and Non-stormwater

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

S-8: Proof of Control Measure Maintenance

Purpose

Continued effectiveness of control measures specified in the 2011 TGM depends on diligent ongoing inspection and maintenance. To ensure that such maintenance is provided, the local permitting agency will require both a Maintenance Agreement and a Maintenance Plan from the owner/operator of stormwater control measures.

Maintenance Agreement

Onsite Treatment Control Measures are to be maintained by the owner/operator. Maintenance Agreements between the governing agency and the owner/operator may be required. A Maintenance Agreement with the governing agency must be executed by the owner/operator before occupancy of the project is approved. A sample Maintenance Agreement form is provided in Appendix H.

Maintenance Plan

A post-construction Maintenance Plan shall be prepared and made available at the governing agency's request. The Maintenance Plan should address items such as:

- Operation plan and schedule, including a site map;
- Maintenance and cleaning activities and schedule;
- Equipment and resource requirements necessary to operate and maintain facility; and
- Responsible party for operation and maintenance.

Additional guidelines for Maintenance Plans are provided in Appendix I.

6 STORMWATER BMP DESIGN

6.1 Introduction

Retention BMPs, Biofiltration BMPs, and Treatment Control Measures are required to augment Site Design Principles and Techniques and Source Control Measures to reduce pollution from stormwater discharges to the maximum extent practicable. Retention BMPs are engineered facilities that are designed to retain surface runoff on the project site. Biofiltration BMPs are vegetated stormwater BMPs that remove pollutants by filtering stormwater through vegetation and soils. Treatment Control Measures are engineered BMPs that provide a reduction of pollutant loads and concentrations in stormwater runoff. The type(s) of Retention BMPs and Biofiltration BMPs to be implemented depends on site suitability factors discussed in this chapter. The type of Treatment Control Measure(s) to be implemented at a site depends on a number of factors including: type of pollutants in the stormwater runoff, quantity of stormwater runoff to be treated, project site conditions, receiving water conditions, and state industrial permit requirements, where applicable. Land requirements and costs to design, construct, and maintain Treatment Control Measures vary by type.

Unlike flood control measures that are designed to handle peak flows, stormwater Retention BMPs, Biofiltration BMPs, and Treatment Control Measures are designed to retain or treat the more frequent, lower-flow storm events, or the first flush runoff from larger storm events (typically referred to as the first flush events). Small, frequent storm events represent most of the total average annual rainfall for the area. It's the volume from such small events, referred to as the Stormwater Quality Design Volume (SQDV), that is targeted for retention onsite in Retention BMPs. Biofiltration BMPs and Treatment Control Measures can be sized to capture either the SQDV or the Stormwater Quality Design Flow (SQDF). Calculation methods for the SQDV and the SQDF are presented in Section 2 and Appendix E.

6.2 General Considerations

Retention BMPs, Biofiltration BMPs, and Treatment Control Measures are designed to remove pollutants contained in stormwater runoff. The pollutants of concern, depending on the watershed, may include trash, debris, and sediment; metals such as copper, lead, and zinc; nutrients such as nitrogen and phosphorous; certain bacteria and viruses; mineral salts such as chloride; and organic chemicals such as petroleum hydrocarbons and pesticides. Pollutant removal methods include sedimentation/settling, filtration, plant uptake, ion exchange, adsorption, and microbially-mediated decomposition. Floatable pollutants such as oil, debris, and scum can be removed with separator structures. Retention BMPs, Biofiltration BMPs, and some Treatment Control Measures are also designed to reduce runoff volume, thereby reducing pollutant loading to receiving waters. Retention BMP, Biofiltration BMPs, and Treatment Control Measure types and common terms used in stormwater treatment are discussed below.

Maintenance Responsibility

Unless otherwise agreed to by the governing stormwater agency, the landowner, site operator, or homeowner's association is responsible for the operation and maintenance of the Retention BMPs, Biofiltration BMPs, and Treatment Control Measures. Failure to properly operate and maintain the measures could result in reduced treatment of stormwater runoff or a concentrated loading of pollutants to the storm drain system. To protect against failure, a Maintenance Plan must be developed and implemented for all Retention BMPs, Biofiltration BMPs, and Treatment Control Measures. Guidelines for maintenance plans are provided in Appendix I of the 2011 TGM. The Plan must be made available at the agency's request. In addition, a maintenance agreement with the governing agency may be required. The example maintenance agreements are included in Appendix H.

In addition to maintenance, the governing agency may require water quality monitoring agreements for any of the Retention BMPs, Biofiltration BMPs, or Treatment Control Measures recommended in the 2011 TGM. Monitoring may be conducted by the site operator, the agency, or both. Monitoring may be required for a period of time to help the agency evaluate the effectiveness of Retention BMPs, Biofiltration BMPs, and Treatment Control Measures in reducing pollutants in stormwater runoff.

Pretreatment

Pretreatment must be provided for filtration and infiltration facilities and other facilities whose function could be adversely affected by sediment or other pollutants. Pretreatment may also be provided for water quality detention basins and other Treatment Control Measures to facilitate the routine removal of sediment, trash, and debris, and to increase the longevity of the downstream BMPs.

Pretreatment may be provided by presettling basins or forebays (small detention basins), vegetated swales, filter strips, and hydrodynamic separators. Source control activities, described in Chapter 5, minimize the introduction of pollutants into stormwater runoff and also help to protect filtration and infiltration facilities. Effort should be made early in the site planning stages to minimize runoff from impervious areas by grading toward landscaped areas, disconnecting downspouts, and using pervious conveyances prior to discharging to the storm drain system. These site design practices can reduce the size and maintenance burden of downstream, end-of-pipe BMPs.

Oil/Water Separation

Oil/water separators remove floating oil from the water surface. There are two general types of separators: American Petroleum Institute (API) separators and coalescing plate (CP) separators. Both types use physical mechanisms to remove high concentrations of floating and dispersed oil. Oil/water separators are not suitable for the relatively low concentrations of petroleum hydrocarbons present in typical urban runoff, and should only be used in locations where higher concentrations of oil are expected to occur, such as retail fuel facilities, high volume roads, and petroleum-related industrial facilities. Oil/water separators must be located off-line from the primary conveyance system, as they function at low flow conditions and will wash out in high flow conditions. Other oil control devices/facilities that may be used for pretreatment of slightly elevated concentrations of oil (i.e., typical of high use commercial parking lots) include catch basin inserts, hydrodynamic devices, and linear sand filters. Oil control devices/facilities should always be placed upstream of other treatment facilities and as close to the oil source as possible.

Infiltration

Infiltration refers to the use of the filtration, adsorption, and biological decomposition properties of soils to remove pollutants prior to the intentional routing of runoff to the subsurface for groundwater recharge. Infiltration BMPs are a type of Retention BMP and include infiltration basins, infiltration trenches, bioretention without an underdrain, dry wells, permeable pavement, and proprietary infiltration devices. Infiltration can provide multiple benefits including pollutant removal, hydromodification control, groundwater recharge, and flood control. However, conditions that can limit the use of infiltration include soil properties and potential adverse impacts on groundwater quality. A geotechnical investigation must be conducted when evaluating infiltration to determine the suitability of the site soil in adequately addressing groundwater protection. This may include an in-situ percolation test, per the guidance provided in Appendix C, and the determination of minimum depth to groundwater. The minimum separation to seasonal high groundwater or estimated mounded groundwater is five feet. Depth to seasonal high groundwater level shall be estimated as the average of the annual minima (i.e., the shallowest recorded measurements in each water year, defined as October 1 through September 30) for all years on record. If groundwater level data are not available or not considered to be representative, seasonal high groundwater depth can be determined by redoximorphic analytical methods combined with temporary groundwater monitoring for November 1 through April 1 at the proposed project site.

Soils should have sufficient organic content and sorption capacity to remove certain pollutants, but must be coarse enough to infiltrate runoff in a reasonable amount of time (e.g., < 72 hours for above-ground ponded water to prevent vector breeding). Examples of suitable soils are silty and sandy loams. Coarser soils, such as gravelly sands, have limited organic content and high permeability and therefore present a potential risk to groundwater from certain pollutants, especially in areas of shallow groundwater. Prior to the use of infiltration BMPs, consult with the local permitting agency to identify if vulnerable unconfined aquifers are located beneath the project to determine the appropriateness of these BMPs. In an area identified as an unconfined aquifer, the application of infiltration BMPs should include significant pretreatment to ensure groundwater is protected from pollutants of concern.

Infiltration BMPs should not be placed in high-risk areas such as at or near service/gas stations, truck stops, and heavy industrial sites due to the groundwater contamination risk. Infiltration BMPs may be placed in high-risk areas if a site-specific evaluation demonstrates that sufficient pretreatment is provided to address pollutants of concern, high risks areas are isolated from stormwater runoff, or infiltration areas have little chance of spill migration.

In addition, infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project. Adequate spacing (100 feet or more) must be provided between infiltration BMPs and potable wells, non-potable wells, drain fields, and springs. Infiltration BMPs must be setback from building foundations at least eight feet or have an alternative setback established by the geotechnical expert for the project.

Infiltration is not allowed at locations with contaminated soils or groundwater where the pollutants could be mobilized or exacerbated by infiltration, unless a site-specific analysis determines the infiltration would not be detrimental. A site-specific analysis shall be prepared where pollutant mobilization (e.g., naturally-derived groundwater pollutants) is a concern. Projects must consider the potential for mobilization of groundwater contamination from natural sources as a result of stormwater infiltration (e.g., marine sediments, selenium-rich groundwater) to the extent that data is available.

Incidental infiltration that occurs in other types of Biofiltration BMPs and Treatment Control Measures, such as dry extended detention basins, vegetation swales, filter strips, and bioretention areas with underdrains, pose little risk to groundwater quality as treatment is provided in the BMP prior to infiltration.

Biofiltration BMPs

Biofiltration BMPs use vegetation and soils or other filtration media for runoff treatment. As runoff passes through the vegetation and filtration media, the combined effects of filtration, adsorption, and biological uptake remove pollutants. In biofiltration BMPs, pore spaces and organic material in the soils help to retain water in the form of soil moisture and to promote the pollutant adsorption (e.g., dissolved metals and petroleum hydrocarbons) into the soil matrix. Plants use soil moisture, promote the drying of the soil through transpiration, and uptake pollutants in their roots and leaves. Plants with extensive root systems also help to maintain filtration rates. Vegetation also decreases the velocity of flow and allows for particulates to settle.

Treatment Control Measures

Filtration

Various media, such as sand, perlite, zeolite, compost, and activated carbon, can be used in filtration BMPs to effectively remove total suspended solids (TSS) and associated pollutants such as organics (hydrocarbons and pesticides) and particulate metals. Filtration systems can be configured in the form of horizontal beds, trenches, or lastly, cartridge systems in underground vaults or catch basins.

Wetpools

A wetpool is a permanent pool of water incorporated into a wetpond or stormwater wetland BMP. Wetpools provide runoff treatment by allowing settling of particulates (sedimentation) by biological uptake and by vegetative filtration (if vegetation is present). Wetpool BMPs may be single-purpose facilities, providing only runoff treatment, or they may also provide flow control by providing additional detention storage with the use of a multi-stage outlet structure. If combined with detention, the wetpool volume can often be stacked under the detention volume with little further loss of development area.

"On-line" and "Off-line" Facilities

The location and configuration of control facilities can vary depending on the desired function. For example, drop structures or grade control may be located in a drainage channel so as to stabilize a channel for hydromodification control purposes. Such facilities are referred to as "in-stream" controls. Retention BMPs, Biofiltration BMPs, and Treatment Control Measures may not be located in-stream. Retention BMPs, Biofiltration BMPs, and Treatment Control Measures cannot be located in Waters of the US, but rather must be located upland to retain or treat runoff prior to discharge into Waters of the US.

If a Retention BMP, Biofiltration BMP, or Treatment Control Measure facility is designed such that all the runoff passes through the facility, the facility is called an "on-line" system. However, care must be taken to limit the resuspension of previously captured pollutants or damage to BMP performance during high flows. If, on the other hand, the facility only receives flows less than or equal to the stormwater quality design flow (SQDF), the facility is called an "off-line" system. Off-line systems therefore require a flow splitter or equivalent device. Generally treatment performance is better for off-line facilities because a larger percentage of the runoff is treated. Figure 6-1 illustrates the difference between on-line, off-line, and in-stream controls.

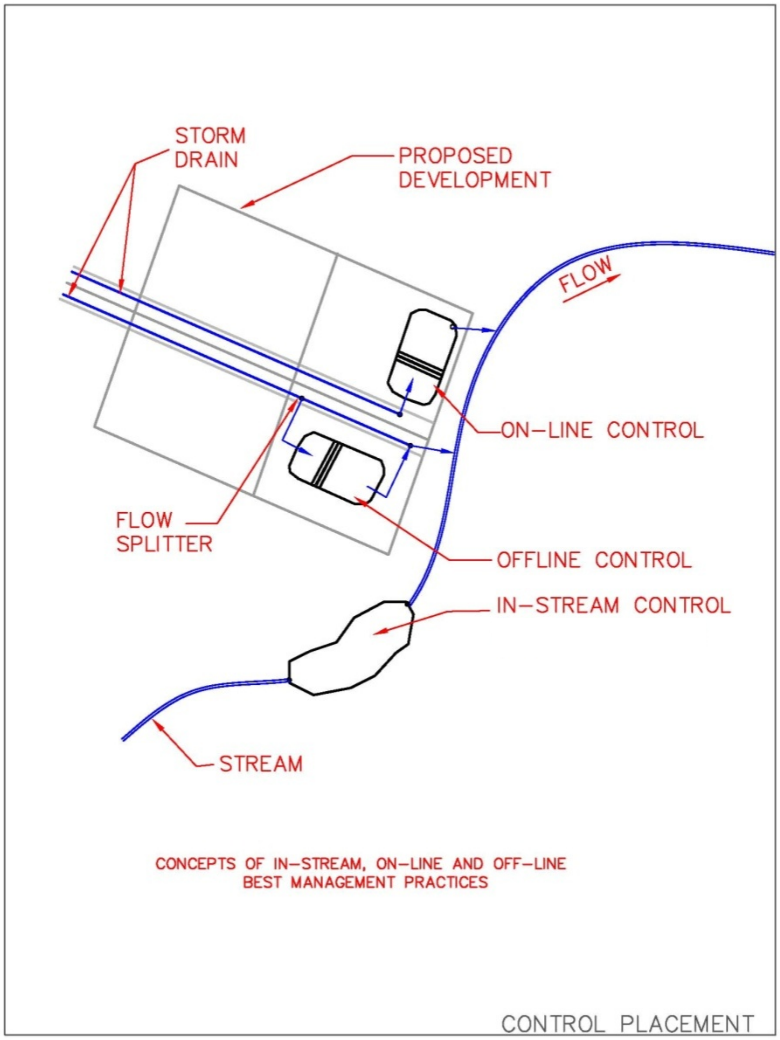


Figure 6-1: Differences between On-line, Off-line, and In-stream Control Measures

6.3 Retention BMP, Biofiltration BMP, and Treatment Control Measure Fact Sheets

This section provides fact sheets with recommended criteria for the design and implementation of Retention BMPs, Biofiltration BMPs, and Treatment Control Measures. The siting, design, and maintenance requirements in the fact sheets are intended to ensure optimal performance of the measures. Alternative designs may be approved by the local permitting authority based on site specific conditions if equivalent pollutant removal performance is provided.

The 2011 TGM also contains calculation worksheets to aid in the design of these BMPs in Appendix E. New BMPs that are equivalent to those included in the 2011 TGM are acceptable based on approval of the local permitting agency.

Fact sheets are provided for the Retention BMPs, Biofiltration BMPs, and Treatment Control Measures listed below:

Retention BMPs

Infiltration BMPs

INF-1: Infiltration Basin
INF-2: Infiltration Trench
INF-3: Bioretention
INF-4: Drywell
INF-5: Permeable Pavement
INF-6: Proprietary Infiltration

Rainwater Harvesting BMPs

RWH-1: Rainwater Harvesting

Evapotranspiration BMPs

ET-1: Green Roof
ET-2: Hydrologic Source Controls

Biofiltration BMPs

BIO-1: Bioretention with Underdrain
BIO-2: Planter Box
BIO-3: Vegetated Swale
BIO-4: Vegetated Filter Strip
BIO-5: Proprietary Biotreatment

Treatment Control Measures

TCM-1: Dry Extended Detention Basin
TCM-2: Wet Detention Basin
TCM-3: Constructed Wetland
TCM-4: Sand Filter (if vegetated, this is considered a Biofiltration BMP)
TCM-5: Cartridge Media Filter

Pretreatment/Gross Solids Removal BMPs

PT-1: Hydrodynamic Device
PT-2: Catch Basin Insert

INF-1: Infiltration Basin

An infiltration basin consists of an earthen basin constructed in naturally pervious soils (Type A or B soils) with a flat bottom and provided with an inlet structure to dissipate energy of incoming flow and an emergency spillway to control excess flows. An optional relief underdrain may be provided to drain the basin if standing water conditions occur. A forebay settling basin or separate Treatment Control Measure must be provided as pretreatment. An infiltration basin functions by retaining the SQDV in the basin and allowing the retained runoff to percolate into the underlying native soils over a specified period of time. The bottoms of infiltration basins are typically vegetated with dry-land grasses or irrigated turf grass. A typical layout of an infiltration basin system is shown in Figure 6-2.

Infiltration Basin in a Fresno, CA Park, Before and After a Rain Event

Photo Credit: Geosyntec Consultants

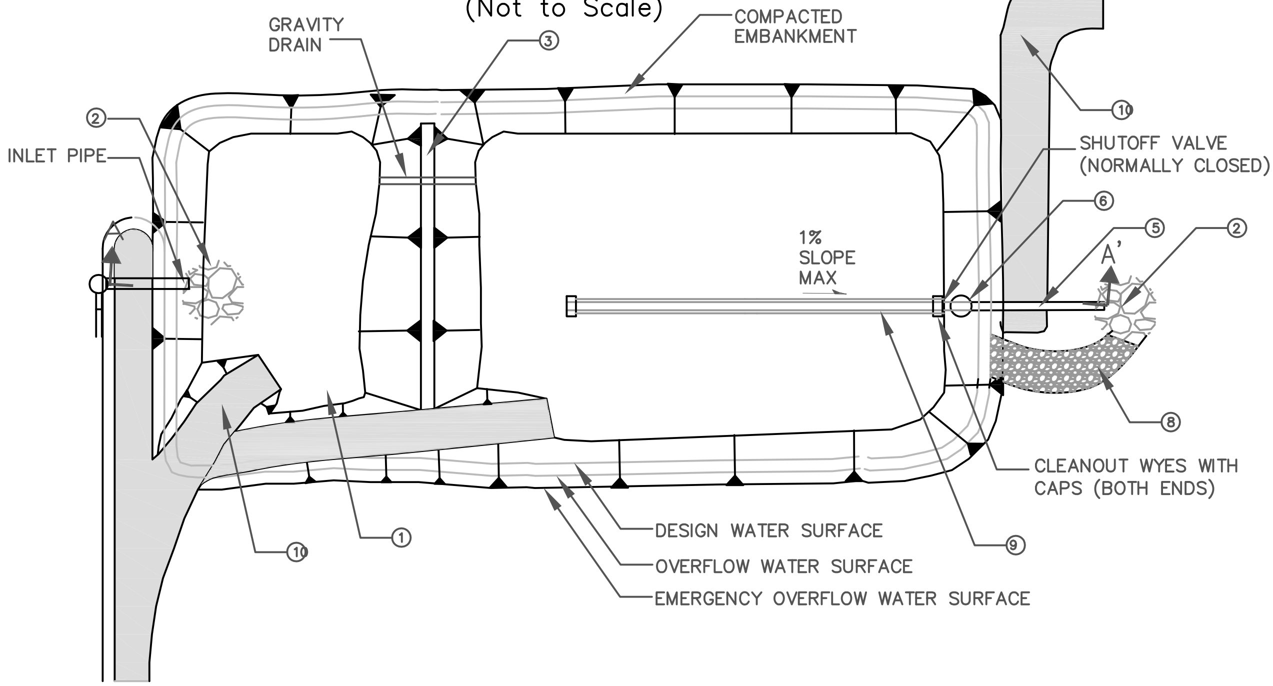
Application

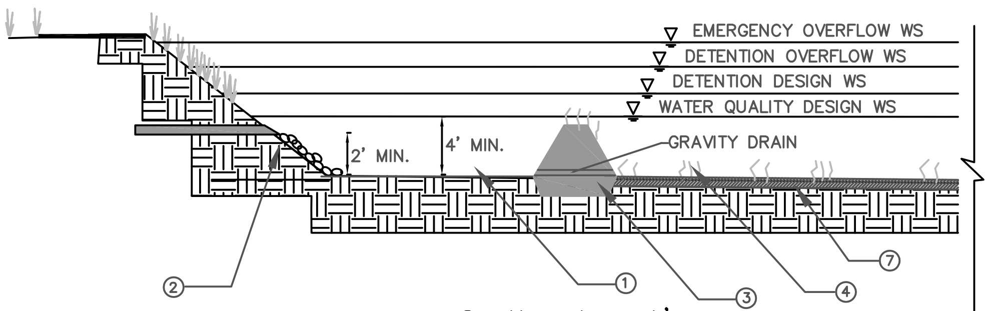
- Mixed-use and commercial
- Roads and parking lots
- Parks and open spaces
- Single and multi-family residential
- Can integrate with parks

Routine Maintenance

- Removal trash, debris, and sediment at inlet and outlets
- Wet weather inspection to ensure drain time
- Remove weeds
- Inspect for mosquito breeding

Plan View
(Not to Scale)





Section A – A'
(Not to Scale)

NOTES:

1. UPSTREAM PRETREATMENT SHALL BE PROVIDED. SEDIMENT FOREBAY WITH VOLUME EQUAL TO 25% OF TOTAL INFILTRATION BASIN VOLUME MAY BE USED IN LIEU OF UPSTREAM PRETREATMENT. DEPTH SHALL BE 4' MIN TO 8' MAX PLUS AN ADDITIONAL 1 FOOT MIN SEDIMENT STORAGE DEPTH.
2. RIP RAP APRON OR OTHER ENERGY DISSIPATION.
3. EXTEND EARTHEN BERM ACROSS ENTIRE WIDTH OF THE INFILTRATION BASIN.
4. INFILTRATION BASIN BOTTOM AND SIDE SLOPES SHALL BE PLANTED WITH DROUGHT TOLERANT VEGETATION. DEEP ROOTED VEGETATION PREFERRED FOR BASIN BOTTOM. NO TOPSOIL SHALL BE ADDED TO INFILTRATION BASIN BED.
5. SIZE OUTLET PIPE TO PASS 100–YEAR PEAK FLOW FOR ON–LINE INFILTRATION BASINS AND WATER QUALITY PEAK FLOW FOR OFF–LINE INFILTRATION BASINS.
6. WATER QUALITY OUTLET STRUCTURE. SEE FIGURE 7–2 AND FIGURE 7–3 FOR DETAILS.
7. OVER EXCAVATE BASIN BOTTOM 1 FOOT. RE–PLACE EXCAVATED MATERIAL UNIFORMLY WITHOUT COMPACTION. AMENDING EXCAVATED MATERIAL WITH 2" – 4" OF COARSE SAND IS RECOMMENDED FOR SOILS WITH BORDER LINE INFILTRATION CAPACITY.
8. INSTALL EMERGENCY OVERFLOW SPILLWAY AS NEEDED. SEE FIGURE 2–4 FOR DETAILS
9. INSTALL OPTIONAL 6" MINIMUM DIAMETER PERFORATED PIPE UNDERDRAIN. INSTALL AT 0.5% MINIMUM SLOPE.
10. MAINTENANCE RAMP SHOULD PROVIDE ACCESS TO BOTH THE FIRST CELL AND MAIN BASIN.

Geosyntec consultants

Figure 6-2: Infiltration Basin

Limitations

The following limitations should be considered before choosing to use an infiltration basin:

- Native soil infiltration rate - permeability of soils at the infiltration basin location must be at least 0.5 inches per hour.
- Depth to groundwater, bedrock, or low permeability soil layer – 5 feet vertical separation is required between the bottom of the infiltration basin and the seasonal high groundwater level or mounded groundwater level, bedrock, or other barrier to infiltration to ensure that the facility will completely drain between storms and that infiltrating water will receive adequate treatment though the soils before it reaches the groundwater.
- Slope stability - infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.
- Setbacks - a minimum setback (100 feet or more) must be provided between infiltration BMPs and potable wells, non-potable wells, drain fields, and springs. Infiltration BMPs must be setback at least eight feet from building foundations or have an alternative setback established by the geotechnical expert for the project.
- Groundwater contamination - the application of infiltration BMPs should include significant pretreatment in an area identified as an unconfined aquifer to ensure groundwater is protected for pollutants of concern.
- Contaminated soils or groundwater plumes - infiltration BMPs are not allowed at locations with contaminated soils or groundwater, where the pollutants could be mobilized or exacerbated by infiltration, unless a site-specific analysis determines the infiltration would be beneficial.
- High pollutant land uses - infiltration BMPs should not be placed in high-risk areas such as at or near service/gas stations, truck stops, and heavy industrial sites due to the groundwater contamination risk unless a site-specific evaluation demonstrates that sufficient pretreatment is provided to address pollutants of concern, high risks areas are isolated from stormwater runoff, or infiltration areas have little chance of spill migration.
- High sediment loading rates – infiltration BMPs may clog quickly if sediment loads are high (e.g., unstabilized site) or if flows are not adequately pretreated.

Additional Control Functions

Infiltration basins can be designed for flow control by providing storage capacity in excess of that provided by infiltration and incorporating outlet controls. The additional storage and outlet structure should be provided per the requirements outlined in the Dry Extended Detention Basins section of the 2011 TGM. Note that the selected outlet structure should not be designed to drain the design volume intended for infiltration and should be similar to outlet structures that maintain a permanent pool (see Section 6.10.2 – Wet Retention Basins).

Multi-Use Opportunities

Infiltration basins may be integrated into the design of a park or playfield. Recreational multi-use facilities should be inspected after every storm and may require a greater maintenance frequency than dedicated infiltration basins to ensure aesthetics and public safety are not compromised. Any planned multi-use facility must obtain approval by the affected City and County departments.

Design Criteria

The main challenge associated with infiltration basins is preventing system clogging and subsequent infiltration inhibition. Infiltration basins should be designed according to the requirements listed in Table 6-1 and outlined in the section below. Detailed design procedures and an example are included in Appendix E.

Table 6-1: Infiltration Basin Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume (SQDV)	acre-feet	See Section 2.3 and Appendix E for calculating SQDV
Design drawdown time	hr	12 - 72 (See Appendix D, Section D.2)
Bottom basin Elevation	feet	5 feet above seasonally high groundwater table or mounded groundwater
Setbacks	feet	100 feet from wells, fields, and springs; 20 feet downslope of 100 feet upslope of foundations; Geotechnical expert should establish the setback requirement from building foundations that must be ≥ 8 ft.
Pretreatment	-	Sedimentation forebay or any Treatment Control Measure shall be provided as pretreatment for all tributary surfaces other than roofs.

Design Parameter	Unit	Design Criteria
Design percolation rate (P_{design})	in/hr	Measured percolation rate must be corrected based onsite suitability assessment and design related considerations described in this fact sheet.
Facility geometry	-	Forebay (if applicable): 25% of facility volume; flat bottom slope
Freeboard (minimum)	ft	1.0
Inlet/ Outlet erosion control	-	Energy dissipater to reduce velocity
Overflow device	-	Required if system is on-line

Geotechnical Considerations

An extensive geotechnical site investigation must be undertaken early in the site planning process to verify site suitability for the installation of infiltration facilities, due to the potential to contaminate groundwater, cause slope instability, impact surrounding structures, and have insufficient infiltration capacity.. Soil infiltration rates and the water table depth should be evaluated to ensure that conditions are satisfactory for proper operation of an infiltration facility. See Appendix C for guidance on infiltration testing.

The project designer must demonstrate through infiltration testing, soil logs, and the written opinion of a licensed civil engineer that sufficiently permeable soils exist onsite to allow the construction of a properly functioning infiltration facility.

1) Infiltration facilities require a minimum soil infiltration rate of 0.5 inches/hour. Pretreatment is required in all instances.

2) Groundwater separation must be at least 5 feet from the basin bottom to the measured Seasonal High Groundwater Elevation or estimated high groundwater mounding elevation. Groundwater levels measurements must be made during the time when water level is expected to be at a maximum (i.e., toward the end of the wet season).

3) Potential BMP sites with a slope greater than 25% (4:1) should be excluded. A geotechnical analysis and report addressing slope stability are required if located within 50 feet of slopes greater than 15%.

Soil Assessment and Site Geotechnical Investigation Reports

The soil assessment report should:

- State whether the site is suitable for the proposed infiltration basin;

- Recommend a design percolation rate (see "*Step 2: Determine The Design Percolation Rate*" below);
- Identify the seasonally high depth to groundwater table surface elevation;
- Provide a good understanding of how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water; and
- If a geotechnical investigation and report are required, the report should:
  - Provide a written opinion by a professional civil engineer describing whether the infiltration basin will compromise slope stability; and
  - Identify potential impacts to nearby structural foundations.

Setbacks

1) Infiltration facilities shall be setback a minimum of 100 feet from proposed or existing potable wells, non-potable wells, septic drain fields, and springs.
2) Infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.
3) The geotechnical expert shall establish the setback requirement from building foundations that must be ≥ 8 ft.

Pretreatment

Pretreatment is required for infiltration basins in order to reduce the sediment load entering the facility and maintain the infiltration rate of the facility. Pretreatment refers to design features that provide settling of large particles before runoff reaches a management practice; easing the long-term maintenance burden. Pretreatment is important for most all structural stormwater BMPs, but it is particularly important for infiltration BMPs. To ensure that pretreatment mechanisms are effective, designers should incorporate sediment reduction practices. Sediment reduction BMPs may include vegetated swales, vegetated filter strips, sedimentation basins or forebays, sedimentation manholes and hydrodynamic separation devices. The use of at least two pretreatment devices is highly recommended for infiltration basins.

For design specification of selected pretreatment devices, refer to:

- BIO-3: Vegetated swales
- BIO-4: Vegetated filter strips
- TCM-4: Sand filters

- TCM-5: Cartridge media filters
- PT-1: Hydrodynamic separation device

Sizing Criteria

As with sand filters, infiltration facilities can be sized using one of two methods: a simple sizing method or a routing modeling method. With either method the SQDV volume must be completely infiltrated within 12 to 72 hours (see Appendix D, Section D.2 for a discussion on drawdown time and BMP performance). The simple sizing procedures provided below can be used for either infiltration basins or infiltration trenches (see INF-2: Infiltration Trench). For the routing modeling method, refer to TCM-4 Sand Filters.

Step 1: Calculate the Design Volume

Infiltration facilities shall be sized to capture and infiltrate the SQDV volume (see Section 2 and Appendix E) with a 12 to 72 hour drawdown time (see Appendix D, Section D.2).

Step 2: Determine the Design Percolation Rate

The percolation rate will decline between maintenance cycles as the surface becomes occluded and particulates accumulate in the infiltrative layer. Monitoring of actual facility performance has shown that the full-scale infiltration rate is far lower than the rate measured by small-scale testing. It is important that adequate conservatism is incorporated in the selection of design percolation rates. For infiltration trenches, the design percolation rate discussed here is the percolation rate of the underlying soils and not the percolation rate of the filter media bed (refer to the "Geometry and Sizing" section of INF-2 for the recommended composition of the filter media bed for infiltration trenches).

Considerations for Design Percolation Rate Corrections

Suitability assessment related considerations include (Table 6-2):

- Soil assessment methods – the site assessment extent (e.g., number of borings, test pits, etc.) and the measurement method used to estimate the short-term infiltration rate.
- Predominant soil texture/percent fines – soil texture and the percent fines can greatly influence the potential for clogging.
- Site soil variability – site with spatially heterogeneous soils (vertically or horizontally), as determined from site investigations, are more difficult to estimate average properties resulting in a higher level of uncertainty associated with initial estimates.

- Depth to seasonal high groundwater/impervious layer – groundwater mounding may become an issue during excessively wet conditions where shallow aquifers or shallow clay lenses are present.

Table 6-2: Suitability Assessment Related Considerations for Infiltration Facility Safety Factors

Consideration	High Concern	Medium Concern	Low Concern
Assessment methods	Use of soil survey maps or simple texture analysis to estimate short-term infiltration rates	Direct measurement of ≥ 20 percent of infiltration area with localized infiltration measurement methods (e.g., infiltrometer)	Direct measurement of ≥ 50 percent of infiltration area with localized infiltration measurement methods or Use of extensive test pit infiltration measurement methods
Ventura Hydrology Manual soil number (measured infiltration rate)	3 (f = 0.5 – 0.64)	4 or 5 (f = 0.65 –0.91)	6 or 7 (f = 0.92 or higher)
Site soil variability	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment	Soil borings/test pits indicate moderately homogeneous soils	Multiple soil borings/test pits indicate relatively homogeneous soils
Depth to groundwater/ impervious layer	<10 ft below facility bottom	10-30 ft below facility bottom	>30 below facility bottom

Localized infiltration testing refers to methods such as the double ring infiltrometer test (ASTM D3385-88), which measure infiltration rates over an area less than 10 sq-ft and do not attempt to account for soil heterogeneity. Extensive infiltration testing refers to methods that include excavating a significant portion of the proposed infiltration area, filling the excavation with water, and monitoring drawdown. In all cases, testing should be conducted in the area of the proposed BMP where, based on geotechnical data, soils appear least likely to support infiltration.

Design related considerations include (Table 6-3):

- Size of area tributary to facility – all things being equal, both physical and economic risk factors related to infiltration facilities increase with an increase in the tributary area served. Therefore facilities serving larger tributary areas should use more restrictive adjustment factors.

- Level of pretreatment/expected influent sediment loads – credit should be given for good pretreatment by allowing less restrictive factors to account for the reduced probability of clogging from high sediment loading. Also, facilities designed to capture runoff from relatively clean surfaces such as rooftops are likely to see low sediment loads and therefore should be allowed to apply less restrictive safety factors.

- Redundancy – facilities that consist of multiple subsystems operating in parallel such that parts of the system remains functional when other parts fail and/or bypass, should be rewarded for the built-in redundancy with less restrictive correction and safety factors. For example, if bypass flows would be at least partially treated by another BMP, the risk of discharging untreated runoff in the event of clogging the primary facility is reduced. A bioretention facility that overflows to a landscaped area is another example. Compaction during construction – proper construction oversight is needed during construction to ensure that the bottoms of infiltration facility are not overly compacted. Facilities that do not commit to proper construction practices and oversight should have to use more restrictive correction and safety factors.

Table 6-3: Design Related Considerations for Infiltration Facility Safety Factors

Consideration	High Concern	Medium Concern	Low Concern
Tributary area size	Greater than 10 acres.	Greater than 2 acres but less than 10 acres.	2 acres or less.
Level of pre-treatment/ expected influent sediment loads	Pre-treatment from gross solids removal devices only, such as hydrodynamic separators, racks and screens, AND tributary area includes landscaped areas, steep slopes, high traffic areas, or any other areas expected to produce high sediment, trash, or debris loads.	Good pre-treatment with BMPs that mitigate coarse sediments such as vegetated swales AND influent sediment loads from the tributary area are expected to be relatively low (e.g., low traffic, mild slopes, disconnected impervious areas, etc.).	Excellent pre-treatment with BMPs that mitigate fine sediments such as bioretention or media filtration OR sedimentation or facility only treats runoff from relatively clean surfaces, such as rooftops.
Redundancy of treatment	No redundancy in BMP treatment train.	Medium redundancy, other BMPs available in treatment train to maintain at least 50% of function of facility in event of failure.	High redundancy, multiple components capable of operating independently and in parallel, maintaining at least 90% of facility functionality in event of failure.
Compaction during construction	Construction of facility on a compacted site or elevated probability of unintended/ indirect compaction.	Medium probability of unintended/ indirect compaction.	Heavy equipment actively prohibited from infiltration areas during construction and low probability of unintended/ indirect compaction.

Adjust the measured short-term infiltration rate using a weighted average of several safety factors using the worksheet shown in Table 6-4 below. The design percolation rate would be determined as follows:

- For each consideration shown in Table 6-2 and Table 6-3 above, determine whether the consideration is a high, medium, or low concern.
- For all high concerns, assign a factor value of 3, for medium concerns, assign a factor value of 2, and for low concerns assign a factor value of 1.
- Multiply each of the factors by the corresponding weight to get a product.

- Sum the products within each factor category to obtain a safety factor for each.
- Multiply the two safety factors together to get the final combined safety factor. If the combined safety factor is less than 2, then use 2 as the safety factor.
- Divide the measured short-term infiltration rate by the combined safety factor to obtain the adjusted design percolation rate for use in sizing the infiltration facility.

Table 6-4: Infiltration Facility Safety Factor Determination Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) $p = w \times v$
A	Suitability Assessment	Soil assessment methods	0.25		
		Predominant soil texture	0.25		
		Site soil variability	0.25		
		Depth to groundwater / impervious layer	0.25		
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			
B	Design	Tributary area size	0.25		
		Level of pre-treatment/ expected sediment loads	0.25		
		Redundancy	0.25		
		Compaction during construction	0.25		
		Design Safety Factor, $S_B = \Sigma p$			
Combined Safety Factor = $S_A \times S_B$					

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.

Step 3: Calculate the surface area

Determine the size of the required infiltrating surface by assuming the SQDV will fill the available ponding depth plus (for infiltration trenches) the void spaces based on the computed porosity of the filter media (normally about 32%).

1) Determine the maximum depth of runoff that can be infiltrated within the required drain time (d_{max}) as follows:

$$d_{\max} = \frac{P_{design}}{12} t \qquad \text{(Equation 6-1)}$$

Where:

d_{max} = the maximum depth of water that can be infiltrated within the required drain time (ft)

P_{design} = design percolation rate of underlying soils (in/hr)

t = required drain time (hrs)

2) Choose the ponding depth (d_p) and/or trench depth (d_t) such that:

$d_{\max} \geq d_p$ For Infiltration Basins (Equation 6-2)

$d_{\max} \geq n_t d_t + d_p$ For Infiltration Trenches (Equation 6-3)

Where:

d_{max} = the maximum depth of water that can be infiltrated within the required drain time (ft)

d_p = ponding depth (ft)

n_t = trench fill aggregate porosity (unitless)

d_t = depth of trench fill (ft)

3) Calculate infiltrating surface area (filter bottom area) required:

$A = \frac{SQDV}{((TP_{design}/12) + d_p)}$ For Infiltration Basins (Equation 6-4)

$A = \frac{SQDV}{((TP_{design}/12) + n_t d_t + d_p)}$ For Infiltration Trenches (Equation 6-5)

Where:

$SQDV$ = stormwater quality design volume (ft^3)

n_t = trench fill aggregate porosity (unitless)

P_{design} = design percolation rate (in/hr)

d_p = ponding depth (ft)

d_t = depth of trench fill (ft)

T = fill time (time to fill to max ponding depth with water) (hrs) [use 2 hours for most designs]

Geometry and Sizing

1) Infiltration basins should be designed and constructed with the flattest bottom slope possible to promote uniform ponding and infiltration across the facility.

2) A sediment forebay is required unless adequate pretreatment is provided in a separate pretreatment unit (e.g., vegetated swale, filter strip, hydrodynamic device) to reduce sediment loads entering the infiltration basin. The sediment forebay, if present, should have a volume equal to 25% of the total infiltration basin volume.

3) The forebay should be designed with a minimum length to width ratio of 2:1 and should completely drain to the main basin through an 8-inch minimum low-flow outlet within 10 minutes.

4) All inlets should enter the sediment forebay. If there are multiple inlets, the length-to-width ratio should be based on the average flowpath length for all inlets.

5) Design embankments to conform to requirements of the State of California Division of Safety of Dams, if the basin dimensions cause it to fall under that agency's jurisdiction.

Drainage

1) The bottom of the infiltration bed should be native soil, over-excavated to at least one foot in depth, and replaced uniformly without compaction. Amending the excavated soil with 2-4 inches (~15-30%) of coarse sand is recommended.

2) The hydraulic conductivity of the subsurface layers should be sufficient to ensure a maximum 72-hr drawdown time. An observation well shall be incorporated to allow observation of drain time.

3) For infiltration basins, an underdrain should be installed within the bottom layer to provide drainage in case of standing water. The underdrain should be operated by opening a valve, which should be closed during normal operation. Cleanouts should be provided for the underdrain. See Sand Filter Section VEG-8 for specifications for underdrains.

Emergency Overflow

1) There should be an overflow route for stormwater flows that overtop the facility or in case the infiltration facility becomes clogged.

2) The overflow channel should be able to safely convey flows from the peak design storm to the downstream stormwater conveyance system or other acceptable discharge point.

3) Spillway and overflow structures should be designed in accordance with applicable standards of the Ventura County Flood Control District or local jurisdiction.

Vegetation

1) A thick mat of drought tolerant grass should be established on the basin floor and side-slopes following construction. Grasses can help prevent erosion and increase evapotranspiration and their roots discourage compaction helping to maintain the surface infiltration rates. Additionally, the active growing vegetation can help break up surface layers that accumulate fine particulates.

2) Grass may need to be irrigated during establishment.

3) For infiltration basins, landscaping of the area surrounding the basin should adhere to the following criteria so as not to hinder maintenance operations:

    a. No trees or shrubs may be planted within 10 feet of inlet or outlet pipes or manmade drainage structures such as spillways, flow spreaders, or earthen embankments. Species with roots that seek water, such as willow or poplar, should not be used within 50 feet of pipes.

    b. Prohibited non-native plant species will not be permitted. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website or the California Invasive Plant Council website at www.cal-ipc.org.

Maintenance Access

1) Maintenance access road(s) shall be provided to the drainage structures associated with the basin (e.g., inlet, emergency overflow, or bypass structures). Manhole and catch basin lids should be in or at the edge of the access road.

2) An access ramp to the basin bottom is required to facilitate the entry of sediment removal and vegetation maintenance equipment without compaction of the basin bottom and side slopes.

Construction Considerations

To preserve and avoid the loss of infiltration capacity, the following construction guidelines are specified:

1) The entire area draining to the facility should be stabilized before construction begins. If this is impossible, a diversion berm should be placed around the perimeter of the infiltration site to prevent sediment entrance during construction.

2) Infiltration basins should not be hydraulically connected to the stormwater conveyance system until all contributing tributary areas are stabilized as shown on the Contract Plans and to the satisfaction of the Engineer. Infiltration basins should not be used as sediment control facilities.

3) Compaction of the subgrade with heavy equipment should be minimized to the maximum extent possible. If the use of heavy equipment on the base of the facility cannot be avoided, the infiltrative capacity should be restored by tilling or aerating prior to placing the infiltrative bed.

4) The exposed soils should be inspected by a civil engineer after excavation to confirm that soil conditions are suitable.

Operations and Maintenance

Infiltration facility maintenance should include frequent inspections to ensure that surface ponding infiltrates into the subsurface completely within the design infiltration time after a storm (see Appendix I for an infiltration BMP inspection and maintenance checklist).

Maintenance and regular inspections are of primary importance if infiltration BMPs are to continue to function as originally designed. A specific maintenance plan shall be formulated specifically for each facility outlining the schedule and scope of maintenance operations, as well as the data handling and reporting requirements. The following are general maintenance requirements:

1) Regular inspection should determine if the pretreatment sediment removal BMPs require routine maintenance.

2) If water is noticed in the basin more than 72 hours after a major storm the infiltration facility may be clogged. Maintenance activities triggered by a potentially clogged facility include:

    a. Check for debris/sediment accumulation, rake surface, and remove sediment (if any) and evaluate potential sources of sediment and debris (e.g., embankment erosion, channel scour, overhanging trees, etc). If suspected upland sources are outside of the immediate jurisdiction, additional pretreatment operations (e.g., trash racks, vegetated swales, etc.) may be necessary.

    b. For basins, removal of the top layer of native soil may be required to restore infiltrative capacity.

    c. Any debris or algae growth located on top of the infiltration facility should be removed and disposed of properly.

    d. Facilities shall be inspected annually. Trash and debris should be removed as needed, but at least annually prior to the beginning of the wet season.

3) Site vegetation should be maintained as frequently as necessary to maintain the aesthetic appearance of the site, and as follows:

   a. Vegetation, large shrubs, or trees that limit access or interfere with basin operation should be pruned or removed.

   b. Slope areas that have become bare should be revegetated and eroded areas should be regraded prior to being revegetated.

   c. Grass should be mowed to 4" - 9" high and grass clippings should be removed.

   d. Fallen leaves and debris from deciduous plant foliage should be raked and removed.

   e. Invasive vegetation, such as Alligatorweed (Alternanthera philoxeroides), Halogeton (Halogeton glomeratus), Spotted Knapweed (Centaurea maculosa), Giant Reed (Arundo donax), Castor Bean (Ricinus communis), Perennial Pepperweed (Lepidium latifolium), and Yellow Starthistle (Centaurea solstitalis) should be removed and replaced with non-invasive species. Invasive species should never contribute more than 25% of the vegetated area. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website or the California Invasive Plant Council website at www.cal-ipc.org.

   f. Dead vegetation should be removed if it exceeds 10% of area coverage. Vegetation should be replaced immediately to maintain cover density and control erosion where soils are exposed.

4) For infiltration basins, sediment build-up exceeding 50% of the forebay capacity should be removed. Sediment from the remainder of the basin should be removed when 6 inches of sediment accumulates. Sediments should be tested for toxic substance accumulation in compliance with current disposal requirements if land uses in the catchment include commercial or industrial zones, or if visual or olfactory indications of pollution are noticed. If toxic substances are encountered at concentrations exceeding thresholds of Title 22, Section 66261 of the California Code of Regulations, the sediment should be disposed of in a hazardous waste landfill and the source of the contaminated sediments should be investigated and mitigated to the extent possible.

5) Following sediment removal activities, replanting and/or reseeding of vegetation may be required for reestablishment.

INF-2: Infiltration Trench

Infiltration trenches are long, narrow, gravel-filled trenches, often vegetated, that infiltrate stormwater runoff from small drainage areas. Infiltration trenches may include a shallow depression at the surface, but the majority of runoff is stored in the void space within the gravel and infiltrates through the sides and the bottom of the trench.

Rural Highway Infiltration Trench

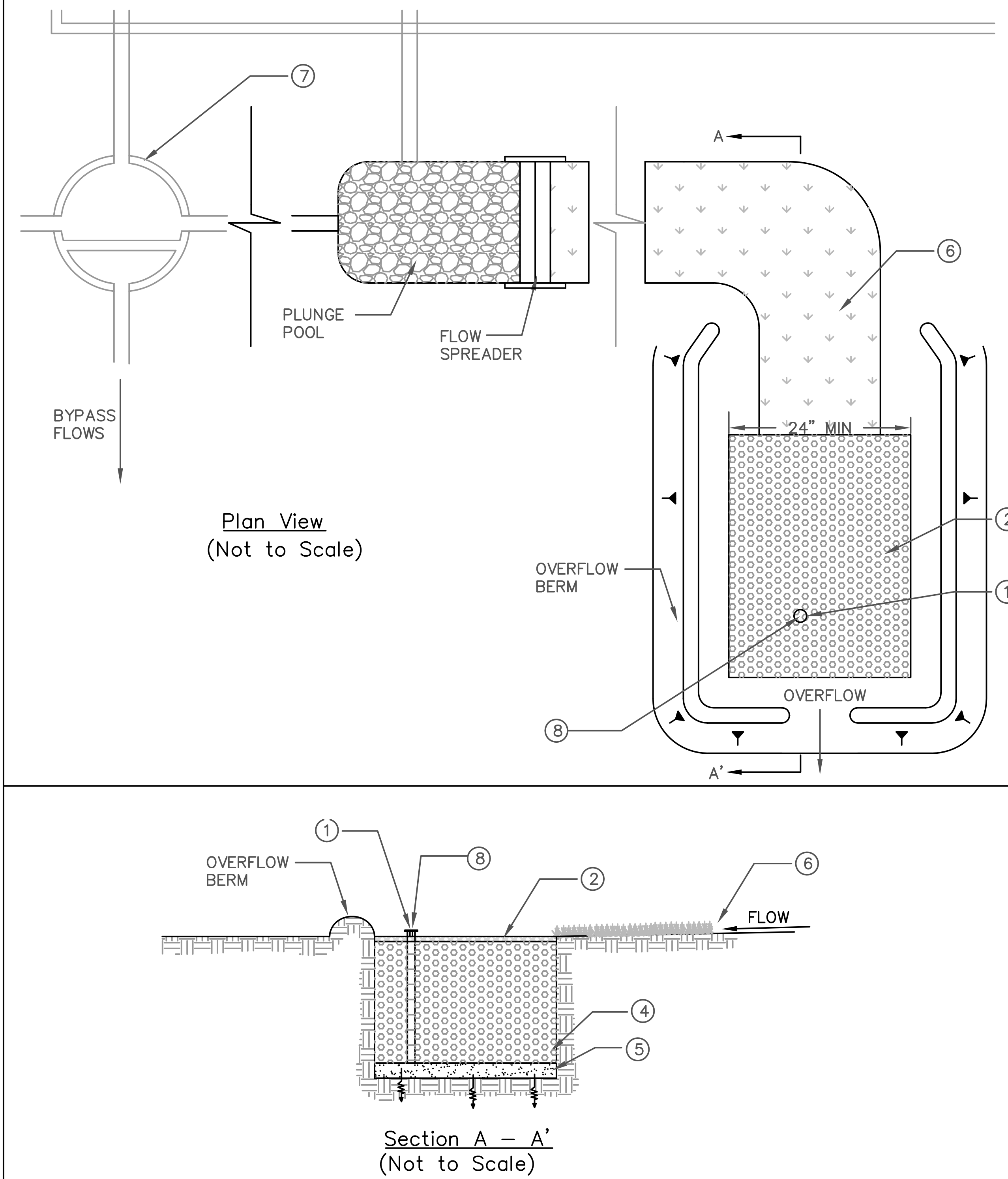
http://stormwater.wordpress.com/2007/05/23/infiltration--trenches/

Application

- Open areas adjacent to parking lots, driveways, and buildings
- Roadway medians and shoulders

Routine Maintenance

- Removal trash, debris, and sediment at inlet and outlets
- Wet weather inspection to ensure drain time
- Remove weeds
- Inspect for mosquito breeding



NOTES:

1. OBSERVATION WELL WITH LOCKABLE ABOVE-GROUND CAP.
2. 2" PEA GRAVEL FILTER LAYER.
3. MINIMUM 10' ABOVE SEASONAL HIGH GROUNDWATER TABLE AND 3' ABOVE BEDROCK.
4. 3' – 5' DEEP TRENCH FILLED WITH 2" – 6" DIAMETER CLEAN STONE WITH 30% – 40% VOIDS.
5. 6" DEEP SAND FILTER LAYER (OR FABRIC EQUIVALENT).
6. RUNOFF FILTERS THROUGH GRASS FILTER STRIP OR VEGETATED SWALE.
7. OPTIONAL FLOW CONTROL DEVICE FOR OFF-LINE CONFIGURATIONS.

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Figure 6-3: Infiltration Trench

Limitations

The following limitations should be considered before choosing to use an infiltration trench:

- Native soil infiltration rate – soil permeability at the infiltration trench location must be at least 0.5 inches per hour.

- Depth to groundwater, bedrock, or low permeability soil layer – 5 feet vertical separation is required between the bottom of the infiltration trench and the seasonal high groundwater level or mounded groundwater level, bedrock, or other barrier to infiltration to ensure that the facility will completely drain between storms and that infiltrating water will receive adequate treatment though the soils before it reaches the groundwater.

- Slope stability - infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.

- Setbacks - a minimum setback (100 feet or more) must be provided between infiltration BMPs and potable wells, non-potable wells, drain fields and springs. Infiltration BMPs must be setback from building foundations at least eight feet or an alternative setback established by the geotechnical expert for the project.

- Groundwater contamination - the application of infiltration BMPs should include significant pretreatment in an area identified as an unconfined aquifer to ensure groundwater is protected for pollutants of concern.

    - Contaminated soils or groundwater plumes - infiltration BMPs are not allowed at locations with contaminated soils or groundwater where the pollutants could be mobilized or exacerbated by infiltration, unless a site-specific analysis determines that infiltration would be beneficial.

- High pollutant land uses - infiltration BMPs should not be placed in high-risk areas such as at or near service/gas stations, truck stops, and heavy industrial sites due to the groundwater contamination risk unless a site-specific evaluation demonstrates that sufficient pretreatment is provided to address pollutants of concern, high risks areas are isolated from stormwater runoff, or infiltration areas have little chance of spill migration.

- High sediment loading rates – infiltration BMPs may clog quickly if sediment loads are high (e.g., unstabilized site) or if flows are not adequately pretreated.

Design Criteria

The main challenge associated with infiltration trenches is preventing system clogging and subsequent infiltration inhibition. Infiltration trenches should be designed according to the requirements listed in Table 6-5 and outlined in the section below. BMP sizing worksheets are presented in Appendix E.

Table 6-5: Infiltration Trench Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume (SQDV)	acre-feet	See Section 2 and Appendix E for calculating SQDV.
Design drawdown time	hr	12 – 72, see Appendix D, Section D.2
Trench bottom elevation	feet	5 feet from seasonally high groundwater table
Setbacks	feet	100 feet from wells, fields, springs Geotechnical expert should establish the setback requirement from building foundations that must be ≥ 8 ft Do not locate under tree drip-lines
Pretreatment	-	BIO-3: Vegetated Swale, BIO-4: Filter Strip, proprietary device, or sedimentation forebay, for all surfaces other than roofs
Design percolation rate, (P_{design})	in/hr	Measured percolation rate must be corrected based onsite suitability assessment and design related considerations described in this fact sheet
Maximum depth of facility (d_{max})	feet	8.0; Defined by the design infiltration rate and the design drawdown time (includes ponding depth and depth of media)
Surface area of facility (A)	square feet	Based on depth of ponding (if applicable) and depth of trench media
Facility geometry	-	Minimum 24 inches wide and maximum 5 feet deep; max 3% bottom slope
Filter media diameter	inches	1 – 3 (gravel); prefabricated media may also be used
Trench lining material	-	Geotextile fabric
Overflow device	-	Required if system is on-line

Geotechnical Considerations

An extensive geotechnical site investigation must be undertaken early in the site planning process to verify site suitability for the installation of infiltration facilities due to the potential to contaminate groundwater, cause slope instability, impact surrounding structures, and have insufficient infiltration capacity. Soil infiltration rates and the water table depth should be evaluated to ensure that conditions are satisfactory for proper operation of an infiltration facility. See Appendix C for guidance on infiltration testing.

The project designer must demonstrate through infiltration testing, soil logs, and the written opinion of a licensed civil engineer that sufficiently permeable soils exist onsite to allow the construction of a properly functioning infiltration facility.

1) Infiltration facilities require a minimum soil infiltration rate of 0.5 inches/hour. If infiltration rates exceed 2.4 inches/hour, then the runoff should be fully treated in an upstream BMP prior to infiltration to protect groundwater quality. Pretreatment for coarse sediment removal is required in all instances.

2) Groundwater separation must be at least 5 feet from the trench bottom to the measured season high groundwater elevation or estimated high groundwater mounding elevation. Groundwater level measurements must be made during the time when water level is expected to be at a maximum (i.e., toward the end of the wet season).

3) Sites with a slope greater than 25% (4:1) should be excluded. A geotechnical analysis and report addressing slope stability are required if located on slopes greater than 15%.

Soil Assessment and Site Geotechnical Investigation Reports

The soil assessment report should:

- State whether the site is suitable for the proposed infiltration trench;
- Recommend a design infiltration rate (see the Step 2 of sizing methodology section, "Determine the design percolation rate," in the Infiltration Basin fact sheet above);
- Identify the seasonally high depth to groundwater table surface elevation.
- Provide a good understanding of how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water; and
- If a geotechnical investigation and report are required, the report should:
    - Provide a written opinion by a professional civil engineer describing whether the infiltration trench will compromise slope stability; and

- Identify potential impacts to nearby structural foundations.

Setbacks

1) Infiltration facilities shall be setback a minimum of 100 feet from proposed or existing potable wells, non-potable wells, septic drain fields, and springs.

2) Infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.

3) Infiltration BMPs must be setback from building foundations at least eight feet or an alternative setback established by the geotechnical expert for the project.

Pretreatment

Pretreatment is required for infiltration trenches in order to reduce the sediment load entering the facility and maintain the infiltration rate of the facility. Pretreatment refers to design features that provide settling of large particles before runoff reaches a management practice; easing the long-term maintenance burden. Pretreatment is important for most all structural stormwater BMPs, but it is particularly important for infiltration BMPs. To ensure that pretreatment mechanisms are effective, designers should incorporate sediment reduction practices. Sediment reduction BMPs may include vegetated swales, vegetated filter strips, sedimentation basins or forebays, sedimentation manholes and hydrodynamic separation devices.

For design specification of selected pre-treatment devices, refer to:

- VEG-3: Vegetated swales
- VEG-4: Vegetated filter strips
- TCM-4: Sand filters
- TCM-5: Cartridge media filters
- PT-1: Hydrodynamic separation device

Sizing Criteria

See Sizing Criteria section in the INF-1: Infiltration Basin fact sheet.

Geometry and Sizing

1) Infiltration trenches should be at least 2 feet wide and 3 to 5 feet deep.

2) The longitudinal slope of the trench should not exceed 3%.

3) The filter bed media layers should have the following composition and thickness:

a. Top layer – If stormwater runoff enters the top of the trench via sheet flow at the ground surface, then the top 2 inches should be pea gravel with a thin 2 to 4 inch layer of pure sand and 2 inch layer of chocking stone (e.g., #8) to capture sediment before entering the trench. If stormwater runoff enters the trench from an underground pipe, pretreatment prior to entry into the trench is required.

b. Middle layer (3 to 5 feet of washed, 1.5 to 3 inch gravel). Void space should be in the range of 30 percent to 40 percent.

c. Bottom layer (6 inches of clean, washed sand to encourage drainage and prevent compaction of the native soil while the stone aggregate is added).

4) One or more observation wells should be installed, depending on trench length, to check for water level, drawdown time, and evidence of clogging. A typical observation well consists of a slotted PVC well screen, 4 to 6 inches in diameter, capped with a lockable, above-ground lid.

Drainage

1) The bottom of the infiltration bed must be native soil, over-excavated to at least one foot in depth and replaced uniformly without compaction. Amending the excavated soil with 2 to 4 inches (~15% to 30%) of coarse sand is recommended.

2) The hydraulic conductivity of the subsurface layers should be sufficient to ensure the design drawdown time. An observation well should be incorporated to allow observation of drain time.

Emergency Overflow

1) There must be an overflow route for stormwater flows that overtop the facility or in case the infiltration facility becomes clogged.

2) The overflow channel must be able to safely convey flows from the peak design storm to the downstream stormwater conveyance system or other acceptable discharge point.

Vegetation

1) Trees and other large vegetation should be planted away from trenches such that drip lines do not overhang infiltration beds.

Maintenance Access

1) The facility and outlet structures must all be safely accessible during wet and dry weather conditions.

2) An access road along the length of the trench is required, unless the trench is located along an existing road or parking lot that can be safely used for maintenance access.

3) If the infiltration trench becomes plugged and fails, then access is needed to excavate the facility to remove and replace the top layer or the filter bed media, as well as to increase all dimensions of the facility by 2 inches to provide a fresh surface for infiltration. To prevent damage and compaction, access must be able to accommodate a backhoe working at “arms length”.

Construction Considerations

To preserve and avoid the loss of infiltration capacity, the following construction guidelines are specified:

1) The entire area draining to the facility must be stabilized before construction begins. If this is impossible, a diversion berm should be placed around the perimeter of the infiltration site to prevent sediment entering during construction.

2) Infiltration trenches should not be hydraulically connected to the stormwater conveyance system until all contributing tributary areas are stabilized as shown on the Contract Plans and to the satisfaction of the Engineer. Infiltration trenches should not be used as sediment control facilities.

3) Compaction of the subgrade with heavy equipment should be minimized to the maximum extent possible. If the use of heavy equipment on the base of the facility cannot be avoided, the infiltrative capacity should be restored by tilling or aerating prior to placing the infiltrative bed.

4) The exposed soils should be inspected by a civil engineer after excavation to confirm that soil conditions are suitable.

Operations and Maintenance

Infiltration facility maintenance should include frequent inspections to ensure that water infiltrates into the subsurface completely within the design drawdown time after a storm.

Maintenance and regular inspections are of primary importance if infiltration trenches are to continue to function as originally designed. A specific maintenance plan shall be developed specific to each facility outlining the schedule and scope of maintenance operations, as well as the documentation and reporting requirements. The following are general maintenance requirements:

1) Regular inspection should determine if the sediment pretreatment structures require preventative maintenance. Inspect a minimum of twice a year, before and after the rainy season, after large storms, or more frequently if needed.

2) If water is noticed in the observation well of the infiltration trench more than 72 hours after a major storm, the infiltration trench may be clogged. Maintenance activities triggered by a potentially clogged facility include:

a. For trenches, assess the condition of the top aggregate layer for sediment buildup and crusting. Remove top layer of pea gravel and replace. If slow draining conditions persist, entire trench may need to be excavated and replaced.

3) Any debris or algae growth located on top of the infiltration facility should be removed and disposed of properly.

4) Inspect a minimum of twice a year, before and after the rainy season, after large storms, or more frequently if needed.

5) Clean when loss of infiltrative capacity is observed. If drawdown time is observed to have increased significantly over the design drawdown time, removal of sediment may be necessary. This is an expensive maintenance activity and the need for it can be minimized through prevention of upstream erosion.

6) Mow as appropriate for vegetative cover species.

7) Monitor health of vegetation and replace as necessary.

8) Control mosquitoes as necessary.

9) Remove litter and debris from trench area as required.

INF-3: Bioretention

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plantings. An optional gravel layer can be added below the planting soil to provide additional storage volume for infiltration. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. For areas with low permeability native soils or steep slopes, see section INF-7: Bioinfiltration or BIO-1: Bioretention with Underdrain for relevant design specifications.

Bioretention in Parkway and parking lots

Photo Credits: Geosyntec Consultants

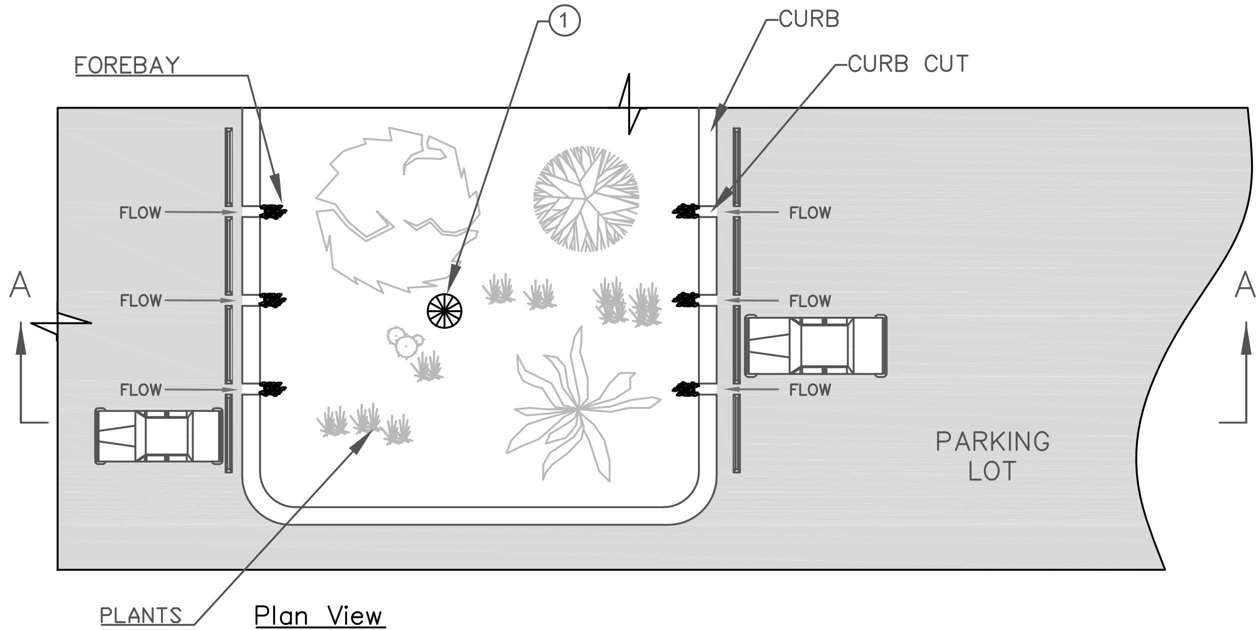
Application

- Commercial, residential, mixed use, institutional, and recreational uses
- Parking lot islands, traffic circles
- Road parkways & medians

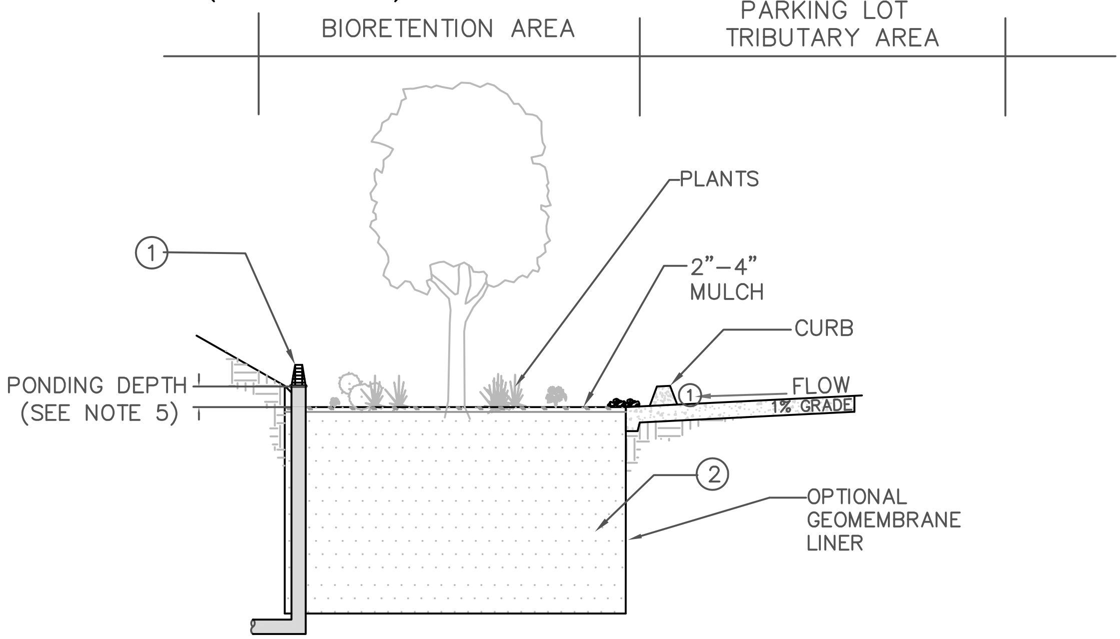
Preventative Maintenance

- Repair small eroded areas
- Remove trash and debris and rake surface soils
- Remove accumulated fine sediments, dead leaves and trash
- Remove weeds and prune back excess plant growth
- Remove sediment and debris accumulation near inlet and outlet structures
- Periodically observe function under wet weather conditions

Plan View
(Not to Scale)



Plan View
(Not to Scale)



Section A – A'
(Not to Scale)

NOTES:

① OVERFLOW DEVICE: VERTICAL RISER OR EQUIVALENT.
② 2' MIN PLANTING MIX; 3' PREFERRED.
③ PONDING DEPTH 18" WITH FENCE; 6" WITHOUT FENCE.

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Figure 6-4: Bioretention

Limitations

The following limitations should be considered before choosing to use bioretention:

1) Native soil infiltration rate - soil permeability at the bioretention location must be at least 0.5 inches per hour.

2) Depth to groundwater, bedrock, or low permeability soil layer – 5 feet vertical separation is required between the bottom of the infiltration trench and the seasonal high groundwater level or mounded groundwater level, bedrock, or other barrier to infiltration to ensure that the facility will completely drain between storms and that infiltrating water will receive adequate treatment though the soils before it reaches the groundwater.

3) Slope stability - infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.

4) Setbacks - a minimum setback (100 feet or more) must be provided between infiltration BMPs and potable wells, non-potable wells, drain fields, and springs. Infiltration BMPs must be setback from building foundations at least eight feet or have an alternative setback established by the geotechnical expert for the project.

5) Groundwater contamination - the application of infiltration BMPs should include significant pretreatment in an area identified as an unconfined aquifer to ensure groundwater is protected for pollutants of concern.

6) Contaminated soils or groundwater plumes - infiltration BMPs are not allowed at locations with contaminated soils or groundwater where the pollutants could be mobilized or exacerbated by infiltration, unless a site-specific analysis determines that infiltration would be beneficial.

7) High pollutant land uses - infiltration BMPs should not be placed in high-risk areas such as at or near service/gas stations, truck stops, and heavy industrial sites due to the groundwater contamination risk unless a site-specific evaluation demonstrates that sufficient pretreatment is provided to address pollutants of concern, high risks areas are isolated from stormwater runoff, or infiltration areas have little chance of spill migration.

8) High sediment loading rates – infiltration BMPs may clog quickly if sediment loads are high (e.g., unstabilized site) or if flows are not adequately pretreated.

9) Vertical relief and proximity to storm drain - site must have adequate relief between the land surface and storm drain to permit vertical percolation through the soil media and collection.

Design Criteria

Bioretention should be designed according to the requirements listed in Table 6-6 and outlined in the section below. BMP sizing worksheets are presented in Appendix E.

Table 6-6: Bioretention Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume (SQDV)	acre-feet	See Section 2 and Appendix E for calculating SQDV.
Forebay	-	Forebay should be provided for all tributary surfaces that contain landscaped areas. Forebays should be designed to prevent standing water during dry weather and should be planted with a plant palette that is tolerant of wet conditions.
Maximum drawdown time of water ponded on surface	hours	48
Maximum drawdown time of surface ponding plus subsurface pores	hours	96 (72 preferred)
Maximum ponding depth	inches	18
Minimum thickness of amended soil	feet	2 (3 preferred)
Minimum thickness of stabilized mulch	inches	2 to 3
Planting mix composition	-	60 to 80% fine sand, 20 to 40% compost
Overflow device	-	Required

Sizing Criteria

Bioretention facilities can be sized using one of two methods: a simple sizing method or a routing modeling method. With either method the SQDV volume must be completely infiltrated within 96 hours (including subsurface pore space), and surface ponding must be infiltrated within 48 hours. The simple sizing procedure is provided below. For the routing modeling method, refer to TCM-4 Sand Filters.

Step 1: Calculate the Design Volume

Bioretention facilities shall be sized to capture and infiltrate the SQDV volume (see Section 2.3 and Appendix E).

Step 2: Determine the Design Percolation Rate

The percolation rate through the BMP and to the subsurface will decline between maintenance cycles as the surface becomes occluded and particulates accumulate in the infiltration layer. Monitoring of actual facility performance has shown that the full-scale infiltration rate is far lower than the rate measured by small-scale testing. It is important that adequate conservatism is incorporated in the selection of design percolation rates. For bioretention facilities, the design percolation rate discussed here is the adjusted percolation rate of the underlying soils and not the percolation rate of the filter media bed.

<u>Considerations for Design Percolation Rate Corrections</u>

Suitability assessment-related considerations include (Table 6-7):

- Soil assessment methods – the site assessment extent (e.g., number of borings, test pits, etc.) and the measurement method used to estimate the short-term infiltration rate.

- Predominant soil texture/percent fines – soil texture and the percent of fines can greatly influence the potential for clogging.

- Site soil variability – site with spatially heterogeneous soils (vertically or horizontally) as determined from site investigations are more difficult to estimate average properties, resulting in a higher level of uncertainty associated with initial estimates.

- Depth to seasonal high groundwater/impervious layer – groundwater mounding may become an issue during excessively wet conditions where shallow aquifers or shallow clay lenses are present.

Localized infiltration testing refers to methods such as the double ring infiltrometer test (ASTM D3385-88), which measure infiltration rates over an area less than 10 sq-ft and do not attempt to account for soil heterogeneity. Extensive infiltration testing refers to methods that include excavating a significant portion of the proposed infiltration area, filling the excavation with water, and monitoring drawdown. In all cases, testing should be conducted in the area of the proposed BMP where, based on geotechnical data, soils appear least likely to support infiltration.

Table 6-7: Suitability Assessment Related Considerations for Infiltration Facility Safety Factors

Consideration	High Concern	Medium Concern	Low Concern
Assessment methods	Use of soil survey maps or simple texture analysis to estimate short-term infiltration rates	Direct measurement of ≥ 20 percent of infiltration area with localized infiltration measurement methods (e.g., infiltrometer)	Direct measurement of ≥ 50 percent of infiltration area with localized infiltration measurement methods or Use of extensive test pit infiltration measurement methods
Ventura Hydrology Manual soil number (measured infiltration rate)	3 (f = 0.5 – 0.64)	4 or 5 (f = 0.65 – 0.91)	6 or 7 (f = 0.92 or higher)
Site soil variability	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment	Soil borings/test pits indicate moderately homogeneous soils	Multiple soil borings/test pits indicate relatively homogeneous soils
Depth to groundwater/ impervious layer	<10 ft below facility bottom	10-30 ft below facility bottom	>30 below facility bottom

Design related considerations include:

- Size of area tributary to facility – all things being equal, both physical and economic risk factors related to infiltration facilities increase with an increase in the tributary area served. Therefore facilities serving larger tributary areas should use more restrictive adjustment factors.
- Level of pretreatment/expected influent sediment loads – credit should be given for good pretreatment by allowing less restrictive factors to account for the reduced probability of clogging from high sediment loading. Also, facilities designed to capture runoff from relatively clean surfaces such as rooftops are likely to see low sediment loads and therefore should be allowed to apply less restrictive safety factors.
- Redundancy – facilities that consist of multiple subsystems operating in parallel such that parts of the system remain functional when other parts fail and/or bypass should be rewarded for the built-in redundancy with less restrictive

correction and safety factors. For example, if bypass flows would be at least partially treated in another BMP, the risk of discharging untreated runoff in the event of clogging the primary facility is reduced. A bioretention facility that overflows to a landscaped area is another example.

- Compaction during construction – proper construction oversight is needed during construction to ensure that the bottoms of bioretention facility are not overly compacted. Facilities that do not commit to proper construction practices and oversight should have to use more restrictive correction and safety factors.

Table 6-8: Design Related Considerations for Infiltration Facility Safety Factors

Consideration	High Concern	Medium Concern	Low Concern
Tributary area size	Greater than 10 acres.	Greater than 2 acres but less than 10 acres.	2 acres or less.
Level of pre-treatment/ expected influent sediment loads	Pre-treatment from gross solids removal devices only, such as hydrodynamic separators, racks and screens, AND tributary area includes landscaped areas, steep slopes, high traffic areas, or any other areas expected to produce high sediment, trash, or debris loads.	Good pre-treatment with BMPs that mitigate coarse sediments such as vegetated swales AND influent sediment loads from the tributary area are expected to be relatively low (e.g., low traffic, mild slopes, disconnected impervious areas, etc.).	Excellent pre-treatment with BMPs that mitigate fine sediments such as bioretention or media filtration OR sedimentation or facility only treats runoff from relatively clean surfaces, such as rooftops.
Redundancy of treatment	No redundancy in BMP treatment train.	Medium redundancy, other BMPs available in treatment train to maintain at least 50% of function of facility in event of failure.	High redundancy, multiple components capable of operating independently and in parallel, maintaining at least 90% of facility functionality in event of failure.
Compaction during construction	Construction of facility on a compacted site or elevated probability of unintended/ indirect compaction.	Medium probability of unintended/ indirect compaction.	Heavy equipment actively prohibited from infiltration areas during construction and low probability of unintended/ indirect compaction.

Adjust the measured short-term infiltration rate using a weighted average of several safety factors using the worksheet shown in Table 6-9 below. The design percolation rate would be determined as follows:

- For each consideration shown in Tables 6-7 and 6-8 above, determine whether the consideration is a high, medium, or low concern.
- For all high concerns assign a factor value of 3, for medium concerns assign a factor value of 2, and for low concerns assign a factor value of 1.
- Multiply each of the factors by the corresponding weight to get a product.
- Sum the products within each factor category to obtain a safety factor for each.
- Multiply the two safety factors together to get the final combined safety factor. If the combined safety factor is less than 2, then use 2 as the safety factor.
- Divide the measured short-term infiltration rate by the combined safety factor to obtain the adjusted design percolation rate for use in sizing the infiltration facility.

Table 6-9: Infiltration Facility Safety Factor Determination Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25		
		Predominant soil texture	0.25		
		Site soil variability	0.25		
		Depth to groundwater / impervious layer	0.25		
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			
B	Design	Tributary area size	0.25		
		Level of pre-treatment/ expected sediment loads	0.25		
		Redundancy	0.25		
		Compaction during construction	0.25		
		Design Safety Factor, $S_B = \Sigma p$			
Combined Safety Factor = S_A x S_B					

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.

Step 3: Calculate the surface area

Determine the size of the required infiltrating surface by assuming the SQDV will fill the available ponding depth plus the void spaces in the media, based on the computed porosity of the filter media and optional aggregate layer.

1) Determine the maximum depth of surface ponding that can be infiltrated within the required surface drain time (48 hr), (d_{max}), as follows:

$$d_{\max} = \frac{P_{design} \times t_{ponding}}{12\frac{in}{ft}} \qquad \text{(Equation 6-6)}$$

Where:

$t_{ponding}$ = required drain time of surface ponding (48 hrs)

P_{design} = design percolation rate of underlying soils (in/hr) (see Step 2, above)

d_{max} = the maximum depth of surface ponding water that can be infiltrated within the required drain time (ft), calculated using Equation 6-6

2) Choose surface ponding depth (d_p) such that:

$$d_p \le d_{\max} \qquad \text{(Equation 6-7)}$$

Where:

d_p = selected surface ponding depth (ft)

d_{max} = the maximum depth of water that can be infiltrated within the required drain time (ft)

Choose thickness(es) of amended media and optional gravel storage layer and calculate total effective storage depth of the bioretention area ($d_{effective}$), as follows:

$$d_{effective} \le (d_p + n^*_{media} l_{media} + n_{gravel} l_{gravel}) \qquad \text{(Equation 6-8)}$$

Where:

$d_{effective}$ = total equivalent depth of water stored in bioretention area (ft), including surface ponding and volume available in pore spaces of media and gravel layers

d_p = surface ponding depth (ft), chosen using Equation 6-7

n^*_{media} = available porosity of amended soil media (ft/ft), approximately 0.25 ft/ft accounting for antecedent moisture conditions. This represents the volume of available pore space as a fraction of the total soil volume; sometimes has units of (ft^3/ft^3) or described as a percentage.

l_{media} = thickness of amended soil media layer (ft), minimum 2 ft

n_{gravel} = porosity of optional gravel layer (ft/ft), approximately 0.40 ft/ft

l_{gravel} = thickness of optional gravel layer (ft)

3) Check that entire effective depth (surface plus subsurface storage), $d_{effective}$, infiltrates in no greater than 96 hours as follows:

$$t_{total} = \frac{d_{effective}}{P_{design}} \times 12 \frac{in}{ft} \leq 96\ hr \qquad \text{(Equation 6-9)}$$

Where:

$d_{effective}$ = total equivalent depth of water stored in bioretention area (ft), calculated using Equation 6-8

P_{design} = design percolation rate of underlying soils (in/hr) (see Step 2, above)

If $t_{total} > 96$ hrs, then reduce surface ponding depth and/or amended media thickness and/or gravel thickness and return to 1).

If $t_{total} \leq 96$ hrs, then proceed to 5).

4) Calculate required infiltrating surface area, (A_{req}):

$$A_{req} = \frac{SQDV}{d_{effective}} \qquad \text{(Equation 6-10)}$$

Where:

A_{req} = required infiltrating area (ft^2). Should be calculated at the contour corresponding to the mid ponding depth (i.e., $0.5 \times d_p$ from the bottom of the facility).

$SQDV$ = stormwater quality design volume (ft^3)

$d_{effective}$ = total equivalent depth of water stored in bioretention area (ft), calculated using Equation 6-8

5) Calculate total footprint required by including a buffer for side slopes and freeboard; A_{req} is calculated at the contour corresponding to the mid ponding depth (i.e., $0.5 \times d_p$ from the bottom of the facility).

Geometry

1) Bioretention areas shall be sized to capture and treat the stormwater quality design volume (See Section 2 and Appendix E for calculating SQDV) with an 18-inch maximum ponding depth. *The intention is that ponding depth be limited to a depth that will allow for a health vegetation layer.*

2) Minimum planting soil depth should be 2 feet, although 3 feet is preferred. *The intention is that the minimum planting soil depth should provide a beneficial root zone for the chosen plant palette and adequate water storage for the SQDV.*

3) A gravel storage layer below the bioretention soil media to promote infiltration into the native soil is optional.

4) Bioretention should be designed to drain below the planting soil in less than 48 hours and completely drain in less than 96 hours. *The intention is that soils must be allowed to dry out periodically in order to restore hydraulic capacity needed to receive flows from subsequent storms, maintain infiltration rates, maintain adequate soil oxygen levels for healthy soil biota and vegetation, and to provide proper soil conditions for biodegradation and retention of pollutants.*

Flow Entrance and Energy Dissipation

The following types of flow entrance can be used for bioretention cells:

1) Dispersed, low velocity flow across a landscape area. Dispersed flow may not be possible given space limitations or if the facility is controlling roadway or parking lot flows where curbs are mandatory.

2) Dispersed flow across pavement or gravel and past wheel stops for parking areas.

3) Curb cuts for roadside or parking lot areas: curb cuts should include rock or other erosion protection material in the channel entrance to dissipate energy. Flow entrance should drop 2 to 3 inches from curb line and it should provide a settling area and periodic sediment removal of coarse material before flow dissipates to the remainder of the cell.

4) Pipe flow entrance: Piped entrances, such as roof downspouts, should include rock, splash blocks, or other appropriate measures at the entrance to dissipate energy and disperse flows.

Woody plants (trees, shrubs, etc.) can restrict or concentrate flows and can be damaged by erosion around the root ball and should not be placed directly in the entrance flow path.

Overflow

An overflow device is required at the 18-inch ponding depth. The following, or equivalent should be provided:

1) A vertical PVC pipe (SDR 35) to act as an overflow riser.

2) The overflow riser(s) should be 6 inches or greater in diameter, so it can be cleaned without damage to the pipe.

The inlet to the riser should be at the ponding depth (18 inches for fenced bioretention areas and 6 inches for areas that are not fenced), and be capped with a spider cap to exclude floating mulch and debris. Spider caps should be screwed in or glued, i.e., not removable.

Hydraulic Restriction Layers

Infiltration pathways may need to be restricted due to the close proximity of roads, foundations, or other infrastructure. A geomembrane liner, or other equivalent water proofing, may be placed along the vertical walls to reduce lateral flows. This liner should have a minimum thickness of 30 mils.

Planting/Storage Media

1) The planting media placed in the cell should achieve a long-term, in-place infiltration rate of at least 1 inch per hour. Higher infiltration rates are permissible. If the design long-term, in-place infiltration rate of the soil exceeds 12 inches per hour, documentation should be provided to demonstrate that the media will adequately address pollutants of concern at a higher flowrate. Bioretention soil shall also support vigorous plant growth.

2) Planting media should consist of 60 to 80% fine sand and 20 to 40% compost.

3) Sand should be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size should be non-plastic. Sand for bioretention should be analyzed by an accredited lab using #200, #100, #40, #30, #16, #8, #4, and 3/8 sieves (ASTM D 422 or as approved by the local permitting authority) and meet the following gradation (Note: all sands complying with ASTM C33 for fine aggregate comply with the gradation requirements below):

Sieve Size (ASTM D422)	% Passing (by weight)	
	Minimum	Maximum
3/8 inch	100	100
#4	90	100
#8	70	100
#16	40	95
#30	15	70
#40	5	55
#100	0	15
#200	0	5

Note: the gradation of the sand component of the media is believed to be a major factor in the hydraulic conductivity of the media mix. If the desired hydraulic conductivity of the media cannot be achieved within the specified proportions of sand and compost (#2), then it may be necessary to utilize sand at the coarser end of the range specified in above ("minimum" column).

4) Compost should be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes, or other organic materials not including manure or biosolids meeting standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program). Compost quality should be verified via a lab analysis to be:

- Feedstock materials shall be specified and include one or more of the following: landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
- Organic matter: 35-75% dry weight basis.
- Carbon and Nitrogen Ratio: 15:1 < C:N < 25:1
- Maturity/Stability: shall have dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120 F) upon delivery or rewetting is not acceptable.
- Toxicity: any one of the following measures is sufficient to indicate non-toxicity:
    - NH4:NH3 < 3
    - Ammonium < 500 ppm, dry weight basis
    - Seed Germination > 80% of control
    - Plant trials > 80% of control

- Solvita® > 5 index value

- Nutrient content:

  - Total Nitrogen content 0.9% or above preferred

  - Total Boron should be <80 ppm, soluble boron < 2.5 ppm

- Salinity: < 6.0 mmhos/cm

- pH between 6.5 and 8 (may vary with plant palette)

Compost for bioretention should be analyzed by an accredited lab using #200, ¼ inch, ½ inch, and 1 inch sieves (ASTM D 422 or as approved by the local permitting authority) and meet the following gradation:

Sieve Size (ASTM D422)	% Passing (by weight)	
	Minimum	Maximum
1 inch	99	100
½ inch	90	100
¼ inch	40	90
#200	2	10

Tests should be sufficiently recent to represent the actual material that is anticipated to be delivered to the site. If processes or sources used by the supplier have changed significantly since the most recent testing, new tests should be requested.

Note: the gradation of compost used in bioretention media is believed to play an important role in the saturated hydraulic conductivity of the media. To achieve a higher saturated hydraulic conductivity, it may be necessary to utilize compost at the coarser end of this range (“minimum” column). The percent passing the #200 sieve (fines) is believed to be the most important factor in hydraulic conductivity.

In addition, a coarser compost mix provides more heterogeneity of the bioretention media, which is believed to be advantageous for more rapid development of soil structure needed to support health biological processes. This may be an advantage for plant establishment with lower nutrient and water input.

5) The bioretention area should be covered with 2 to 4 inches (average 3 inches) of mulch at the start and an additional placement of 1 to 2 inches of mulch should be added annually. *The intention is that to help sustain the nutrient levels, suppress weeds, retain moisture, and maintain infiltration capacity*.

Plants

1) Plant materials should be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 to 96 hours.

2) It is recommended that a minimum of three types of tree, shrubs, and/or herbaceous groundcover species be incorporated to protect against facility failure due to disease and insect infestations of a single species.

3) Native plant species and/or hardy cultivars that are not invasive and do not require chemical inputs should be used to the maximum extent practicable.

Operations and Maintenance

Bioretention areas require annual plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant removal capabilities. In general, bioretention maintenance requirements are typical landscape care procedures and include:

1) Watering: Plants should be drought-tolerant. Watering may be required during prolonged dry periods after plants are established.

2) Erosion control: Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred (see Appendix I for a bioretention inspection and maintenance checklist). Properly designed facilities with appropriate flow velocities should not have erosion problems, except perhaps in extreme events. If erosion problems occur, the following should be reassessed: (1) flow velocities and gradients within the cell, and (2) flow dissipation and erosion protection strategies in the pretreatment area and flow entrance. If sediment is deposited in the bioretention area, immediately determine the source within the contributing area, stabilize, and remove excess surface deposits.

3) Plant material: Depending on aesthetic requirements, occasional pruning and removing of dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause and, if necessary, replace with more appropriate species. Periodic weeding is necessary until plants are established. The weeding schedule should become less frequent if the appropriate plant species and planting density have been used and, as a result, undesirable plants excluded.

4) Nutrients and pesticides: The soil mix and plants should be selected for optimum fertility, plant establishment, and growth. Nutrient and pesticide inputs should not be required and may degrade the pollutant processing capability of the bioretention area, as well as contribute pollutant loads to receiving waters. By design, bioretention facilities are located in areas where phosphorous and nitrogen levels are often elevated and these should not be limiting nutrients. If in question, have soil analyzed for fertility.

5) Mulch: Replace mulch annually in bioretention facilities where heavy metal deposition is likely (e.g., contributing areas that include industrial and auto dealer/repair parking lots and roads). In residential lots or other areas where metal

deposition is not a concern, replace or add mulch as needed to maintain a 2 to 3 inch depth at least once every two years.

6) Soil: Soil mixes for bioretention facilities are designed to maintain long-term fertility and pollutant processing capability. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental concern for at least 20 years in bioretention systems. Replacing mulch in bioretention facilities where heavy metal deposition is likely provides an additional level of protection for prolonged performance. If in question, have soil analyzed for fertility and pollutant levels.

INF-4: Drywell

A dry well is defined as a bored, drilled, or driven shaft or hole whose depth is greater than its width. A dry well is designed specifically for flood alleviation and stormwater disposal. Drywells are similar to infiltration trenches in their design and function, as they are designed to temporarily store and infiltrate runoff, primarily from rooftops or other impervious areas with low pollutant loading. A dry well may be either a small excavated pit filled with aggregate or a prefabricated storage chamber or pipe segment.

Dry wells can be used to reduce the increased volume of stormwater runoff caused by roofs of buildings. While generally not a significant source of runoff pollution, roofs are one of the most important sources of new or increased runoff volume from land development sites. Dry wells can also be used to indirectly enhance water quality by reducing the amount of SQDV to be treated by the other, downstream stormwater management facilities.

Drywell installation

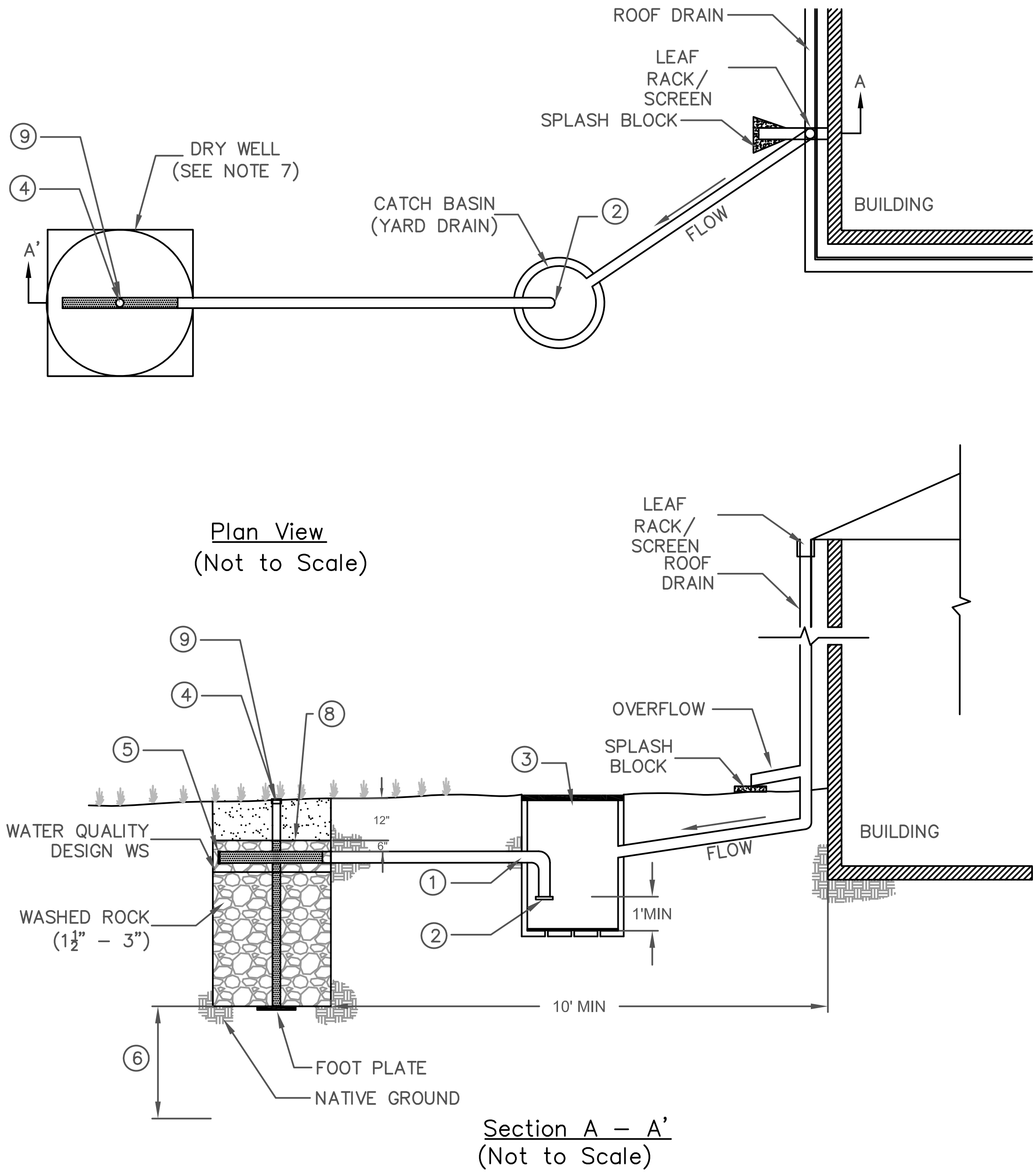
Photo Credits: 1. K&A Enterprises; 2. Canale Landscaping

Application

- Infiltration of roof runoff

Preventative Maintenance

- Remove trash, debris, and sediment at inlet and outlets
- Wet weather inspection to ensure drain time
- Inspect for mosquito breeding



NOTES:

1. MINIMUM 4" – 6" DIAMETER PVC PIPE. INSTALL AT FLAT SLOPE.
2. INSTALL FINE MESH SCREEN AT INLET TO DRY WELL. SET INLET ELEVATION AT 1' MINIMUM ABOVE CATCH BASIN BOTTOM.
3. CATCH BASIN (YARD DRAIN) INSTALLED WITH A SOLID LID FLUSH WITH GROUND SURFACE.
4. 4–6" VERTICAL PERFORATED PVC INSPECTION WELL WITH SCREW LID (NUT DOWN) FLUSH WITH GROUND SURFACE.
5. CAP END OF 4–6" HORZONTAL PERFORATED PVC DISPERSION PIPE.
6. MINIMUM 10' ABOVE SEASONAL HIGH GROUNDWATER TABLE AND 3' ABOVE BEDROCK.
7. DRY WELL CONFIGURATION MAY VARY (E.G. PRE–FAB MAY BE CIRCULAR).
8. CHOKING STONE LAYER SHALL BE PLACED ON TOP OF THE DRY WELL TO SEPARATE IT FROM THE TOPSOIL AND PREVENT CLOGGING.

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Figure 6-5: Drywell

Limitations

The following limitations shall be considered before choosing to use a dry well:

- Native soil infiltration rate – soil permeability at the infiltration basin location must be at least 0.5 inches per hour.
- Depth to groundwater, bedrock, or low permeability soil layer – 5 feet vertical separation is required between the bottom of the infiltration basin and the seasonal high groundwater level or mounded groundwater level, bedrock, or other barrier to infiltration to ensure that the facility will completely drain between storms and that infiltrating water will receive adequate treatment though the soils before it reaches the groundwater.
- Slope stability - infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.
- Setbacks - a minimum setback (100 feet or more) must be provided between infiltration BMPs and potable wells, non-potable wells, drain fields, and springs. Infiltration BMPs must be setback from building foundations at least eight feet or have an alternative setback established by the geotechnical expert for the project.
- Groundwater contamination - the application of infiltration BMPs should include significant pretreatment in an area identified as an unconfined aquifer, to ensure groundwater is protected from pollutants of concern.
- Contaminated soils or groundwater plumes - infiltration BMPs are not allowed at locations with contaminated soils or groundwater where the pollutants could be mobilized or exacerbated by infiltration, unless a site-specific analysis determines the infiltration would be beneficial.
- High pollutant land uses - infiltration BMPs should not be placed in high-risk areas such as at or near service/gas stations, truck stops, and heavy industrial sites due to groundwater contamination risk unless a site-specific evaluation demonstrates that sufficient pretreatment is provided to address pollutants of concern, high risks areas are isolated from stormwater runoff, or infiltration areas have little chance of spill migration.
- High sediment loading rates – infiltration BMPs may clog quickly if sediment loads are high (e.g., unstabilized site) or if flows are not adequately pretreated.
- Dry wells cannot receive untreated stormwater runoff, except rooftop runoff. Pretreatment of runoff from other surfaces is necessary to prevent premature failure that results from clogging with fine sediment, and to prevent potential groundwater contamination due to nutrients, salts, and hydrocarbons.

- Infiltration structures cannot be used to treat runoff from portions of the site that are not stabilized.
- Rehabilitation of failed dry wells requires complete reconstruction.

Design Criteria

The main challenge associated with drywells, as with infiltration trenches, is the prevention of system clogging and subsequent infiltration inhibition. Drywells should be designed according to the requirements listed in Table 6-10 and outlined in the section below. BMP sizing worksheets are presented in Appendix E.

Table 6-10: Infiltration BMP Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume (SQDV)	acre-feet	See Section 2 and Appendix E for calculating SQDV.
Design drawdown time	hour	12
Pretreatment	-	BIO-3: Vegetated Swale, BIO-4: Filter Strip, proprietary device, or equivalent.
Design percolation rate (k_{design})	in/hr	Shall be corrected for testing method, potential for clogging and compaction over time, and facility geometry.
Maximum depth of facility (d_{max})	feet	Defined by the design infiltration rate and the design drawdown time (includes depth of media).
Surface area of facility (A)	ft^2	Based on depth of dry well media.
Facility geometry	-	Geometry varies; max 10 feet deep; flat bottom slope.
Filter media diameter	inches	1.5 – 3 (gravel); prefabricated media may also be used
Overflow device	-	Required if system is on-line

Geotechnical Considerations

An extensive geotechnical site investigation must be undertaken early in the site planning process to verify site suitability for the installation of infiltration facilities, due to the potential to contaminate groundwater, cause slope instability, impact surrounding structures, and have insufficient infiltration capacity. Soil infiltration rates and the water table depth should be evaluated to ensure that conditions are satisfactory for proper operation of an infiltration facility. See Appendix C for guidance on infiltration testing.

The project designer must demonstrate through infiltration testing, soil logs, and the written opinion of a licensed civil engineer that sufficiently permeable soils exist on site to allow the construction of a properly functioning infiltration facility.

1) Infiltration facilities require a minimum soil infiltration rate of 0.5 inches/hour. If infiltration rates exceed 2.4 inches/hour, then the runoff should be fully-treated in an upstream BMP prior to infiltration to protect groundwater quality. Pretreatment for coarse sediment removal is required in all instances.

2) Groundwater separation must be at least 5 feet from the basin bottom to the measured season high groundwater elevation or estimated high groundwater mounding elevation. Measurements of groundwater levels must be made during the time when water level is expected to be at a maximum (i.e., toward the end of the wet season).

3) Sites with a slope greater than 25% (4:1) should be excluded. A geotechnical analysis and report addressing slope stability are required if located on slopes greater than 15%.

Soil Assessment and Site Geotechnical Investigation Reports

The soil assessment report should:

- State whether the site is suitable for the proposed drywell;
- Recommend a design infiltration rate (see the Step 2 of sizing methodology section, “Determine the design percolation rate,” in the INF-1: Infiltration Basin fact sheet above);
- Identify the seasonal high depth to groundwater table surface elevation;
- Provide a good understanding of how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water; and
- If a geotechnical investigation and report are required, the report should:
  - Provide a written opinion by a professional civil engineer describing whether the drywell will compromise slope stability; and
  - Identify potential impacts to nearby structural foundations.

Setbacks

1) Infiltration facilities shall be setback a minimum of 100 feet from proposed or existing potable wells, non-potable wells, septic drain fields, and springs.

2) Infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.

3) Infiltration BMPs must be setback from building foundations at least eight feet or have an alternative setback established by the geotechnical expert for the project.

Pretreatment

- A removable filter with a screened bottom should be installed in the roof leader below the surcharge pipe in order to screen out leaves and other debris.

- Though roofs are generally not a significant source of runoff pollution, they can still be source of particulates and organic matter. Measures such as roof gutter guards, roof leader clean-out with sump, or an intermediate sump box can provide pretreatment for dry wells by minimizing the amount of sediment and other particulates that may enter it.

Sizing Criteria

See Sizing Criteria section in the INF-1: Infiltration Basin fact sheet.

Geometry and Sizing

1) Dry well configurations vary, but generally they have length and width dimensions closer to square than infiltration trenches. Pre-fabricated dry-wells are often circular. The surface area of the dry well must be large enough to infiltrate the storage volume in 12 hours based on the maximum depth allowable (d_{max}).

2) The filter bed media layers are the same as for infiltration trenches unless prefabricated dry wells and/or media are used. The porosity of gravel media systems is generally 30 to 40% and is 80 to 95% for prefabricated media systems.

3) If a dry well receives runoff from an underground pipe (i.e., runoff does not enter the top of the dry well from the ground surface), a fine mesh screen should be installed at the inlet. The inlet elevation should be 18 inches below the ground surface (i.e., below 12 inches of surface soil and 6 inches of dry well media).

4) An observation well should be installed to check for water levels, drawdown time, and evidence of clogging. A typical observation well consists of a slotted PVC well screen, 4 to 6 inches in diameter, capped with a lockable, above-ground lid.

Drainage

1) The bottom of infiltration bed must be native soil, over-excavated to at least one foot in depth and replaced uniformly without compaction. Amending the excavated soil with 2 to 4 inches (~15% to 30%) of coarse sand is recommended.

2) The hydraulic conductivity of the subsurface layers should be sufficient to ensure a maximum 12 hr drawdown time. An observation well should be incorporated to allow observation of drain time.

Emergency Overflow

1) There must be an overflow route for stormwater flows that overtop the facility or in case the infiltration facility becomes clogged.

2) The overflow channel must be able to safely convey flows from the peak design storm to the downstream stormwater conveyance system or other acceptable discharge point.

Vegetation

1) Drywells should be kept free of vegetation.

2) Trees and other large vegetation should be planted away from drywells such that drip lines do not overhang infiltration beds.

Maintenance Access

1) The facility and outlet structures must all be safely accessible during wet and dry weather conditions.

2) Maintenance access is required.

3) If the drywell becomes plugged and fails, then access is needed to excavate the facility to remove and replace the top layer and the filter bed media of the structure. To prevent damage and compaction, access must be able to accommodate a backhoe working at “arms length”.

Construction Considerations

To preserve and avoid the loss of infiltration capacity, the following construction guidelines should be specified:

1) The entire area draining to the facility must be stabilized before construction begins. If this is impossible, a diversion berm should be placed around the perimeter of the infiltration site to prevent sediment entering during construction.

2) Drywells should not be hydraulically connected to the stormwater conveyance system until all contributing tributary areas are stabilized as shown on the Contract Plans and to the satisfaction of the Engineer. Drywells should not be used as sediment control facilities.

3) Compaction of the subgrade with heavy equipment should be minimized to the maximum extent possible. If the use of heavy equipment on the base of the facility

cannot be avoided, the infiltration capacity should be restored by tilling or aerating prior to placing the infiltrative bed.

4) The exposed soils should be inspected by a civil engineer after excavation to confirm that soil conditions are suitable.

Operations and Maintenance

Drywell maintenance should be performed frequently to ensure that water infiltrates into the subsurface completely within the recommended infiltration time (or drain time if a drywell receives runoff from an underground pipe) of 72 hours or less after a storm.

Maintenance and regular inspections are important for the proper function of drywells. A specific maintenance plan shall be developed specifically for each facility outlining the schedule and scope of maintenance operations, documentation, and reporting requirements.

INF-5: Permeable Pavement

Permeable pavements contain small voids that allow water to pass through to a stone base. They come in a variety of forms; they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or a poured-in-place solution (porous concrete or permeable asphalt). All permeable pavements with a stone reservoir base treat stormwater and remove sediments and metals to some degree. While conventional pavement result in increased rates and volumes of surface runoff, porous pavements when properly constructed and maintained, allow some of the stormwater to percolate through the pavement and enter the soil below. This facilitates groundwater recharge while providing the structural and functional features needed for the roadway, parking lot, or sidewalk. The paving surface, subgrade, and installation requirements of permeable pavements are more complex than those for conventional asphalt or concrete surfaces. For porous pavements to function properly over an expected life span of 15 to 20 years, they must be properly sited and carefully designed and installed, as well as periodically maintained. Failure to protect paved areas from construction-related sediment loads can result in their premature clogging and failure. Note that the 2011 TGM does not provide specific instructions on how to design and construct pavement.

Permeable pavement applications

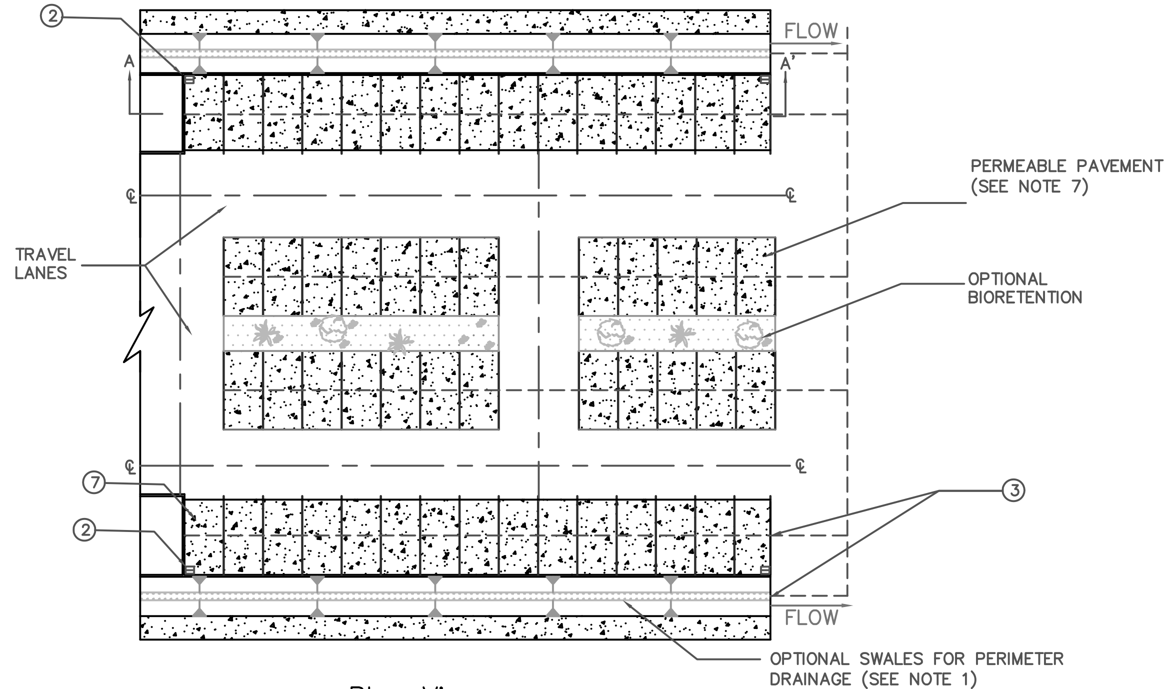
Photo Credits: 1. Geosyntec Consultants; 2. EPA Stormwater Management

Application

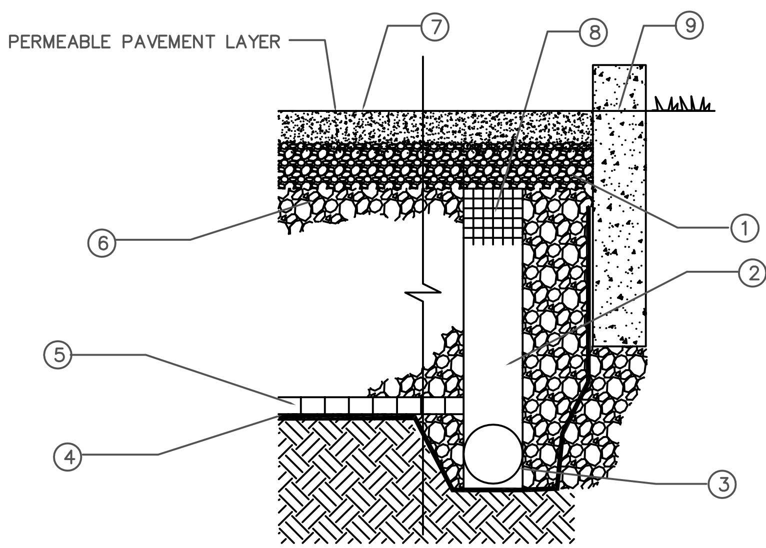
- Parking lots
- Driveways
- Sidewalks and walkways
- Outdoor athletic courts

Preventative Maintenance

- Trash removal
- Post-rain inspections
- Vacuum sweeping
- Vegetation inspection and removal



Plan View
(Not to Scale)



Section A – A'
(Not to Scale)

NOTES:

1. BEDDING COURSE SHALL BE 1½" TO 3" MIN THICKNESS (TYP NO. 8 AGGREGATE).
2. OPTIONAL OVERFLOW PIPE(S) SHALL BE PROVIDED IF OVERFLOWS ARE NOT MANAGED VIA PERIMETER DRAINAGE TO SWALES, BIORETENTION OR STORM WATER CONVEYANCE SYSTEM INLETS.
3. CONNECT OUTFALL PIPES TO DOWNSTREAM STORMWATER CONVEYANCE SYSTEM. OUTFALL PIPES SHALL BE SLOPED TOWARDS COLLECTION SYSTEM.
4. SOIL SUBGRADE SHALL HAVE ZERO SLOPE.
5. INSTALL GEOTEXTILE OR CHOKING LAYER ON BOTTOM & SIDES OF OPEN-GRADED BASE FOR FULL AND PARTIAL INFILTRATION, OR AN IMPERMEABLE LINER FOR NO INFILTRATION.
6. OPEN-GRADED BASE. THICKNESS AND GRADATION VARIES WITH DESIGN. TYP. NO. 57 AGGREGATE OR 4" THICK NO. 57 OVER NO. 2 STONE SUBASE. THICKNESS OF SUB-BASE VARIES WITH DESIGN.
7. PERMEABLE PAVEMENT INFILTRATIVE LAYER
8. OPTIONAL RIGID PLASTIC SCREEN FASTENED OVER OVERFLOW INLETS.
9. CURB/EDGE RESTRAINT WITH CUT-OUTS FOR OVERFLOW DRAINAGE TO PERIMETER BMPS, STORMWATER CONVEYANCE SYSTEM INLETS OR OPTIONAL OVERFLOW PIPES.
10. PARTIAL EXFILTRATION THROUGH THE SOIL. PERFORATED PIPES DRAIN EXCESS RUNOFF THAT CAN NOT BE ABSORBED BY SLOW-DRAINING SOIL.

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Figure 6-6: Permeable Pavement

Limitations

The following describes limitations for the use of permeable pavement.

- Native soil infiltration rate - permeability of soils at the BMP location must be at least 0.5 inches per hour.

- Depth to groundwater, bedrock, or low permeability soil layer – 5 feet vertical separation is required between the bottom of the infiltration trench and the seasonal high groundwater level or mounded groundwater level, bedrock, or other infiltration barrier to ensure that the facility will completely drain between storms and that infiltrating water will receive adequate treatment though the soils before it reaches the groundwater.

- Slope stability - infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.

- Setbacks - a minimum setback (100 feet or more) must be provided between infiltration BMPs and potable wells, non-potable wells, drain fields, and springs. Infiltration BMPs must be setback from building foundations at least eight feet or an alternative setback established by the geotechnical expert for the project.

- Groundwater contamination - the application of infiltration BMPs should include significant pretreatment in an area identified as an unconfined aquifer, to ensure groundwater is protected for pollutants of concern.

- Contaminated soils or groundwater plumes - infiltration BMPs are not allowed at locations with contaminated soils or groundwater where the pollutants could be mobilized or exacerbated by infiltration, unless a site-specific analysis determines the infiltration would be beneficial.

- High pollutant land uses - infiltration BMPs should not be placed in high-risk areas such as at or near a service/gas stations, truck stops, and heavy industrial sites due to the groundwater contamination risk unless a site-specific evaluation demonstrates that sufficient pretreatment is provided to address pollutants of concern, high risks areas are isolated from stormwater runoff, or infiltration areas that have little chance of spill migration.

- High sediment loading rates – infiltration BMPs may clog quickly if sediment loads are high (e.g., unstabilized site) or if flows are not adequately pretreated.

- Permeable pavement cannot receive untreated stormwater runoff from other surfaces. Pretreatment of run-on from other surfaces is necessary to prevent premature failure that results from clogging with fine sediment.

- Permeable pavement cannot be used to treat runoff from portions of the site that are not stabilized.

Design Criteria

Permeable pavement should be designed according to the requirements listed in Table 6-11 and outlined in the section below.

Table 6-11: Permeable Pavements Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater Quality Design Volume (SQDV)	acre-feet	See Section 2 and Appendix E for calculating SQDV.
Pretreatment	-	Runoff from pervious areas should be minimized but, if provided, BIO-3: Vegetated Swale or BIO-4: Filter Strip should be provided for all runoff from offsite sources that are not directly adjacent to the permeable pavement.
Drawdown time of gravel drainage layer	hrs	12 - 72
Porous Pavement Infill		ASTM C-33 sand or equivalent
Minimum depth to bedrock	ft	2 (without underdrains)
Minimum depth to seasonal high water table	ft	2 (with underdrains); 10 (without underdrains)
Infiltration rate of subsoil	in/hr	1.0 (minimum without an underdrain)
Overflow device	-	Required

Geotechnical Considerations

An extensive geotechnical site investigation must be undertaken early in the site planning process to verify site suitability for the installation of infiltration facilities, due to the potential to contaminate groundwater, cause slope instability, impact surrounding structures, and have insufficient infiltration capacity. Soil infiltration rates and the water table depth should be evaluated to ensure that conditions are satisfactory for proper operation of an infiltration facility. See Appendix C for guidance on infiltration testing.

The project designer must demonstrate through infiltration testing, soil logs, and the written opinion of a licensed civil engineer that sufficiently permeable soils exist onsite to allow the construction of a properly functioning infiltration facility.

1) Infiltration facilities require a minimum native soil infiltration rate of 0.5 inches/hour. If infiltration rates exceed 2.4 inches/hour, then the runoff should be fully treated in an upstream BMP prior to infiltration to protect groundwater quality.

Pretreatment for removing coarse sediment present in runoff from the tributary area is required in all instances.

2) Groundwater separation must be at least 5 feet from the basin bottom to the measured season high groundwater elevation or estimated high groundwater mounding elevation. Groundwater levels measurements must be made during the time when the water level is expected to be at a maximum (i.e., toward the end of the wet season).

3) Sites with a slope greater than 25% (4:1) should be excluded. A geotechnical analysis and report addressing slope stability are required if located on slopes greater than 15%.

Soil Assessment and Site Geotechnical Investigation Reports

The soil assessment report should:

- State whether the site is suitable for the proposed permeable pavement;
- Recommend a design infiltration rate (see the Step 2 of sizing methodology section, "Determine the design percolation rate," in the Infiltration Basin fact sheet above);
- Identify the seasonal high depth to groundwater table surface elevation;
- Provide a good understanding of how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water; and
- If a geotechnical investigation and report are required, the report should:
  - Provide a written opinion by a professional civil engineer describing whether the infiltration trench will compromise slope stability; and
  - Identify potential impacts to nearby structural foundations.

Setbacks

1) Infiltration facilities shall be setback a minimum of 100 feet from proposed or existing potable wells, non-potable wells, septic drain fields, and springs.

2) Infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.

3) Infiltration BMPs must be setback from building foundations at least eight feet or have an alternative setback established by the geotechnical expert for the project.

Pretreatment

1) Depending on how and where permeable pavements will be used, pretreatment of the runoff entering the permeable pavement may be necessary. This is particularly important when the permeable pavement will be accepting run-on from pervious areas or areas that are not completely stabilized. If this is the case, then the run-on should be treated prior to contacting the permeable pavement. Without adequate pretreatment, the life of the permeable pavement may be significantly decreased.

2) If sheet flow is conveyed to the permeable pavement over stabilized grassed areas, the site must be graded in such a way that minimizes erosive conditions.

Sizing Criteria

Permeable pavement must be designed to meet Ventura County codes and/or applicable local permitting authority codes. These sizing criteria are meant to provide guidance for runoff volume storage only.

Step 1: Calculate the Design Volume

Infiltration facilities shall be sized to capture and infiltrate the SQDV volume (see Section 2 and Appendix E) with a 12 to 72 hour drawdown time (see Appendix D, Section D.2).

Step 2: Determine the Design Percolation Rate

The percolation rate will decline between maintenance cycles as the surface becomes occluded and particulates accumulate in the infiltration layer. Monitoring of actual facility performance has shown that the full-scale infiltration rate is far lower than the rate measured by small-scale testing. It is important that adequate conservatism is incorporated in the selection of design percolation rates. For infiltration trenches, the design percolation rate discussed here is the percolation rate of the underlying soils and not the percolation rate of the filter media bed (refer to the "Geometry and Sizing" section of INF-2 for the recommended composition of the filter media bed for infiltration trenches).

Considerations for Design Percolation Rate Corrections

Suitability assessment related considerations include (Table 6-12):

- Soil assessment methods – the site assessment extent (e.g., number of borings, test pits, etc.) and the measurement method used to estimate the short-term infiltration rate.

- Predominant soil texture/percent fines – soil texture and the percent of fines can greatly influence the potential for clogging.

- Site soil variability – site with spatially heterogeneous soils (vertically or horizontally) as determined from site investigations are more difficult to estimate average properties resulting in a higher level of uncertainty associated with initial estimates.

- Depth to seasonal high groundwater/impervious layer – groundwater mounding may become an issue during excessively wet conditions where shallow aquifers or shallow clay lenses are present.

Table 6-12: Suitability Assessment Related Considerations for Infiltration Facility Safety Factors

Consideration	High Concern	Medium Concern	Low Concern
Assessment methods	Use of soil survey maps or simple texture analysis to estimate short-term infiltration rates	Direct measurement of ≥ 20 percent of infiltration area with localized infiltration measurement methods (e.g., infiltrometer)	Direct measurement of ≥ 50 percent of infiltration area with localized infiltration measurement methods or Use of extensive test pit infiltration measurement methods
Ventura Hydrology Manual soil number (measured infiltration rate)	3 (f = 0.5 – 0.64)	4 or 5 (f = 0.65 – 0.91)	6 or 7 (f = 0.92 or higher)
Site soil variability	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment	Soil borings/test pits indicate moderately homogeneous soils	Multiple soil borings/test pits indicate relatively homogeneous soils
Depth to groundwater/ impervious layer	<10 ft below facility bottom	10-30 ft below facility bottom	>30 below facility bottom

Localized infiltration testing refers to methods such as the double ring infiltrometer test (ASTM D3385-88) which measure infiltration rates over an area less than 10 sq-ft and do not attempt to account for soil heterogeneity. Extensive infiltration testing refers to methods that include excavating a significant portion of the proposed infiltration area, filling the excavation with water, and monitoring drawdown. In all cases, testing should be conducted in the area of the proposed BMP where, based on geotechnical data, soils appear least likely to support infiltration.

Design related considerations include (Table 6-13):

- Size of area tributary to facility – all things being equal, both physical and economic risk factors related to infiltration facilities increase with an increase in the tributary area served. Therefore facilities serving larger tributary areas should use more restrictive adjustment factors.

- Level of pretreatment/expected influent sediment loads – credit should be given for good pretreatment by allowing less restrictive factors to account for the reduced probability of clogging from high sediment loading. Also facilities designed to capture runoff from relatively clean surfaces such as rooftops are likely to see low sediment loads and therefore should be allowed to apply less restrictive safety factors.

- Redundancy – facilities that consist of multiple subsystems operating in parallel such that parts of the system remains functional when other parts fail and/or bypass should be rewarded for the built-in redundancy with less restrictive correction and safety factors. For example, if bypass flows would be at least partially treated in another BMP, the risk of discharging untreated runoff in the event of clogging the primary facility is reduced. A bioretention facility that overflows to a landscaped area is another example.

Compaction during construction – proper construction oversight is needed during construction to ensure that the bottom of the infiltration facility are not overly compacted. Facilities that do not commit to proper construction practices and oversight should have to use more restrictive correction and safety factors.

Table 6-13: Design Related Considerations for Infiltration Facility Safety Factors

Consideration	High Concern	Medium Concern	Low Concern
Tributary area size	Greater than 10 acres.	Greater than 2 acres but less than 10 acres.	2 acres or less.
Level of pre-treatment/ expected influent sediment loads	Pre-treatment from gross solids removal devices only, such as hydrodynamic separators, racks and screens AND tributary area includes landscaped areas, steep slopes, high traffic areas, or any other areas expected to produce high sediment, trash, or debris loads.	Good pre-treatment with BMPs that mitigate coarse sediments such as vegetated swales AND influent sediment loads from the tributary area are expected to be relatively low (e.g., low traffic, mild slopes, disconnected impervious areas, etc.).	Excellent pre-treatment with BMPs that mitigate fine sediments such as bioretention or media filtration OR sedimentation or facility only treats runoff from relatively clean surfaces, such as rooftops.
Redundancy of treatment	No redundancy in BMP treatment train.	Medium redundancy, other BMPs available in treatment train to maintain at least 50% of function of facility in event of failure.	High redundancy, multiple components capable of operating independently and in parallel, maintaining at least 90% of facility functionality in event of failure.
Compaction during construction	Construction of facility on a compacted site or elevated probability of unintended/ indirect compaction.	Medium probability of unintended/ indirect compaction.	Heavy equipment actively prohibited from infiltration areas during construction and low probability of unintended/ indirect compaction.

Adjust the measured short-term infiltration rate using a weighted average of several safety factors, using the worksheet shown in Table 6-14 below. The design percolation rate would be determined as follows:

- For each consideration shown in Table 6-12 and Table 6-13 above, determine whether the consideration is a high, medium, or low concern.
- For all high concerns assign a factor value of 3, for medium concerns assign a factor value of 2, and for low concerns assign a factor value of 1.
- Multiply each of the factors by the corresponding weight to get a product.

- Sum the products within each factor category to obtain a safety factor for each.
- Multiply the two safety factors together to get the final combined safety factor. If the combined safety factor is less than 2, then use 2 as the safety factor.
- Divide the measured short term infiltration rate by the combined safety factor to obtain the adjusted design percolation rate for use in sizing the infiltration facility.

Table 6-14: Infiltration Facility Safety Factor Determination Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25		
		Predominant soil texture	0.25		
		Site soil variability	0.25		
		Depth to groundwater / impervious layer	0.25		
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			
B	Design	Tributary area size	0.25		
		Level of pre-treatment/ expected sediment loads	0.25		
		Redundancy	0.25		
		Compaction during construction	0.25		
		Design Safety Factor, $S_B = \Sigma p$			
Combined Safety Factor = S_A x S_B					

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.

Step 3: Determine the Gravel Drainage Layer Depth

Permeable pavement (including the base layers) should be designed to drain in less than 72 hours. The basis for this is that soils must be allowed to dry out periodically in order to restore hydraulic capacity to receive flows from subsequent storms, maintain infiltration rates, maintain adequate sub soil oxygen levels for healthy soil biota, and to provide proper soil conditions for biodegradation and retention of pollutants.

1) Calculate the maximum depth of runoff (d_{max}) that can be infiltrated within the drawdown time:

$$d_{\max} = \frac{P_{design} \bullet t}{12} \qquad \text{(Equation 6-11)}$$

Where:

d_{max} = maximum depth that can be infiltrated (ft)

P_{design} = design percolation rate of underlying soils (in/hr) (see Step 2, above)

t = drawdown time (12-72 hours) (hr)

2) Select the gravel drainage layer depth, (l), such that:

$$d_{\max} \geq n \times l \qquad \text{(Equation 6-12)}$$

Where:

d_{max} = maximum depth that can be infiltrated (ft) (see 1) above)

n = gravel drainage layer porosity(unitless)(generally about 40% or 0.40 for gravel)

l = gravel drainage layer depth (ft)

Step 4: Determine infiltrating surface area

3) Calculate infiltrating surface area for permeable pavement (A):

$$A = \frac{SQDV}{\frac{TP_{design}}{12} + nl} \qquad \text{(Equation 6-13)}$$

Where:

P_{design} = design percolation rate of underlying soils (in/hr) (see Step 2, above)

n = gravel drainage layer porosity(unitless)[about 40% or 0.40 for gravel]

l = depth of gravel drainage layer (ft)

T = time to fill the gravel drainage layer with water (use 2 hours for most designs) (hr)

Geometry and Size

1) Permeable pavement shall be sized to capture and treat the stormwater quality design volume (SQDV).

2) Pavement design options include:

a. Full or partial infiltration – A design for full infiltration uses an open graded base for maximum infiltration and storage of stormwater. The water infiltrates directly into the base and through the soil. Pipes may provide drainage in overflow conditions. Partial infiltration does not rely completely on infiltration through the soil to dispose all of the captured runoff. Some of the water may infiltrate into the soil and the remainder drained by pipes.

b. No infiltration – No infiltration is desirable when the soil has low permeability and low strength, or there are other site limitations. An underdrain should be provided if the depth to bedrock is less than 2 feet or the depth to the water table is less than 10 feet. By storing water for a time in the base and then slowly releasing it through pipes, the design behaves like an underground detention pond. In other cases, the soil of the sub-base may be compacted and stabilized to render improved support for vehicular loads. This practice reduces infiltration into the soil to nearly zero. The "no infiltration" option requires the use of geotextile and bedding between the pavement and the open graded base.

3) If permeable pavement is located on a site with a slope greater than 2%, the permeable pavement area should be terraced to prevent lateral flow through the subsurface. Permeable pavement cannot be located on a site with a slope greater than 5%.

4) Porous pavement systems generally consist of at least four different layers of material:

a. The top or wearing layer consists of either asphalt or concrete with a greater than normal percentage of voids (typically 12 to 20 percent in the case of asphalt). The wearing layer may also be comprised of lattice-type pavers (either hollow concrete blocks or paving stones made from solid conventional concrete or stone), which are set in a bedding material (sand, pea-sized gravel or turf grass).

b. Below the wearing layer, a stone reservoir layer or a thick layer of aggregate (e.g., 2 inch stone) provides the bulk of the water storage capacity for a porous pavement system. In the pavement design, it is important to ensure that this reservoir layer retains its load bearing capacity under saturated conditions, because it may take several days for complete drainage to occur.

c. Typically, porous pavement designs include two (or more) transition layers that can be constructed from 1 to 2 inch diameter stone. One transition layer separates the top wearing layer from the underlying stone reservoir layer. Another transition layer is used to separate the stone reservoir from the undisturbed subgrade soil. Some designs also add a geotextile layer to this bottom layer or some combination of stones and geotextiles.

d. Porous asphalt pavement, for example, consists of open grade asphalt mixture ranging in depth from 2 to 4 inches with 16 percent voids. The thickness selected depends on bearing strength and pavement design requirements. This layer sits on a 2 to 4 inch transition layer located over a stone reservoir. The bottom layer completes the transition to the underlying undisturbed soil using a combination transition/filter fabric layer.

e. The depth of each layer should be determined by a licensed civil engineer based on analyses of the hydrology, hydraulics, and structural requirements of the site.

5) Modular paving stones are also used to create porous pavements. These pavements can be constructed in situ by pouring concrete into special frames or by using preformed blocks. The top layer of these porous pavements consists of conventional concrete, with the intervening void areas filled with either turf or sand. A transition or bedding layer is used to make the transition to the reservoir layer. These lattice-type pavers or hollow concrete blocks are often used in conjunction with turf grasses and are used in low-traffic parking lots, lanes, or driveways. Porous pavements using paving stones have similar construction, but can be designed to have a much higher load bearing capacity, and therefore have more widespread applicability. Construction guidelines and design specifications are available from the manufacturers of these products.

6) Permeable pavement (including the base layers) should be designed to drain in less than 72 hours. The basis for this is that soils must be allowed to dry out periodically in order to restore hydraulic capacity to receive flows from subsequent storms, maintain infiltration rates, maintain adequate subsoil oxygen levels for healthy soil biota, and to provide proper soil conditions for biodegradation and retention of pollutants.

7) The percolation rate will decline as the surface becomes occluded and particulates accumulate in the infiltration layer. It is important that adequate conservatism is incorporated in the selection of design percolation rates.

Overflow

An overflow mechanism is required. Two options are provided:

Option 1: Perimeter control

Flows in excess of the design capacity of the permeable pavement system will require an overflow system connected to a downstream conveyance or other stormwater runoff BMP. In addition, if the pavement becomes clogged and infiltration decreases to the point that there is ponding, runoff will migrate off of the pavement via overland flow instead of infiltrating into the subsurface gravel layer. There are several options for handling overflow using perimeter controls such as:

1) Perimeter vegetated swale.
2) Perimeter bioretention.
3) Storm drain inlets.
4) Rock filled trench that funnels flow around pavement and into the subsurface gravel layer.

Option 2: Overflow pipe(s)

1) A vertical pipe should be connected to the underdrain.
2) The diameter, location, and quantity may vary with design and should be determined by a licensed civil engineer.
3) The pipe should be located away from vehicular traffic.
4) The piping system may incorporate an observational and/or cleanout well.
5) The top of the overflow pipe should be covered with a screen fastened over the overflow inlet.

Construction Considerations

1) Permeable pavement should be laid close to level and the bottom of the base layers must be level to ensure uniform infiltration.
2) Permeable pavement surfaces should not be used to store site materials, unless the surface is well protected from accidental spillage or other contamination.
3) To prevent/minimize soil compaction in the area of the permeable pavement installation, use light equipment with tracks or oversized tires.
4) Divert stormwater from the area as needed (before and during installation).
5) The pavement should be the last installation done at a development site. Landscaping should be completed and adjacent areas stabilized, before pavement installation to minimize the risk of clogging.
6) Vehicular traffic should be prohibited for at least 2 days after installation.

Operations and Maintenance

Permeable pavement mainly requires vacuuming and management of adjacent areas to limit sediment contamination and prevent clogging by fine sediment particles. Therefore, little special training is needed for maintenance crews. The following maintenance concerns and maintenance activities shall be considered and provided:

1) Trash tends to accumulate in paved areas, particularly in parking lots and along roadways. The need for litter removal should be determined through periodic inspection.

2) Regularly (e.g., monthly for a few months after initial installation, then quarterly) inspect pavement for pools of standing water after rain events, this could indicate surface clogging.

3) Actively (3 to 4 times per year, or more frequently depending onsite conditions) vacuum sweep the pavement to reduce the risk of clogging by frequently removing fine sediments before they can clog the pavement and subsurface layers. This also helps to prolong the functional period of the pavement.

4) Inspect for vegetation growth on pavement and remove when present.

5) Inspect for missing sand/gravel in spaces between pavers and replace as needed.

6) Activities that lead to ruts or depressions on the surface should be prevented or the integrity of the pavement should be restored by patching or repaving. Examples are vehicle tracks and utility maintenance.

7) Spot clogging of porous concrete may be remedied by drilling 0.5 inch holes every few feet in the concrete.

8) Interlocking pavers that are damaged should be replaced.

9) Maintain landscaped areas and reseed bare areas.

INF-6: Proprietary Infiltration

A number of vendors offer proprietary infiltration products that allow for similar or enhanced rates of infiltration and subsurface storage while offering durable prefrabricated structures. There are many varieties of proprietary infiltration BMPs.

Proprietary Infiltration BMPs

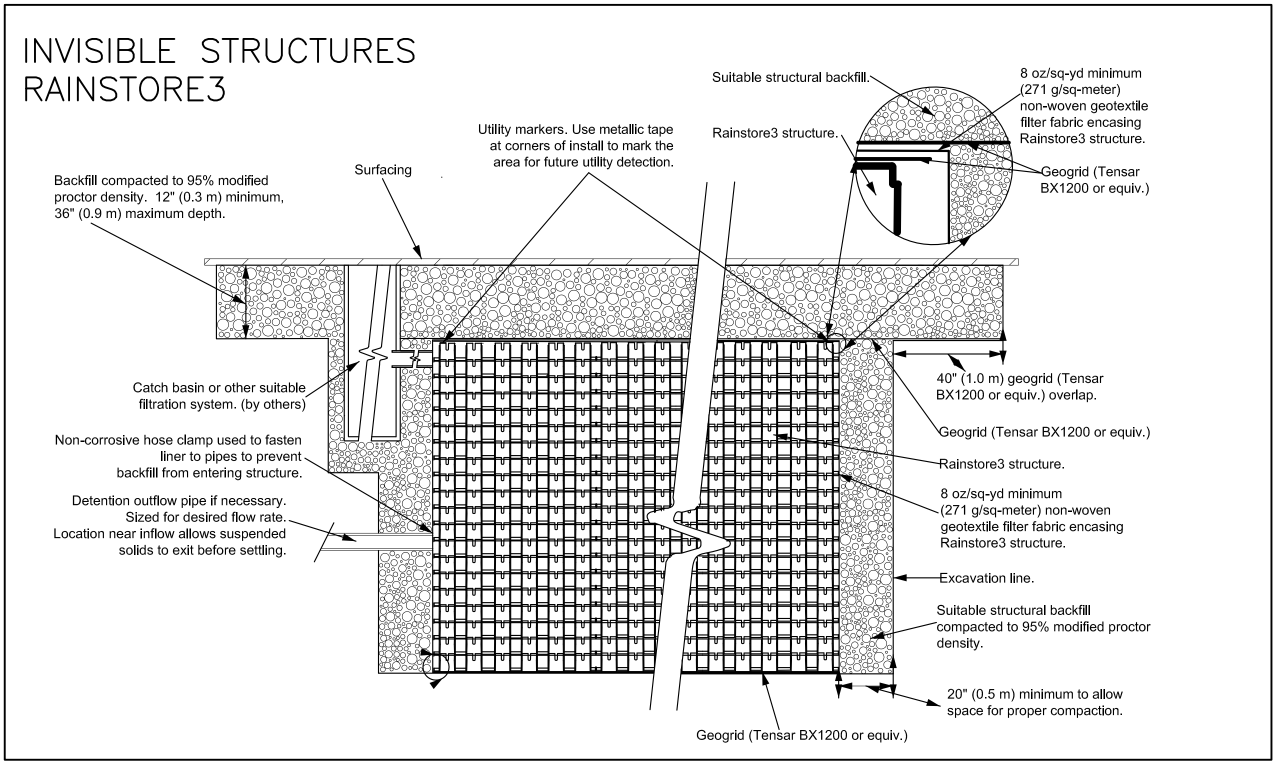
Photo Credits: 1. & 2. Contech Stormwater Solutions, Inc.

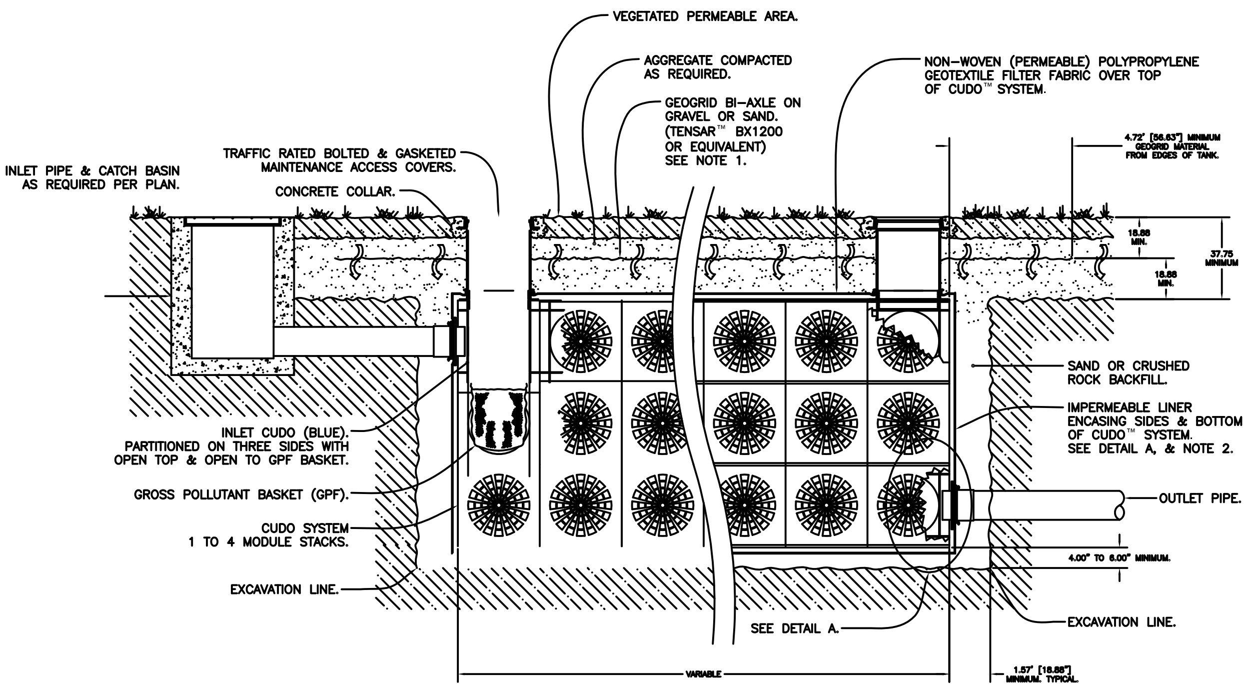
Application

- Mixed-use and commercial
- Roads and parking lots
- Parks and open spaces
- Single and multi-family residential

Routine Maintenance

- Removal trash, debris, and sediment at inlet and outlets
- Wet weather inspection to ensure drain time
- Inspect for mosquito breeding





SECTION / CUTAWAY VIEW
SCALE: NONE

CUDO Stormwater Products, Inc.
P.O. Box 497 Occidental, CA 95465
Ph. (877) 876-3345 Fax (707) 876-3346

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Figure 6-7: Proprietary Infiltration BMPs

Limitations

The following limitations shall be considered before choosing to use an infiltration BMP:

- Native soil infiltration rate - soil permeability of the infiltration basin location must be at least 0.5 inches per hour.

- Depth to groundwater, bedrock, or low permeability soil layer – 5 feet vertical separation is required between the bottom of the infiltration basin and the seasonal high groundwater level or mounded groundwater level, bedrock, or other barrier to infiltration to ensure that the facility will completely drain between storms and that infiltrating water will receive adequate treatment though the soils before it reaches the groundwater.

- Slope stability - infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.

- Setbacks - a minimum setback (100 feet or more) must be provided between infiltration BMPs and potable wells, non-potable wells, drain fields and springs. Infiltration BMPs must be setback from building foundations at least eight feet or have an alternative setback established by the geotechnical expert for the project.

- Groundwater contamination - the application of infiltration BMPs should include significant pretreatment in an area identified as an unconfined aquifer, to ensure groundwater is protected for pollutants of concern.

- Contaminated soils or groundwater plumes - infiltration BMPs are not allowed at locations with contaminated soils or groundwater where the pollutants could be mobilized or exacerbated by infiltration, unless a site-specific analysis determines the infiltration would be beneficial.

- High pollutant land uses - infiltration BMPs should not be placed in high-risk areas such as at or near service/gas stations, truck stops, and heavy industrial sites due to the groundwater contamination risk unless a site-specific evaluation demonstrates that sufficient pretreatment is provided to address pollutants of concern, high risks areas are isolated from stormwater runoff, or infiltration areas have little chance of spill migration

- High sediment loading rates – infiltration BMPs may clog quickly if sediment loads are high (e.g., unstabilized site) or if flows are not adequately pretreated.

Table 6-15: Proprietary Infiltration Manufacturer Websites

Device	Manufacturer	Website
A-2000™	Contech® Construction Products Inc.	www.contech-cpi.com/stormwater/13
ChamberMaxx™	Contech® Construction Products Inc.	www.contech-cpi.com/stormwater/13
CON/SPAN Vaults™	Contech® Construction Products Inc.	www.contech-cpi.com/stormwater/13
CON/Storm™	Contech® Construction Products Inc.	www.contech-cpi.com/stormwater/13
Perforated Corrugated Metal Pipe (CMP)	Contech® Construction Products Inc.	www.contech-cpi.com/stormwater/13
Drywell StormFilter	Contech® Construction Products Inc.	www.contech-cpi.com/stormwater/13
CUDO® Water Storage System	KriStar Enterprises Inc.	www.kristar.com
D-Raintank® Matrix Tank Modules	Atlantis®	www.atlantis-america.com
EcoRain™ Modular Rain Tank	EcoRain Systems Inc.	www.ecorain.com
Landmax®	Hancor®	www.hancor.com
Landsaver™	Hancor®	www.hancor.com
Precast Concrete Dry Well	Jensen Precast®	www.jensenprecast.com
Rainstore^3	Invisible Structures Inc.	www.invisiblestructures.com
StormChambers™	Hydrologic Solutions, Inc.	www.hydrologicsolutions.com
Stormtech® SC-740 and SC-310 Chambers	StormTech LLC	www.stormtech.com
StormTrap®	StormTrap	www.stormtrap.com
Triton Chambers™	Triton Stormwater Solutions	www.tritonsws.com

Geotechnical Considerations

An extensive geotechnical site investigation must be undertaken early in the site planning process to verify site suitability for the installation of infiltration facilities, due to the potential to contaminate groundwater, cause slope instability, impact surrounding structures, and have insufficient infiltration capacity. Soil infiltration rates and the water table depth should be evaluated to ensure that conditions are satisfactory for proper operation of an infiltration facility. See Appendix C for guidance on infiltration testing.

The project designer must demonstrate through infiltration testing, soil logs, and the written opinion of a licensed civil engineer that sufficiently permeable soils exist onsite to allow the construction of a properly functioning infiltration facility.

1) Infiltration facilities require a minimum soil infiltration rate of 0.5 inches/hour. If infiltration rates exceed 2.4 inches/hour such that pollutant removal may not be adequate to protect groundwater quality, then the runoff should be fully treated in an upstream BMP prior to infiltration to protect groundwater quality. Pretreatment for coarse sediment removal is required in all instances.

2) Groundwater separation must be at least 5 feet from the basin bottom to the measured season high groundwater elevation or estimated high groundwater mounding elevation. Measurements of groundwater levels must be made during the time when water level is expected to be at a maximum (i.e., toward the end of the wet season).

3) Sites with a slope greater than 25% (4:1) should be excluded. A geotechnical analysis and report addressing slope stability are required if located on slopes greater than 15%.

Soil Assessment and Site Geotechnical Investigation Reports

The soil assessment report should:

- State whether the site is suitable for the proposed proprietary infiltration BMP.;
- Recommend a design infiltration rate (see the Step 2 of sizing methodology section, "Determine the design percolation rate," in the Infiltration Basin fact sheet above);
- Identify the seasonal high depth to groundwater table surface elevation;
- Provide a good understanding of how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water; and
- If a geotechnical investigation and report are required, the report should:
  - Provide a written opinion by a professional civil engineer describing whether the infiltration trench will compromise slope stability; and
  - Identify potential impacts to nearby structural foundations.

Setbacks

1) Infiltration facilities shall be setback a minimum of 100 feet from proposed or existing potable wells, non-potable wells, septic drain fields, and springs.

2) Infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.

3) Infiltration BMPs must be setback from building foundations at least eight feet or have an alternative setback established by the geotechnical expert for the project.

Pretreatment

Pretreatment is required for proprietary infiltration BMPs in order to reduce the sediment load entering the facility and maintain the infiltration rate of the facility. Pretreatment refers to design features that provide settling of sediment particles before runoff reaches a management practice. This eases the long-term maintenance burden and likelihood of failure. Pretreatment is important for most stormwater treatment BMPs, but it is particularly important for infiltration BMPs. To ensure that pretreatment mechanisms are effective, designers should incorporate sediment reduction practices. Sediment reduction BMPs may include vegetated swales, vegetated filter strips, sedimentation basins, sedimentation manholes and hydrodynamic separation devices. The use of at least two pretreatment devices is highly recommended for infiltration BMPs.

Sizing

1) Proprietary infiltration BMPs shall be sized to capture and treat the stormwater quality design volume (SQDV). See Section 2 and Appendix E for calculating for further detail.

2) The percolation rate will decline as the surface becomes occluded and particulates accumulate in the infiltrative layer. It is important that adequate conservatism is incorporated in the selection of design percolation rates.

3) For the sizing guidelines, refer to the manufacturer's website.

Operations and Maintenance

See vendor's website for maintenance requirements.

INF-7: Bioinfiltration

Bioinfiltration facilities are designed for partial infiltration of runoff and partial biotreatment. These facilities are similar to bioretention devices with underdrains, but the underdrain is raised above the gravel sump to facilitate infiltration. These facilities can be used in areas where there are no hazards associated with infiltration, but infiltration of the full DCV may not be feasible due to low infiltration rates (Soil Type 3) or high depths of fill. These facilities may not result in retention of the DCV but they can be used to meet the MEP standards.

Bioretention in Parkway and parking lots

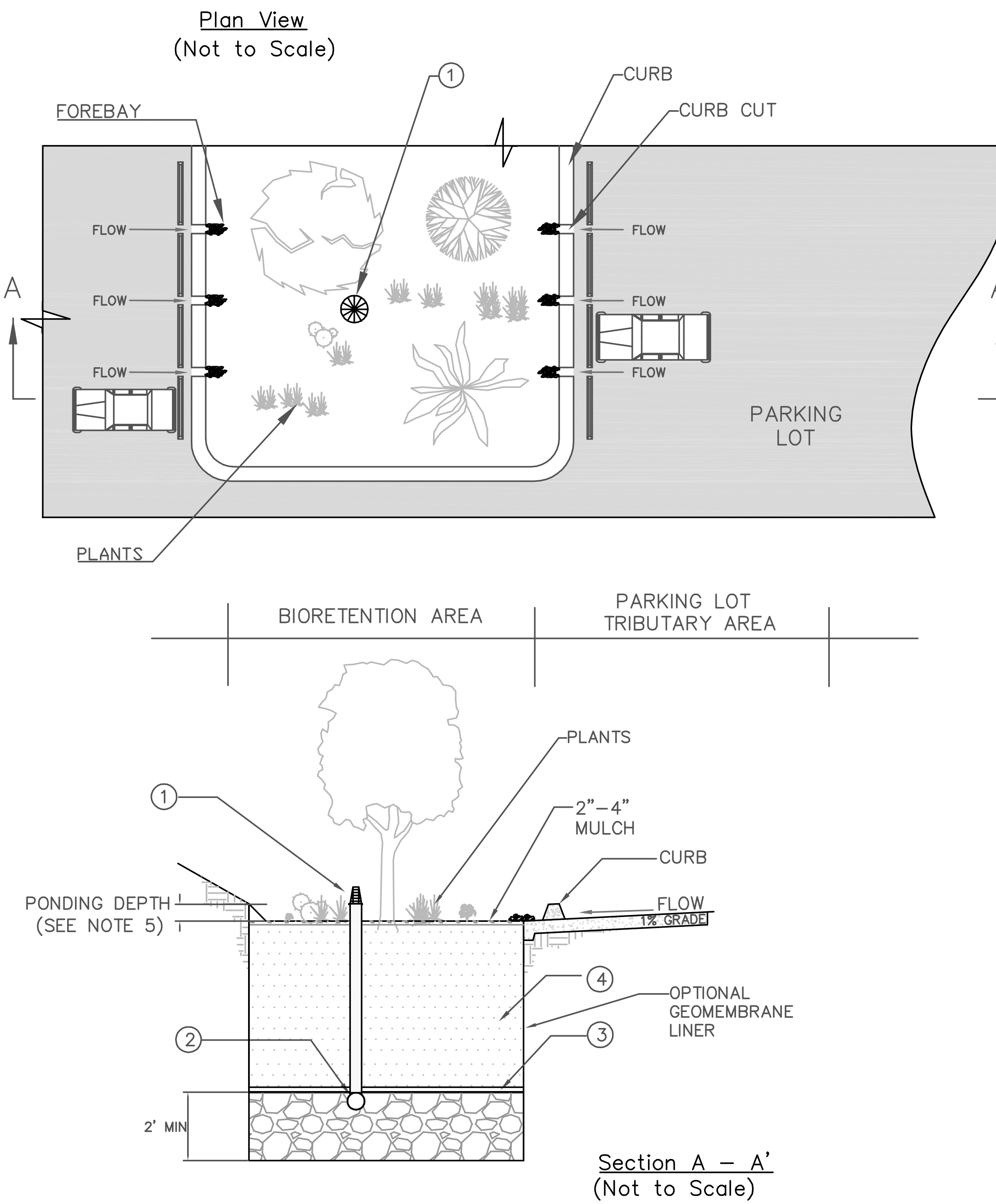
Photo Credits: Geosyntec Consultants

Application

- Commercial, residential, mixed use, institutional, and recreational uses
- Parking lot islands, traffic circles
- Road parkways & medians

Preventative Maintenance

- Repair small eroded areas
- Remove trash and debris and rake surface soils
- Remove accumulated fine sediments, dead leaves and trash
- Remove weeds and prune back excess plant growth
- Remove sediment and debris accumulation near inlet and outlet structures
- Periodically observe function under wet weather conditions



NOTES:

1. OVERFLOW DEVICE: VERTICAL RISER OR EQUIVALENT.
2. PERFORATED 6" MIN PVC PIPE UNDERDRAIN.
3. OPTIONAL CHOKING GRAVEL LAYER.
4. 2' MIN PLANTING MIX; 3' PREFERRED.
5. PONDING DEPTH 18" WITH FENCE; 6" WITHOUT FENCE.
6. 2' MIN GRAVEL LAYER DEPTH.

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Figure 6-8: Bioinfiltration

Limitations

The following limitations should be considered before choosing to use bioinfiltration:

1) Native soil infiltration rate - soil permeability at the bioinfiltration location must be no less than 0.3 inches per hour.

2) Depth to groundwater, bedrock, or low permeability soil layer – 5 feet vertical separation is required between the bottom of the infiltration trench and the seasonal high groundwater level or mounded groundwater level, bedrock, or other barrier to infiltration to ensure that the facility will completely drain between storms and that infiltrating water will receive adequate treatment though the soils before it reaches the groundwater.

3) Slope stability - infiltration BMPs must be sited at least 50 feet away from slopes steeper than 15 percent or an alternative setback established by the geotechnical expert for the project.

4) Setbacks - a minimum setback (100 feet or more) must be provided between infiltration BMPs and potable wells, non-potable wells, drain fields, and springs. Infiltration BMPs must be setback from building foundations at least eight feet or have an alternative setback established by the geotechnical expert for the project.

5) Groundwater contamination - the application of infiltration BMPs should include significant pretreatment in an area identified as an unconfined aquifer to ensure groundwater is protected for pollutants of concern.

6) Contaminated soils or groundwater plumes - infiltration BMPs are not allowed at locations with contaminated soils or groundwater where the pollutants could be mobilized or exacerbated by infiltration, unless a site-specific analysis determines that infiltration would be beneficial.

7) High pollutant land uses - infiltration BMPs should not be placed in high-risk areas such as at or near service/gas stations, truck stops, and heavy industrial sites due to the groundwater contamination risk unless a site-specific evaluation demonstrates that sufficient pretreatment is provided to address pollutants of concern, high risks areas are isolated from stormwater runoff, or infiltration areas have little chance of spill migration.

8) High sediment loading rates – infiltration BMPs may clog quickly if sediment loads are high (e.g., unstabilized site) or if flows are not adequately pretreated.

9) Vertical relief and proximity to storm drain - site must have adequate relief between the land surface and storm drain to permit vertical percolation through the soil media and collection.

Design Criteria

Bioinfiltration should be designed according to the requirements listed in Table 6-16 and outlined in the section below.

Table 6-16: Bioretention Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume (SQDV)	acre-feet	See Section 2 and Appendix E for calculating SQDV.
Forebay	-	Forebay should be provided for all tributary surfaces that contain landscaped areas. Forebays should be designed to prevent standing water during dry weather and should be planted with a plant palette that is tolerant of wet conditions.
Maximum drawdown time of water ponded on surface	hours	48
Maximum drawdown time of surface ponding plus subsurface pores	hours	96 (72 preferred)
Maximum ponding depth	inches	18
Minimum thickness of amended soil	feet	2 (3 preferred)
Minimum thickness of stabilized mulch	inches	2 to 4
Planting mix composition	-	60 to 80% fine sand, 20 to 40% compost
Underdrain sizing	-	Underdrain should be installed below the choking stone; 6 inch minimum diameter; 0.5% minimum slope; slotted, polyvinyl chloride (PVC) pipe (PVC SDR 35 or approved equivalent); spacing shall be determined to provide capacity for maximum rate filtered through amended media
Minimum thickness of gravel layer	feet	2
Overflow device	-	Required

Sizing Criteria

Bioinfiltration facilities can be sized using one of two methods: a simple sizing method or a routing modeling method. With either method the SQDV volume must be completely infiltrated within 96 hours (including subsurface pore space), and surface ponding must be infiltrated within 48 hours. The simple sizing procedure is provided below. For the routing modeling method, refer to TCM-4 Sand Filters.

Step 1: Calculate the Design Volume

Bioinfiltration facilities shall be sized to capture and partially infiltrate and partially biotreat the SQDV volume (see Section 2.3 and Appendix E).

Step 2: Determine the Design Percolation Rate

The percolation rate through the BMP and to the subsurface will decline between maintenance cycles as the surface becomes occluded and particulates accumulate in the infiltration layer. Monitoring of actual facility performance has shown that the full-scale infiltration rate is far lower than the rate measured by small-scale testing. It is important that adequate conservatism is incorporated in the selection of design percolation rates. For bioinfiltration facilities, the design percolation rate discussed here is the adjusted percolation rate of the underlying soils and not the percolation rate of the filter media bed. The measured short-term infiltration rate should be adjusted using a factor of safety of 2.0.

Step 3: Calculate the surface area

Determine the size of the required infiltrating surface by assuming the SQDV will fill the available ponding depth plus the void spaces in the media, based on the computed porosity of the filter media and optional aggregate layer.

1) Determine the maximum depth of surface ponding that can be infiltrated within the required surface drain time (48 hr), (d_{max}), as follows:

$$d_{\max} = \frac{P_{design} \times t_{ponding}}{12\frac{in}{ft}} \qquad \text{(Equation 6-14)}$$

Where:

$t_{ponding}$ = required drain time of surface ponding (48 hrs)

P_{design} = design percolation rate of underlying soils (in/hr) (see Step 2, above)

d_{max} = the maximum depth of surface ponding water that can be infiltrated within the required drain time (ft), calculated using Equation 6-14

2) Choose surface ponding depth (d_p) such that:

$$d_p \leq d_{\max} \qquad \text{(Equation 6-15)}$$

Where:

d_p = selected surface ponding depth (ft)

d_{max} = the maximum depth of water that can be infiltrated within the required drain time (ft)

Choose thickness(es) of amended media and aggregate layer(s) and calculate total effective storage depth of the bioinfiltration area ($d_{effective}$), as follows:

$$d_{effective} \leq (d_p + n^*_{media} l_{media} + n_{gravel} l_{gravel}) \qquad \text{(Equation 6-16)}$$

Where:

$d_{effective}$ = total equivalent depth of water stored in bioinfiltration area (ft), including surface ponding and volume available in pore spaces of media and gravel layers

d_p = surface ponding depth (ft), chosen using Equation 6=15

n^*_{media} = available porosity of amended soil media (ft/ft), approximately 0.25 ft/ft accounting for antecedent moisture conditions. This represents the volume of available pore space as a fraction of the total soil volume; sometimes has units of (ft^3/ft^3) or described as a percentage.

l_{media} = thickness of amended soil media layer (ft), minimum 2 ft

n_{gravel} = porosity of gravel layer (ft/ft), approximately 0.40 ft/ft

l_{gravel} = thickness of gravel layer (ft), minimum 2 ft

3) Check that entire effective depth (surface plus subsurface storage), $d_{effective}$, infiltrates in no greater than 96 hours as follows:

$$t_{total} = \frac{d_{effective}}{P_{design}} \times 12 \frac{in}{ft} \leq 96\ hr \quad \text{(Equation 6-17)}$$

Where:

$d_{effective}$ = total equivalent depth of water stored in bioinfiltration area (ft), calculated using Equation 6-16

P_{design} = design percolation rate of underlying soils (in/hr) (see Step 2, above)

If $t_{total} > 96$ hrs, then reduce surface ponding depth and/or amended media thickness and/or gravel thickness and return to 1).

If $t_{total} \leq 96$ hrs, then proceed to 5).

4) Calculate required infiltrating surface area, (A_{req}):

$$A_{req} = \frac{SQDV}{d_{effective}} \quad \text{(Equation 6-18)}$$

Where:

A_{req} = required infiltrating area (ft^2). Should be calculated at the contour corresponding to the mid ponding depth (i.e., $0.5 \times d_p$ from the bottom of the facility).

$SQDV$ = stormwater quality design volume (ft^3)

$d_{effective}$ = total equivalent depth of water stored in bioinfiltration area (ft), calculated using Equation 6-16

5) Calculate total footprint required by including a buffer for side slopes and freeboard; A_{req} is calculated at the contour corresponding to the mid ponding depth (i.e., $0.5 \times d_p$ from the bottom of the facility).

Geometry

1) Minimum planting soil depth should be 2 feet, although 3 feet is preferred.

The intention is that the minimum planting soil depth should provide a beneficial root zone for the chosen plant palette and adequate water storage for the stormwater quality design volume. A deeper soil depth will provide a smaller surface area footprint.

2) Minimum gravel layer depth is 2 feet.

The intention is that the gravel sump provides partial retention of captured water.

3) Bioinfiltration should be designed to drain below the planting soil in less than 48 hours and completely drain from the gravel layer in 96 hours (both starting from the end of inflow).

   The intention is that soils must be allowed to dry out periodically in order to restore hydraulic capacity to receive flows from subsequent storms, maintain infiltration rates, maintain adequate soil oxygen levels for healthy soil biota and vegetation, and to provide proper soil conditions for biodegradation and retention of pollutants.

Flow Entrance and Energy Dissipation

The following types of flow entrance can be used for bioinfiltration cells:

1) Dispersed, low velocity flow across a landscape area. Dispersed flow may not be possible given space limitations or if the facility is controlling roadway or parking lot flows where curbs are mandatory.

2) Dispersed flow across pavement or gravel and past wheel stops for parking areas.

3) Curb cuts for roadside or parking lot areas: curb cuts should include rock or other erosion protection material in the channel entrance to dissipate energy. Flow entrance should drop 2 to 3 inches from curb line and it should provide a settling area and periodic sediment removal of coarse material before flow dissipates to the remainder of the cell.

4) Pipe flow entrance: Piped entrances, such as roof downspouts, should include rock, splash blocks, or other appropriate measures at the entrance to dissipate energy and disperse flows.

Woody plants (trees, shrubs, etc.) can restrict or concentrate flows and can be damaged by erosion around the root ball and should not be placed directly in the entrance flow path.

Underdrains

Underdrains should meet the following criteria:

1) 6-inch minimum diameter.

2) Underdrains should be made of slotted, polyvinyl chloride (PVC) pipe (PVC SDR 35 or approved equivalent). *The intention is that compared to round-hole perforated pipe, slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.*

3) Slotted pipe should have 2 to 4 rows of slots cut perpendicular to the axis of the pipe or at right angles to the pitch of corrugations. Slots should be 0.04 to 0.1 inches and should have a length of 1 to 1.25 inches. Slots should be longitudinally spaced such that the pipe has a minimum of one square inch of slot per lineal foot of pipe and should be placed with slots facing the bottom of the pipe.

4) Underdrains should be sloped at a minimum of 0.5%.

5) Rigid non-perforated observation pipes with a diameter equal to the underdrain diameter should be connected to the underdrain every 100 feet to provide a clean-out port as well as an observation well to monitor dewatering rates. The wells/cleanouts should be connected to the perforated underdrain with the appropriate manufactured connections. The wells/cleanouts should extend 6 inches above the top elevation of the bioinfiltration facility mulch, and should be capped with a lockable screw cap. The ends of the underdrain pipes not terminating in an observation well/cleanout should also be capped.

Gravel Layer

1) The following aggregate should be used for the gravel layer below the underdrain pipe. Place the underdrain below the choking stone, within the top 6 inches of the gravel layer.

Sieve size	Percent Passing
¾ inch	100
¼ inch	30-60
US No. 8	20-50
US No. 50	3-12
US No. 200	0-1

2) At the option of the designer/geotechnical engineer, a geotextile fabric may be placed between the planting media and the gravel layer. If a geotextile fabric is used, it should meet a minimum permittivity rate of 75 gal/min/ft^2, should not impede the infiltration rate of the soil medium, and should meet the following minimum materials requirements.

Geotextile Property	Value	Test Method
Trapezoidal Tear (lbs)	40 (min)	ASTM D4533
Permeability (cm/sec)	0.2 (min)	ASTM D4491
AOS (sieve size)	#60 - #70 (min)	ASTM D4751
Ultraviolet resistance	70% or greater	ASTM D4355

Preferably, aggregate (choking stone) should be used in place of filter fabric to reduce the potential for clogging. This aggregate layer should consist of 2 to 4 inches of washed sand underlain with 2 inches of choking stone (Typically #8 or #89 washed).

3) Bioinfiltration facilities have the added benefit of enhanced nitrogen removal due to the elevated underdrain. This allows for a fluctuating anaerobic/aerobic zone below the drain pipe. *The intention is that denitrification within the anaerobic/anoxic zone is facilitated by microbes using forms of nitrogen (NO_2 and NO_3) instead of oxygen for respiration.*

4) The underdrain should drain freely to an acceptable discharge point. The underdrain can be connected to a downstream open conveyance (vegetated swale), to another bioinfiltration cell as part of a connected treatment system, to a storm drain, daylight to a vegetated dispersion area using an effective flow dispersion device, or to a storage facility for harvesting.

Overflow

An overflow device is required at the 18-inch ponding depth. The following, or equivalent should be provided:

1) A vertical PVC pipe (SDR 35) to act as an overflow riser.

2) The overflow riser(s) should be 6 inches or greater in diameter, so it can be cleaned without damage to the pipe.

The inlet to the riser should be at the ponding depth (18 inches for fenced bioinfiltration areas and 6 inches for areas that are not fenced), and be capped with a spider cap to exclude floating mulch and debris. Spider caps should be screwed in or glued, i.e., not removable.

Hydraulic Restriction Layers

Infiltration pathways may need to be restricted due to the close proximity of roads, foundations, or other infrastructure. A geomembrane liner, or other equivalent water proofing, may be placed along the vertical walls to reduce lateral flows. This liner should have a minimum thickness of 30 mils.

Planting/Storage Media

1) The planting media placed in the cell should achieve a long-term, in-place infiltration rate of at least 1 inch per hour. Higher infiltration rates are permissible. If the design long-term, in-place infiltration rate of the soil exceeds 12 inches per hour, documentation should be provided to demonstrate that the media will adequately address pollutants of concern at a higher flowrate. Bioinfiltration soil shall also support vigorous plant growth.

2) Planting media should consist of 60 to 80% fine sand and 20 to 40% compost.

3) Sand should be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size should be non-plastic. Sand for bioinfiltration should be analyzed by an accredited lab using #200, #100, #40, #30, #16, #8, #4, and 3/8 sieves (ASTM D 422 or as approved by the local permitting authority) and meet the following gradation (Note: all sands complying with ASTM C33 for fine aggregate comply with the gradation requirements below):

Sieve Size (ASTM D422)	% Passing (by weight)	
	Minimum	Maximum
3/8 inch	100	100
#4	90	100
#8	70	100
#16	40	95
#30	15	70
#40	5	55
#100	0	15
#200	0	5

Note: the gradation of the sand component of the media is believed to be a major factor in the hydraulic conductivity of the media mix. If the desired hydraulic conductivity of the media cannot be achieved within the specified proportions of sand and compost (#2), then it may be necessary to utilize sand at the coarser end of the range specified in above (“minimum” column).

4) Compost should be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes, or other organic materials not including manure or biosolids meeting standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program). Compost quality should be verified via a lab analysis to be:

- Feedstock materials shall be specified and include one or more of the following: landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
- Organic matter: 35-75% dry weight basis.
- Carbon and Nitrogen Ratio: 15:1 < C:N < 25:1
- Maturity/Stability: shall have dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120 F) upon delivery or rewetting is not acceptable.

- Toxicity: any one of the following measures is sufficient to indicate non-toxicity:
    - NH4:NH3 < 3
    - Ammonium < 500 ppm, dry weight basis
    - Seed Germination > 80% of control
    - Plant trials > 80% of control
    - e. Solvita® > 5 index value
- Nutrient content:
    - Total Nitrogen content 0.9% or above preferred
    - Total Boron should be <80 ppm, soluble boron < 2.5 ppm
- Salinity: < 6.0 mmhos/cm
- pH between 6.5 and 8 (may vary with plant palette)

Compost for bioinfiltration should be analyzed by an accredited lab using #200, ¼ inch, ½ inch, and 1 inch sieves (ASTM D 422 or as approved by the local permitting authority) and meet the following gradation:

Sieve Size (ASTM D422)	% Passing (by weight)	
	Minimum	Maximum
1 inch	99	100
½ inch	90	100
¼ inch	40	90
#200	2	10

Tests should be sufficiently recent to represent the actual material that is anticipated to be delivered to the site. If processes or sources used by the supplier have changed significantly since the most recent testing, new tests should be requested.

Note: the gradation of compost used in bioinfiltration media is believed to play an important role in the saturated hydraulic conductivity of the media. To achieve a higher saturated hydraulic conductivity, it may be necessary to utilize compost at the coarser end of this range (“minimum” column). The percent passing the #200 sieve (fines) is believed to be the most important factor in hydraulic conductivity.

In addition, a coarser compost mix provides more heterogeneity of the bioinfiltration media, which is believed to be advantageous for more rapid development of soil structure needed to support health biological processes. This may be an advantage for plant establishment with lower nutrient and water input.

5) The bioinfiltration area should be covered with 2 to 4 inches (average 3 inches) of mulch at the start and an additional placement of 1 to 2 inches of mulch should be added annually. *The intention is that to help sustain the nutrient levels, suppress weeds, retain moisture, and maintain infiltration capacity*.

Planting/Storage Media Design for Nutrient Sensitive Receiving Waters

1) Where the BMP discharges to receiving waters with nutrient impairments or nutrient TMDLs, the planting media placed in the cell should be designed with the specific goal of minimizing the potential for initial and long term leaching of nutrients from the media.

2) In general, the potential for leaching of nutrients can be minimized by:

   a. Utilizing stable, aged compost (as required of media mixes under all conditions).

   b. Utilizing other sources of organic matter, as appropriate, that are safe, non-toxic, and have lower potential for nutrient leaching than compost.

   c. Reducing the content of compost or other organic material in the media mix to the minimum amount necessary to support vigorous plant growth and healthy biological processes.

3) A landscape architect should be consulted to assist in the design of planting/storage media to balance the interests of plant establishment, water retention capacity (irrigation demand), and the potential for nutrient leaching. The following practices should be considered in developing the media mix design:

   a. The actual nutrient content and organic content of the selected compost source should be considered when specifying the proportions of compost and sand. The compost specification allows a range of organic content over approximately a factor of 2 and nutrient content may vary more widely. Therefore determining the actual organic content and nutrient content of the compost expected to be supplied is important in determining the proportion to be used for amendment.

   b. A commitment to periodic soil testing for nutrient content and a commitment to adaptive management of nutrient levels can help reduce the amount of organic amendment that must be provided initially. Generally, nutrients can be added planting areas through the addition of organic mulch, but cannot be removed.

   c. Plant palettes and the associated planting mix should be designed with native plants where possible. Native plants generally have a broader tolerance for nutrient content, and can be longer lived in leaner/lower nutrient soils. An additional benefit of lower nutrient levels is that native plants will generally have less competition from weeds.

d. Nutrients are better retained in soils with higher cation exchange capacity (CEC). CEC can be increased through selection of organic material with naturally high CEC, such as peat, and/or selection of inorganic material with high CEC such as some sands or engineered minerals (e.g., low P-index sands, zeolites, rhyolites, etc). Including higher CEC materials would tend to reduce the net leaching of nutrients.

e. Soil structure can be more important than nutrient content in plant survival and biologic health of the system. If a good soil structure can be created with very low amounts of compost, plants survivability should still be provided. Soil structure is loosely defined as the ability of the soil to conduct and store water and nutrients as well as the degree of aeration of the soil. While soil structure generally develops with time, planting/storage media can be designed to promote earlier development of soil structure. Soil structure is enhanced by the use of amendments with high hummus content (as found in well-aged organic material). In addition, soil structure can be enhanced through the use of compost/organic material with a distribution of particle sizes (i.e., a more heterogeneous mix). Finally, inorganic amendments such as polymer beads may be useful for promoting aeration and moisture retention associated with a good soil structure. An example of engineered soil to promote soil structure can be found here:

   http://www.hort.cornell.edu/uhi/outreach/pdfs/custructuralsoilwebpdf.pdf

f. Younger plants are generally more tolerant of lower nutrient levels and tend to help develop soil structure as they grow. Starting plants from smaller transplants can help reduce the need for organic amendments and improve soil structure. The project should be able to accept a plant mortality rate that is somewhat higher than starting from larger plants and providing high organic content.

g. With these considerations, it is anticipated that less than 10 percent compost amendment could be used, while still balancing plant survivability and water retention.

Plants

1) Plant materials should be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 to 96 hours.

2) It is recommended that a minimum of three types of tree, shrubs, and/or herbaceous groundcover species be incorporated to protect against facility failure due to disease and insect infestations of a single species.

3) Native plant species and/or hardy cultivars that are not invasive and do not require chemical inputs should be used to the maximum extent practicable.

Operations and Maintenance

Bioinfiltration areas require annual plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant removal capabilities. In general, bioinfiltration maintenance requirements are typical landscape care procedures and include:

1) Watering: Plants should be drought-tolerant. Watering may be required during prolonged dry periods after plants are established.

2) Erosion control: Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred (see Appendix I for a bioinfiltration inspection and maintenance checklist). Properly designed facilities with appropriate flow velocities should not have erosion problems, except perhaps in extreme events. If erosion problems occur, the following should be reassessed: (1) flow velocities and gradients within the cell, and (2) flow dissipation and erosion protection strategies in the pretreatment area and flow entrance. If sediment is deposited in the bioinfiltration area, immediately determine the source within the contributing area, stabilize, and remove excess surface deposits.

3) Plant material: Depending on aesthetic requirements, occasional pruning and removing of dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause and, if necessary, replace with more appropriate species. Periodic weeding is necessary until plants are established. The weeding schedule should become less frequent if the appropriate plant species and planting density have been used and, as a result, undesirable plants excluded.

4) Nutrients and pesticides: The soil mix and plants should be selected for optimum fertility, plant establishment, and growth. Nutrient and pesticide inputs should not be required and may degrade the pollutant processing capability of the bioinfiltration area, as well as contribute pollutant loads to receiving waters. By design, bioinfiltration facilities are located in areas where phosphorous and nitrogen levels are often elevated and these should not be limiting nutrients. If in question, have soil analyzed for fertility.

5) Mulch: Replace mulch annually in bioinfiltration facilities where heavy metal deposition is likely (e.g., contributing areas that include industrial and auto dealer/repair parking lots and roads). In residential lots or other areas where metal deposition is not a concern, replace or add mulch as needed to maintain a 2 to 3 inch depth at least once every two years.

6) Soil: Soil mixes for bioinfiltration facilities are designed to maintain long-term fertility and pollutant processing capability. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental

concern for at least 20 years in bioinfiltration systems. Replacing mulch in bioinfiltration facilities where heavy metal deposition is likely provides an additional level of protection for prolonged performance. If in question, have soil analyzed for fertility and pollutant levels.

RWH-1: Rainwater Harvesting

Rainwater harvesting BMPs capture and store stormwater runoff for later use. These BMPs are engineered to store a specified volume of water with no surface discharge until this volume is exceeded. Storage facilities that can be used to harvest rainwater include cisterns (above ground tanks), open storage reservoirs (e.g., ponds and lakes), and underground storage devices (tanks, vaults, pipes, arch spans, and proprietary storage systems). Uses of captured water may potentially include irrigation demand, indoor non-potable demand, industrial process water demand, or other demands. Rainwater harvesting systems typically include several components: (1) methods to divert runoff to the storage device, (2) an overflow for when the storage device is full, and (3) a distribution system to get the water to where it is intended to be used. Harvesting systems typically include pretreatment to remove large sediment and vegetative debris. Systems used for internal uses may require an additional level of treatment prior to use.

Cistern

Photo Credit: MetaEfficient

Application

- Any type of land use, provided adequate water demand

Preventative Maintenance

- Debris and sediment removal
- After-rain inspections

Limitations

Rainwater harvesting may be used to meet all of the 5% EIA requirement if reliable demand is available. Rainwater harvesting is not required to be used if the available demands do not meet the volume required for 80% capture using a 72 hour drawdown time.

Design Criteria

Specific considerations for cistern rainwater harvesting systems include:

- Cisterns should include screens on gutters and downspouts to remove vegetative debris and sediment from the runoff prior to entering the cistern.
- Above-ground cisterns should be secured in place.
- Above-ground cisterns should not be located on uneven or sloped surfaces; if installed on a sloped surface, the base where the cistern will be installed should be leveled and designed for the weight of the filled cistern prior to installation.
- Child-resistant covers and mosquito screens should be placed on all water entry holes.
- A first flush diverter may be installed so that initial runoff bypasses the cistern. Where a first flush diverter is used, the diverted flows must be directed to a pervious area so that no runoff is produced or another form of treatment must be provided for this flow.
- Above-ground cisterns should be installed in a location with easy access for maintenance or replacement.

Specific considerations for underground detention include:

- Access entry covers (36” diameter minimum) should be locking and within 50 feet of all areas of the detention tank.
- In cases where the detention facility provides sediment containment, the facility should be laid flat and there should be at least ½ foot of dead storage within the tank or vault.
- Outlet structures should be designed using the 100-year storm as overflow and should be easily accessible for maintenance activities.
- For detention facilities beneath roads and parking areas, structural requirements should meet H20 load requirements.
- In cases where groundwater may cause flotation, these forces should be counteracted with backfill, anchors, or other measures.

- Underground detention facilities should be installed on consolidated and stable native soil; if the facility is constructed in fill slopes, a geotechnical analysis should be performed to ensure stability.

General considerations include:

- In cases where there is non-potable indoor demand, proper pretreatment measures should be installed such as pre-filtration, cartridge filtration, and/or disinfection (which can also be provided between the cistern and point of use).
- Plumbing systems should be installed in accordance with the current California Building and Plumbing Codes (CBC – part of California Code of Regulations, Title 24).
- Underground detention facilities can be incorporated into a treatment train to provide initial or supplemental storage to other detention storage facilities and/or infiltration BMPs.
- Treatment of the captured rainwater (i.e. disinfection) may be required depending on the end use of the water.

Rainwater harvesting uses include:

- Harvested rainwater can be used for irrigation and other non-potable uses (if local, State, and Federal ordinances allow). The use of captured stormwater allows a reduced demand on the potable water supply. Cross-contamination should be prevented when make-up water is required for rainwater use demand by providing a backflow prevention system on the potable water supply line and/or an air gap.
- Irrigation Use
  - Subsurface (or drip) irrigation should not require disinfection pretreatment prior to use; other irrigation types, such as spray irrigation, may require additional pre-treatment prior to use
  - Selecting native and/or drought tolerant plants for landscaped area will reduce irrigation demand; however, they are still recommended for use.
- Domestic Use
  - Domestic uses may include toilet flushing and clothes washing (if local, State, and Federal ordinances allow).
  - Pretreatment requirements per local, State, or Federal codes and ordinances may apply.
- Other Non-Potable Uses

- Other potential non-potable uses may include vehicle/equipment washing, evaporative cooling, industrial processes, and dilution water for recycled water systems.

Sizing Criteria

The effectiveness of rainwater harvesting (RWH) systems is a function of tributary area, storage volume, demand patterns and magnitudes, and operational regime. If either of the latter two factors are too complex, simple design criteria metrics are not possible. The rainwater harvesting design criteria provided in this Fact Sheet are intended for the evaluation of systems that have relatively simple demand regimes and passive operation. If the answer to any of the following complexity screening questions is yes, a site-specific evaluation of rainwater harvesting effectiveness should be completed using a continuous simulation model with a long-term precipitation record.

Complexity Screening Questions:

- Does the proposed system have seasonally-varying demand other than irrigation?
- Will the system be operated by advanced control systems or otherwise actively controlled?
- Does the operational regime call for the system be shut down at any time during the rainy season?

Effectiveness of a harvesting system for retaining the SQDV depends on the cistern's effective storage capacity (i.e., the volume available for storage at the beginning of each event). Therefore, the required storage volume varies based on precipitation and demand. Using the following sizing charts, cisterns should be sized to achieve 80 percent capture efficiency. These nomographs are based on continuous simulation performed in EPA SWMM using precipitation and ET records representative of lowland regions (Oxnard Airport Precipitation Gauge, El Rio Spreading Grounds ET station) and mountainous regions (Ojai-Stewart Canyon Precipitation Gauge, Matilja ET Station) of the County.

Instructions for determining required cistern volume and demand are provided below:

Step 1: Determine Required Rainwater Harvesting Design Volume (RWHDV)

Note that a rainwater harvesting system sized for 80% capture runoff (as determined by continuous modeling), which can draw down in 72 hours is required to meet the 5% EIA standard. If the demand required to draw a tank sized for these parameters is not available, rainwater harvesting is not mandated for use. Partial capture of runoff is allowable if rainwater harvesting is desired for use. Sizing instructions for partial capture are included in Step 3.

1) Determine the design storm required for 80% capture with a 72 hour drawdown time by selecting the project region (lowland or mountainous), then determining where the 72 hour drawdown curve intersects the 80% capture line. Pivot down from this intersection to the x axis to read the design storm, d_{design}.

2) Determine the required rainwater harvesting system volume using the following equation:

$$RWHDV = C*(d_{design}/12)*A_{retain} \qquad \text{(Equation 6-19)}$$

Where:

RWHDV	=	rainwater harvesting design volume (acre-ft)
C	=	runoff coefficient, calculated using Appendix E and the site imperviousness
d_{design}	=	design storm required for 80% capture with a 72 hour drawdown time, estimated as described in 1) (inches)
A_{retain}	=	the drainage area from which runoff must be retained (acres)

Step 2: Determine the Required Daily Demand to Achieve 80% Capture

1) The required daily demand to achieve 80% capture of runoff can be calculated as follows:

$$Demand = [RWHDV/(72/24)] * (325{,}851) \qquad \text{(Equation 6-20)}$$

Where:

Demand	=	required project daily demand to draw down rainwater harvesting system sized for 80% capture in 72 hours (gallons)
RWHDV	=	rainwater harvesting design volume (acre-ft), from Step 1 above

If the project daily demand is less than the Demand calculated, the project is not required to utilize rainwater harvesting. If rainwater harvesting is desired for use for partial retention, if a longer drawdown time is desired, or if a predetermined daily demand is to be used, refer to Steps 3 and 4 below.

Step 3: Determine RWHDV for Partial Retention or a Longer Drawdown Time

1) Calculate RWHDV for selected combination of % capture and drawdown time using nomographs and the following equation:

$$RWHDV = C^*(d_{design}/12)^*A_{retain} \quad \text{(Equation 6-21)}$$

Where:

RWHDV	=	rainwater harvesting design volume (acre-ft)
C	=	runoff coefficient, calculated using Appendix E and the site imperviousness
d_{design}	=	design storm required for selected % capture and drawdown time (inches)
A_{retain}	=	the drainage area from which runoff must be retained (acres)

2) Determine the required daily demand for the selected capture efficiency and/or drawdown time:

$$Demand = [RWHDV/(t_{drawdown}/24)] * (325{,}851) \quad \text{(Equation 6-22)}$$

Where:

Demand	=	required project daily demand to draw down rainwater harvesting system sized for 80% capture in 72 hours (gallons)
RWHDV	=	rainwater harvesting design volume (acre-ft), from 1) above
$t_{drawdown}$	=	selected drawdown time (hours)

Step 4: Determine RWHDV for a Predetermined Daily Demand

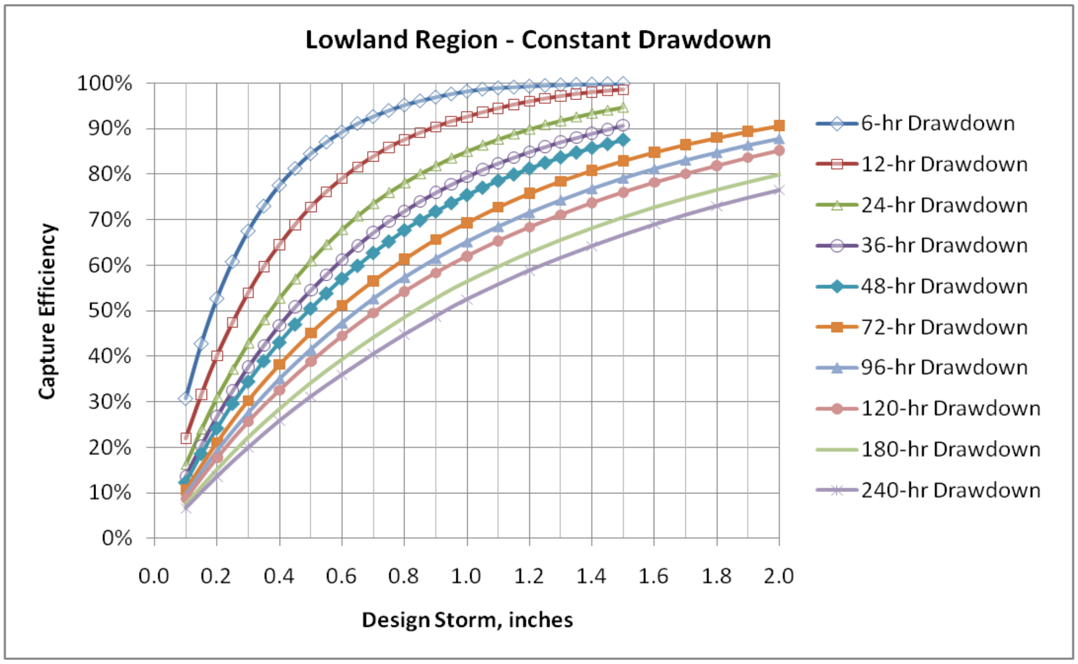
1) Determine the daily demand requirement in acre-feet (1 acre-foot = 325,851 gallons).

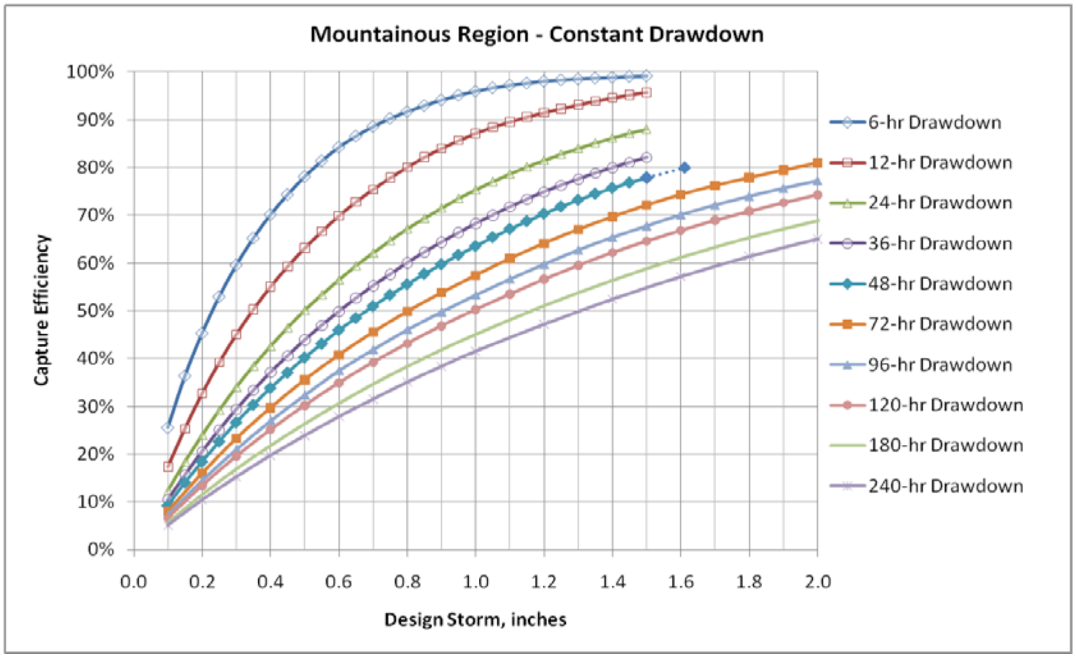
2) Calculate the required RWHDV for the desired drawdown time using the following equation:

$$RWHDV = Demand *(t_{drawdown}/24) \quad \text{(Equation 6-23)}$$

Where:

Demand	=	required project daily demand (acre-feet)
RWHDV	=	rainwater harvesting design volume (acre-ft)
$t_{drawdown}$	=	selected drawdown time (hours)


Lowland Region - Constant Drawdown
Capture Efficiency
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Design Storm, inches
6-hr Drawdown
12-hr Drawdown
24-hr Drawdown
36-hr Drawdown
48-hr Drawdown
72-hr Drawdown
96-hr Drawdown
120-hr Drawdown
180-hr Drawdown
240-hr Drawdown


Mountainous Region - Constant Drawdown
Capture Efficiency
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Design Storm, inches
6-hr Drawdown
12-hr Drawdown
24-hr Drawdown
36-hr Drawdown
48-hr Drawdown
72-hr Drawdown
96-hr Drawdown
120-hr Drawdown
180-hr Drawdown
240-hr Drawdown

Operations and Maintenance

1) Inspect storage facilities, associated pipes, and valve connections for leaks.
2) Clean gutters and filters of debris that has accumulated and is obstructing flow into the storage facility.
3) Clean and remove accumulated sediment annually.
4) Check cisterns for stability and anchor if necessary.
5) If the storage device is underground, ensure that a manhole is accessible, operational, and secure.

ET-1: Green Roof

Green roofs (also known as eco-roofs and vegetated roof covers) are roofing systems that layer a soil/vegetative cover over a waterproofing membrane. Green roofs rely on highly porous media and moisture retention layers to store intercepted precipitation and to support vegetation that can reduce the volume of stormwater runoff via evapotranspiration. There are two types of green roofing systems: extensive, which is a light-weight system; and intensive, which is a heavier system that allows for larger plants but requires additional structural support.

Green Roof Examples

Photo Credits:

1. Milwaukee Department of Environmental Sustainability;

2. Geosyntec Consultants

Application

- Building roofs
- Outdoor eating area roofs
- Parking structure or turnaround roofs

Preventative Maintenance

- Weeding and pruning
- Leaf and debris removal
- Regular membrane inspection
- Drain cleanout

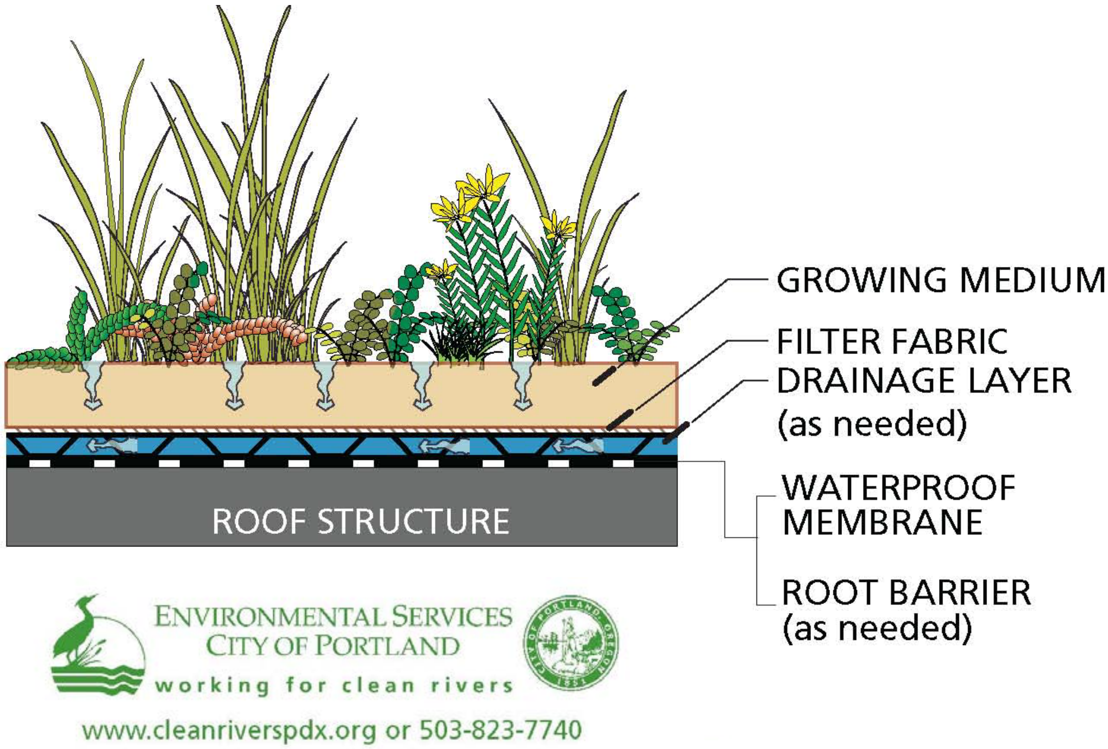


Exhibit A: Green Roof Schematic Courtesy of Portland, OR Environmental Services Department

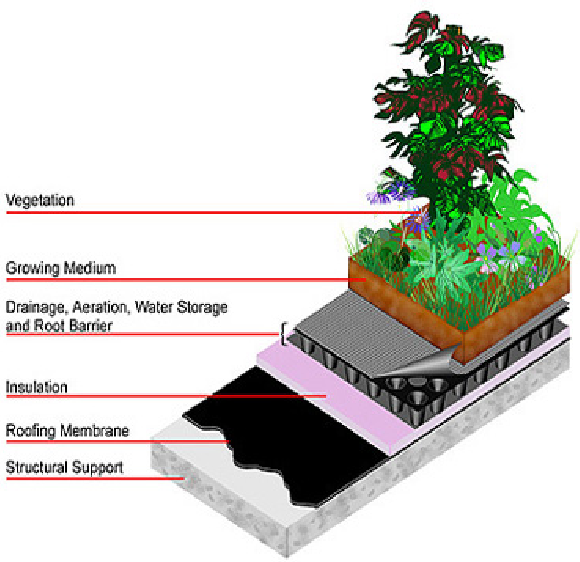


Exhibit B: Green Roof Schematic Courtesy of American Wick

Geosyntec consultants

Figure 6-9: Green Roofs

Limitations

The following describes additional site suitability recommendations and limitations for green roofs.

- Typically not used for steep roofs (>25%); and
- Structural roof support must be sufficient to support additional roof weight.

Design Criteria

Green roofs should be designed according to the requirements listed in Table 6-17 and outlined in the section below.

Table 6-17: Green Roof Design Criteria

Design Parameter	Unit	Design Criteria
Soil depth range	inch	2 – 6
Saturated soil weight	lbs. / sq. ft.	10 – 25
Maximum roof slope	%	25
Minimum roof slope	--	Flat
Vegetation type	--	Varies (see vegetation section below)
Vegetation height	--	Varies (see vegetation section below)

Sizing

Green roofs may provide quantifiable reduction in volume. However, they are not explicitly sized to meet the water quality treatment requirements. Rather, the volume reduction is accounted for implicitly in sizing calculations for the treatment BMPs for the remainder of the site by assuming that the roof area is pervious rather than impervious when calculating a runoff coefficient for the site.

Green Roof Components

Structural Support

The first requirement that must be met before installing a green roof is the structural support of the roof. The roof must be able to support the additional weight of the soil, water, and vegetation. A licensed structural engineer should be consulted to determine the proposed structural support during the design phase.

Waterproof Roofing Membrane

Waterproof roofing membrane is an integral part of a green roofing system. The waterproof membrane prevents the roof runoff from penetrating and damaging the roofing material. There are many materials available for this purpose and come in various forms (i.e., rolls, sheets, liquid) and exhibit different characteristics (e.g., flexibility, strength, etc.). Depending on the type of membrane chosen a root barrier may be required to prevent roots from compromising the integrity of the membrane.

Drainage Layer

Depending on the design of the roof, a drainage layer may be required to convey the excess runoff from of the roof. If a drainage layer is needed, there are numerous options including a gravel layer (which may require additional structural support), and many styles and types of plastic drainage layers.

Soil Considerations

The soil layer is an important factor in the construction and operation of green roofs. The soil layer must have excellent drainage, not be too heavy when saturated, and be adequately fertile as a growing medium for plants. Many companies sell their own proprietary soil mixes. However, a simple mix of ¼ topsoil, ¼ compost, and the remainder pumice perlite may be used for many applications. Other soil amendments may be substituted for the compost and the pumice perlite. The soil mix used should not contain any clay.

Vegetation

Green roofs must be vegetated in order to provide adequate treatment of runoff via filtration and evapotranspiration. Vegetation, when chosen and maintained appropriately, also improves the aesthetics of a site. Green roofs should be vegetated with a mix of erosion-resistant plant species that effectively bind the soil and can withstand the extreme environment of rooftops. A diverse selection of low growing plants that thrive under the specific site, climatic, and watering conditions should be identified. A mixture of drought-tolerant, self-sustaining (perennial or self-sowing without need for fertilizers, herbicides, and or pesticides) is most effective in the Ventura County region. Plants selected should also be low maintenance and able to withstand heat, cold, and high winds. Native or adapted sedum/succulent plants are preferred because they generally require less fertilizer, limited maintenance, and are more drought resistant than exotic plants. When appropriate, green roofs may be planted with larger plants. However, this depends on structural support and soil depth.

The following provides additional vegetation guidance for green roofs.

1) For extensive roofs, trees or shrubs may be used as long as the increased soil depth required may be supported.

2) Irrigation is required if the seed is planted in spring or summer. The use of a permanent smart (self-regulating) irrigation system or other watering system, may help provide maximal water quality performance. Drought-tolerant plants should be specified to minimize irrigation requirements. For projects seeking "High Performance Building" recognition, ASHRAE Standard 189.1 states that potable water cannot be used for irrigating green roofs after they are established.

3) Locate the green roof vegetation in an area without excessive shade to avoid poor vegetative growth. For moderately shaded areas, shade tolerant plants should be used.

4) A relevant plant list should be provided by a landscape professional and used as a guide to support project-specific planting recommendations, including recommendations on appropriate plants, fertilizer, mulching applications, and irrigation requirements (if any) to ensure healthy vegetation growth.

Drain

1) There must be a drain pipe (gutter) to convey runoff (both overflow and underdrain flow, if appropriate) safely from the roof to another basic or stormwater runoff BMP, a pervious area, or the stormwater conveyance system.

Construction Considerations

1) Building structure must be adequate to hold the additional weight of the soil, retained water, and plants.

2) Plants should be selected carefully to minimize maintenance and function properly.

Operations and Maintenance

1) During the establishment period, green roofs may need irrigation and occasional light fertilization until the plants have fully established themselves. Once healthy and fully established, properly selected climate-appropriate plants will no longer need irrigation except during extreme drought.

2) Weeding during the establishment period may be required to ensure proper establishment of the desired vegetation. Once established and assuming proper selection of vegetation, the vegetation should not require any preventative maintenance.

3) The roofing membrane should be inspected routinely, as it is a crucial element of the green roof. In addition, preventative inspection of the drainage paths is required to ensure that there are no clogs in the system. If a green roof is not properly draining, the moisture in the system may cause the roof to leak and/or the plants to drown or rot. Leaks in the roof may occur not only due to improper drainage, but also if the incorrect combination of waterproofing barrier, root barrier, and drainage systems

are selected. Leak inspections in the roofing system are advised, especially in locations prone to leaks, such as at all joints.

4) Inspect green roofs for erosion or damage to vegetation after every storm greater than 0.75 inches and at the end of the wet season to schedule summer maintenance and in the fall to ensure readiness for winter. Additional inspection after periods of heavy runoff is recommended. Green roofs should be checked for debris, litter, and signs of clogging.

5) Replanting and/or reseeding of vegetation may be required for reestablishment.

6) Vegetation should be healthy and dense enough to provide filtering while protecting underlying soils from erosion.

7) Fallen leaves and debris from deciduous plant foliage should be removed.

8) Invasive vegetation, such as Alligatorweed (*Alternanthera philoxeroides*), Halogeton (*Halogeton glomeratus*), Spotted Knapweed (*Centaurea maculosa*), Giant Reed (*Arundo donax*), Castor Bean (*Ricinus communis*), Perennial Pepperweed (*Lepidium latifolium*), and Yellow Starthistle (*Centaurea solstitalis*) should be removed and replaced with non-invasive species. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website or the California Invasive Plant Council website at www.cal-ipc.org.

9) Dead vegetation should be removed if greater than 10% of the area coverage. Vegetation should be replaced and established before the wet season to maintain cover density and control erosion where soils are exposed.

ET-2: Hydrologic Source Control BMPs

Hydrologic source control (HSC) BMPs are simple BMPs that are highly integrated with the site design to reduce runoff volume. The practices described in this fact sheet include impervious area dispersion, street trees, and rain barrels.

Application

- Building roofs
- Sidewalks and patios
- Landscaping hardscapes

Preventative Maintenance

- Weeding and pruning
- Leaf and debris removal

Hydrologic Source Control Examples

Photo Credits:

1. http://www.auburn.edu/projects/sustainability/website/newsletter/0910.php;

2. Geosyntec Consultants;

3. toronto.ca/environment/water.htm

Accounting for Hydrologic Source Controls in Hydrologic Calculations

The effects of HSC BMPs are accounted for in hydrologic calculations as an adjustment to the storm depth used in the SQDV calculations described in Section 2. Runoff volume calculations are performed exactly as described in Section 2, with the exception that the storm depth used in the calculation is adjusted prior to the calculation. Adjustments are based on the type and magnitude of HSC BMPs employed for the drainage area per guidance outlined in this Fact Sheet.

EXAMPLE 6.1: ACCOUNTING FOR HSCS IN HYDROLOGIC CALCULATIONS

Given:

- A drainage area consists of a 1 acre building roof surrounded by 0.25 acres of landscaping (80 percent composite imperviousness);
- The drainage from the roof is spread uniformly over the entire pervious area via splash pads and level spreaders;
- Soils are moderately well drained and have a shallow slope;
- For the purpose of this example, assume the hydrologic source control adjustment for this configuration of disconnected downspouts is 0.3 inches. For an actual project, hydrologic source control adjustment would be calculated based on instructions in this section; and
- The unadjusted design storm depth at the project site is 0.75 inches.

Result:

1) The designer uses 0.75 inches – 0.3 inches = 0.45 inches in the calculation of SQDV.

Impervious Area Dispersion

Impervious area dispersion refers to the practice of routing runoff from impervious areas, such as rooftops, walkways, and patios, onto the surface of adjacent pervious areas. Runoff is dispersed uniformly via splash block or dispersion trench and soaks into the ground as it moves slowly across the surface of the pervious area. Minor ponding may occur, but it is not the intent of this practice to actively promote localized on-lot infiltration, which should be designed as an infiltration BMP (see INF-1 through INF-6 above).

Design Considerations

1) Not likely to result in net increased infiltration over existing condition for previously pervious sites, but has potential to result in some geotechnical hazards associated with infiltration.

2) Significant pervious area should be available, at a ratio of at least 1 part pervious area capable of receiving flow to 5 parts impervious.

3) Pervious area receiving flow should have a slope ≤ 2 percent and path lengths of ≥ 10 feet per 1000 sf of impervious area.

4) Overflow from the pervious area up to the SQDV should be directed to a Retention BMP, Biofiltration BMP, or Treatment Control Measure. Larger flows should be directed to the storm drain system.

5) Soils in the pervious area should be preserved in their natural condition or improved with soil amendments (see Soil Amendments below).

6) Impervious area disconnection is an HSC that may be used as the first element in any treatment train.

7) The use of impervious area disconnection reduces the sizing requirement for downstream Retention BMPs, Biofiltration BMPs, and/or Treatment Control Measures.

Calculating HSC Retention Volume

1) The retention volume provided by downspout dispersion is a function of the ratio of impervious to pervious area.

2) Determine flow patterns in pervious area and estimate footprint of pervious area receiving dispersed flow. Calculate the ratio of pervious to impervious area.

3) Check soil conditions using the checklist below; amend if necessary.

4) Look up the storm retention depth (d_{HSC}), from the chart to the right.

[1] Pervious area used in calculation should only include the pervious area receiving flow, not pervious area receiving only direct rainfall or upslope pervious drainage.

5) The max d_{HSC} is equal to the design storm depth for the project site.

Soil Condition Checklist

1) Soil should have a maximum slope of 2 percent.

2) Landscaping should be well-established.

3) Amended soils should consist of: 60 to 70% sand, 15 to 25% compost, 10 to 20% clean topsoil. The organic content of the soil mixture should be 8 to 12%; the pH range should be 5.5 to 7.5.

Additional References

- SMC LID Manual (pp 131): http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf
- City of Portland Bureau of Environmental Services. 2010. How to manage stormwater – Disconnect Downspouts: http://www.portlandonline.com/bes/index.cfm?c=43081&a=177702
- Seattle Public Utility: http://www.cityofseattle.org/util/stellent/groups/public/@spu/@usm/documents/webcontent/spu01_006395.pdf
- Thurston County, Washington State (pp 10): http://www.co.thurston.wa.us/wwm/Engineering_Standards/Drainage_Manual/PDFs/DG-5%20Roof%20Runoff%20Control.pdf

Amended Soils

A soil amendment is any material added to the upper layer of soil especially in the vicinity of the root zone soil to improve its physical properties, such as the water retention, permeability, water infiltration, drainage, aeration and structure. The goal is to provide a better environment for roots. To do its work, an amendment should be thoroughly mixed into the soil. If it is merely buried, its effectiveness is reduced and it will interfere with water and air movement and root growth.

Amending a soil is different from mulching, although many mulches also are used as amendments. A mulch is left on the soil surface. Its purpose is to reduce evaporation and runoff, inhibit weed growth, and create an attractive appearance. Mulches also moderate soil temperature, helping to warm soils in the spring and cool them in the summer. Mulches may be incorporated into the soil as amendments after they have decomposed to the point that they no longer serve their purpose.

Organic amendments, such as compost, increase soil organic matter content and offer many benefits. Organic matter improves soil aeration, water infiltration, and both water- and nutrient-holding capacity. Many organic amendments contain plant nutrients and act as organic fertilizers. Organic matter also is an important energy source for bacteria, fungi and earthworms that live in the soil.

Design Considerations

1) Landscaped and other developed pervious areas can be amended to improve evapotranspiration and soil moisture storage capacity.

2) Landscape and other developed pervious areas can be amended to increase infiltration rates in cases where the limiting infiltration horizon exists near the surface of the soil column.

3) Soil amendments are common components of several Retention BMPs, Biofiltration BMPs, and Treatment Control Measures, including infiltration basins, bioretention, vegetated swales, filter strips, planter boxes, green roofs, dry extended detention basins, wet retention basins, and constructed treatment wetlands.

4) Compost, soil conditioners, and fertilizers should be rototilled into the native soil to a minimum depth of 6 inches; 12 inches preferred.

5) All soil amendments shall be free of sticks, glass, plastic, metal, debris larger than 1 inch, and other deleterious material.

6) Compost shall meet criteria listed in the guidelines for planting and storage media.

Calculating HSC Retention Volume

No retention credit is given for amended soils alone. Amended soils should be used to increase the retention volume of Retention BMPs, Biofiltration BMPs, and Treatment Control Measures.

Additional References

- San Diego County LID Handbook Appendix 4 (Factsheet 30): http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf

- Colorado State University Extension website: http://www.ext.colostate.edu/pubs/garden/07235.html

Street Trees

By intercepting rainfall, trees can provide several aesthetic and stormwater benefits including peak flow control, increased infiltration and evapotranspiration, and runoff temperature reduction. The volume of precipitation intercepted by the canopy reduces the treatment volume required for downstream treatment BMPs. Shading reduces the heat island effect as well as the temperature of adjacent impervious surfaces over which stormwater flows, and thus reduces the heat transferred to the downstream waterbody. Tree roots also strengthen the soil structure and provide infiltrative pathways, simultaneously reducing erosion potential and enhancing infiltration.

Design Considerations

1) Street trees can be incorporated along sidewalks, streets, parking lots, or driveways.

2) Street trees can be used in combination with bioretention systems along medians or in traffic calming bays.

3) There should be sufficient space available to accommodate both the tree canopy and the root system.

4) The mature tree canopy, height, and root system should not interfere with subsurface utilities, overhead powerlines, buildings and foundations, or other existing or planned structures.

5) Depending on space constraints, a 20 to 30 foot canopy (at maturity) is recommended for stormwater mitigation.

6) Native, drought-tolerant species should be selected in order to minimize irrigation requirements and improve the long-term viability of the tree.

7) Trees should not impede pedestrian or vehicle sight lines.

8) Planting locations should receive adequate sunlight and wind protection. Other environmental factors should be considered prior to planting.

9) Soils should be preserved in their natural condition (if appropriate for planting) or restored via soil amendments. If necessary, a landscape architect should be consulted.

Calculating HSC Retention Volume

1) The retention volume provided by streets trees via canopy interception is dependent on the tree species, time of the year, and maturity.

2) To compute the retention credit, the expected impervious area covered by the full tree canopy after 4 years of growth should be computed (IA_{HSC}). The maximum retention depth credit for canopy interception (d_{HSC}) is 0.05 inches.

Additional References

- California Stormwater BMP Handbook: http://www.cabmphandbooks.com/Documents/Development/Section_3.pdf
- City of Los Angeles, Street Tree Division - Street Tree Selection Guide: http://bss.lacity.org/UrbanForestryDivision/StreetTreeSelectionGuide.htm
- Portland Stormwater Management Manual: http://www.portlandonline.com/bes/index.cfm?c=35122&a=55791
- San Diego County LID Handbook Fact Sheets: http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf

Residential Rain Barrels

Rain barrels are above ground storage vessels that capture runoff from roof downspouts during rain events and detain that runoff for later use for irrigating landscaped areas.

Design Considerations

1) If detained water will be used for irrigation, sufficient vegetated areas and other impervious surfaces should be present in the drainage area.

2) Storage capacity and sufficient area for overflow dispersion should be accounted for.

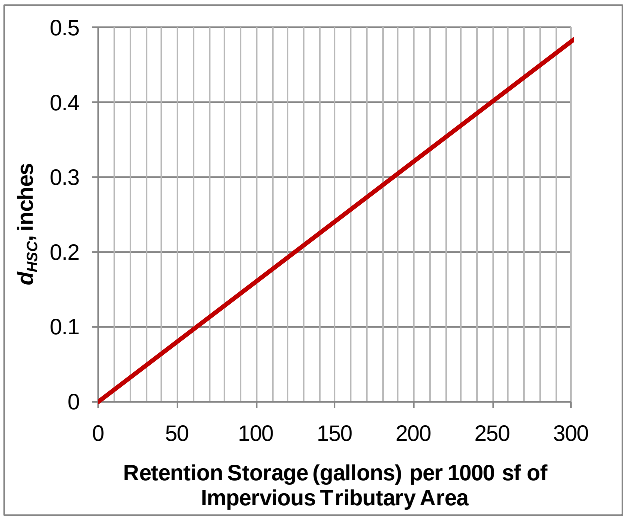
3) Screens on gutters and downspouts to remove sediment and particles as the water enters the barrel or cistern should be provided.

4) Removable child-resistant covers and mosquito screening should be provided to prevent unwanted access.

5) Above-ground barrels should be secured in place.

6) Above-ground barrels should not be located on uneven or sloped surfaces. If installed on a sloped surface, the base where the rain barrel will be installed should be leveled prior to installation.

7) Overflow dispersion should occur greater than 5 feet from building foundations.



8) Dispersion should not cause geotechnical hazards related to slope stability.

9) Effective energy dissipation and uniform flow spreading methods should be employed to prevent erosion and facilitate dispersion.

10) Placement should allow easy access for regular maintenance.

Calculating HSC Retention Volume

1) The retention volume provided by rain barrels that are not actively managed can be computed as 50% of the total storage volume (e.g., 22.5 gallons for each 55 gallon barrel).

2) If the rain barrel is actively managed, then it should be treated as a cistern (see RWH-1).

3) Estimate the average retention volume per 1000 square feet impervious tributary area provided by rain barrels.

4) Look up the storm retention depth (d_{HSC}), from the chart to the right.

5) The max d_{HSC} is equal to the design storm depth for the project site.

Additional References

- Santa Barbara BMP Guidance Manual, Chapter 6: http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf

- County of Los Angeles LID Standards Manual: http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf

- SMC LID Manual (pp 114): http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf

- San Diego County LID Handbook Appendix 4 (Factsheet 26): http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf

BIO-1: Bioretention with Underdrain

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil and plant based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plantings. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. Bioretention with an underdrain is a treatment control measures that can be used for areas with low permeability native soils or steep slopes. Bioretention may be designed without an underdrain to serve as a retention BMP in areas of high soil permeability (see INF-3 Bioretention) or partial retention/ partial biofiltration BMP (see INF-7: Bioinfiltration).

Bioretention in Parking Lots

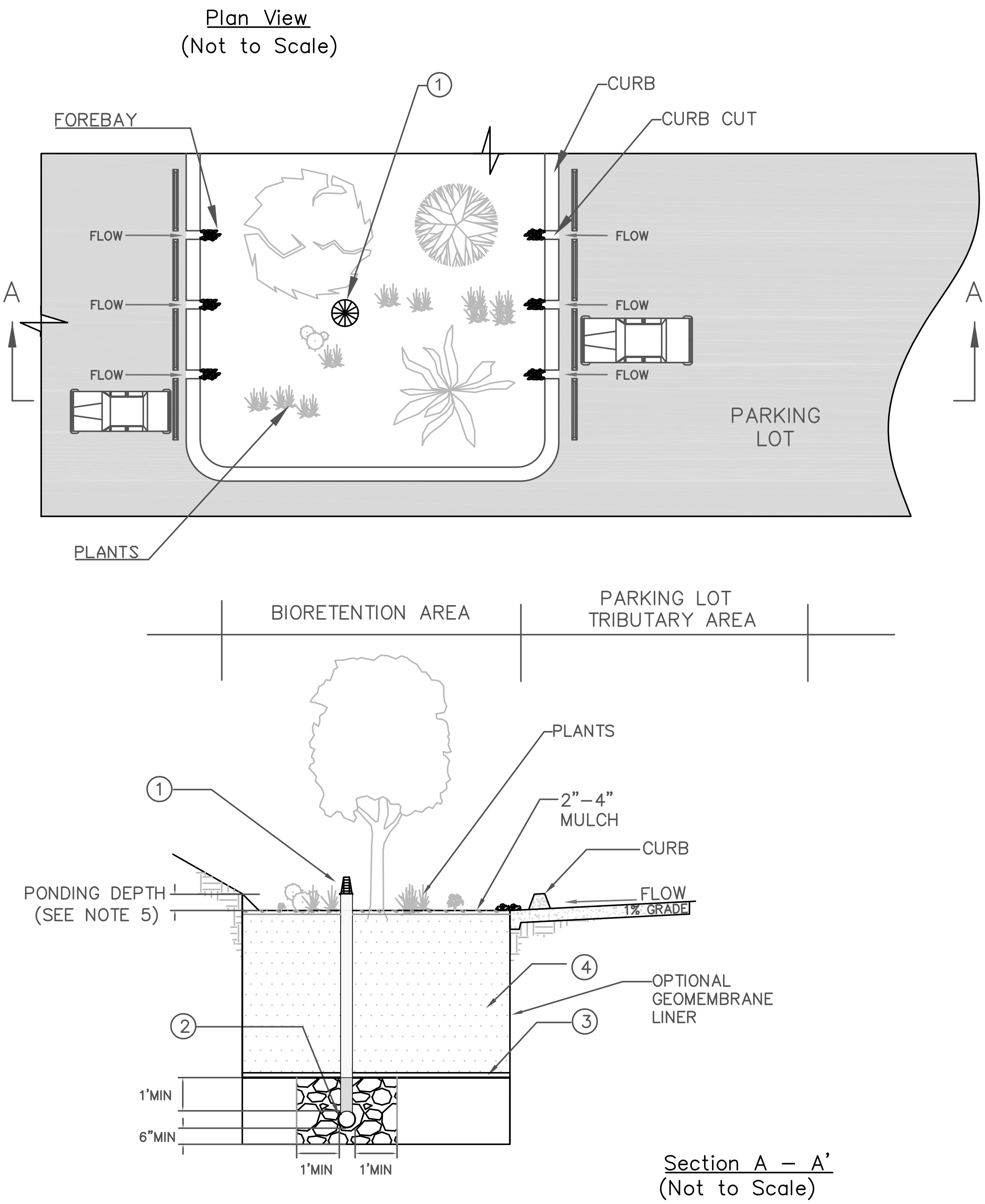
Photo Credits: Geosyntec Consultants

Application

- Parking lots
- Roadway parkways and medians
- School entrances, courtyards, and walkways
- Playgrounds and sports fields

Preventative Maintenance

- Repair small eroded areas
- Remove trash and debris and rake surface soils
- Remove accumulated fine sediments, dead leaves, and trash
- Remove weeds and prune back excess plant growth
- Remove sediment and debris accumulation near inlet and outlet structures
- Periodically observe function under wet weather conditions



NOTES:

1. OVERFLOW DEVICE: VERTICAL RISER OR EQUIVALENT.
2. PERFORATED 6" MIN PVC PIPE UNDERDRAIN.
3. OPTIONAL CHOKING GRAVEL LAYER.
4. 2' MIN PLANTING MIX; 3' PREFERRED.
5. PONDING DEPTH 18" WITH FENCE; 6" WITHOUT FENCE.

Geosyntec consultants

Figure 6-10: Bioretention with Underdrain

Limitations

1) Vertical relief and proximity to storm drain - site must have adequate relief between land surface and storm drain to permit vertical percolation through the soil media and collection and conveyance in underdrain to storm drain system.

2) Depth to groundwater - shallow groundwater table may not permit complete drawdown between storms.

Design Criteria

Bioretention with an underdrain should be designed according to the requirements listed in Table 6-18 and outlined in the section below. BMP sizing worksheets are presented in Appendix E.

Table 6-18: Bioretention with an Underdrain Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume (SQDV)	acre-feet	See Section 2 and Appendix E for calculating SQDV.
Forebay	-	Forebay should be provided for all tributary surfaces that contain landscaped areas. Forebays should be designed to prevent standing water during dry weather and should be planted with a plant palette that is tolerant of wet conditions.
Maximum drawdown time of water ponded on surface	hours	72
Maximum drawdown time of surface ponding plus subsurface pores	hours	96 (72 preferred)
Maximum ponding depth	inches	18 inches
Minimum thickness of amended soils layer	feet	2 (3 preferred)
Minimum thickness of stabilized mulch	inches	2 to 4
Planting mix composition	-	60 to 80% fine sand, 20 to 40% compost
Underdrain sizing	-	6 inch minimum diameter; 0.5% minimum slope; slotted, polyvinyl chloride (PVC) pipe (PVC SDR 35 or approved equivalent); spacing shall be determined to provide

Design Parameter	Unit	Design Criteria
		capacity for maximum rate filtered through amended media
Gravel layer	-	A gravel bed should be provided around underdrain. Underdrain should have at least 1 foot of gravel installed to the sides and on top of the underdrain, and at least 0.5 feet of gravel installed below underdrain.
Overflow device	-	Required

Sizing Criteria

Bioretention facilities with underdrains shall be designed to capture and treat the SQDV. However because these systems commonly have a relatively high amended soil infiltration rate and shallow depth, these systems are typically capable of filtering a significant portion of the SQDV during a storm event. Therefore, a simplified routing approach is described in the following steps that accounts for the portion of the SQDV that is filtered during the storm event.

Step 1: Calculate the Design Volume

Bioretention facilities shall be sized to capture and biofilter the SQDV (see Section 2.3 and Appendix E).

Step 2: Determine the Design Percolation Rate

Sizing is based on the design saturated hydraulic conductivity (K_{sat}) of the amended soil layer. A target K_{sat} of 5 inches per hour is recommended for non-proprietary amended soil media. The media K_{sat} will decline between maintenance cycles as the surface becomes occluded and particulates accumulate in the amended soil layer. A factor of safety of 2.0 should be applied such that the resulting recommended design K_{sat} is 2.5 inches per hour. This value should be used for sizing unless sufficient rationale is provided to justify a higher design K_{sat}.

Step 3: Calculate the surface area

Determine the size of the required infiltrating surface by assuming the SQDV will fill the available ponding depth plus the void spaces in the media, based on the computed porosity of the filter media and aggregate layer.

1) Select a surface ponding depth (d_p) that satisfies geometric criteria and is congruent with the constraints of the site. Selecting a deeper ponding depth (18 inches maximum) generally yields a smaller footprint, however, it requires greater consideration for public safety, energy dissipation, and plant selection.

2) Compute time for selected ponding depth to filter through media:

$$t_{ponding} = \frac{d_p}{K_{design}} 12 \frac{in}{ft}$$ (Equation 6-24)

Where:

$t_{ponding}$	=	required drain time of surface ponding (≤ 72 hrs)
d_p	=	selected surface ponding water depth (ft)
K_{design}	=	media design saturated hydraulic conductivity (in/hr) (see Step 2, above)

If $t_{ponding}$ exceeds 72 hours, return to (1) and reduce surface ponding or increase media K_{design}. Otherwise, proceed to next step.

Note: In nearly all cases, $t_{ponding}$ will not approach 72 hours unless a low K_{design} is specified.

3) Compute depth of water that may be filtered during the design storm event as follows:

$$d_{filtered} = Minimum\left[\frac{K_{design} \times T_{routing}}{12 \, in/ft}, d_p\right]$$ (Equation 6-25)

Where:

$d_{filtered}$	=	depth of water that may be considered to be filtered during the design storm event (ft) for routing calculations; this value should not exceed the surface ponding depth (d_p)
K_{design}	=	design saturated hydraulic conductivity (in/hr) (see Step 2, above)
$T_{routing}$	=	storm duration that may be assumed for routing calculations; this should be assumed to be 3 hours unless rationale for an alternative assumption is provided
d_p	=	selected surface ponding water depth (ft)

The intention is that routing is important in the appropriate sizing of bioretention with underdrains. However, the depth of water considered to be filtered during the storm should be limited to the maximum ponding depth. This *results in designs that are robust to account for a variety of storm depths and durations. This limitation is for sizing calculations only. In reality, the depth that is filtered during a storm will vary based on storm depth, duration, and intensity. This TGM does not intend to limit the amount that may actually be filtered.*

4) Calculate required infiltrating surface area (filter bottom area):

$$A_{req} = \frac{SQDV}{d_p + d_{filtered}} \qquad \text{(Equation 6-26)}$$

Where:

A_{req} = required infiltrating area (ft^2). Should be calculated at the contour corresponding to the mid ponding depth (i.e., $0.5 \times d_p$ from the bottom of the facility)

$SQDV$ = stormwater quality design volume (ft^3)

d_p = selected surface ponding water depth (ft)

$d_{filtered}$ = depth of water that can be considered to be filtered during the design storm event (ft) for routing calculations (See Equation 6-15)

5) Calculate total footprint required by including a buffer for side slopes and freeboard; A_{req} is calculated at the contour corresponding to the mid ponding depth (i.e., $0.5 \times d_p$ from the bottom of the facility).

Geometry

1) Minimum planting soil depth should be 2 feet, although 3 feet is preferred.

   The intention is that the minimum planting soil depth should provide a beneficial root zone for the chosen plant palette and adequate water storage for the stormwater quality design volume. A deeper soil depth will provide a smaller surface area footprint.

2) Bioretention should be designed to drain below the planting soil in less than 72 hours and completely drain from the underdrain in 96 hours (both starting from the end of inflow).

   The intention is that soils must be allowed to dry out periodically in order to restore hydraulic capacity to receive flows from subsequent storms, maintain infiltration rates, maintain adequate soil oxygen levels for healthy soil biota and vegetation, and to provide proper soil conditions for biodegradation and retention of pollutants.

Flow Entrance and Energy Dissipation

The following types of flow entrance can be used for bioretention cells:

1) Dispersed, low velocity flow across a landscape area. Dispersed flow may not be possible given space limitations or if the facility is controlling roadway or parking lot flows where curbs are mandatory.

2) Dispersed flow across pavement or gravel and past wheel stops for parking areas.

3) Curb cuts for roadside or parking lot areas: Curb cuts should include rock or other erosion protection material in the channel entrance to dissipate energy. Flow entrance should drop 2 to 3 inches from curb line and provide an area for settling and periodic removal of sediment and coarse material before flow dissipates to the remainder of the cell.

4) Pipe flow entrance: Piped entrances, such as roof downspouts, should include rock, splash blocks, or other appropriate measures at the entrance to dissipate energy and disperse flows.

5) Woody plants (trees, shrubs, etc.) can restrict or concentrate flows and can be damaged by erosion around the root ball and should not be placed directly in the entrance flow path.

Underdrains

Underdrains should meet the following criteria:

1) 6-inch minimum diameter.

2) Underdrains should be made of slotted, polyvinyl chloride (PVC) pipe (PVC SDR 35 or approved equivalent). *The intention is that compared to round-hole perforated pipe, slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.*

3) Slotted pipe should have 2 to 4 rows of slots cut perpendicular to the axis of the pipe or at right angles to the pitch of corrugations. Slots should be 0.04 to 0.1 inches and should have a length of 1 to 1.25 inches. Slots should be longitudinally spaced such that the pipe has a minimum of one square inch of slot per lineal foot of pipe and should be placed with slots facing the bottom of the pipe.

4) Underdrains should be sloped at a minimum of 0.5%.

5) Rigid non-perforated observation pipes with a diameter equal to the underdrain diameter should be connected to the underdrain every 100 feet to provide a clean-out port as well as an observation well to monitor dewatering rates. The wells/cleanouts should be connected to the perforated underdrain with the appropriate manufactured connections. The wells/cleanouts should extend 6 inches above the top

elevation of the bioretention facility mulch, and should be capped with a lockable screw cap. The ends of the underdrain pipes not terminating in an observation well/cleanout should also be capped.

6) The following aggregate should be used to provide a gravel blanket and bedding for the underdrain pipe. Place the underdrain on a bed of washed aggregate at a minimum thickness of 6 inches and cover it with the same aggregate to provide a 1 foot minimum depth around the top and sides of the slotted pipe.

Sieve size	Percent Passing
¾ inch	100
¼ inch	30-60
US No. 8	20-50
US No. 50	3-12
US No. 200	0-1

7) At the option of the designer/geotechnical engineer, a geotextile fabric may be placed between the planting media and the drain rock. If a geotextile fabric is used, it should meet a minimum permittivity rate of 75 gal/min/ft^2, should not impede the infiltration rate of the soil medium, and should meet the following minimum materials requirements.

Geotextile Property	Value	Test Method
Trapezoidal Tear (lbs)	40 (min)	ASTM D4533
Permeability (cm/sec)	0.2 (min)	ASTM D4491
AOS (sieve size)	#60 - #70 (min)	ASTM D4751
Ultraviolet resistance	70% or greater	ASTM D4355

Preferably, aggregate should be used in place of filter fabric to reduce the potential for clogging. This aggregate layer should consist of 2 to 4 inches of washed sand underlain with 2 inches of choking stone (Typically #8 or #89 washed).

8) For bioretention facilities enhanced to remove address nitrogen as the primary pollutant class, the underdrain should be elevated from the bottom of the bioretention facility by at least 6 inches within the gravel blanket to create a fluctuating anaerobic/aerobic zone below the drain pipe. *The intention is that denitrification within the anaerobic/anoxic zone is facilitated by microbes using forms of nitrogen (NO_2 and NO_3) instead of oxygen for respiration.*

An alternative enhanced nitrogen removal design is to include an internal water storage layer by adding a 90-degree elbow to the underdrain to raise the outlet. This design feature provides additional storage in the media. The bioretention facility must have at least 30 inches of planting media. The top of the elbow should be at least 12 inches below the top of the planting media, and in poorly draining soils, should preferably be 18 to 24 inches below the top of the planting media. The top of the water storage layer should not be less than 12 inches from the bottom of the planting media layer. (For more information, see Urban Waterways publication).

9) The underdrain should drain freely to an acceptable discharge point. The underdrain can be connected to a downstream open conveyance (vegetated swale), to another bioretention cell as part of a connected treatment system, to a storm drain, daylight to a vegetated dispersion area using an effective flow dispersion device, or to a storage facility for rainwater harvesting.

Overflow

An overflow device is required at the maximum ponding depth. The following, or equivalent, should be provided:

1) A vertical PVC pipe (SDR 35) should be connected to the underdrain.

2) The overflow riser(s) should be 6 inches or greater in diameter, so it can be cleaned without damage to the pipe. The vertical pipe will provide access to cleaning the underdrains.

3) The inlet to the riser should be at the ponding depth (maximum 18 inches for fenced bioretention areas and 6 inches for areas that are not fenced), and be capped with a spider cap to exclude floating mulch and debris. Spider caps should be screwed in or glued (i.e., not removable).

Hydraulic Restriction Layers

Infiltration pathways may need to be restricted due to the close proximity of roads, foundations, or other infrastructure. A geomembrane liner, or other equivalent water proofing, may be placed along the vertical walls to reduce lateral flows. This liner should have a minimum thickness of 30 mils.

Planting/Storage Media

1) The planting media placed in the cell should achieve a long-term, in-place infiltration rate of at least 1 inch per hour. Higher infiltration rates are permissible. If the design long-term, in-place infiltration rate of the soil exceeds 12 inches per hour, documentation should be provided to demonstrate that the media will adequately address pollutants of concern at a higher flowrate. Bioretention soil shall also support vigorous plant growth.

2) Planting media should consist of 60 to 80% fine sand and 20 to 40% compost.

3) Sand should be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size should be non-plastic. Sand for bioretention should be analyzed by an accredited lab using

#200, #100, #40, #30, #16, #8, #4, and 3/8 sieves (ASTM D 422 or as approved by the local permitting authority) and meet the following gradation (Note: all sands complying with ASTM C33 for fine aggregate comply with the gradation requirements below):

Sieve Size (ASTM D422)	% Passing (by weight)	
	Minimum	Maximum
3/8 inch	100	100
#4	90	100
#8	70	100
#16	40	95
#30	15	70
#40	5	55
#100	0	15
#200	0	5

Note: the gradation of the sand component of the media is believed to be a major factor in the hydraulic conductivity of the media mix. If the desired hydraulic conductivity of the media cannot be achieved within the specified proportions of sand and compost (#2), then it may be necessary to utilize sand at the coarser end of the range specified in above ("minimum" column).

4) Compost should be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes, or other organic materials not including manure or biosolids meeting standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program). Compost quality should be verified via a lab analysis to be:

- Feedstock materials shall be specified and include one or more of the following: landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
- Organic matter: 35-75% dry weight basis.
- Carbon and Nitrogen Ratio: 15:1 < C:N < 25:1
- Maturity/Stability: shall have dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120 F) upon delivery or rewetting is not acceptable.
- Toxicity: any one of the following measures is sufficient to indicate non-toxicity:
  - $NH_4:NH_3 < 3$
  - Ammonium < 500 ppm, dry weight basis

- Seed Germination > 80% of control
- Plant trials > 80% of control
- Solvita® > 5 index value

- Nutrient content:
  - Total Nitrogen content 0.9% or above preferred
  - Total Boron should be <80 ppm, soluble boron < 2.5 ppm
- Salinity: < 6.0 mmhos/cm
- pH between 6.5 and 8 (may vary with plant palette)

Compost for bioretention should be analyzed by an accredited lab using #200, ¼ inch, ½ inch, and 1 inch sieves (ASTM D 422 or as approved by the local permitting authority) and meet the following gradation:

Sieve Size (ASTM D422)	% Passing (by weight)	
	Minimum	Maximum
1 inch	99	100
½ inch	90	100
¼ inch	40	90
#200	2	10

Tests should be sufficiently recent to represent the actual material that is anticipated to be delivered to the site. If processes or sources used by the supplier have changed significantly since the most recent testing, new tests should be requested.

Note: the gradation of compost used in bioretention media is believed to play an important role in the saturated hydraulic conductivity of the media. To achieve a higher saturated hydraulic conductivity, it may be necessary to utilize compost at the coarser end of this range (“minimum” column). The percent passing the #200 sieve (fines) is believed to be the most important factor in hydraulic conductivity.

In addition, a coarser compost mix provides more heterogeneity of the bioretention media, which is believed to be advantageous for more rapid development of soil structure needed to support health biological processes. This may be an advantage for plant establishment with lower nutrient and water input.

5) The bioretention area should be covered with 2 to 4 inches (average 3 inches) of mulch at the start and an additional placement of 1 to 2 inches of mulch should be added annually. *The intention is that to help sustain the nutrient levels, suppress weeds, retain moisture, and maintain infiltration capacity*.

Plants

Plant materials should be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 to 96 hours.

It is recommended that a minimum of three types of tree, shrubs, and/or herbaceous groundcover species be incorporated to protect against facility failure due to disease and insect infestations of a single species.

Native plant species and/or hardy cultivars that are not invasive and do not require chemical inputs should be used to the maximum extent practicable.

Operations and Maintenance

Bioretention areas require annual plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant removal capabilities. In general, bioretention maintenance requirements are typical landscape care procedures and include:

1) Watering: Plants should be selected to be drought-tolerant and not require watering after establishment (2 to 3 years). Watering may be required during prolonged dry periods after plants are established.

2) Erosion control: Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred (see Appendix I for a bioretention inspection and maintenance checklist). Properly designed facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems occur, the following should be reassessed: (1) flow velocities and gradients within the cell, and (2) flow dissipation and erosion protection strategies in the pretreatment area and flow entrance. If sediment is deposited in the bioretention area, immediately determine the source within the contributing area, stabilize, and remove excess surface deposits.

3) Plant material: Depending on aesthetic requirements, occasional pruning and removing of dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause and, if necessary, replace with more appropriate species. Periodic weeding is necessary until plants are established. The weeding schedule should become less frequent if the appropriate plant species and planting density have been used and, as a result, undesirable plants have been excluded.

4) Nutrient and pesticides: The soil mix and plants are selected for optimum fertility, plant establishment, and growth. Nutrient and pesticide inputs should not be required and may degrade the pollutant processing capability of the bioretention area, as well as contribute pollutant loads to receiving waters. By design, bioretention facilities are located in areas where phosphorous and nitrogen levels are often

elevated and these should not be limiting nutrients. If in question, have soil analyzed for fertility.

5) Mulch: Replace mulch annually in bioretention facilities where high trash, sediment load, and heavy metal deposition is likely (e.g., heavy metal contributing areas include industrial and auto dealer/repair parking lots and roads). In residential lots or other areas where metal deposition is not a concern, replace or add mulch as needed to maintain a 2 to 3 inch depth at least once every two years.

6) Soil: Soil mixes for bioretention facilities are designed to maintain long-term fertility and pollutant processing capability. Replacing mulch in bioretention facilities where high trash, sediment load, and heavy metal deposition are likely provides an additional level of protection for prolonged performance. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental concern for at least 20 years in bioretention systems. However, the saturated hydraulic conductivity should be assessed at least annually to ensure that the design water quality event is being treated. If in question, have soil analyzed for fertility and pollutant levels.

BIO-2: Planter Box

Planter boxes are bioretention treatment control measures that are completely contained within an impermeable structure with an underdrain (they do not infiltrate). These facilities function as a soil and plant based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, plantings, and an underdrain within the planter box. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. Planter boxes are comprised of a variety of materials, usually chosen to be the same material as the adjacent building or sidewalk.

Planter boxes may be placed adjacent to or near buildings, other structures, or sidewalks. Planter boxes can be used directly adjacent to buildings beneath downspouts as long as the boxes are properly lined on the building side and the overflow outlet discharges away from the building to ensure water does not percolate into footings or foundations. They can also be placed further away from buildings by conveying roof runoff in shallow engineered open conveyances, shallow pipes, or other innovative drainage structures.

Planter boxes extending along a building wall

Photo Credit: Geosyntec Consultants

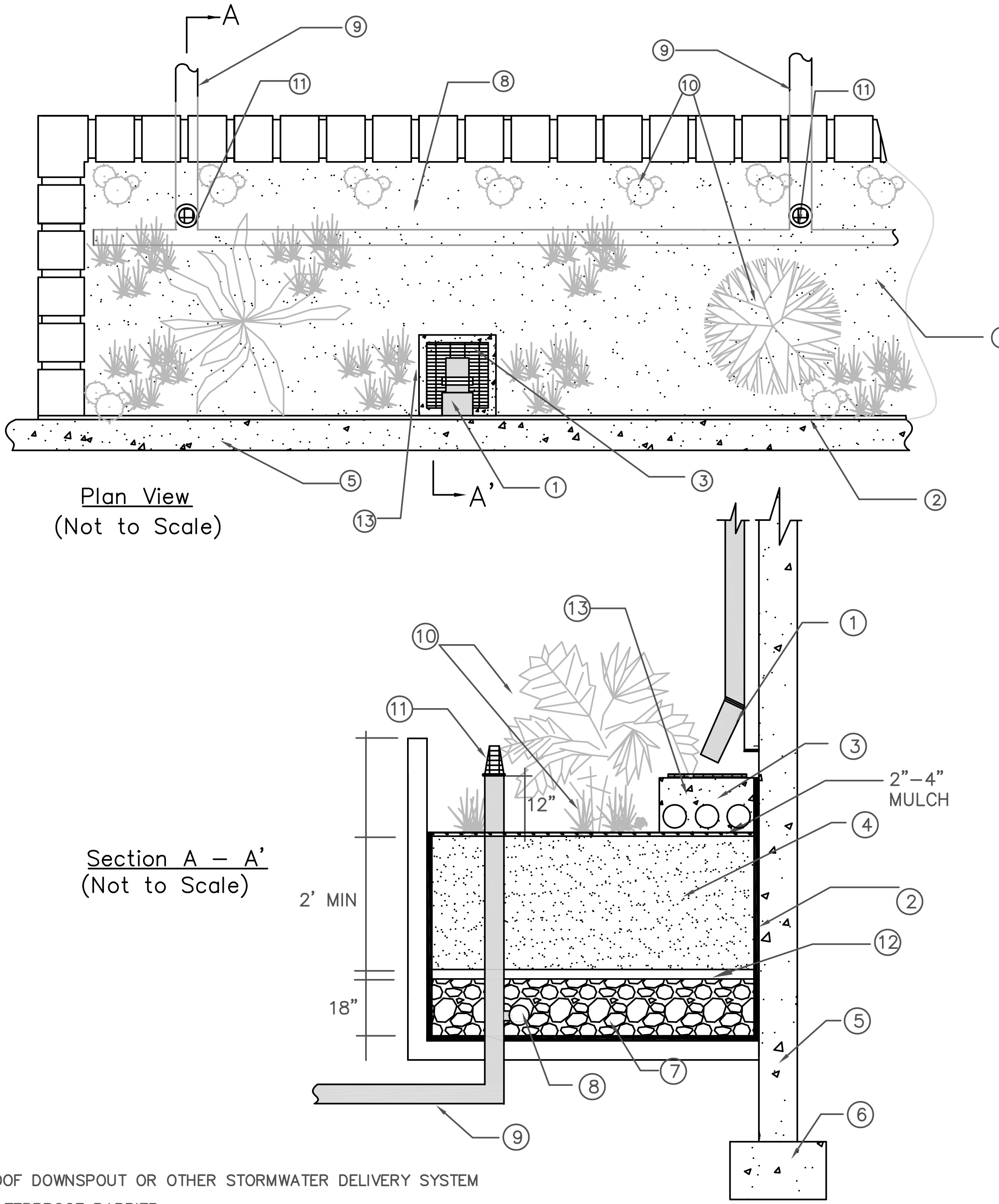
Application

- Areas adjacent to buildings and sidewalks
- Building entrances, courtyards, and walkways

Preventative Maintenance

- Repair small eroded areas
- Remove trash and debris and rake surface soils
- Remove accumulated fine sediments, dead leaves, and trash
- Remove weeds and prune back excess plant growth
- Remove sediment and debris accumulation near inlet and outlet structures

Periodically observe function under wet weather conditions



NOTES:

1. ROOF DOWNSPOUT OR OTHER STORMWATER DELIVERY SYSTEM
2. WATERPROOF BARRIER
3. SHALLOW ENERGY DISSIPATOR BASIN DISPERSES FLOW AT SOIL SURFACE
4. SOIL MIX (SEE PLANTING MEDIA SECTION)
5. BUILDING
6. FOUNDATION. INSTALL FOUNDATION DRAINS AS NEEDED
7. GRAVEL BEDDING (SEE UNDERDRAIN)
8. PERFORATED PIPE SHALL RUN ENTIRE LENGTH OF PLANTER
9. CONNECTION TO DOWNSTREAM CONVEYANCE SYSTEM
10. PLANTS
11. SET OVERFLOW 2" BELOW THE TOP OF THE PLANTER
12. OPTIONAL CHOKING GRAVEL LAYER

Geosyntec consultants

Figure 6-11: Planter Box

Limitations

The applicability of stormwater planter boxes is limited by the following site characteristics:

1) The tributary area (area draining to the planter box area) should be less than 15,000 ft^2.

2) Groundwater levels should be at least 2 ft lower than the bottom of the planter box.

3) Site must have adequate vertical relief between land surface and the stormwater conveyance system to permit connection of the underdrain to the stormwater conveyance system.

4) Planter boxes should not be located in areas with excessive shade to avoid poor vegetative growth. For moderately shaded areas, shade tolerant plants should be used.

Design Criteria

Planter boxes should be designed according to the requirements listed in Table 6-19 and outlined in the section below. BMP sizing worksheets are presented in Appendix E.

Table 6-19: Planter Box Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume (SQDV)	acre-feet	See Section 2 and Appendix E for calculating SQDV.
Drawdown time of planting soil	hours	12
Maximum ponding depth	inches	12
Minimum soil depth	feet	2; 3 preferred
Stabilized mulch depth	inches	2 to 3
Planting soil composition	-	60 to 70% sand, 30 to 40% compost
Underdrain	-	6 inch minimum diameter; 0.5% minimum slope; slotted, polyvinyl chloride (PVC) pipe (PVC SDR 35 or approved equivalent)
Overflow device	-	Required

Sizing Criteria

See Sizing Criteria section in the BIO-1: Bioretention with underdrains fact sheet.

Geometry and Size

1) Planter boxes areas should be sized to capture and treat the SQDV with a 12 inch maximum ponding depth. The mulch layer should be included as part of the ponding depth.

2) Minimum soil depth should be 2 feet, although 3 feet is preferred. *The intention is that a minimum soil depth should provide a beneficial root zone for the chosen plant palette and adequate water storage for the SQDV. A deeper planting soil depth will provide a smaller surface area footprint.*

3) Planter boxes should be designed to drain to below the planting soil depth in less than 48 hours. *The intention is that soils must be allowed to dry out periodically in order to restore hydraulic capacity to receive flows from subsequent storms, maintain infiltration rates, prevent long periods of saturation for plant health, maintain adequate soil oxygen levels for healthy soil biota and vegetation, reduce potential for vector breeding, and provide proper soil conditions for biodegradation and retention of pollutants.*

4) Any planter box shape configuration is possible as long as other design criteria are met.

5) The distance between the downspouts and the overflow outlet should be maximized. *The intention is to increase the opportunity for stormwater retention and filtration.*

6) Off-line configurations should be considered to minimize the possibility of scouring and resuspension of previously captured pollutants during large storms.

Structural Materials

1) Planter boxes should be constructed out of stone, concrete, brick, recycled plastic, or other permanent materials. Pressure-treated wood or other materials that may leach pollutants (e.g., arsenic, copper, zinc, etc.) should not be allowed.

2) The structure should be adequately sealed or a waterproof membrane installed to ensure water only exits the structure via the underdrain.

Flow Entrance and Energy Dissipation

The following types of flow entrance can be used for planter boxes:

1) Pipe flow entrance: Piped entrances, such as roof downspouts, should include rock, splash blocks, or other appropriate measures at the entrance to dissipate energy and disperse flows.

2) Woody plants (e.g., trees, shrubs, etc.) can restrict or concentrate flows and can be damaged by erosion around the root ball and should not be placed directly in the entrance flow path.

Underdrains

Underdrains are required and should meet the following criteria:

1) 6-inch minimum diameter.

2) Underdrains should be made of slotted, polyvinyl chloride (PVC) pipe (PVC SDR 35 or approved equivalent). *The intention is that in comparison to round-hole perforated pipe, slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.*

3) Slotted pipe should have 2 to 4 rows of slots cut perpendicular to the axis of the pipe or at right angles to the pitch of corrugations. Slots should be 0.04 to 0.1 inch and should have a length of 1 to 1.25 inches. Slots should be longitudinally spaced such that the pipe has a minimum of one square inch opening per lineal foot and should face down.

4) Underdrains should be sloped at a minimum of 0.5%.

5) Rigid non-perforated observation pipes with a diameter equal to the underdrain diameter should be connected to the underdrain every 100 feet to provide a clean-out port as well as an observation well to monitor dewatering rates. The wells/cleanouts should be connected to the perforated underdrain with the appropriate manufactured connections. The wells/cleanouts should extend 6 inches above the top elevation of the bioretention facility mulch, and should be capped with a lockable screw cap. The ends of underdrain pipes not terminating in an observation well/cleanout should also be capped.

6) The following aggregate should be used to provide a gravel blanket and bedding for the underdrain pipe. Place the underdrain on a bed of washed aggregate at a minimum thickness of 6 inches and cover it with the same aggregate to provide a 1 foot minimum depth around the top and sides of the slotted pipe.

Sieve size	Percent Passing
¾ inch	100
¼ inch	30-60
US No. 8	20-50
US No. 50	3-12
US No. 200	0-1

7) At the option of the designer/geotechnical engineer, a geotextile fabric may be placed between the planting media and the drain rock. If a geotextile fabric is used, it should

meet a minimum permittivity rate of 75 gal/min/ft^2, should not impede the infiltration rate of the soil medium, and should meet the following minimum materials requirements.

Geotextile Property	Value	Test Method
Trapezoidal Tear (lbs)	40 (min)	ASTM D4533
Permeability (cm/sec)	0.2 (min)	ASTM D4491
AOS (sieve size)	#60 - #70 (min)	ASTM D4751
Ultraviolet resistance	70% or greater	ASTM D4355

Preferably, aggregate should be used in place of filter fabric to reduce the potential for clogging. This aggregate layer should consist of 2 to 4 inches of washed sand underlain with 2 inches of choking stone (Typically #8 or #89 washed).

8) The underdrain should be elevated from the bottom of the bioretention facility by 6 inches within the gravel blanket to create a fluctuating anaerobic/aerobic zone below the drain pipe. *The intention is that denitrification within the anaerobic/anoxic zone is facilitated by microbes using forms of nitrogen (NO_2 and NO_3) instead of oxygen for respiration.*

9) The underdrain must drain freely to an acceptable discharge point. The underdrain can be connected to a downstream open conveyance (vegetated swale), to another bioretention cell as part of a connected treatment system, to a storm drain, daylight to a vegetated dispersion area using an effective flow dispersion device, or to a storage facility for rainwater harvesting.

Overflow

An overflow device is required to be set at 2 inches below the top of the planter and no more than 12 inches above the soil surface. The most common option is a vertical riser, described below.

Vertical riser

1) A vertical PVC pipe (SDR 35) should be connected to the underdrain.

2) The overflow riser(s) should be 6 inches or greater in diameter, so it can be cleaned without damage to the pipe. The vertical pipe will provide access to cleaning the underdrains.

3) The inlet to the riser should be a maximum of 12 inches above the planting soil, and be capped with a spider cap. Spider caps should be screwed in or glued (i.e., not removable).

Hydraulic Restriction Layers

A waterproof barrier should be provided to restrict moisture away from foundations. Geomembrane liners should have a minimum thickness of 30 mils. Equivalent waterproofing measures may be used.

Planting/Storage Media

1) The planting media placed in the cell should achieve a long-term, in-place infiltration rate of at least 1 inch per hour. Higher infiltration rates are permissible. If the design long-term, in-place infiltration rate of the soil exceeds 12 inches per hour, documentation should be provided to demonstrate that the media will adequately address pollutants of concern at a higher flowrate. Planter box soil shall also support vigorous plant growth.

2) Planting media should consist of 60 to 80% fine sand and 20 to 40% compost.

3) Sand should be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size should be non-plastic. Sand for the planter box should be analyzed by an accredited lab using #200, #100, #40, #30, #16, #8, #4, and 3/8 sieves (ASTM D 422 or as approved by the local permitting authority) and meet the following gradation (Note: all sands complying with ASTM C33 for fine aggregate comply with the gradation requirements below):

Sieve Size (ASTM D422)	% Passing (by weight)	
	Minimum	Maximum
3/8 inch	100	100
#4	90	100
#8	70	100
#16	40	95
#30	15	70
#40	5	55
#100	0	15
#200	0	5

Note: the gradation of the sand component of the media is believed to be a major factor in the hydraulic conductivity of the media mix. If the desired hydraulic conductivity of the media cannot be achieved within the specified proportions of sand and compost (#2), then it may be necessary to utilize sand at the coarser end of the range specified in above (“minimum” column).

4) Compost should be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes, or other organic materials not including manure or biosolids meeting standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal

of Testing Assurance (STA) Program (a compost testing and information disclosure program). Compost quality should be verified via a lab analysis to be:

- Feedstock materials shall be specified and include one or more of the following: landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
- Organic matter: 35-75% dry weight basis.
- Carbon and Nitrogen Ratio: 15:1 < C:N < 25:1
- Maturity/Stability: shall have dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120 F) upon delivery or rewetting is not acceptable.
- Toxicity: any one of the following measures is sufficient to indicate non-toxicity:
  - $NH_4:NH_3 < 3$
  - Ammonium < 500 ppm, dry weight basis
  - Seed Germination > 80% of control
  - Plant trials > 80% of control
  - Solvita® > 5 index value
- Nutrient content:
  - Total Nitrogen content 0.9% or above preferred
  - Total Boron should be <80 ppm, soluble boron < 2.5 ppm
- Salinity: < 6.0 mmhos/cm
- pH between 6.5 and 8 (may vary with plant palette)

Compost for planter box should be analyzed by an accredited lab using #200, ¼ inch, ½ inch, and 1 inch sieves (ASTM D 422 or as approved by the local permitting authority) and meet the following gradation:

Sieve Size (ASTM D422)	% Passing (by weight)	
	Minimum	Maximum
1 inch	99	100
½ inch	90	100
¼ inch	40	90
#200	2	10

Tests should be sufficiently recent to represent the actual material that is anticipated to be delivered to the site. If processes or sources used by the supplier have changed significantly since the most recent testing, new tests should be requested.

Note: the gradation of compost used in planter box media is believed to play an important role in the saturated hydraulic conductivity of the media. To achieve a higher saturated hydraulic conductivity, it may be necessary to utilize compost at the coarser end of this range ("minimum" column). The percent passing the #200 sieve (fines) is believed to be the most important factor in hydraulic conductivity.

In addition, a coarser compost mix provides more heterogeneity of the planter box media, which is believed to be advantageous for more rapid development of soil structure needed to support health biological processes. This may be an advantage for plant establishment with lower nutrient and water input.

5) The planter box should be covered with 2 to 4 inches (average 3 inches) of mulch at the start and an additional placement of 1 to 2 inches of mulch should be added annually. *The intention is that to help sustain the nutrient levels, suppress weeds, retain moisture, and maintain infiltration capacity*.

Plants

1) Plant materials should be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 to 96 hours.

2) It is recommended that a minimum of three types of tree, shrubs, and/or herbaceous groundcover species be incorporated to protect against facility failure due to disease and insect infestations of a single species.

3) Native plant species and/or hardy cultivars that are not invasive and do not require chemical inputs should be used to the maximum extent practicable.

4) Plants should be selected carefully to minimize maintenance and function properly.

Operations and Maintenance

Planter boxes require annual plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant removal capabilities. In general, planter box maintenance requirements are typical of landscape care procedures and include:

1) Watering: Plants should be selected to be drought-tolerant and do not require watering after establishment (2 to 3 years). Watering may be required during prolonged dry periods after plants are established.

2) Erosion control: Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred (see Appendix I for an inspection and maintenance checklist). Properly designed facilities with appropriate flow velocities should not have erosion problems

except perhaps in extreme events. If erosion problems occur, the following should be reassessed: (1) flow velocities and gradients within the cell, and (2) flow dissipation and erosion protection strategies in the flow entrance. If sediment is deposited in the planter box, immediately determine the source within the contributing area, stabilize, and remove excess surface deposits.

3) Plant material: Depending on aesthetic requirements, occasional pruning and removing of dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause and, if necessary, replace with more appropriate species. Periodic weeding is necessary until plants are established. The weeding schedule should become less frequent if the appropriate plant species and planting density have been used and, as a result, undesirable plants have been excluded.

4) Nutrients and pesticides: The soil mix and plants are selected for optimum fertility, plant establishment, and growth. Nutrient and pesticide inputs should not be required and may degrade the pollutant processing capability of the planter box area, as well as contribute pollutant loads to receiving waters. By design, planter boxes are located in areas where phosphorous and nitrogen levels are often elevated and these should not be limiting nutrients. If in question, have soil analyzed for fertility.

5) Mulch: Replace mulch annually in planter boxes where high trash, sediment load, and heavy metal deposition is likely (e.g., heavy metal contributing areas include industrial, auto dealer/repair, parking lots, and roads). In residential lots or other areas where metal deposition is not a concern, replace or add mulch as needed to maintain a 2 to 3 inch depth at least once every two years.

6) Soil: Soil mixes for planter boxes are designed to maintain long-term fertility and pollutant processing capability. Replacing mulch in planter boxes where high trash, sediment load, and heavy metal deposition are likely provides an additional level of protection for prolonged performance. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental concern for at least 20 years in planter boxes. However, the saturated hydraulic conductivity should be assessed at least annually to ensure that the design water quality event is being treated. If in question, have soil analyzed for fertility and pollutant levels.

BIO-3: Vegetated Swale

Vegetated swales are open, shallow channels with low-lying vegetation covering the side slopes and bottom that collect and slowly convey runoff to downstream discharge points. Vegetated swales provide pollutant removal through settling and filtration in the vegetation (usually grasses) lining the channels, provide the opportunity for stormwater volume reduction through infiltration and evapotranspiration, reduce the flow velocity, and conveying stormwater runoff. An effective vegetated swale achieves uniform sheet flow through a densely vegetated area for a period of several minutes. The vegetation in the swale can vary depending on its location and is the choice of the designer, depending on the design criteria outlined in this section.

Vegetated swale captures flow from a residential street

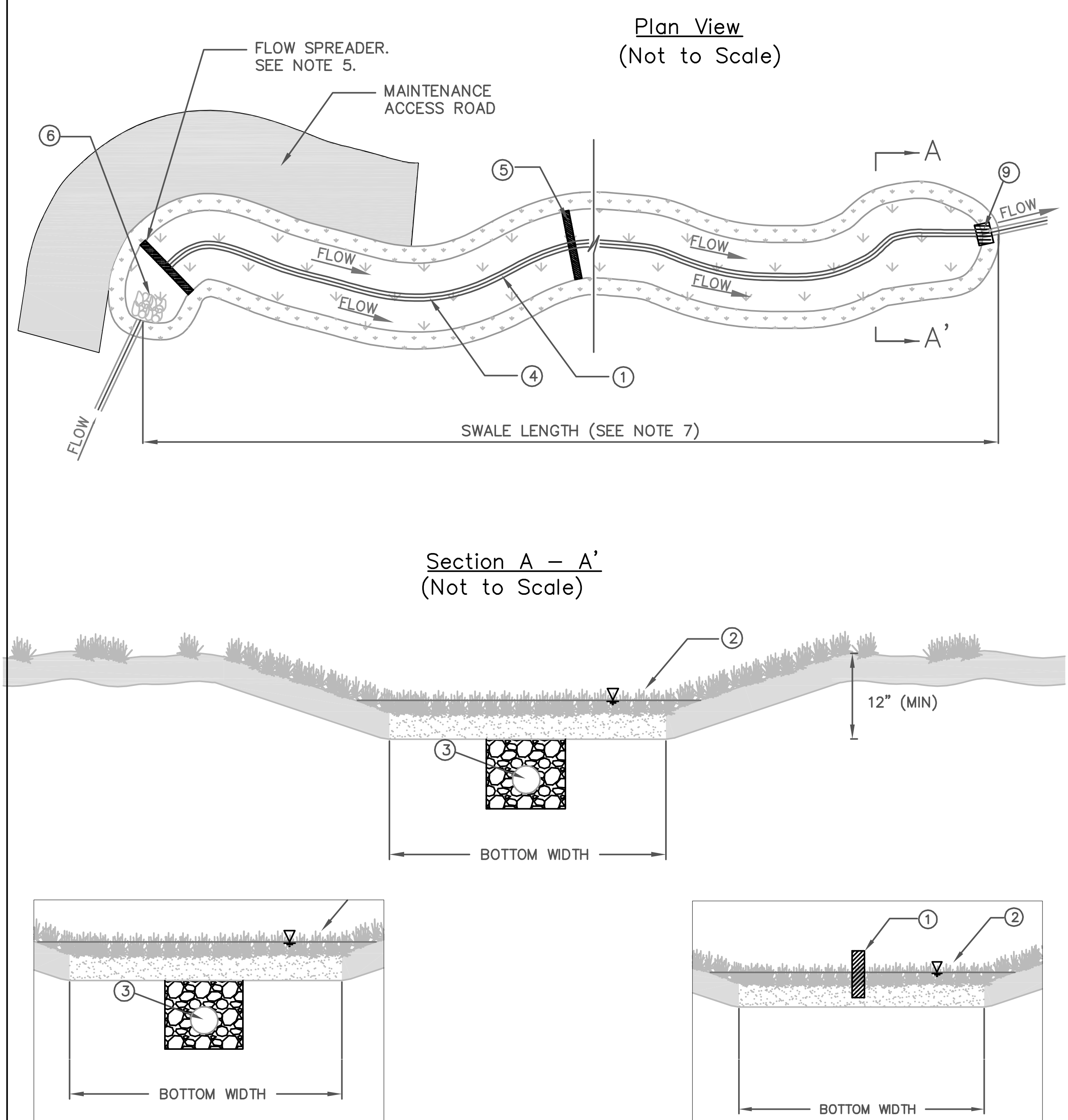
Photo Credit: Geosyntec Consultants

Application

- Open areas adjacent to parking lots
- Open spaces adjacent to athletic fields
- Roadway medians and shoulders

Preventative Maintenance

- Remove excess sediment, trash, and debris
- Clean and reset flow spreaders
- Mow regularly
- Remove sediment and debris build-up near inlets and outlets
- Repair minor erosion and scouring



NOTES:

1. SWALE DIVIDER REQUIRED FOR BOTTOM WIDTHS > 10'. MINIMUM REQUIRED BOTTOM WIDTH IS 2' EXCLUDING WIDTH OF LOW FLOW CHANNEL. MAXIMUM BOTTOM WIDTH WITH DIVIDER IS 16'.
2. DEPTH OF FLOW FOR WATER QUALITY TREATMENT MUST NOT EXCEED TWO–THIRDS OF VEGETATION HEIGHT OR NOT GREATER THAN 2" FOR FREQUENTLY MOWED TURF.
3. IF AN UNDERDRAIN IS REQUIRED, IT MUST CONSIST OF AN AT LEAST 6" DIAMETER PERFORATED PIPE IN COARSE AGGREGATE BED CONNECTED TO STORM DRAIN. GRAVEL BED MUST EXTEND 6" BELOW AND 12" TO THE SIDE AND TOP OF THE PIPE.
4. IF NO UNDERDRAIN, LOW FLOW DRAIN SHALL EXTEND ENTIRE LENGTH OF SWALE AND SHALL HAVE A DEPTH OF 6" MINIMUM AND WIDTH NO MORE THAN 5% SWALE BOTTOM WIDTH. ANCHORED PLATE FLOW SPREADER IF USED, SHALL HAVE V–NOTCHES (MAX TOP WIDTH = 5% OF SWALE WIDTH) OR HOLES TO ALLOW PREFERENTIAL EXIT OF LOW FLOWS.
5. INSTALL CHECK DAMS OR GRADE CONTROL STRUCTURES FOR SLOPES > 2% AT 50' MAXIMUM SPACING TO ACHIEVE A MAXIMUM EFFECTIVE LONGITUDINAL SLOPE OF 2%. FLOW SPREADERS SHALL BE PROVIDED AT INLET AND AT THE BASE OF EACH CHECK DAM.
6. INSTALL ENERGY DISSIPATOR AT THE INLET OF VEGETATED SWALE.
7. SWALE LENGTH SHALL LENGTH REQUIRED TO PROVIDE 7 MINUTES RESIDENCE TIME.
8. INSTALL APPROPRIATE OUTLET STRUCTURE. ACCOMODATE LOW FLOW CHANNEL AND/OR UNDERDRAIN (IF PRESENT).
9. AMEND SOILS WITH 2" OF COMPOST TILLED INTO 6" OF NATIVE SOIL UNLESS NATIVE SOIL ORGANIC CONTENT > 10%.

Geosyntec consultants

Figure 6-12: Vegetated Swale

Limitations

1) Compatibility with flood control - swales should not interfere with flood control functions of existing conveyance and detention structures.

2) Vegetation - select vegetation appropriately based on irrigation requirements and exposure (shady versus sunny areas). A thick vegetative cover is needed for vegetated swales to function properly. Native and drought tolerant plants are recommended.

3) Drainage area - each vegetated swale can treat a relatively small drainage area. Large areas should be divided and treated using multiple swales.

Design Criteria

Vegetated swales should be designed according to the requirements listed in Table 6-20 and outlined in the section below. BMP sizing worksheets are presented in Appendix E.

Table 6-20: Vegetated Swale Filter Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design flow rate (SQDF)	cfs	See Section 2 and Appendix E for calculating SQDF.
Swale Geometry	-	Trapezoidal
Minimum bottom width	feet	2
Maximum bottom width	feet	10; if greater than 10 must use swale dividers; with dividers, max is 16
Minimum length	feet	sufficient length to provide minimum contact time
Minimum slope in flow direction	%	0.2 (provide underdrains for slopes less < 0.5%)
Maximum slope in flow direction	%	2.0 (provide grade-control checks for slopes > 2.0)
Maximum flow velocity	ft/sec	1.0 (water quality treatment); 3.0 (flood conveyance)
Maximum depth of flow for water quality treatment	inches	3 to 5 (1 inch below top of grass)
Minimum residence (contact) time	minutes	7 (provide sufficient length to yield minimum residence time)
Vegetation type	--	Varies (see vegetation section below); Native and drought tolerant plants are recommended
Vegetation height	inches	4 to 6 (trim or mow to maintain height)

Sizing Criteria

The flow capacity of a vegetated swale is a function of the longitudinal slope (parallel to flow), the resistance to flow (i.e. Manning's roughness), and the cross sectional area. The cross section is normally approximately trapezoidal and the area is a function of the bottom width and side slopes. The flow capacity of vegetated swales should be such that the SQDF will not exceed a flow depth of 2/3 the height of the vegetation within the swale or 4 inches at the SQDF. Once design criteria have been selected, the resulting flow depth for the SQDF is checked. If the depth restriction is exceeded, swale parameters (e.g. longitudinal slope, width) are adjusted to reduce the flow depth.

Procedures for sizing vegetated swales are summarized below. A vegetated swale sizing worksheet and example are also provided.

Step 1: Select design flows

The swale sizing is based on the SQDF (see Section 2 and Appendix E).

Step 2: Calculate swale bottom width

The swale bottom width (b) is calculated based on Manning's equation for open-channel flow. This equation can be used to calculate discharges (Q) as follows:

$$Q = \frac{1.49AR^{0.67}S^{0.5}}{n} \qquad \text{(Equation 6-27)}$$

Where:

Q	=	flow rate (cfs)
n	=	Manning's roughness coefficient (unitless)
A	=	cross-sectional area of flow (ft2)
R	=	hydraulic radius (ft) = area divided by wetted perimeter
S	=	longitudinal slope (ft/ft)

For shallow flow depths in swales, channel side slopes are ignored in the calculation of bottom width. Use the following equation (a simplified form of Manning's formula) to estimate the swale bottom width (b):

$$b = \frac{SQDF * n_{wq}}{1.49y^{0.67}s^{0.5}} \qquad \text{(Equation 6-28)}$$

Where:

b	=	bottom width of swale (ft)

$SQDF$	=	stormwater quality design flow (cfs)
n_{wq}	=	Manning's roughness coefficient for shallow flow conditions = 0.2 (unitless)
y	=	design flow depth (ft)
s	=	longitudinal slope (along direction of flow) (ft/ft)

Proceed to Step 3 if the bottom width is calculated to be between 2 and 10 feet. A minimum 2-foot bottom width is required. Therefore, if the calculated bottom width is less than 2 feet, increase the width to 2 feet and recalculate the design flow depth y using the Equation 6-18, where $SQDF$, n_{wq}, and s are the same values as used above, but b = 2 feet.

The maximum allowable bottom width is 10 feet. Therefore, if the calculated bottom width exceeds 10 feet, then one of the following steps is necessary to reduce the design bottom width:

1) Increase the longitudinal slope (s) to a maximum of 2 feet in 100 feet (0.02 feet per foot).
2) Increase the design flow depth (y) to a maximum of 4 inches.
3) Place a divider lengthwise along the swale bottom (Figure 6-11) at least three-quarters of the swale length (beginning at the inlet), without compromising the design flow depth and swale lateral slope requirements. The swale width can be increased to an absolute maximum of 16 feet if a divider is provided.

Step 3: Determine design flow velocity

To calculate the design flow velocity (V_{wq}) through the swale, use the flow continuity equation:

$$V_{wq} = SQDF/A_{wq} \qquad \text{(Equation 6-29)}$$

Where:

V_{wq}	=	design flow velocity (fps)
$SQDF$	=	stormwater quality design flow (cfs)
A_{wq}	=	$by + Zy^2$ = cross-sectional area (ft^2) of flow at design depth, where Z = side slope length per unit height (e.g., Z = 3 if side slopes are 3H:1V)

If the design flow velocity exceeds 1 foot per second, go back to Step 2 and modify one or more of the design parameters (longitudinal slope, bottom width, or flow depth) to reduce the design flow velocity to 1 foot per second or less. If the design flow velocity is calculated to be less than 1 foot per second, proceed to Step 4. *Note: It is desirable to have the design velocity as low as possible, both to improve treatment effectiveness and to reduce swale length requirements.*

Step 4: Calculate swale length

Use the following equation to determine the necessary swale length (L) to achieve a hydraulic residence time of at least 7 minutes:

$$L = 60 t_{hr} V_{wq} \qquad \text{(Equation 6-30)}$$

Where:

L	=	minimum allowable swale length (ft)
t_{hr}	=	hydraulic residence time (min)
V_{wq}	=	design flow velocity (fps), calculated by Equation 6-19

If there is adequate space on the site to accommodate a larger swale, consider using a greater length to increase the hydraulic residence time and improve the swale's pollutant removal capability. If the calculated length is too long for the site, or if it would cause layout problems, such as encroachment into shaded areas, proceed to Step 5 to further modify the layout. If the swale length can be accommodated on the site (meandering may help), proceed to Step 6.

Step 5: Adjust swale layout to fit on site

If the swale length calculated in Step 4 is too long for the site, the length can be reduced (to a minimum of 100 feet) by increasing the bottom width up to a maximum of 16 feet, as long as the 10 minute retention time is retained. However, the length cannot be increased in order to reduce the bottom width because Manning's depth-velocity-flow rate relationships would not be preserved. If the bottom width is increased to greater than 10 feet, a low flow dividing berm is needed to split the swale cross section in half to prevent channelization.

Length can be adjusted by calculating the top area of the swale and providing an equivalent top area with the adjusted dimensions.

1) Calculate the swale treatment top area (A_{top}), based on the swale length calculated in Step 4:

$$A_{top} = (b_i + b_{slope}) L_i \qquad \text{(Equation 6-31)}$$

Where:

A_{top}	=	top area (ft^2) at the design treatment depth
b_i	=	bottom width (ft), calculated in Step 2 using Equation 6-18
b_{slope}	=	the additional top width (ft) above the side slope for the design water depth (for 3:1 side slopes and a 4-inch water depth, b_{slope} = 2 feet)
L_i	=	initial length (ft) calculated in Step 4 using Equation 6-30

2) Use the swale top area and a reduced swale length (L_f) to increase the bottom width, using the following equation:

$$L_f = A_{top} / (b_f + b_{slope}) \qquad \text{(Equation 6-32)}$$

Where:

L_f	=	reduced swale length (ft)
b_f	=	increased bottom width (ft)

3) Recalculate V_{wq} according to Step 3 using the revised cross-sectional area A_{wq} based on the increased bottom width (b_f). Revise the design as necessary if the design flow velocity exceeds 1 foot per second.

4) Recalculate to ensure that the 10 minute retention time is retained.

Step 6: Provide conveyance capacity for flows higher than SQDF

Vegetated swales may be designed as flow-through channels that convey flows higher than the SQDF, or they may be designed to incorporate a high-flow bypass upstream of the swale inlet. A high-flow bypass usually results in a smaller swale size. If a high-flow bypass is provided, this step is not needed. If no high-flow bypass is provided, proceed with the procedure below. A flow splitter structure design is described in Appendix F.

1) Check the swale size to determine whether the swale can convey the flood control design storm peak flow (Refer to Ventura County Hydrology Manual, revised 2006).

2) The peak flow velocity of the flood control design storm (see Ventura County Hydrology Manual revised 2006) should be less than 3.0 feet per second. If this velocity exceeds 3.0 feet per second, return to Step 2 and increase the bottom width or flatten the longitudinal slope as necessary to reduce the flood control design storm peak flow velocity to 3.0 feet per second or less. If the longitudinal slope is flattened, the swale bottom width must be recalculated (Step 2) and must meet all design criteria.

Geometry and Size

1) In general, a trapezoidal channel shape should be assumed for sizing calculations above, but a more naturalistic channel cross-section is preferred.

2) Swales designed for water quality treatment purposes only are usually fairly shallow, generally less than 1 ft. Therefore, a side slope of 2:1 (H:V) can be used and is acceptable.

3) Swales shall be greater than 100 feet in length. The vegetated swale can be shorter than 100 feet if it is used for pretreatment only (i.e., prior to infiltration). Length can be increased by meandering the swale.

4) The minimum swale bottom width shall be 2 feet to allow for ease of mowing.

5) The maximum swale bottom width shall be limited to 10 feet, unless a swale divider is provided, then the maximum bottom width can be a maximum of 16 feet wide. The swale width is calculated without the swale diving berm. *The intention is that experience shows that when the width exceeds about 10 feet, it is difficult to keep the water from concentrating in low flow channels. It is also difficult to construct the bottom level without sloping to one side. Vegetated swales are best constructed by leveling the bottom after excavating. A single-width pass with a front-end loader produces a better result than a multiple-width pass.*

6) Swales that are required to convey flood flow as well as the SQDF should be sized to convey the flood control design storm and include a provision of freeboard as required by the local approval authority.

7) Gradual meandering bends in the swale are desirable for aesthetic purposes and to promote slower flow.

Bottom Slope

1) The longitudinal slope (along the direction of flow) should be between 1% and 6%.

2) If longitudinal slopes are less than 1.5% and the soils are poorly drained (e.g., silts and clays), then underdrains should be provided. A soils report to verify soils properties should be provided for swales less than 1.5%.

3) If longitudinal slope exceeds 2%, check dams with vertical drops of 12 inches or less should be provided to achieve a bottom slope of 2% or less between the drop structures.

4) The lateral (horizontal) slope at the bottom of the swale should be zero (flat) to discourage channeling.

Water Depth and Dry Weather Flow Drain

1) Water depth should not exceed 4 inches (or 2/3 of the expected vegetation height), except for frequently mowed turf swales, in which the depth should not exceed 2 inches.

2) The swale length must provide a minimum hydraulic residence time of 7 minutes.

3) A low flow drain should be provided if the potential for dry weather flows exists. The low flow drain should extend the entire length of the swale. The drain should have a minimum depth of 6 inches, and a width no more than 5% of the calculated swale bottom width. The width of the drain should be in addition to the required bottom width. The flow spreader at the swale inlet should have v-notches (maximum top width = 5% of swale width) or holes to allow preferential exit of low flows into the drain, if applicable. If an underdrain or gravel drainage layer is installed as discussed below, the low flow drain should be omitted.

Swale Inflow and Design Capacity

1) Whenever possible, inflow should be directed towards the upstream end of the swale and should, at a minimum, occur evenly over the length of the swale. Swale inflow design should provide for positive drainage into the swale to function on the long-term with minimal maintenance.

2) On-line vegetated swales should be designed to convey flow rates up to the post-development peak stormwater runoff discharge rate (flow rate) for the 100-yr 24-hour storm event, with appropriate freeboard (see Ventura County Hydrology Manual, revised 2006).

3) Off-line vegetated swales should be designed to convey the flow-based SQDF by using a flow diversion structure (e.g., flow splitter) which diverts the SQDF to the off-line vegetated swale designed to handle SQDF. Freeboard for off-line swales is not required, but should be provided if space is available. Flow splitter design specifications are described in Appendix F.

Energy Dissipation

1) Vegetated swales may be designed either on-line or off-line. If the facility is on-line, velocities should be maintained below the maximum design flow velocity of 3 feet per second to prevent scour and resuspension of deposited sediments.

2) The maximum flow velocity under the stormwater quality design flow rate should not exceed 1.0 foot per second. *The intention is that this maximum SQDV promotes settling and keeps vegetation upright.*

3) This velocity limitation combined with a maximum depth of 4 inches and bottom width of 10 feet results in a recommended maximum flow capacity of about 3.3 cfs,

after accounting for the side slopes. The contributory drainage area to each swale is limited so as not to exceed this recommended maximum flow capacity.

4) The maximum flow velocity during the 100-yr 24-hr storm event should not exceed 3.0 foot per second. This can be accomplished by:

   a. Splitting roadside swales near high points in the road so that flows drain in opposite directions, mimicking flow patterns on the road surface.

   b. Limiting tributary areas to long swales by diverting flows throughout the length of the swale at regular intervals, to the downstream stormwater conveyance system.

5) A flow spreader (see “Flow Spreaders” below) should be used at the inlet so that the entrance velocity is quickly dissipated and the flow is uniformly distributed across the whole swale. Energy dissipation controls should be constructed of sound materials such as stones, concrete, or proprietary devices that are rated to withstand the energy of the influent flows.

6) If check dams are used to reduce the longitudinal slope, a flow spreader should be provided at the toe of each vertical drop, with specifications described below.

7) If flow is to be introduced through curb cuts, place pavement approximately one inch above the elevation of the vegetated areas. Curb cuts should be at least 12 inches wide to prevent clogging.

Flow Spreaders

1) An anchored plate flow spreader or similar device should be provided at the inlet to the swale. Equivalent methods for spreading flows evenly throughout the width of the swale are acceptable.

2) The top surface of the flow spreader plate should be level, projecting a minimum of 2 inches above the ground surface of the water quality facility, or v-notched with notches 6 to 10 inches on center and 1 to 4 inches deep (use shallower notches with closer spacing).

3) A flow spreader plate should extend horizontally beyond the bottom width of the facility to prevent water from eroding the side slope. The plate should have a row of horizontal perforations at its base to prevent ponding for long durations. The horizontal extent should be such that the bank is protected for all flows up to the 100-yr 24-hr storm event (on-line swales) or the maximum flow that will enter the water quality facility (off-line swales).

4) Flow spreader plates should be securely fixed in place.

5) Flow spreader plates may be made of either concrete, stainless steel, or other durable material.

6) Anchor posts should be 4-inch square concrete, tubular stainless steel, or other material resistant to decay.

Check Dams

If check dams are required, they can be designed using a number of different materials, including riprap, earthen berms, or removal stop logs. Where vegetated swales parallel urban streets, the check dam can double as a crossing walk so that pedestrians have a pathway from the parked car to the building.

Check dams must be placed as to achieve the desired slope (1 to 6%) at a maximum of 50 feet apart. Check dams should be no higher than 12 inches. If riprap is used, the material should consist of well-graded stone consisting of a mixture of rock sizes. The following is an example of an acceptable gradation:

Particle Size	% Passing
24 inch	100
15 inch	75
9 inch	50
4 inch	10

Underdrains

If underdrains (not to be confused with a dry weather flow drain) are required, then they should meet the following criteria:

1) Underdrains should be made of slotted, polyvinyl chloride (PVC) pipe (PVC SDR 35 or approved equivalent). *The intention is that in comparison to round-hole perforated pipe, slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.*

2) Slotted pipe should have 2 to 4 rows of slots cut perpendicular to the axis of the pipe or at right angles to the pitch of corrugations. Slots should be 0.04 to 0.1 inch and should have a length of 1 to 1.25 inches. Slots should be longitudinally spaced such that the pipe has a minimum of one square inch of opening per linear foot of pipe.

3) Underdrains should be sloped at a minimum of 0.5%.

4) The underdrain pipe should be 6 inches or greater in diameter, so it can be cleaned without damage to the pipe. Clean-out risers with diameters equal to the underdrain pipe should be placed at the terminal ends of the underdrain and can be incorporated into the flow spreader and outlet structure to minimize maintenance obstacles in the swale. Intermediate clean-out risers may also be placed in the check dams or grade control structures. The cleanout risers should be capped with a lockable screw cap.

5) The underdrain should be placed parallel to the swale bottom and backfilled and underbedded with six inches of drain rock. The following coarse aggregate should be used to provide a gravel blanket and bedding for the underdrain pipe to provide a 1 foot minimum depth around the top and sides of the slotted pipe.

Sieve size	Percent Passing
¾ inch	100
¼ inch	30-60
US No. 8	20-50
US No. 50	3-12
US No. 200	0-1

6) At the option of the designer/geotechnical engineer, the drain rock may be wrapped in a geotextile fabric meeting the following minimum materials requirements. If a geotextile fabric is used, it should pass 75 gal/min/ft^2, should not impede the infiltration rate of the soil medium, and should meet the following minimum materials requirements.

Geotextile Property	Value	Test Method
Trapezoidal Tear (lbs)	40 (min)	ASTM D4533
Permeability (cm/sec)	0.2 (min)	ASTM D4491
AOS (sieve size)	#60 - #70 (min)	ASTM D4751
Ultraviolet resistance	70% or greater	ASTM D4355

Preferably, aggregate should be used in place of geotextile fabric to reduce the potential for clogging. This aggregate layer should consist of 2 to 4 inches of washed sand underlain with 2 inches of choking stone (Typically #8 or #89 washed).

7) The underdrain should drain freely to an acceptable discharge point. The underdrain can be connected to a downstream open conveyance (vegetated swale), to another bioretention cell as part of a connected treatment system, daylight to a vegetated dispersion area using an effective flow dispersion device, stored for rainwater harvesting, or to a storm drain.

Gravel Drainage Layer

To increase volume reduction and if soil conditions allow (infiltration rate > 0.5 in/hr), omit the low flow drain or underdrain and install an appropriately sized gravel drainage layer (typically a washed 57 stone) beneath the swale to achieve desired volume reduction goals. Where slopes are greater than 1%, the gravel drainage layer should be installed in combination with check dams (e.g., drop structures) to slow the flow in the swale and allow for infiltration into the gravel drainage layer and then into the subsurface. The base of the drainage layer should have zero slope. The drawdown time in the gravel drainage layer should not exceed 72 hours. The soil and gravel layers should be separated with a geotextile filter fabric or a thin, 2 to 4 inch layer of pure sand and a thin layer (nominally two inches) of choking stone (such as #8). Sizing of the gravel drainage layer is based on volume reduction requirements.

Swale Divider

1) If a swale divider is used, the divider should be constructed of a firm material that will resist weathering and not erode, such as concrete, plastic, or compacted soil seeded with grass. Treated timber should not be used. Selection of divider material should take into account maintenance activities, such as mowing.

2) The divider should have a minimum height of 1 inch greater than the stormwater quality design water depth.

3) Earthen berms should be no steeper than 2H:1V.

4) Material other than earth should be embedded to a depth sufficient to be stable.

Soils

Swale soils should be amended with 2 inches of compost, unless the organic content is already greater than 10%. The compost should be mixed into the native soils to a depth of 6 inches to prevent soil layering and washout of compost. The compost will contain no sawdust, green or under-composted material, or any other toxic or harmful substance. It should contain no un-sterilized manure, which can lead to high levels of pathogen indictors (coliform bacteria) in the runoff.

Vegetation

Swales must be vegetated in order to provide adequate treatment of runoff via filtration. Vegetation, when chosen and maintained appropriately, also improves the aesthetics of a site. It is important to maximize water contact with vegetation and the soil surface.

1) The swale area should be appropriately vegetated with a mix of erosion-resistant plant species that effectively bind the soil. A diverse selection of low growing plants that thrive under the specific site, climatic, and watering conditions should be specified. A mixture of dry-area and wet-area grass species that can continue to grow through silt deposits is most effective. Native or adapted grasses are preferred because they generally require less fertilizer, limited maintenance, and are more drought-resistant than exotic plants. When appropriate, swales that are integrated within a project may use turf or other more intensive landscaping, while swales that are located on the project perimeter, within a park, or close to an open space area are encouraged to be planted with a more naturalistic plant palette.

2) Trees or shrubs may be used in the landscape as long as they do not over-shade the turf.

3) Above the design treatment elevation, a typical lawn mix or landscape plants can be used provided they do not shade the swale vegetation.

4) Irrigation is required if the seed is planted in the spring or summer. Use of a permanent irrigation system may help provide maximal water quality performance. Drought-tolerant grasses should be specified to minimize irrigation requirements.

5) Vegetative cover should be at least 4 inches in height, ideally 6 inches. Swale water depth should ideally be 2/3 of the height of the shortest plant species.

6) Locate the swale in an area without excessive shade to avoid poor vegetative growth. For moderately shaded areas, shade tolerant plants should be used.

7) Locate the swale away from large trees that may drop excessive leaves or needles, which may smother the grass or impede the flow through the swale. Landscape planter beds should be designed and located so that soil does not erode from the beds and enter a nearby swale.

Maintenance Access

1) Access to the swale inlet and outlet should be safely provided, with ample room for maintenance and operational activities.

Operations and Maintenance

1) Inspect vegetated swales for erosion or damage to vegetation after every storm greater than 0.75 inches for on-line swales and at least twice annually for off-line swales, preferably at the end of the wet season to schedule summer maintenance and in the fall to ensure readiness for winter. Additional inspection after periods of heavy runoff is recommended. Each swale should be checked for debris and litter and areas of sediment accumulation (see Appendix I for a vegetated swale inspection and maintenance checklist).

2) Swale inlets (curb cuts or pipes) should maintain a calm flow of water entering the swale. Remove sediment as needed at the inlet, if vegetation growth is inhibited in greater than 10% of the swale or if the sediment is blocking even distribution and entry of the water. Following sediment removal activities, replanting and/or reseeding of vegetation may be required for reestablishment.

3) Flow spreaders should provide even dispersion of flows across the swale. Sediments and debris should be removed from the flow spreader if blocking flows. Splash pads should be repaired if needed to prevent erosion. Spreader level should be checked and releveled if necessary.

4) Side slopes should be maintained to prevent erosion that introduces sediment into the swale. Slopes should be stabilized and planted using appropriate erosion control measures when native soil is exposed or erosion channels are formed.

5) Swales should drain within 48 hours of the end of a storm. Till the swale if compaction or clogging occurs and revegetate. If a perforated underdrain pipe is present, it should be cleaned if necessary.

6) Vegetation should be healthy and dense enough to provide filtering, while protecting underlying soils from erosion:

   - Mulch should be replenished as needed to ensure survival of vegetation.
   - Vegetation, large shrubs or trees that interfere with landscape swale operation should be pruned.
   - Fallen leaves and debris from deciduous plant foliage should be removed.
   - Grassy swales should be mowed to 4 to 6 inches height. Grass clippings should be removed.
   - Invasive vegetation, such as Alligatorweed (*Alternanthera philoxeroides*), Halogeton (*Halogeton glomeratus*), Spotted Knapweed (*Centaurea maculosa*), Giant Reed (*Arundo donax*), Castor Bean (*Ricinus communis*), Perennial Pepperweed (*Lepidium latifolium*), and Yellow Starthistle (*Centaurea solstitalis*) should be removed and replaced with non-invasive species. Invasive species should never contribute more than 10% of the vegetated area. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website or the California Invasive Plant Council website at www.cal-ipc.org.
   - Dead vegetation should be removed if greater than 10% of area coverage or when swale function is impaired. Vegetation should be replaced and established before the wet season to maintain cover density and control erosion where soils are exposed.

7) Check dams (if present) should control and distribute flow across the swale. Causes for altered water flow and/or channelization should be identified and obstructions cleared. Check dams and swale should be repaired if damaged.

8) The vegetated swale should be well maintained. Trash and debris, sediment, visual contamination (e.g., oils), noxious or nuisance weeds, should all be removed.

BIO-4: Vegetated Filter Strip

Filter strips are vegetated areas designed to treat sheet flow runoff from adjacent impervious surfaces or intensive landscaped areas such as golf courses. Filter strips decrease runoff velocity, filter out total suspended solids and associated pollutants, and provide some infiltration into underlying soils. While some assimilation of dissolved constituents may occur, filter strips are generally more effective in trapping sediment and particulate-bound metals, nutrients, and pesticides. Filter strips are more effective when the runoff passes through the vegetation and thatch layer in the form of shallow, uniform flow. Biological and chemical processes may help break down pesticides, uptake metals, and use nutrients that are trapped in the filter.

Vegetated filter strip captures runoff from freeway

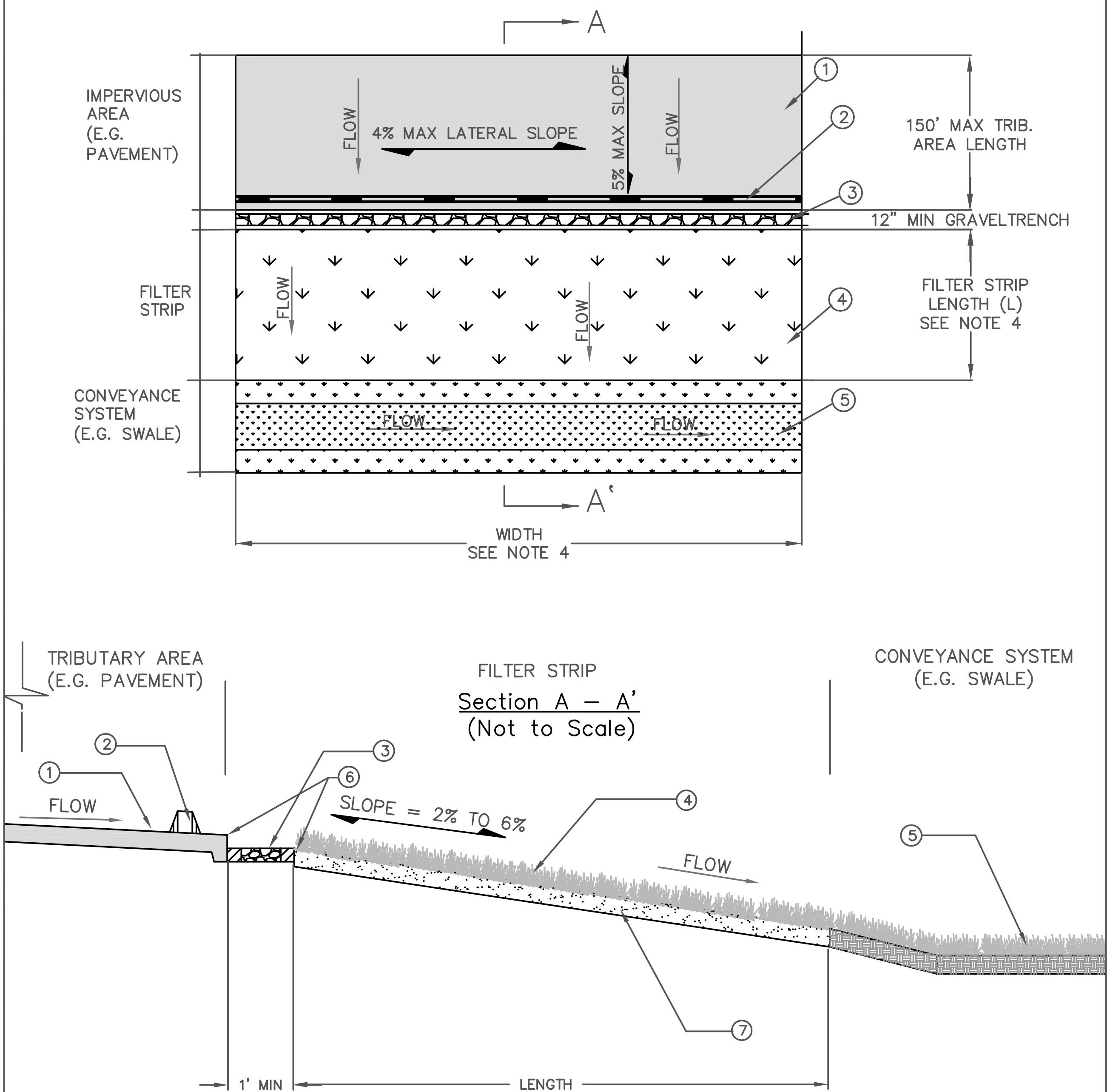
Photo Credit: Washington Department of Transportation

Applications

- Areas adjacent to parking lots and driveways
- Road medians and shoulders

Preventative Maintenance

- Remove excess sediment
- Stabilize/repair minor erosion and scouring
- Remove trash and debris
- Mow regularly



NOTES:

1. MAXIMUM LENGTH OF IMPERVIOUS TRIBUTARY AREA (PER UNIT WIDTH OF FILTER STRIP) SHALL BE 150'.
2. OPTIONAL NOTCHED CURB SPREADERS MAY BE USED IN CONJUNCTION WITH GRAVEL FLOW SPREADER.
3. GRAVEL FLOW SPREADER 6" DEEP BY 12" WIDE MIN SHALL BE PROVIDED.
4. VEGETATED FILTER STRIP SURFACE. SLOPE SHALL BE BETWEEN 2–4%. LENGTH OF STRIP MUST BE BETWEEN 15' AND 150'. WIDTH MUST BE EQUAL OR GREATER THAN THE WIDTH OF THE TRIBUTARY AREA.
5. INSTALL SWALE OR OTHER CONVEYANCE SYSTEM DOWNSTREAM OF FILTER STRIP.
6. TOP OF FILTER STRIP SHALL BE >1" BELOW TOP OF ADJACENT PAVEMENT.
7. AMEND SOILS WITH 2" OF COMPOST TILLED INTO 6" OF NATIVE SOIL UNLESS NATIVE SOIL ORGANIC CONTENT > 10%.

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Figure 6-13: Vegetated Filter Strip

Limitations

The following describes limitations for vegetated filter strips:

- High flow velocity - steep terrain and/or large tributary area may cause concentrated, erosive flows.
- Sheet flow - shallow, evenly-distributed flow across the entire width of the filter strip is required. Filter strips are designed to treat small areas. The maximum flow path from a contributing impervious surface should not exceed 150 feet. Flows should enter as sheet flow and not exceed a depth of 1 inch.
- Shallow grades – a limited site slope may cause ponding.
- Availability of pervious area adjacent to impervious area - filter strips require sheet flow from impervious areas.

Design Criteria

The main challenge associated with filter strips is maintaining sheet flow, which is critical to the performance of this BMP. If flows are concentrated, then little or no treatment of stormwater runoff is achieved and erosive rilling is likely. The use of a flow spreading device (e.g., gravel trench or level spreader) to deliver shallow, evenly-distributed sheet flow to the strip is required. Vegetated filter strips should be designed according to the requirements listed in Table 6-21 and outlined in the section below. BMP sizing worksheets are presented in Appendix E.

Table 6-21: Vegetated Filter Strip Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design flow (SQDF)	cfs	See Section 2 and Appendix E for calculating SQDF.
Maximum design flow depth	inches	1
Design residence time	minutes	7
Design flow velocity	ft/sec	< 1 ft/sec
Minimum length in flow direction	feet	15 (25 preferred); If sized for pretreatment only, filter strip can be a minimum of 4.
Maximum length (parallel to flow) of tributary area per unit width (perpendicular to flow) of filter strip	feet	150
Minimum slope in flow direction	%	2

Design Parameter	Unit	Design Criteria
Maximum slope in flow direction	%	4
Maximum lateral slope	%	4
Vegetation	-	Turf grass (irrigated) or approved equal
Minimum grass height	inches	2
Maximum grass height	inches	4 (typical) or as required to prevent shading
Elevation of flow spreader	inches	> 1 inch below the pavement surface

Sizing Criteria

The flow capacity of a vegetated filter strips (filter strips) is a function of the longitudinal slope (parallel to flow), the resistance to flow (e.g., Manning's roughness), and the width and length of the filter strip. The slope should be shallow enough to ensure that the depth of water will not exceed 1 inch over the filter strip. Similarly, the flow velocity should be less than 1 ft/sec. Procedures for sizing filter strips are summarized below. A filter strip sizing example is also provided.

Step 1: Calculate the design flow rate

The design flow is calculated based on the SQDF (see Section 2).

Step 2: Calculate the minimum width

Determine the minimum width (W_{min}), perpendicular to flow, allowable for the filter strip and design for that width or larger.

$$W_{min} = (SQDF) / (q_{a,min}) \quad \text{(Equation 6-33)}$$

Where

W_{min} = minimum width of filter strip (and tributary area)

$SQDF$ = design flow (cfs)

$q_{a,min}$ = minimum linear unit application rate, 0.005 cfs/ft

Step 3: Calculate the design flow depth

The design flow depth (d_f) is calculated based on the width and the slope, parallel to the flow path, using a modified Manning's equation as follows:

$$d_f = 12 \times [SQDF * n_{wq} / 1.49 W_{trib} s^{0.5}]^{0.6} \quad \text{(Equation 6-34)}$$

Where:

d_f	=	design flow depth (inches)
$SQDF$	=	design flow (cfs)
W	=	width of strip (perpendicular to flow = width of impervious surface contributing area (ft))
s	=	slope (ft/ft) of strip parallel to flow, average over the whole width
n_{wq}	=	Manning's roughness coefficient (0.25-0.30)

If d_f is greater than 1 inch (0.083 ft), then a shallower slope is required, or a filter strip cannot be used.

Step 4: Calculate the design velocity

The design flow velocity (V_{wq}) is based on the design flow, design flow depth, and width of the strip:

$$Vwq = SQDF/\ (df\ W) \qquad \text{(Equation 6-35)}$$

Where:

$d_{f,ft}$	=	design flow depth (ft) (d_f/12)
$SQDF$	=	stormwater quality design flow (cfs)
W	=	width of strip (perpendicular to flow = width of impervious surface contributing area (ft))

Step 5: Calculate the desired length of the filter strip

Determine the required length (L) to achieve a desired minimum residence time of 7 minutes using:

$$L = 60t_{hr} * V_{wq} \qquad \text{(Equation 6-36)}$$

Where:

L	=	minimum allowable strip length (ft)
t_{hr}	=	hydraulic residence time (min)
V_{wq}	=	design flow velocity (fps) calculated by Equation 6-35

Geometry and Size

1) The width of the filter strip shall extend across the full width of the tributary area. The upstream boundary of the filter should be located contiguous to the developed tributary area.

2) The length (in direction of flow) should be between 15 and 150 feet. A minimum length of 25 feet is preferred. Filter strips used for pretreatment shall be at least 4 feet long (in direction of flow).

3) Filter strips shall be designed on slopes (parallel to the direction of flow) between 2% and 4%; steeper slopes tend to result in concentrated flow. Slopes less than 2% could pond runoff, and in poorly permeable soils, create a mosquito breeding habitat.

4) The lateral slope of strip (parallel to the edge of the pavement, perpendicular to the direction of flow) should be 4% or less.

5) Grading should be even: a filter strip with uneven grading perpendicular to the flow path will develop flow channels over time.

6) The top of the strip should be installed 2 to 5 inches below the adjacent pavement to allow for vegetation and sediment accumulation at the edge of the strip. A beveled transition is acceptable and may be required per roadside design specifications.

7) Both the top and toe of the slope should be as flat as possible to encourage sheet flow and prevent channeling and erosion. For engineered filter strips, the facility surface should be graded flat prior to placement of vegetation.

Energy Dissipation / Level Spreading

Runoff entering a filter strip must not be concentrated. A flow spreader should be installed at the edge of the pavement to uniformly distribute the flow along the entire width of the filter strip.

1) At a minimum, a gravel flow spreader (gravel-filled trench) should be placed between the impervious area contributing flows and the filter strip, and meet the following requirements:

    a. The gravel flow spreader should be a minimum of 6 inches deep and should be 12 inches wide.

    b. The gravel should be a minimum of 1 inch below the pavement surface. *The intention is that this allows sediment from the paved surface to be accommodated without blocking drainage onto the strip.*

2) The gravel flow spreader should be a minimum of 6 inches deep and should be 12 inches wide.

a. Where the ground surface is not level, the gravel spreader must be installed so that the bottom of the gravel trench and the outlet lip are level.

b. Along roadways, gravel flow spreaders must be placed and designed in accordance with County road design specifications for compacted road shoulders.

3) Curb ports and interrupted curbs may only be used in conjunction with a gravel spreader to better ensure that water sheet flows onto the strip, provided:

a. Curb ports use fabricated openings that allow concrete curbing to be poured or extruded while still providing an opening through the curb to admit water to the filter strip. Interrupted curbs are sections of curb placed to have gaps spaced at regular intervals along the total width of the treatment area. Openings or gaps in the curb should be at regular intervals but at least every 6 feet. The width of each opening should be a minimum of 11 inches.

b. At a minimum, gaps should be every 6 feet to allow distribution of flows into the treatment facility before they become too concentrated. The opening should be a minimum of 11 inches. Approximately 15 percent or more of the curb section length should be in open ports, and as a general rule, no opening should discharge more than 10 percent of the overall flow entering the facility.

4) Energy dissipaters are needed in a filter strips if sudden slope drops occur, such as locations where flows in a filter strip pass over a rockery or retaining wall aligned perpendicular to the direction of flow. Adequate energy dissipation at the base of a drop section can be provided by a riprap pad.

Access

1) Access should be provided at the upper edge of a filter strip to enable maintenance of the inflow spreader throughout the strip width and allow access for mowing equipment.

Water Depth and Velocity

1) The design water depth shall not exceed 1 inch.

2) Runoff flow velocities should not exceed approximately 1 foot per second across the filter strip surface.

Soils

Filter strip soils should be amended with 2 inches of compost, unless the organic content is already greater than 10%. The compost should be mixed into the native soils to a depth of 6 inches to prevent soil layering and washout of compost. The compost will contain no sawdust, green or under-composted material, or any other toxic or harmful substance. It should contain no un-sterilized manure which can lead to high levels of potentially pathogenic bacteria in the runoff.

Vegetation

Filter strips must be uniformly graded and densely vegetated with erosion-resistant grasses that effectively bind the soil. Native or adapted grasses are preferred because they generally require less fertilizer and are more drought-resistant than exotic plants. The following vegetation guidelines should be followed for filter strips:

1) Sod (turf) can be used instead of grass seed, as long as there is complete coverage.

2) Irrigation should be provided to establish the grasses.

3) Grasses or turf should be maintained at a height of 2 to 4 inches. Regular mowing is often required to maintain the turf grass cover.

4) Trees or shrubs should not be used in abundance because they shade the turf and impede sheet flow.

Operations and Maintenance

Filter strips mainly require vegetation management. Therefore little special training is needed for maintenance crews. Typical maintenance activities and frequencies include:

1) Inspect strips at least twice annually for erosion or damage to vegetation, preferably at the end of the wet season to schedule summer maintenance and in the fall to ensure the strip is ready for winter. However, additional inspection after periods of heavy runoff is most desirable. The strip should be checked for debris and litter and areas of sediment accumulation (see Appendix I for a vegetated filter strip inspection and maintenance checklist).

2) Mow as frequently as necessary (at least twice a year) for safety and aesthetics or to suppress weeds and woody vegetation.

3) Trash tends to accumulate in strip areas, particularly along roadways. The need for litter removal should be determined through periodic inspection. Litter should always be removed prior to mowing.

4) Regularly inspect vegetated buffer strips for pools of standing water. Vegetated filter strips can become a nuisance due to mosquito breeding in level spreaders (unless designed to dewater completely in less than 72 hours), in pools of standing water if obstructions develop (e.g. debris accumulation, invasive vegetation), and/or if proper drainage slopes are not implemented and maintained.

5) Activities that lead to ruts or depressions on the surface of the filter strip should be prevented or the integrity of the strip should be restored by leveling and reseeding. Examples are vehicle tracks, utility maintenance, and pedestrian (short-cut) tracks.

6) Vegetation should be healthy and dense enough to provide filtering, while protecting underlying soils from erosion:

   - Mulch should be replenished as needed to ensure survival of vegetation.

   - Vegetation, large shrubs or trees that interfere with landscape swale operation should be pruned.

   - Fallen leaves and debris from deciduous plant foliage should be removed.

   - Filter strips should be mowed to 4 to 6 inches height. Grass clippings should be removed.

   - Invasive vegetation, such as Alligatorweed (*Alternanthera philoxeroides*), Halogeton (*Halogeton glomeratus*), Spotted Knapweed (*Centaurea maculosa*), Giant Reed (*Arundo donax*), Castor Bean (*Ricinus communis*), Perennial Pepperweed (*Lepidium latifolium*), and Yellow Starthistle (*Centaurea solstitalis*) should be removed and replaced with non-invasive species. Invasive species should never contribute more than 10% of the vegetated area. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website or the California Invasive Plant Council website at www.cal-ipc.org.

   - Dead vegetation should be removed if greater than 10% of area coverage or when filter strip function is impaired. Vegetation should be replaced and established before the wet season to maintain cover density and control erosion where soils are exposed.

BIO-5: Proprietary Biotreatment

Proprietary biotreatment devices are manufactured treatment BMPs that incorporate plants, soil, and microbes engineered to provide treatment at higher flow rates or volumes and with smaller footprints than their non-proprietary counterparts. Incoming flows are typically pretreated to remove larger particles/debris, filtered through a planting media (mulch, compost, soil, and plants), collected by an underdrain, and delivered to the stormwater conveyance system.

Proprietary Biotreatment Examples

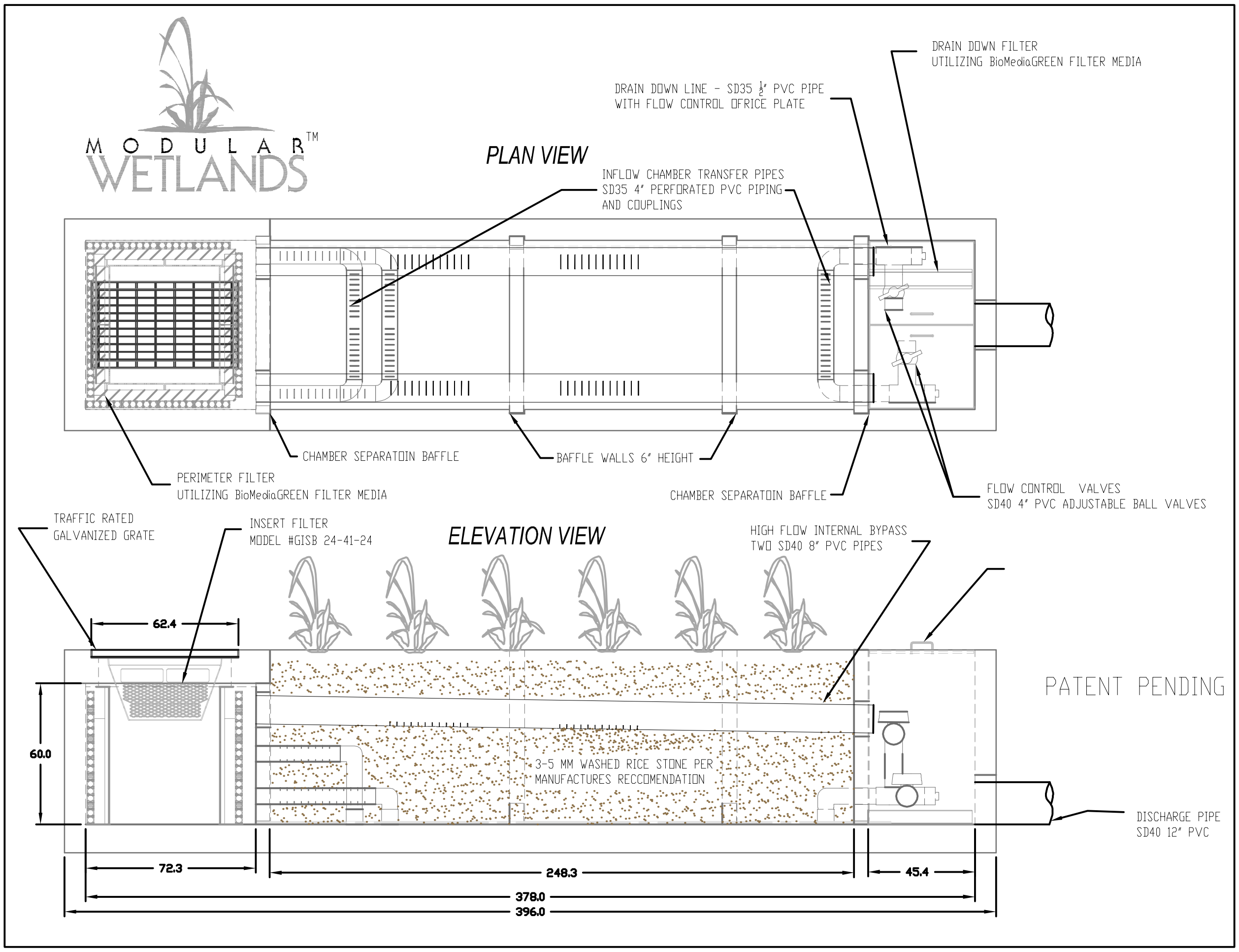
Photo Credits: 1. Filterra®; 2. Stormtreat™

Application

- Parking lot islands
- Pickup/drop off turnarounds
- Roadway curbs

Maintenance

- Filter media replacement
- Sediment, trash, and debris removal
- Mulch replacement
- Vegetation upkeep and replacement



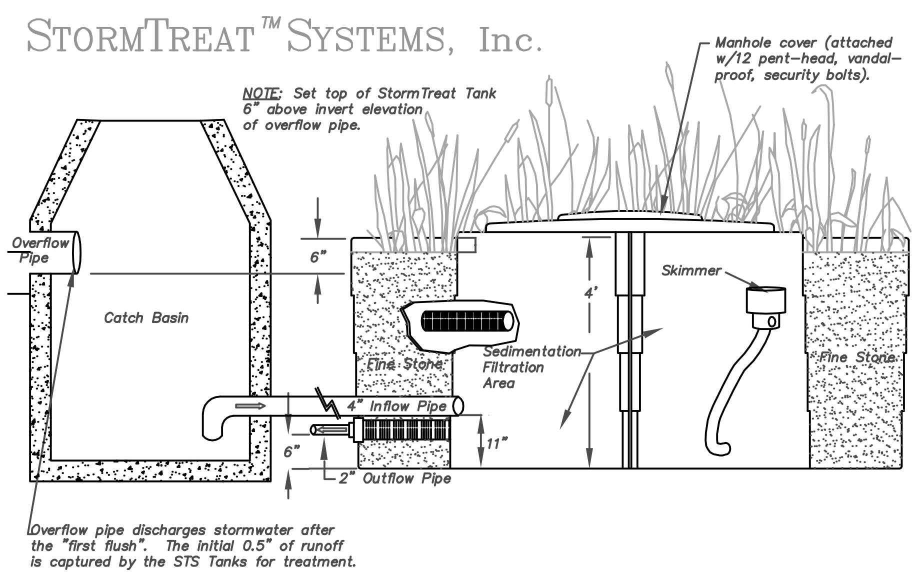


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Figure 6-14: Biotreatment Device

Table 6-22: Proprietary Biotreatment Device Manufacturer Websites

Device	Manufacturer	Website
DeepRoot® Silva Cell	DeepRoot® Urban Landscape Products	www.deeproot.com
Filterra®	Filterra® Bioretention Systems	www.filterra.com
Modular Wetlands (MWS-LINEAR)	Modular Wetlands Systems Inc.	www.modularwetlands.com
StormTreat™	StormTreat Systems Inc.	www.stormtreat.com
UrbanGreen BioFilter	Contech® Construction Products Inc.	www.contech-cpi.com/stormwater/13

Design Criteria

As proprietary biotreatment BMP vendors are constantly updating and expanding their product lines, refer to the specific vendor for the latest design and sizing guidance.

TCM-1: Dry Extended Detention Basin

Dry extended detention (ED) basins are basins whose outlets have been designed to detain the SQDV for 36 to 48 hours to allow sediment particles and associated pollutants to settle and be removed. Dry ED basins do not have a permanent pool. They are designed to drain completely between storm events. They can also be used to provide hydromodification and/or flood control by modifying the outlet control structure and providing additional detention storage. The slopes, bottom, and forebay of dry ED basins are typically vegetated. Without the addition of a sand filter beneath the basin, considerable stormwater volume reduction can still occur, depending on the infiltration capacity of the subsoil.

Extended Detention Basin Application

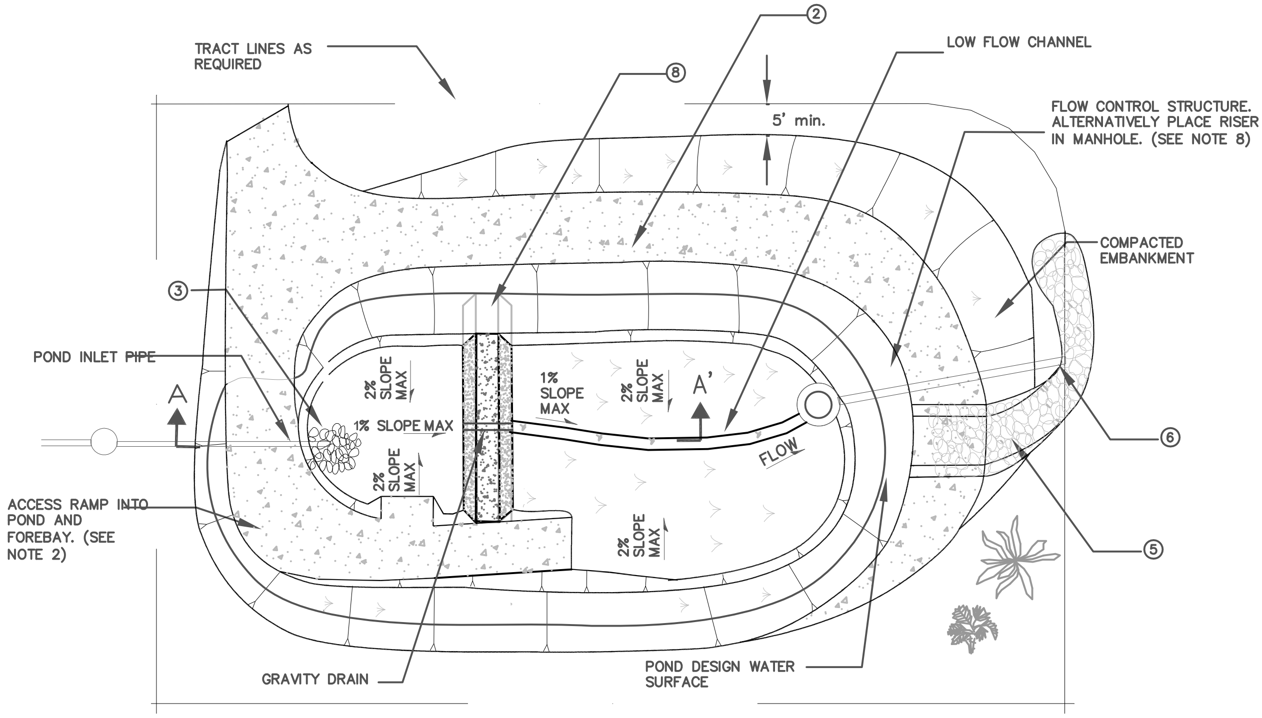
Photo Credit: Geosyntec Consultants

Application

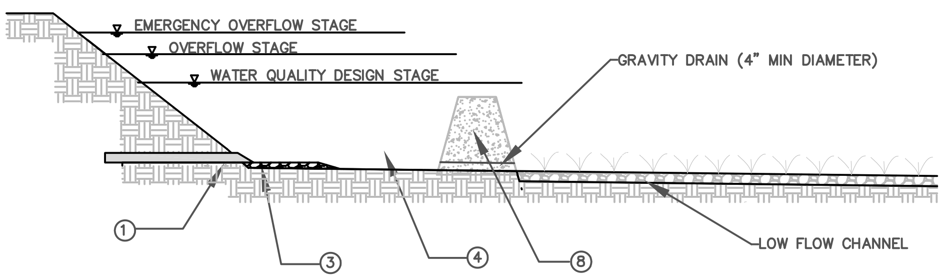
- Adjacent to parking lots
- Road medians and shoulders
- Within open areas or play fields

Preventative Maintenance

- Remove trash and debris, minor sediment accumulation, and obstructions near inlet and outlet structures
- Replace top 2 to 4 inch of sand
- Mow or weed surface of filter



Plan View
(Not to Scale)



Section A – A'
(Not to Scale)

NOTES:

1. INLET PIPE SHALL BE DESIGNED AND LOCATED SO THAT NON–EROSIVE VELOCITIES OCCUR IN THE FOREBAY
2. MAINTENANCE RAMP SHOULD PROVIDE ACCESS TO BOTH THE FOREBAY AND MAIN BASIN.
3. RIP RAP APRON OR OTHER INLET ENERGY DISSIPATION SHALL BE PROVIDED SUCH THAT VELOCITIES IN THE FOREBAY ARE < 4 FT/S.
4. SEDIMENT FOREBAY SHOULD BE SIZED TO PROVIDE 5–15% OF THE TOTAL BASIN VOLUME.
5. EMERGENCY SPILLWAY MUST BE SIZED TO PASS 100–YEAR PEAK FLOW FOR ON–LINE BASINS, AND WATER QUALITY DESIGN FLOW FOR OFF–LINE BASINS.
6. OUTLET PIPE. ENERGY DISSIPATION SHALL BE PROVIDED UNLESS DISCHARGE IS TO PIPE OR HARDENED CHANNEL.
7. OUTLET STRUCTURE SHOULD BE SIZED TO DRAIN WATER QUALITY VOLUME IN 36 – 48 HOURS (SEE FIGURE 2–2 FOR PERFORATED RISER DETAILS). ALTERNATIVELY PLACE RISER STRUCTURE IN A MANHOLE (SEE FIGURE 2–3).
8. INSTALL EARTHEN BERM OR EQUIVALENT. TOP OF BERM SHALL BE 2' MINIMUM BELOW DESIGN WATER QUALITY STAGE. BERM SHALL BE KEYED INTO EMBANKMENT A MINIMUM OF 1' ON BOTH SIDES.

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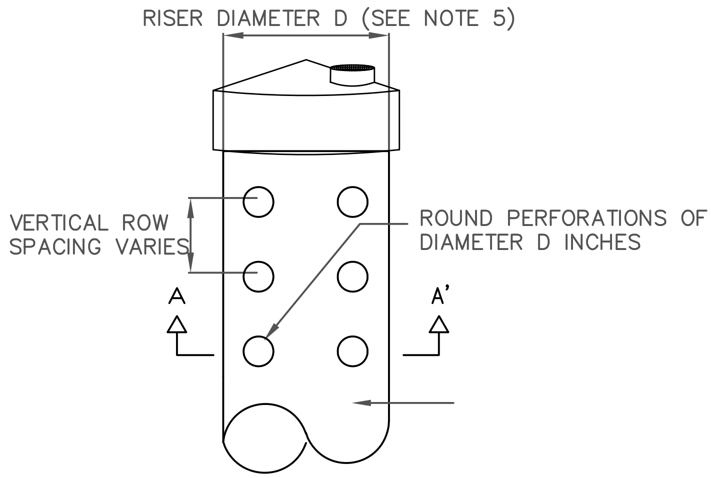
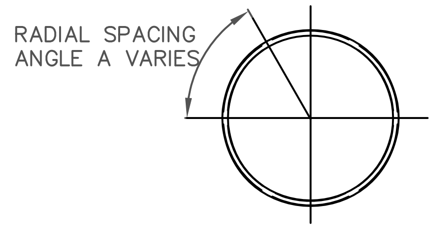
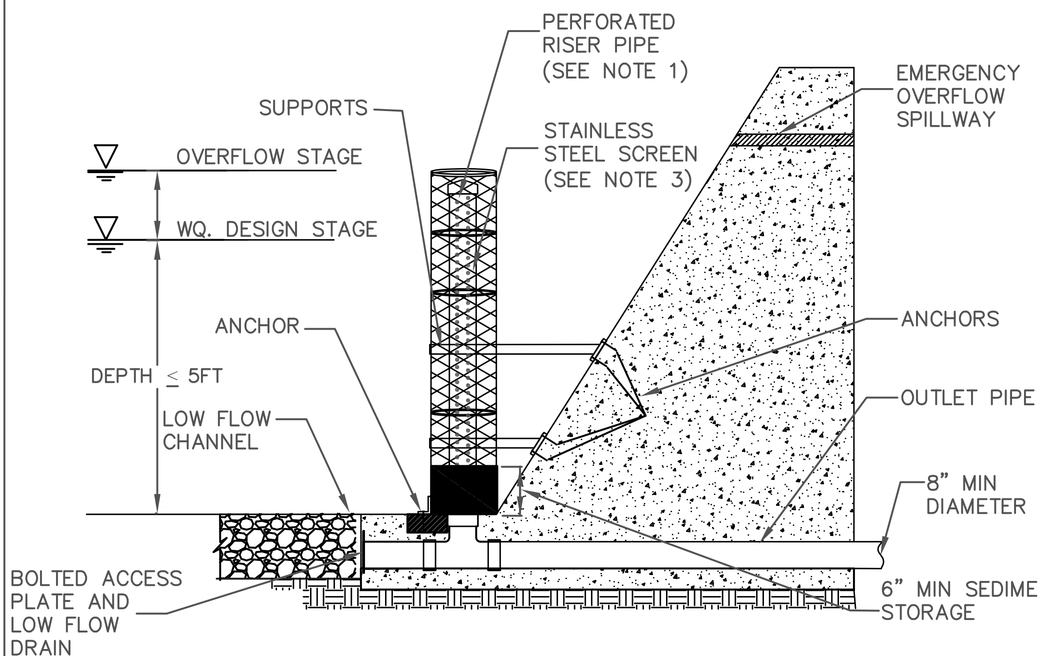
Figure 6-15: Extended Detention Basin



Perforated Riser Detail
(Not to Scale)



Section A – A'
(Not to Scale)



Perforated Riser Outlet Structure
(Not to Scale)

NOTES:

1. RISER PIPE SHALL BE SIZED TO PROVIDE 36 TO 48–HOUR FULL BRIM DRAW DOWN TIME.
2. TOTAL OUTLET CAPACITY: 100–YEAR PEAK FLOW FOR ON–LINE BASINS AND WATER QUALITY DESIGN FLOW FOR OFF–LINE BASINS.
3. SCREEN OPENINGS SHALL BE AT LEAST ¼" AND SHALL NOT EXCEED THE DIAMETER OF THE PERFORATIONS ON THE RISER.
4. RISER PIPE PERFORATION DIAMETER SHALL BE NO LESS THAN ½" AND NO MORE THAN 2"
5. MINIMUM PIPE DIAMETER (D) IS 2'
6. RISER PIPE MATERIAL IS CMP

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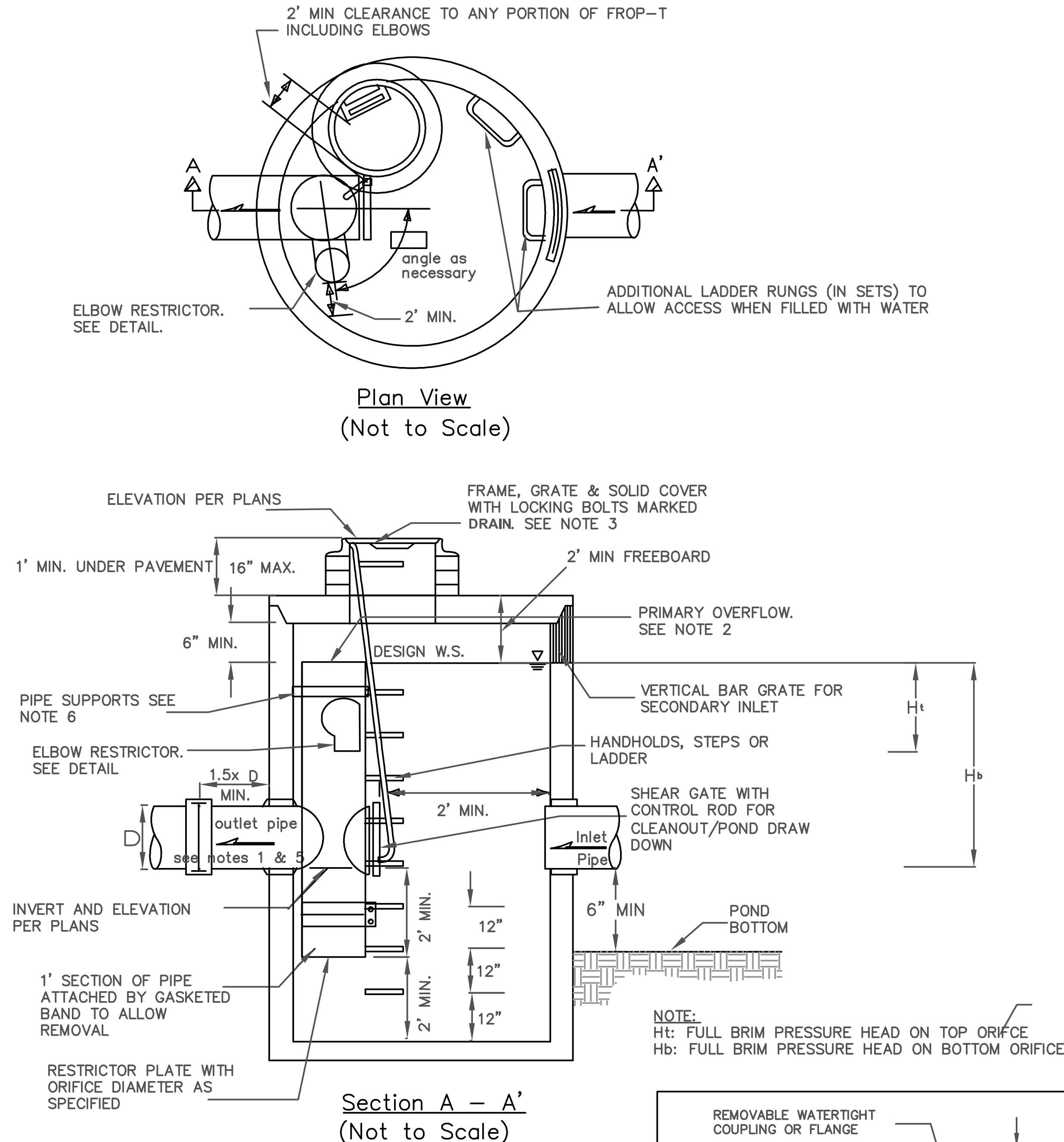
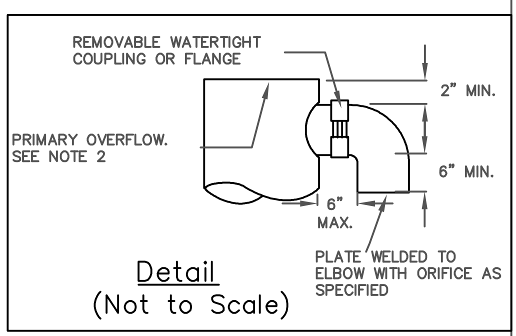
Figure 6-16: Perforated Riser Outlet





NOTES:

1. USE A MINIMUM OF A 54" DIA TYPE 2 CATCH BASIN
2. OUTLET CAPACITY: 100-YEAR PEAK FLOW FOR ON-LINE BASINS.
3. METAL PARTS: CORROSION RESISTANT. NON-GALVANIZED PARTS PERFERRED. GALVANIZED PIPE PARTS TO HAVE ASPHALT TREATMENT.
4. FRAME AND LADDER OR STEPS OFFSET SO:
   A. CLEANOUT GATE IS VISIBLE FROM TOP.
   B. CLIMB-DOWN SPACE IS CLEAR OF RISER AND
   C. FRAME IS CLEAR OF CURB.
5. IF METAL OUTLET PIPE CONNECTS TO CEMENT CONCRETE PIPE: OUTLET PIPE TO HAVE SMOOTH O.D. EQUAL TO CONCRETE PIPE I.D. LESS ¼"
6. PROVIDE AT LEAST ONE 3 X .090 GAGE SUPPORT BRACKET ANCHORED TO CONCRETE WALL. (MAXIMUM 3' VERTICAL SPACING)
7. LOCATE ADDITIONAL LADDER RUNGS IN STRUCTURES USED AS ACCESS TO TANKS OR VAULTS TO ALLOW ACCESS WHEN CATCH BASIN IS FILLED WITH WATER

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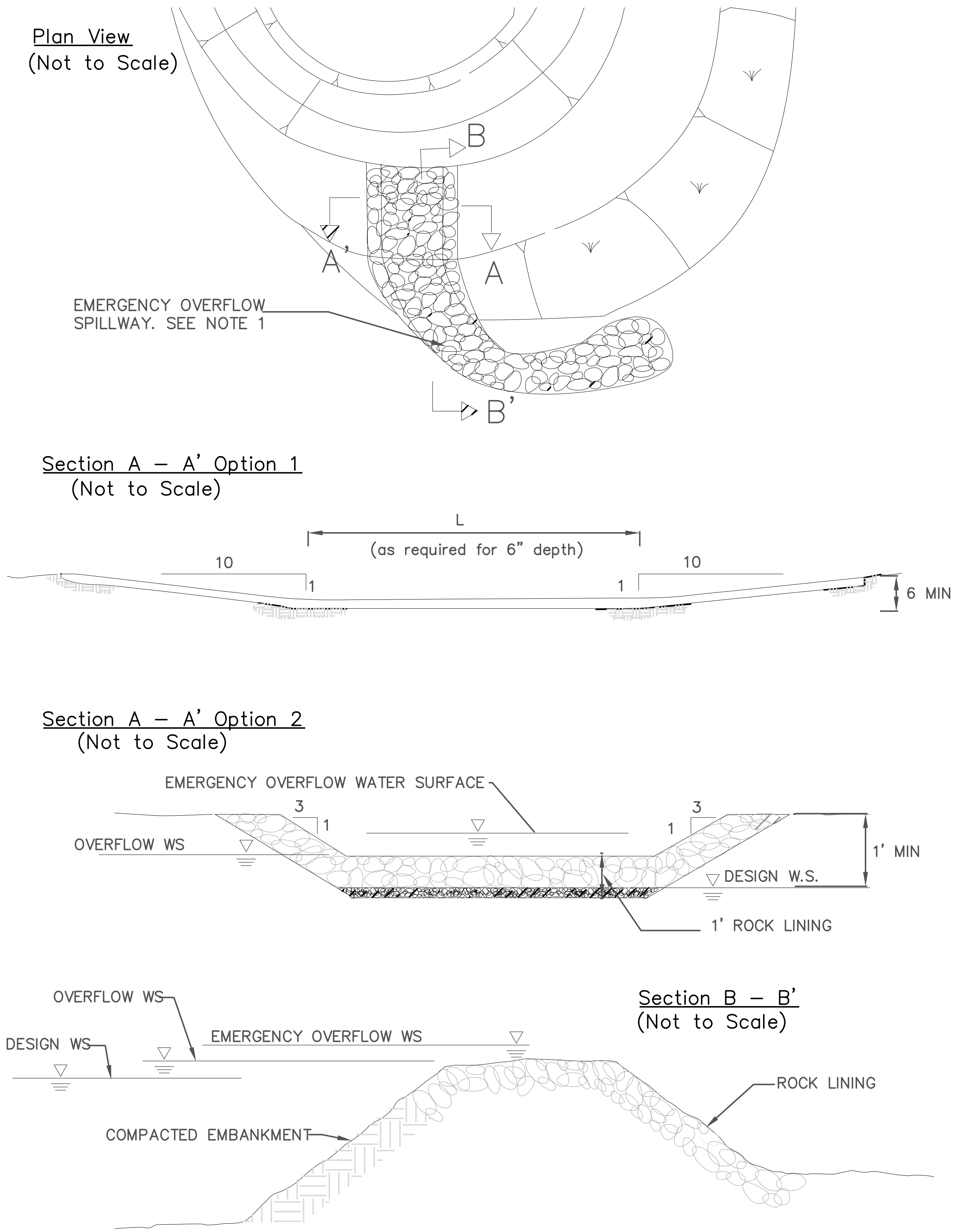
Figure 6-17: Multiple Orifice Outlet



NOTES:

1. ALTERNATIVE SPILLWAY DESIGNS BASED ON THE CALIFORNIA DEPARTMENT OF WATER RESOURCES' GUIDELINES FOR THE DESIGN AND CONSTRUCTION OF SMALL EMBANKMENT DAMS OR AT THE DISCRETION OF THE DEPARTMENT

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Figure 6-18: Spillway

Limitations

Limitations for dry extended detention basins include:

- Surface space availability - typically 0.5 to 2.0 percent of the total tributary development area required.

- Depth to groundwater - bottom of basin should be 2 feet higher than the seasonal high water table elevation.

- Steep slopes - basins placed above slopes greater than 15 percent or within 200 feet from the top of a hazardous slope or landslide area require a geotechnical investigation.

- Compatibility with flood control - basins must not interfere with flood control functions of existing conveyance and detention structures.

Design Criteria

Dry extended detention basins should be designed according to the requirements listed in Table 6-23 and outlined in the section below. BMP sizing worksheets are presented in Appendix E.

Table 6-23: Dry Extended Detention Basin Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume (SQDV)	acre-feet	See Section 2 and Appendix E for calculating SQDV
Drawdown time for SQDV	hours	Top 50%: 12 hrs (minimum); Bottom 50%: 36 hrs
Basin Design Volume	acre-ft	1.2 * SQDV
Forebay basin size	acre-feet	5 to 15% of SQDV
Maximum forebay drain time	min	45
Low–flow channel depth	inches	9
Low-flow channel flow capacity		2*forebay outlet rate
Freeboard (minimum)	inches	12
Flow path length to width ratio	L:W	2:1, larger preferred; can be achieved using internal berms
Longitudinal slope	percentage	1 (forebay) and 0-2 (main basin)
Low flow channel geometry	feet	depth of 0.5 and width of 1
Minimum outflow device diameter	inches	18

Sizing Criteria

Dry extended detention (ED) basins are basins designed such that the SQDV is detained for 48 hours. This allows sediment particles and associated pollutants to settle and be removed from the stormwater. Procedures for sizing extended detention basins are summarized below. A sizing example is also provided.

Step 1: Calculate the design volume

Dry extended detention facilities shall be sized to capture and treat the SQDV (see Section E.1).

Step 2: Calculate the volume of the active basin

The total basin volume should be increased an additional 20% above the SQDV to account for sediment accumulation, at a minimum. If the basin is designed only for water quality treatment then the basin volume would be 120% of the SQDV. Freeboard is in additional to the total basin volume. Calculate the volume of the active basin (ft^2) (V_a):

$$V_a = 1.20 * SQDV \qquad \text{(Equation 6-37)}$$

Step 3: Determine detention basin location and preliminary geometry based on site constraints

Based on site constraints, determine the basin geometry (area and length) and the storage available by developing an elevation-storage relationship for the basin. The cross-sectional geometry across the width of the basin should be approximately trapezoidal. Shallow side slopes are necessary if the basin is designed to have recreational uses during dry weather conditions.

1) Calculate the width of the basin footprint (W_{tot}) as follows:

$$W_{tot} = \frac{A_{tot}}{L_{tot}} \qquad \text{(Equation 6-38)}$$

Where:

A_{tot} = total surface area of the basin footprint (ft^2)

L_{tot} = total length of the basin footprint (ft)

2) Calculate the length of the active volume surface area including the internal berm but excluding the freeboard, ($L_{av\text{-}tot}$):

$$L_{av-tot} = L_{tot} - 2Zd_{fb} \qquad \text{(Equation 6-39)}$$

Where:

Z = interior side slope as length per unit height (H:V)

d_{fb} = freeboard depth (ft)

3) Calculate the width of the active volume surface area including the internal berm but excluding freeboard (ft), ($W_{av\text{-}tot}$):

$$W_{av-tot} = W_{tot} - 2Zd_{fb}$$ (Equation 6-40)

4) Calculate the total active volume surface area including the internal berm and excluding freeboard, ($A_{av\text{-}tot}$):

$$A_{av-tot} = L_{av-tot} \times W_{av-tot}$$ (Equation 6-41)

5) Calculate the area of the berm, (A_{berm}):

$$A_{berm} = W_{berm} \times L_{berm}$$ (Equation 6-4243)

Where:

W_{berm} = width of the internal berm

L_{berm} = length of the internal berm (= width excluding freeboard, $W_{av\text{-}tot}$)

6) Calculate the surface area excluding the internal berm and freeboard, A_{av}:

$$A_{av} = A_{av=tot} - A_{berm}$$ (Equation 6-44)

Step 4: Determine Dimensions of Forebay

The forebay should be sized to at least 5 to 15% of the basin active volume (V_a). Calculate the active volume of the forebay, (V_1):

$$V_1 = \frac{V_a \times \%V_1}{100}$$ (Equation 6-45)

Where:

$\%V_1$ = percent of V_a in forebay (%)

V_a = total active volume (ft^3)

7) Calculate the surface area for the active volume of forebay (A_1):

$$A_1 = \frac{V_1}{d_1}$$ (Equation 6-46)

Where:

d_1 = average depth for the forebay (ft)

8) Calculate the length of forebay, (L_1):

$$L_1 = \frac{A_1}{W_1}$$ (Equation 6-47)

Where:

W_1 = width of forebay (ft)

Step 5: Determine Dimensions of Cell 2

Cell 2 will consist of the remainder of the basin's active volume.

1) Calculate the active volume of Cell 2, (V_2):

$$V_2 = V_a - V_1$$ (Equation 6-48)

Where:

V_a = total basin active volume (ft^3)

V_1 = volume of forebay (ft^3)

2) Calculate the surface area, A_2, for the active volume of Cell 2:

$$A_2 = A_{av} - A_1$$ (Equation 6-49)

Where:

A_{av} = basin surface area excluding berm and freeboard (ft^2)

A_1 = surface area of forebay (ft^2)

3) Calculate the average depth (d_2) for the active volume of Cell 2:

$$d_2 = \frac{V_2}{A_2}$$ (Equation 6-50)

4) Calculate the length of Cell 2, (L_2):

$$L_2 = \frac{A_2}{W_2}$$ (Equation 6-51)

Where:

W_2 = width of Cell 2 (ft)

5) Verify that the length-to-width ratio of Cell 2 at half of d_2 is at least 1.5:1 with ≥2:1 preferred. If the length-to-width ratio is less than 1.5:1, modify input parameters until a ratio of at least 1.5:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the basin should be chosen. Calculate the length-to width (LW_{mid2}) ratio of Cell 2 at half of d_2 follows:

$$LW_{mid2} = \frac{L_{mid2}}{W_{mid2}} \quad \text{(Equation 6-52)}$$

Where:

W_{mid2} = $W_2 - Zd_2$ (Equation 6-53)

L_{mid2} = $L_2 - Zd_2$ (Equation 6-54)

W_{mid2} = width of Cell 2 at half of d_2 (ft)

L_{mid2} = length of Cell 2 at half of d_2 (ft)

Z = interior side slope as length per unit height (H:V)

d_2 = cell 2 average depth (ft)

Step 6: Ensure Design Requirements and Site Constraints are achieved

Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the basin is inadequate to meet the design requirements, choose a new location or alternative treatment BMP.

Step 7: Size Outlet Structure

The total drawdown time for the basin should be 48 hours. The outlet structure should be designed to release the bottom 50% of the detention volume (half-full to empty) over 36 hours, and the top half (full to half-full) in 12 hours. A primary overflow should be sized to pass the peak flow rate from the developed capital design storm. See Section 6 for outlet structure sizing methodologies.

Step 8: Determine Emergency Spillway Requirements

For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm in order to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the 100-yr, 24-hr post-development peak stormwater runoff discharge rate directly to the downstream conveyance system or another acceptable discharge point. For sites where the emergency spillway discharges to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.

Sizing and Geometry

1) The total basin volume should be increased an additional 20% of the SQDV to account for sediment accumulation, at a minimum. If the basin is designed only for water quality treatment then the basin volume would be 120% of the SQDV. Freeboard is in addition to the total basin volume.

2) The minimum freeboard should be at least 1 foot above the emergency overflow water surface for dry extended detention basins.

3) The minimum flow-path length to width ratio at half basin height should be a minimum of 3:1 (L:W) and can be achieved using internal berms or other means to prevent short-circuiting. Intent: a long flow length will improve fine sediment removal.

4) The cross-sectional geometry across the width of the basin should be approximately trapezoidal. Shallow side slopes are necessary if the basin is designed to have recreational uses during dry weather conditions.

5) All dry ED basins should be free draining and a low flow channel should be provided. A low flow channel is a narrow, shallow trench filled with pea gravel and encased with filter fabric that runs the length of the basin to drain dry weather flows. The low flow channel should be of sufficient size considering the natural characteristics of the soil and have a positive-draining gradient flowing toward the outlet structure (typically 1 ft wide by 6 inches deep). If infiltration rates of subsurface soils are insufficient, the low flow channel should tie into perforated pipe at the outlet structure. If a sand filter or planting media is provided beneath the dry ED basin for increased volume reduction, it may be designed to take the place of the low flow channel.

6) The basin bottom should have a 1% longitudinal slope (direction of flow) in the forebay, and may range from 0 to 2% longitudinal slope in the main basin. The bottom of the basin should slope 2% toward the center low flow channel.

7) A basin should be large enough to allow for equipment access via a graded ramp.

Soils Considerations

1) The slopes of the detention basin should be analyzed for slope stability using rapid drawdown conditions and should meet the minimum standards set by the Ventura County Flood Control District. A 1.5 static factor of safety should be used. Seismic analysis is not required due to the temporary storage of water in the basin.

2) The infiltration capability of the dry ED basin can be enhanced by incorporating soil amendments.

Energy Dissipation

1) Energy dissipation controls constructed of sound materials such as stones, concrete, or proprietary devices that are rated to withstand the energy of the influent flow should be installed at the inlet to the sediment forebay. Flow velocity into the basin forebay should be controlled to 4 feet per second (ft/sec) or less.

2) Energy dissipation controls must also be used at the outlet/spillway from the detention basin unless the basin discharges to a storm drain or hardened channel.

Sediment Forebay

As untreated stormwater enters the dry ED basin, it passes through a sediment forebay for coarse solids removal. The forebay may be constructed using an internal berm constructed out of earthen embankment material, grouted riprap, stop logs, or other structurally sound material.

1) The basin should be sized so that 5 to 15% of the total basin volume is in the forebay and 85 to 95% of the total basin volume is in the main portion of the basin.

2) A gravity drain outlet from the forebay (2 inch minimum diameter) should extend the entire width of the internal berm and be designed to completely drain to the main basin within 10 minutes.

3) The forebay outlet should be offset (horizontally) from the inflow streamline to prevent short-circuiting.

4) Permanent steel post depth markers should be placed in the forebay to define sediment removal limits at 50% of the forebay sediment storage depth.

Vegetation

Vegetation within the dry ED basin provides erosion protection from wind and water and biofiltration of stormwater. The local permitting authority should review and approve any proposed basin landscape plan prior to implementation and following guidelines should be followed:

1) The bottom and slopes of the dry ED basin should be vegetated. A mix of erosion-resistant plant species that effectively bind the soil should be used on the slopes and a diverse selection of plants that thrive under the specific site, climatic, and watering conditions should be specified for the basin bottom. The basin bottom should not be planted with trees, shrubs, or other large woody plants that may interfere with sediment removal activities. The basin should be free of floating objects. Only native perennial grasses, forbs, or similar vegetation that can be replaced via seeding should be used on the basin bottom.

    a. Landscaping outside of the basin is required for all dry ED basins and should adhere to the following criteria so as not to hinder maintenance operations:

b. No trees or shrubs may be planted within 15 feet of inlet or outlet pipes or manmade drainage structures such as spillways, flow spreaders, or earthen embankments. Species with roots that seek water, such as willow or poplar, should not be used within 50 feet of pipes or manmade structures. Weeping willow (Salix babylonica) should not be planted in or near detention basins.

2) Prohibited non-native plant species will not be permitted. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website- or the California Invasive Plant Council website at www.cal-ipc.org.

3) A plant list provided by a landscape professional should be used as a guide only and should not replace project-specific planting recommendations, including recommendations on appropriate plants, fertilizer, mulching applications, and irrigation requirements (if any) to ensure healthy vegetation growth.

Sand Filter or Planting Media Layer

For increasing the volume reduction capability of a dry ED basin, an appropriately sized sand filter or planting media layer can be placed beneath the dry ED basin to achieve desired volume reduction goals if soil and slope conditions allow (i.e., infiltration rate greater than 0.5 in/hr but less than 2.4 in/hr; site slope less than 15%). The drawdown time of the sand filter or planting media layer should be less than 72 hours. The base of the sand filter or planting media layer should be level (i.e., zero slope). If a sand filter/planting media layer is provided over the length of the basin, it can take the place of the low-flow channel so long as it is designed to adequately infiltrate dry weather flows. Sizing of the sand filter and planting media layer for dry ED basins is the same as for sand filters and bioretention areas, respectively. The depth of water in the dry ED basin should not exceed 6 feet.

Outlet Structure and Drawdown Time

A drawdown time of 36 to 48 hours shall be provided for the SQDV. This drawdown time is for the volume in the basin above the sand filter layer (if provided) and serves the purpose of water quality treatment. An outflow device should be designed to release the bottom 50% of the detention volume (half-full to empty) over 24 to 32 hours, and the top half (full to half-full) in 12 to 16 hours. *The intention is that the drawdown schemes that detain low flows for longer periods than high flows have the following advantages over outlets that drain the basin evenly:*

- Greater flood control capabilities
- Enhanced treatment of low flows which make up the bulk of incoming flows.

Additional storage, detention, and outlet control is required to achieve pre-development stormwater runoff discharge rates for hydromodification control. The outlet structure can be designed to achieve flow control for meeting the multiple objectives of water quality and flow attenuation.

The outflow device (i.e., outlet pipe) should be oversized (18 inch minimum diameter). There are two options that can be used for the outlet structure:

1) Uniformly perforated riser structures.

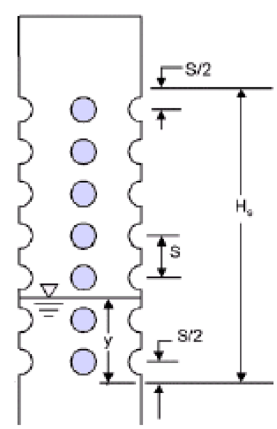
2) Multiple orifice structures (orifice plate).

The outlet structure can be placed in the basin with a debris screen (Figure 6-15) or housed in a standard manhole (Figure 6-16). If a multiple orifice structure is used, an orifice restriction (if necessary) should be used to limit orifice outflow to the maximum discharge rates allowable for achieving the desired water quality and flow control objectives. Orifice restriction plates should be removable for emergency situations. A removable trash rack should be provided at the outlet.

Note that a primary overflow (typically a riser pipe connected to the outlet works) should be sized to pass flows larger than the stormwater quality design storm (if the ED basin is sized only for water quality) or to pass flows larger than the peak flow rate of the maximum design storm to be detained in the basin (e.g., 100-yr, 24-hr). The primary overflow is intended to protect against overtopping or breaching of a basin embankment.

Perforated Risers Outlet Sizing Methodology

The following attributes influence the perforated riser outlet sizing calculations**:**



Perforated Riser Outlet

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- Shape of the basin (e.g., trapezoidal)
- Depth and volume of the basin
- Elevation / depth of first row of holes
- Elevation / depth of last row of holes
- Size of perforations
- Number of rows or perforations and number of perforations per row
- Desired drawdown time (e.g., 16 hour and 32 hour draw down for top half and bottom half respectively, 48 hour total drawdown time for the stormwater quality design volume)

The governing rate of discharge from a perforated riser structure can be calculated using Equation 6-44 below:

$$Q = C_p \frac{2A_p}{3H_s} \sqrt{2g} H^{3/2}$$

(Equation 6-55)

Where:

Q	=	riser flow discharge (cfs)
C_p	=	discharge coefficient for perforations (use 0.61)
A_p	=	cross-sectional area of all the holes (ft^2)
s	=	center to center vertical spacing between perforations (ft)
H_s	=	distance from s/2 below the lowest row of holes to s/2 above the top row of holes (McEnroe 1988).
H	=	effective head on the orifice (measured from center of orifice to water surface)

For the iterative computations needed to size the perforations in the riser and determine the riser height, a simplified version of Equation 6-44 may be used as shown below in Equation 6-45 and Equation 6-46:

$$Q = kH^{3/2}$$

(Equation 6-56)

Where:

H	=	effective head on the orifice (measured from center of orifice to water surface)

$$k = C_p \frac{2A_p}{3H_s} \sqrt{2g}$$

(Equation 6-57)

Where:

C_p	=	discharge coefficient for perforations (use 0.61)
A_p	=	cross-sectional area of all the holes (ft^2)
s	=	center to center vertical spacing between perforations (ft)

H_S	=	distance from s/2 below the lowest row of holes to s/2 above the top row of holes.
g	=	32.17 ft/sec^2

Uniformly perforated riser designs are defined by the depth or elevation of the first row of perforations, the length of the perforated section of pipe, and the size or diameter of each perforation.

Multiple Orifice Outlet Sizing Methodology

The following attributes influence multiple orifice outlet sizing calculations**:**

- Shape of the basin (e.g., trapezoidal)
- Depth and volume of the basin
- Elevation of each orifice
- Desired draw-down time (e.g., 16 hour and 32 hour draw down times for top half and bottom half respectively, 48 hour drawdown time for stormwater quality design volume)

The rate of discharge from a single orifice can be calculated using Equation 6-22.

$$Q = CA(2gH)^{0.5}$$ (Equation 6-58)

Where:

Q	=	orifice flow discharge
C	=	discharge coefficient
A	=	cross-sectional area of orifice or pipe (ft2)
g	=	acceleration due to gravity (32.2 ft/s2)
H	=	effective head on the orifice (measured from center of orifice to water surface)

Multiple orifice designs are defined by the depth (or elevation) and the size (or diameter) of each orifice. The steps needed to size a dual orifice outlet are outlined in Appendix E; multiple orifices may be provided and sized using a similar approach.

Emergency Spillway

An emergency overflow spillway in addition to the primary overflow outlet (as described above) is required. The emergency spillway should be sized for flows greater than the peak 100-year 24-hour storm if the basin is designed on-line or, if the basin is designed on-line, the spillway should be sized for flows greater than the basin design volume (e.g., stormwater quality design volume). The spillway should provide for adequate energy dissipation downstream. The spillway should allow for at least 12 inches of freeboard above the emergency overflow water surface elevation if the basin is on-line. If the basin is on-line, 2 feet of freeboard is preferable.

Spillways shall meet the California Department of Water Resources, Division of Safety of Dams Guidelines for the Design and Construction of Small Embankment Dams (http://damsafety.water.ca.gov/docs/GuidelinesSmallDams.pdf). *Intent: Emergency overflow spillways are intended to control the location of basin overtopping and safely direct overflows back into the downstream conveyance system or other acceptable discharge point.*

On-line Basins

1) On-line basins must have an emergency overflow spillway to prevent overtopping of walls or berms should blockage of the primary outlet occur based on a downstream risk assessment.

2) The overflow spillway must be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm.

3) The minimum freeboard should be 1 foot (but preferably at least 2 feet) above the maximum water surface elevation over the emergency spillway.

Off-line Basins

1) Off-line basins must have either an emergency overflow spillway or an emergency overflow riser. The emergency overflow must be designed to pass the 100-yr 24-hr post-development peak stormwater runoff discharge rate directly to the downstream conveyance system or another acceptable discharge point. Where an emergency overflow spillway would discharge to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.

2) The emergency overflow spillway shall be armored to withstand the energy of the spillway flows.

3) The minimum freeboard should be 1 foot above the maximum water surface elevation over the emergency spillway.

Side Slopes

1) Interior side slopes above the stormwater quality design depth and up to the emergency overflow water surface steeper than 4:1 (H:V) should be stabilized to prevent erosion with a method approved by the local permitting authority.

2) Exterior side slopes steeper than 2:1 (H:V) should be stabilized to prevent erosion with a method approved by the local permitting authority.

3) For any slope (interior or exterior) greater than 2:1 (H:V), a geotechnical investigation and report must be submitted and approved by the local permitting authority.

4) Landscaped slopes should be no greater than 3:1 (H:V) to allow for maintenance.

5) Basin walls may be vertical retaining walls, provided: (a) they are constructed of reinforced concrete, (b) a fence is provided along the top of the wall (see fencing below) or further back, and (c) the design is stamped by a licensed civil engineer and approved by the Local permitting authority.

Embankments

1) Earthworks and berm embankments should be performed in accordance with the latest edition of the "Greenbook Standard Specifications for Public Works Construction".

2) Embankments are earthen slopes or berms used for detaining or redirecting the flow of water.

3) Top of berm separating forebay and main basin should be 2 feet minimum below the stormwater quality design water surface and should be keyed into embankment a minimum of 1 foot on both sides.

4) Typically, the top width of berm embankments are at least 20 feet, but narrower embankments may be plausible if approved by the civil engineer and the Local permitting authority.

5) Basin berm embankments should be constructed on native consolidated soil (or adequately compacted and stable fill soils analyzed by a licensed civil engineer) free of loose surface soil materials, roots, and other organic debris.

6) The berm embankment should be constructed of compacted soil (95% minimum dry density, modified proctor method per ASTM D1557), placed in 6-inch lifts.

7) Basin berm embankments greater than 4 feet in height should be constructed by excavating a key equal to 50% of the berm embankment cross-sectional height and width. This requirement may be waived if specifically recommended by a licensed civil engineer.

8) The berm embankment should be constructed of compacted soil (95% minimum dry density, modified proctor method per ASTM D1557), placed in 6-inch lifts.

9) Low growing native or non-invasive perennial grasses should be planted on downstream embankment slopes. See vegetation section below.

Fencing

1) Safety is provided either by fencing of the facility or by managing the contours of the basin to eliminate drop-offs and other hazards.

2) If fences are required, fences should be designed and constructed in accordance with relevant standards and should typically be located at or above the overflow water surface elevation. Shrubs (approved, California-adapted species) can be used to hide the fencing. See vegetation section above.

Right-of-Way

1) Dry extended detention basins and associated access roads to be maintained by a public agency should be dedicated in fee or in an easement to the public agency with appropriate access.

Maintenance Access

1) Ownership of the basin and maintenance thereof is the responsibility of the developer/applicant. A maintenance agreement with the Local permitting authority is required to ensure adequate performance and allow emergency access to the facilities.

2) Maintenance access road(s) should be provided to the control structure and other drainage structures associated with the basin (e.g., inlet, emergency overflow or bypass structures). Manhole and catch basin lids should be in or at the edge of the access road.

3) A ramp into the basin should be constructed near the basin outlet. An access ramp is required for removal of sediment with a backhoe or loader and truck. The ramp should extend to the basin bottom to avoid damage to vegetation planted on the basin slope.

4) All access ramps and roads should be provided in accordance with the current policies of the Ventura County Flood Control District or local approval authority.

Construction Considerations

The use of treated wood or galvanized metal anywhere inside the facility is prohibited.

Operations and Maintenance

Maintenance is of primary importance if extended detention basins are to continue to function as originally designed. A maintenance agreement must be developed with the local approval authority to ensure adequate performance and allow emergency access. Maintenance of the basin is the responsibility of the development, unless otherwise agreed upon.

A specific maintenance plan shall be formulated for each facility outlining the schedule and scope of maintenance operations, as well as the data handling and reporting requirements. The following are general maintenance requirements:

1) The basin should be inspected semiannually or more frequently, and inspections after major storm events are encouraged (see Appendix I for guidance on facility maintenance inspections). Trash and debris should be removed as needed, but at least annually prior to the beginning of the wet season (see Appendix I for dry extended detention basin inspection and maintenance checklist).

2) Site vegetation should be maintained as follows:

   - Vegetation, large shrubs, or trees that limit access or interfere with basin operation should be pruned or removed.

   - Slope areas that have become bare should be revegetated and eroded areas should be regraded prior to being revegetated.

   - Grass should be mowed to 4 to 9 inch high and grass clippings should be removed.

   - Fallen leaves and debris from deciduous plant foliage should be raked and removed.

   - Invasive vegetation, such as Alligatorweed (Alternanthera philoxeroides), Halogeton (Halogeton glomeratus), Spotted Knapweed (Centaurea maculosa), Giant Reed (Arundo donax), Castor Bean (Ricinus communis), Perennial Pepperweed (Lepidium latifolium), and Yellow Starthistle (Centaurea solstitalis) should be removed and replaced with non-invasive species. Invasive species should never contribute more than 25% of the vegetated area. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website or the California Invasive Plant Council website at www.cal-ipc.org.

   - Dead vegetation should be removed if it exceeds 10% of area coverage. Vegetation should be replaced immediately to maintain cover density and control erosion where soils are exposed.

   - No herbicides or other chemicals should be used to control vegetation.

3) Sediment buildup exceeding 50% of the forebay capacity should be removed. Sediment from the remainder of the basin should be removed when 6 inches of sediment accumulates. Sediments should be tested for toxic substance accumulation in compliance with current disposal requirements if land uses in the catchment include commercial or industrial zones, or if visual or olfactory indications of pollution are noticed. If toxic substances are encountered at concentrations exceeding thresholds of Title 22, Section 66261 of the California Code of Regulations,

the sediment must be disposed of in a hazardous waste landfill. It is recommended to clean the forebay frequently to reduce frequency of main basin cleaning.

4) Remove sediment from basin when accumulation reaches 25% of original design depth. Cleaning is recommended to occur in early spring to allow vegetation to reestablish.

5) Repair erosion to banks and bottom of basin as required.

6) Following sediment removal activities, replanting, and/or reseeding of vegetation may be required for reestablishment.

7) Control vectors as needed.

TCM-2: Wet Detention Basin

Wet detention basins are constructed, naturalistic ponds with a permanent or seasonal pool of water (also called a "wet pool" or "dead storage"). Aquascape facilities, such as artificial lakes, are a special form of wet pool facility that can incorporate innovative design elements to allow them to function as a stormwater treatment facility in addition to an aesthetic water feature. Wetponds require base flows to exceed or match losses through evaporation and/or infiltration and they must be designed with the outlet positioned and/or operated in such a way as to maintain a permanent pool. Wetponds can be designed to provide extended detention of incoming flows using the volume above the permanent pool surface.

Wet Detention Basin

Photo Credit: Geosyntec Consultants

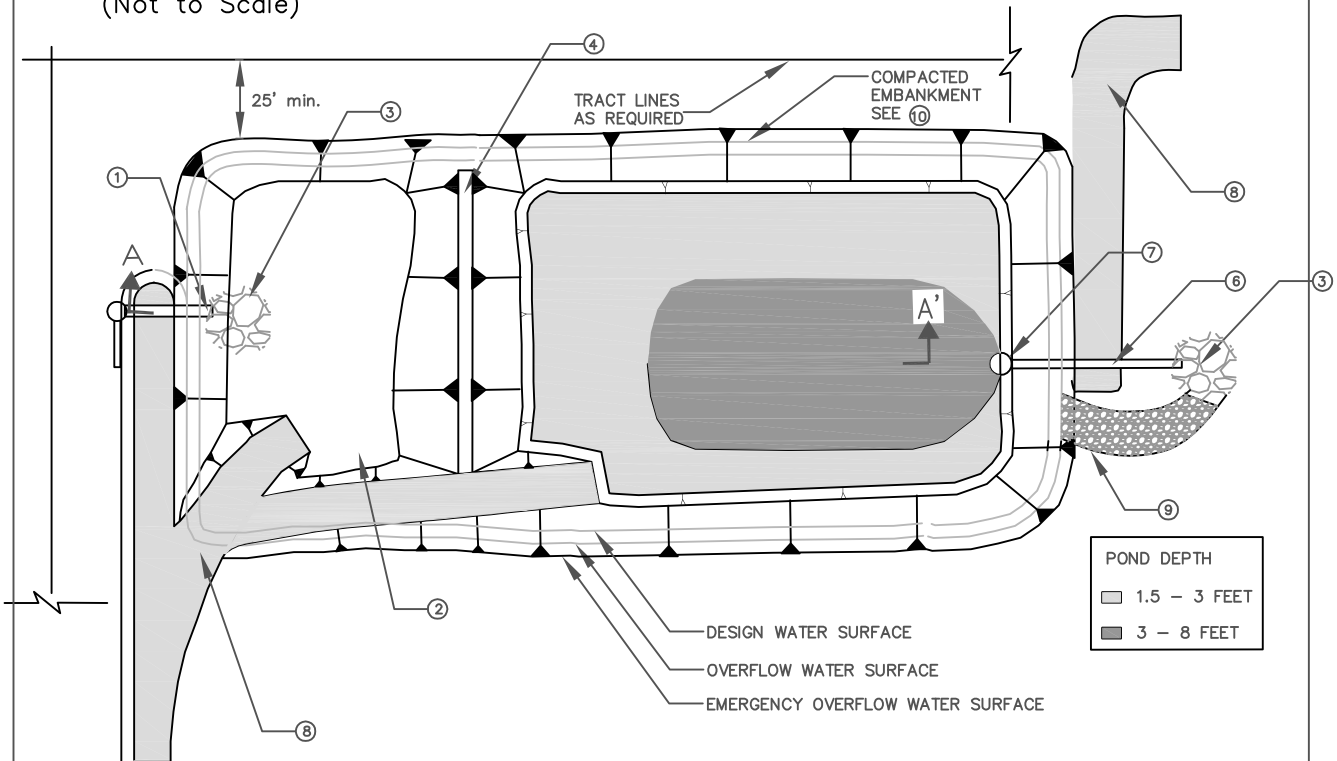
Application

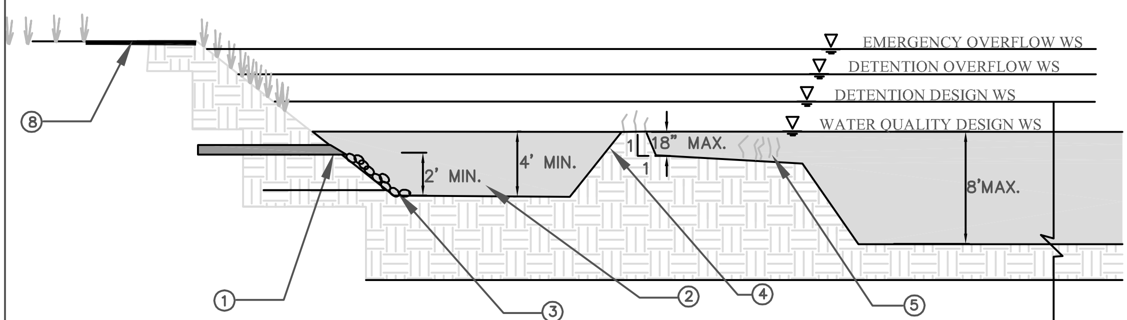
- Regional detention & treatment
- Roads, highways, parking lots, commercial, residential
- Parks, open spaces, and golf courses

Preventative Maintenance

- inspected at a minimum annually and inspections after major storm events
- Pruned or remove vegetation, large shrubs, or trees that limit access or interfere with basin operation
- Remove sediment buildup at inlets and outlets

Plan View
(Not to Scale)





Section A - A'
(Not to Scale)

NOTES:

1. INLET PIPE SHOULD BE SUBMERGED WITH A MINIMUM OF 2' DISTANCE FROM THE BOTTOM
2. FIRST CELL VOLUME SHALL EQUAL 25% TO 35% OF TOTAL WETPOND VOLUME. DEPTH SHALL BE 4' MIN TO 8' MAX PLUS AN ADDITIONAL I' MIN SEDIMENT STORAGE DEPTH.
3. RIP RAP APRON OR OTHER ENERGY DISSIPATION.
4. BERM SHALL EXTEND ACROSS ENTIRE WIDTH OF THE WETPOND.
5. EMERGENT VEGETATION SHALL BE PLANTED IN REGIONS OF THE POND THAT ARE 3' DEEP OR LESS.
6. SIZE OUTLET PIPE TO PASS 100–YEAR PEAK FLOW FOR ON–LINE PONDS AND WATER QUALITY PEAK FLOW FOR OFF–LINE PONDS.
7. WATER QUALITY OUTLET STRUCTURE. SEE FIGURE 8–2 AND FIGURE 8–3 FOR DETAILS.
8. MAINTENANCE ACCESS ROAD SHOULD PROVIDE ACCESS TO BOTH THE FIRST CELL AND MAIN BASIN.
9. INSTALL EMERGENCY OVERFLOW SPILLWAY AS NEEDED. SEE FIGURE 2–4 FOR DETAILS

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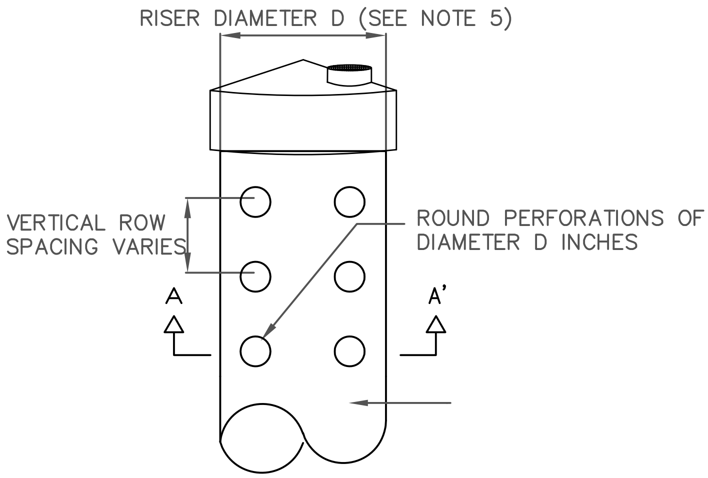
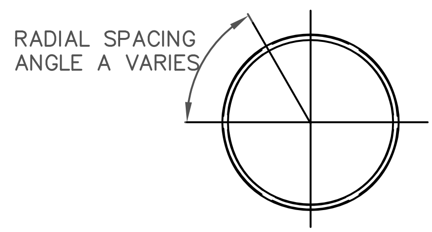
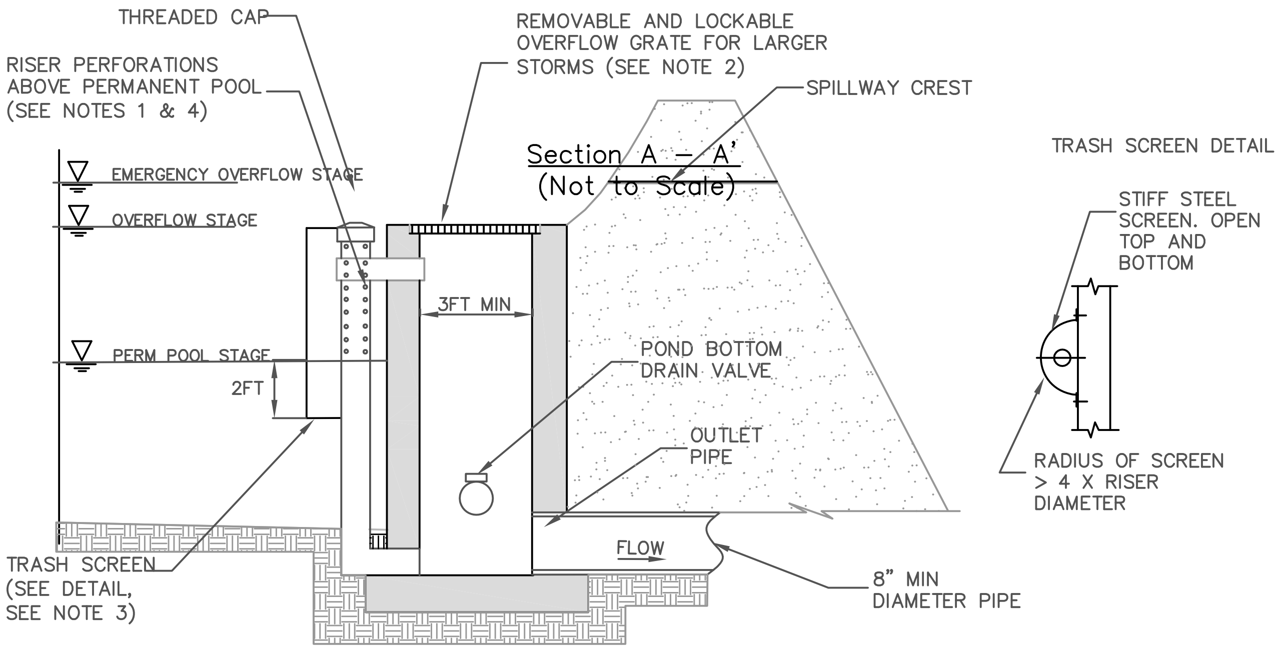
Figure 6-19: Wet Detention Basin



Perforated Riser Detail
(Not to Scale)



Section A – A'
(Not to Scale)



Perforated Riser Outlet Structure
(Not to Scale)

NOTES:

1. RISER PIPE SHALL BE SIZED TO PROVIDE 36 TO 48–HOUR FULL BRIM DRAW DOWN TIME.
2. TOTAL OUTLET CAPACITY: 100–YEAR PEAK FLOW FOR ON–LINE BASINS AND WATER QUALITY DESIGN FLOW FOR OFF–LINE BASINS.
3. SCREEN OPENINGS SHALL BE AT LEAST ¼" AND SHALL NOT EXCEED THE DIAMETER OF THE PERFORATIONS ON THE RISER.
4. RISER PIPE PERFORATION DIAMETER SHALL BE NO LESS THAN ½" AND NO MORE THAN 2"
5. MINIMUM PIPE DIAMETER (D) IS 2'
6. RISER PIPE MATERIAL IS CMP

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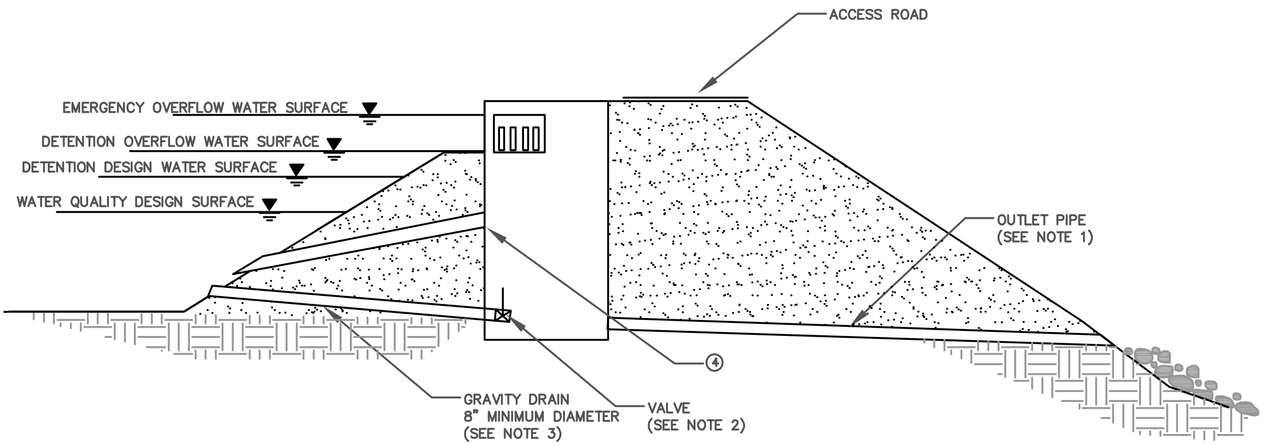
Figure 6-20: Riser Outlet



Inverted Pipe Outlet Structure
(Not to Scale)

NOTES:

1. SIZE OUTLET PIPE SYSTEM TO PASS 100–YEAR FLOW FOR ON–LINE PONDS AND WATER QUALITY PEAK FLOW FOR OFF–LINE PONDS.
2. VALVE MAY BE LOCATED INSIDE MANHOLE OR OUTSIDE WITH APPROVED OPERATIONAL ACCESS
3. INVERT OF DRAIN SHALL BE 6" MINIMUM BELOW TOP OF INTERNAL BERM. LOWER PLACEMENT IS DESIRABLE. INVERT SHALL BE 6" MINIMUM ABOVE BOTTOM OF POND.
4. OUTLET PIPE INVERT SHALL BE AT WETPOOL WATER SURFACE ELEVATION

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Figure 6-21: Inverted Pipe Outlet

Limitations

Limitations for wet detention basins include:

- Wet detention basins typically are used for treating areas larger than 10 acres and less than 10 square miles. They are especially applicable for regional water quality treatment and flow control.
- Off-line wet detention basins must not interfere with flood control functions of existing conveyance and detention structures.
- If wet detention basins are located in areas with site slopes greater than 15% or within 200 feet of a hazardous steep slope or mapped landslide area (on the uphill side), a geotechnical investigation and report must be provided to ensure that the basin does not compromise the stability of the site slope or surrounding slopes.
- Wet detention basins require a regular source of base flow if water levels are to be maintained. If base flow is insufficient during summer months, supplemental water may be necessary to maintain water levels.

Design Criteria

The main challenge associated with wet detention basins is maintaining desired water levels. A wet detention basin should be designed according to the requirements listed in Table 6-24 and outlined in the section below. BMP sizing worksheets are presented in Appendix E.

Table 6-24: Wet Detention Basin Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume, SQDV	acre-ft	See Section 2 and Appendix E for calculating SQDV.
Permanent Pool Volume		SQDV
Forebay Volume		5 to 10% of SQDV
Maximum Forebay Drain Time	min	45
Depth without sediment storage	feet	0.5-12 (littoral zone, 25-40% permanent pool) 4 (first cell minimum) 8 (any cell maximum) Deeper zone: 4-8 feet average; 12 feet maximum depth
Maximum residence time	Days	7 (dry weather)
Freeboard (minimum)	inches	12

Flow path length to width ratio	L:W	2:1 (larger preferred)
Side slope (maximum)	H:V	4:1 (H:V) Interior and 3:1 (H:V) Exterior
Longitudinal slope	percentage	1 (forebay) and 0-2 (main basin)
Vegetation Type	--	Varies see vegetation section below
Vegetation Height	--	Varies see vegetation section below
Buffer zone (minimum)	feet	25
Minimum outflow device diameter	inches	18

Sizing Criteria

Wet Detention basins may be designed with or without extended detention above the permanent pool. The extended detention portion of the wet detention basin above the permanent pool, if provided, functions like a dry extended detention (ED) basin (see VEG-5: Dry Extended Detention Basin). If there is no extended detention provided, wet detention basins shall be sized to provide a minimum wet pool volume equal to the stormwater quality design volume plus an additional 5% for sediment accumulation. If extended detention is provided above the permanent pool, the sizing is dependent of the functionality of the basin; the basin may function as water quality treatment only or water quality plus peak flow attenuation.

If the basin is designed for water quality treatment only, then the permanent pool volume should be a minimum of 10 percent of the stormwater quality design volume and the surcharge volume (above the permanent pool) should make up the remaining 90 percent. If extended detention is provided above the permanent pool and the basin is designed for water quality treatment and peak flow attenuation, then the permanent pool volume should be equal to the water quality treatment volume, and the surcharge volume should be sized to attenuate peak flows in order to meet the peak runoff discharge requirements. The extended detention portion of the wet detention basin above the permanent pool, if provided, functions like a dry extended detention (ED) basin (see VEG-5: Dry Extended Detention Basin).

Step 1: Calculate the design volume

Wet detention basins shall be sized with a permanent pool volume equal to the SQDV volume (see Section 2 and Appendix E).

Step 2: Determine the active design volume for the wet detention basin without extended detention

The active volume of the wet detention basin, V_a, shall be equal to the SQFV plus an additional 5% for sediment accumulation.

$$V_a = 1.05 \times SQDV \qquad \text{(Equation 6-59)}$$

Step 3: Determine pond location and preliminary geometry based on site constraints

Based on site constraints, determine the pond geometry and the storage available by developing an elevation-storage relationship for the pond. Note that a more natural geometry may be used and is in many cases recommended; the preliminary basin geometry calculations should be used for sizing purposes only.

1) Calculate the width of the pond footprint, W_{tot}, as follows:

$$W_{tot} = \frac{A_{tot}}{L_{tot}} \qquad \text{(Equation 6-60)}$$

Where:

A_{tot} = total surface area of the pond footprint (ft^2)

L_{tot} = total length of the pond footprint (ft)

1) Calculate the length of the active volume surface area including the internal berm but excluding the freeboard, $L_{av\text{-}tot}$:

$$L_{av-tot} = L_{tot} - 2Zd_{fb} \qquad \text{(Equation 6-61)}$$

Where:

Z = interior side slope as length per unit height

d_{fb} = freeboard depth

2) Calculate the width of the active volume surface area including the internal berm but excluding freeboard, $W_{av\text{-}tot}$:

$$W_{av-tot} = W_{tot} - 2Zd_{fb} \qquad \text{(Equation 6-62)}$$

3) Calculate the total active volume surface area including the internal berm and excluding freeboard, $A_{av\text{-}tot}$:

$$A_{av-tot} = L_{av-tot} \times W_{av-tot} \qquad \text{(Equation 6-63)}$$

4) Calculate the area of the berm, A_{berm}:

$$A_{berm} = W_{berm} \times L_{berm} \qquad \text{(Equation 6-64)}$$

Where:

W_{berm} = width of the internal berm

L_{berm} = length of the internal berm

5) Calculate the active volume surface area excluding the internal berm and freeboard, A_{wq}:

$$A_{wq} = A_{wq\,=\,tot} - A_{berm} \quad \text{(Equation 6-65)}$$

Step 4: Determine Dimensions of Forebay

The wet detention basin should be divided into two cells separated by a berm or baffle. The forebay should contain between 5 and 10 percent of the total volume. The berm or baffle volume should not count as part of the total volume. Calculate the active volume of forebay, V_1:

$$V_1 = \frac{V_a \times \%V_1}{100} \quad \text{(Equation 6-66)}$$

Where:

$\%V_1$ = percent of SQDV in forebay (%)

1) Calculate the surface area for the active volume of forebay, A_1:

$$A_1 = \frac{V_1}{d_1} \quad \text{(Equation 6-67)}$$

Where:

d_1 = average depth fo rhte active volume of forebay (ft)

1) Calculate the length of forebay, L_1. Note, inlet and outlet should be configured to maximize the residence time.

$$L_1 = \frac{A_1}{W_1} \quad \text{(Equation 6-68)}$$

Where:

W_1 = width of forebay (ft), $W_1 = W_{av\text{-}tot} = L_{berm}$

Step 5: Determine Dimensions of Cell 2

Cell 2 will consist of the remainder of the basin's active volume.

1) Calculate the active volume of Cell 2, V_2:

$$V_2 = V_a - V_1 \quad \text{(Equation 6-69)}$$

2) The minimum wetpool surface area includes 0.3 acres of wetpool per acre-foot of permanent wetpool volume. Calculate A_{min2}:

$$A_{min2} = (V_2 \times 0.3 \ \frac{acres}{acre-feet}) \quad \text{(Equation 6-70)}$$

3) Calculate the actual wetpool surface area, A_2:

$$A_2 = A_{av} - A_1 \quad \text{(Equation 6-71)}$$

Verify that A_2 is greater than A_{min2}. If A_2 is less than A_{min2}, then modify input parameters to increase A_2 until it is greater than A_{min2}. If site constraints limit this criterion, then another site for the pond should be chosen.

4) Calculate the top length of Cell 2, L_2:

$$L_2 = \frac{A_2}{W_2} \quad \text{(Equation 6-72)}$$

Where:

W_2 = width of Cell 2 (ft), $W_2 = W_1 = W_{wq\text{-}tot} = L_{berm}$

5) Verify that the length-to-width ratio of Cell 2 is at least 1.5:1 with ≥ 2:1 preferred. If the length-to-width ratio is less than 1.5:1, modify input parameters until a ratio of at least 1.5:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the pond should be chosen.

$$LW_2 = \frac{L_2}{W_2} \quad \text{(Equation 6-73)}$$

6) Calculate the emergent vegetation surface area, A_{ev}:

$$A_{ev} = \frac{A_2 \bullet \%A_{ev}}{100} \quad \text{(Equation 6-74)}$$

Where:

$\%A_{ev}$ = percent of surface area that will be planted with emergent vegetation

7) Calculate the volume of the emergent vegetation shallow zone (1.5 – 3 ft), V_{ev}:

$$V_{ev} = A_{ev} \bullet d_{ev} \quad \text{(Equation 6-75)}$$

Where:

d_{ev} = average depth of the emergent vegetation shallow zone (1.5 – 3 ft)

8) Calculate the length of the emergent vegetation shallow zone, L_{ev}:

$$L_{ev} = \frac{A_{ev}}{W_{ev}} \qquad \text{(Equation 6-76)}$$

Where:

W_{ev} = width of the emergent vegetation shallow zone (ft), $W_{ev} = W_2$

9) Calculate the volume of the deep zone, V_{deep}:

$$V_{deep} = V_2 - V_{ev} \qquad \text{(Equation 6-77)}$$

10) Calculate the surface area of the deep (>3 ft) zone, A_{deep}:

$$A_{deep} = A_2 - A_{ev} \qquad \text{(Equation 6-78)}$$

11) Calculate the average depth of the deep zone (4-8 ft), d_{deep}:

$$d_{deep} = \frac{V_{deep}}{A_{deep}} \qquad \text{(Equation 6-79)}$$

12) Calculate length of the deep zone, L_{deep}:

$$L_{deep} = \frac{A_{deep}}{W_{deep}} \qquad \text{(Equation 6-80)}$$

Where:

W_{deep} = width of the deep zone (ft), $W_{deep} = W_2$

Step 6: Ensure design requirements and site constraints are achieved

Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the basin is inadequate to meet the design requirements, choose a new location for the BMP.

Step 7: Size Outlet Structure

For extended detention wet detention basin, outlet structures should be designed to provide 12 to 48 hour emptying time for the water quality volume above the permanent pool.

The basin outlet pipe should be sized, at a minimum, to pass flows greater than the stormwater quality design peak flow for off-line basins or flows greater than the peak runoff discharge rate for the 100-year, 24-hr design storm for on-line basins.

Step 8: Determine Emergency Spillway Requirements

For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the water quality design storm. For sites where the emergency spillway discharges to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.

Sizing and Geometry

1) If there is no extended detention provided, wet detention basins shall be sized to provide a minimum wet pool volume equal to the stormwater quality design volume plus an additional 5% for sediment accumulation. If extended detention is provided above the permanent pool and the basin is designed for water quality treatment only, then the permanent pool volume should be a minimum of 10 percent of the stormwater quality design volume and the surcharge volume (above the permanent pool) should make up the remaining 90 percent. If extended detention is provided above the permanent pool and the basin is designed for water quality treatment and peak flow attenuation, then the permanent pool volume shall be equal to the water quality treatment volume and the surcharge volume should be sized to attenuate peak flows to meet the peak runoff discharge requirements. The extended detention portion of the wet detention basin above the permanent pool, if provided, functions like a dry extended detention (ED) basin (see TCM-1: Dry Extended Detention Basin).

2) The wet detention basin should be divided into two cells separated by a berm or baffle. The first cell should contain between 25 to 35 percent of the total volume. The berm or baffle volume should not count as part of the total volume. Intent: The full-length berm or baffle reduces short-circuiting and promotes plug flow.

3) Wet detention basins with wetpool volumes less than or equal to 4,000 cubic feet may be single-celled (i.e., no baffle or berm is required).

4) Sediment storage should be provided in the first cell. The sediment storage should have a minimum depth of 1 foot. This volume should not be included as part of the required water quality volume.

5) The minimum depth of the first cell should be 4 feet, exclusive of sediment storage requirements. The depth of the first cell may be greater than the depth of the second cell. Average depth should be between 4 feet and 8 feet.

6) For wet detention basin depths in excess of 6 feet, some form of recirculation should be provided, such as a fountain or aerator, to prevent stratification, stagnation and low dissolved oxygen conditions.

7) The edge of the basin should slope from the surface of the permanent pool to a depth of 12 to 18 inches at a slope of 1:1 or greater. If soil conditions will not support a 1:1 (H:V) slope then the steepest slope that can be supported should be used or a shallow retaining wall constructed (18 inch max). Beyond the edge of the basin, a bench sloped at 4:1 (H:V) maximum should extend into the basin to a depth of at least 3 feet. A steeper slope may be used beyond the 3 foot depth to a maximum of 8 feet. Intent: steep slopes at water's edge will minimize very shallow areas that can support mosquitoes.

8) At least 25% of the basin area should be deeper than 3 feet to prevent the growth of emergent vegetation across the entire basin. If greater than 50% of the wet pool area is in excess of 6 feet deep, some form of recirculation should be provided, such as a fountain or aerator, to prevent stratification, stagnation and low dissolved oxygen conditions.

9) A wet detention basin should have a surface area of not less than 0.3 acres for each acre-foot of permanent pool volume. In addition, extra area needed to provide a design that meets all other provisions of this section should be provided. Additional surface area in excess of the minimum may be provided. There is no maximum surface area provided that all provisions of this section are met.

10) Inlets and outlets should be placed to maximize the flowpath through the facility. The flowpath length-to-width ratio should be a minimum of 1.5:1, but a flowpath length-to-width ratio of 2:1 or greater is preferred. The flowpath length is defined as the distance from the inlet to the outlet, as measured at mid-depth. The width at mid-depth can be found as follows: width = (average top width + average bottom width)/2. Intent: a long flowpath length will improve fine sediment removal.

11) All inlets should enter the first cell. If there are multiple inlets, the length-to-width ratio should be based on the average flowpath length for all inlets.

12) The minimum freeboard should be 1 foot above the maximum water surface elevation (2 feet preferred) for on-line basins and 1 foot above the maximum water surface elevation for on-line basins.

13) The maximum residence time for dry weather flows should be 7 days. Intent: Vector control.

Internal Berms and Baffles

1) A berm or baffle should extend across the full width of the wet detention basin and be keyed into the basin side slopes. If the berm embankments are greater than 4 feet in height, the berm should be constructed by excavating a key equal to 50% of the embankment cross-sectional height and width. This requirement may be waived if recommended by a licensed civil engineer for the specific site conditions. The geotechnical investigation must consider the situation in which one of the two cells is empty while the other remains full of water.

2) The top of the berm should extend to the permanent pool surface or be one foot below the permanent pool surface to discourage public access. If the top of the berm is at the water permanent pool surface, the side slopes should be 4H:1V. Berm side slopes may be steeper (up to 3:1) if the berm is submerged one foot.

3) If good vegetation cover is not established on the berm, erosion control measures should be used to prevent erosion of the berm back-slope when the basin is initially filled.

4) The interior berm or baffle may be a retaining wall provided that the design is prepared and stamped by a licensed civil engineer. If a baffle or retaining wall is used, it should be submerged one foot below the permanent pool surface to discourage access by pedestrians.

5) Internal earthen berms 6 feet high or less should have a minimum top width 6 feet or as recommended by a civil engineer.

Water Supply

1) Water balance calculations should be provided to demonstrate that adequate water supply will be present to maintain a pool of water during a drought year when precipitation is 50% of average for the site. Water balance calculations should include evapotranspiration, infiltration, precipitation, spillway discharge, and dry weather flow (where appropriate).

2) Where water balance indicates that losses will exceed inputs, a source of water should be provided to maintain the basin water surface elevation throughout the year. The water supply should be of sufficient quantity and quality to not have an adverse impact on the wet detention basin water quality. Water that meets drinking water standards should be assumed to be of sufficient quality.

3) Wet detention basin may be designed as seasonal ponds where the water balance and water supply conditions make it infeasible to sustain a permanent wet detention basin.

Soils Considerations

Wet detention basin implementation in areas with high permeability soils requires liners to increase the chances of maintaining a permanent pool in the basin. Liners can be either synthetic materials or imported lower permeability soils (i.e., clays). The water balance assessment should determine whether a liner is required.

If low permeability soils are used for the liner, a minimum of 18 inches of native soil amended with good topsoil or compost (one part compost mixed with 3 parts native soil) should be placed over the liner. If a synthetic material is used, a soil depth of 2 feet is recommended to prevent damage to the liner during planting.

Buffer Zone

A minimum of 25 feet buffer should be provided around the top perimeter of the wet detention basin. The portion of the access road outside of the maximum water level may be included as part of the buffer.

Stormwater Quality Design Features

1) Wet detention basins that are located in publicly-accessible or highly visible locations should include design features that will improve and maintain the quality of water within the BMP at a level suitable for the proposed location and uses of the surrounding area. Typical design features include aeration, pumped circulation, filters, biofilters, and other facilities that operate year-round to remove pollutants and nutrients. Stormwater quality design features will result in higher quality water in the BMP and lower discharges of pollutants downstream.

2) Wet detention basins in publicly-accessible or highly visible locations should have a maintenance plan that includes regular collection and removal of trash from the area within and surrounding the BMP.

3) If fencing is required for wet detention basins in publicly-accessible or highly visible locations, the fence can be designed to be aesthetically incorporated into the site and Shrubs (approved, California-adapted species) can be used to hide the fencing. See vegetation section below.

Energy Dissipation

1) The inlet to the wet detention basin should be submerged with the inlet pipe invert a minimum of two feet from the basin bottom (not including sediment storage). The top of the inlet pipe should be submerged at least 1 foot, if possible. Intent: The inlet is submerged to dissipate energy of the incoming flow. The distance from the bottom is set to minimize resuspension of settled sediments. Alternative inlet designs that accomplish these objectives are acceptable.

2) Energy dissipation controls should also be used at the outlet from the wet detention basin unless the basin discharges to a stormwater conveyance system or hardened channel.

Vegetation

A plan should be prepared that indicates how aquatic, temporarily submerged areas (extended detention wet detention basins) and terrestrial areas will be stabilized with vegetation.

1) If the second cell of the wet detention basin is 3 feet or shallower, the bottom area should be planted with emergent wetland vegetation.

2) Emergent aquatic vegetation should be planted to cover 25-75% of the area of the permanent pool.

3) Outside of the basin, native vegetation adapted for site conditions should be used in non-irrigated sites.

4) The area surrounding a wet detention basin should be landscaped to minimize erosion and should adhere to the following criteria so as not to hinder maintenance operations:

5) No trees or shrubs may be planted within 15 feet of inlet or outlet pipes or manmade drainage structures such as spillways, flow spreaders, or earthen embankments. Species with roots that seek water, such as willow or poplar, should not be used within 50 feet of pipes or manmade structures. Weeping willow (Salix babylonica) should not be planted in or near detention basins.

6) Prohibited non-native plant species will not be permitted. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website- or the California Invasive Plant Council website at www.cal-ipc.org.

7) A landscape professional should provide recommendations on appropriate plants, fertilizer, mulching applications, and irrigation requirements (if any) to ensure healthy vegetation growth.

Outlet Structure

1) An outlet pipe and outlet structure should be provided. The outlet pipe may be a perforated standpipe strapped to a manhole or placed in an embankment, suitable for extended detention, or may be back-sloped to a catch basin with a grated opening (jail house window) or manhole with a cone grate (birdcage). The grate or birdcage openings provide an overflow route should the basin outlet pipe become clogged.

2) For extended detention wet detention basin, outlet structures should be designed to provide 12 to 48 hour emptying time for the water quality volume above the permanent pool.

3) The basin outlet pipe should be sized, at a minimum, to pass flows greater than the stormwater quality design peak flow for off-line basins or flows greater than the peak runoff discharge rate for the 100-year, 24-hr design storm for on-line basins.

Emergency Spillway

An emergency overflow spillway in addition to the primary overflow outlet (as described above) is required. The emergency spillway should be sized for flows greater than the peak 100-year 24-hour storm if the basin is designed on-line or, if the basin is designed off-line, the spillway should be sized for flows greater than the basin design volume (e.g., stormwater quality design volume). The spillway provide for adequate energy dissipation downstream. The spillway should allow for at least 12 inches of freeboard above the emergency overflow water surface elevation if the basin is on-line. If the basin is -line, 2 feet of freeboard is preferable.

Spillways shall meet the California Department of Water Resources, Division of Safety of Dams Guidelines for the Design and Construction of Small Embankment Dams (http://damsafety.water.ca.gov/docs/GuidelinesSmallDams.pdf). *Intent: Emergency overflow spillways are intended to control the location of basin overtopping and safely direct overflows back into the downstream conveyance system or other acceptable discharge point.*

<u>On-line Basins</u>

1) On-line basins must have an emergency overflow spillway to prevent overtopping of walls or berms should blockage of the primary outlet occur based on a downstream risk assessment.

2) The overflow spillway must be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm.

3) The minimum freeboard should be 1 foot (but preferably at least 2 feet) above the maximum water surface elevation over the emergency spillway.

<u>Off-line Basins</u>

1) Off-line basins must have either an emergency overflow spillway or an emergency overflow riser. The emergency overflow must be designed to pass flows greater than the basin design volume (e.g., stormwater quality design volume) directly to the downstream conveyance system or another acceptable discharge point. Where an emergency overflow spillway would discharge to a steep slope, an emergency overflow riser, in addition to the spillway should be provided. See Appendix E for basin/pond outlet sizing worksheets.

2) The emergency overflow spillway should be armored to withstand the energy of the spillway flows. The spillway should be constructed of grouted rip-rap.

3) The minimum freeboard should be 1 foot above the maximum water surface elevation over the emergency spillway.

Side Slopes

1) Interior side slopes above the stormwater quality design depth and up to the emergency overflow water surface steeper than 4:1 (H:V) should be stabilized to prevent erosion with a method approved by the local permitting authority.

2) Exterior side slopes steeper than 2:1 (H:V) should be stabilized to prevent erosion with a method approved by the local permitting authority.

3) For any slope (interior or exterior) greater than 2:1 (H:V), a geotechnical investigation and report must be submitted and approved by the local permitting authority.

4) Landscaped slopes should be no steeper than 3:1 (H:V) to allow for maintenance.

5) Basin walls may be vertical retaining walls, provided: (a) they are constructed of reinforced concrete, (b) a fence is provided along the top of the wall (see fencing below) or further back, and (c) the design is stamped by a licensed civil engineer.

Embankments

1) Earthworks and berm embankments should be performed in accordance with the latest edition of the "Greenbook Standard Specifications for Public Works Construction".

2) Embankments are earthen slopes or berms used for detaining or redirecting the flow of water.

3) Top of berm should be 2 feet minimum below the stormwater quality design water surface and should be keyed into embankment a minimum of 1 foot on both sides.

4) Typically, the top width of berm embankments are at least 20 feet, but narrower embankments may be plausible if approved by the civil engineer and the Local permitting authority.

5) Basin berm embankments should be constructed on native consolidated soil (or adequately compacted and stable fill soils analyzed by a licensed civil engineer) free of loose surface soil materials, roots, and other organic debris.

6) The berm embankment should be constructed of compacted soil (95% minimum dry density, modified proctor method per ASTM D1557), placed in 6-inch lifts.

7) Basin berm embankments greater than 4 feet in height should be constructed by excavating a key equal to 50% of the berm embankment cross-sectional height and width. This requirement may be waived if specifically recommended by a licensed civil engineer.

8) The berm embankment should be constructed of compacted soil (95% minimum dry density, modified proctor method per ASTM D1557), placed in 6-inch lifts.

9) Low growing native or non-invasive perennial grasses should be planted on downstream embankment slopes. See vegetation section below.

Fencing

Safety is provided either by fencing of the facility or by managing the contours of the basin to eliminate drop-offs and other hazards.

1) If fences are required, fences should be designed and constructed in accordance with current and relevant policies and typically are required to be located at or above the overflow water surface elevation. Shrubs (approved, California-adapted species) can be used to hide the fencing. See vegetation section above.

Right-of-Way

2) Wet detention basins and associated access roads to be maintained by a public agency should be dedicated in fee or in an easement to the public agency with appropriate access.

Maintenance Access

1) Ownership of the basin and maintenance thereof is the responsibility of the developer/applicant. A maintenance agreement is required to ensure adequate performance and allow emergency access to the facilities.

2) Maintenance access road(s) should be provided to the control structure and other drainage structures associated with the basin (e.g., inlet, emergency overflow or bypass structures). Manhole and catch basin lids should be in or at the edge of the access road.

3) A ramp into the basin should be constructed near the basin outlet. An access ramp is required for removal of sediment with a backhoe or loader and truck. The ramp should extend to the basin bottom to avoid damage to vegetation planted on the basin slope.

4) All access ramps and roads should be provided in accordance with the current policies of the Flood Control District.

Vector Control

1) A Mosquito Management Plan or Service Contract should be approved or waived by the local Vector Control District for any facility that maintains a pool of water for 72 hours or more.

Operations and Maintenance

General Requirements

Maintenance is of primary importance if extended detention basins are to continue to function as originally designed. A maintenance agreement must be developed with the Flood Control District to ensure adequate performance and allow the County emergency access. Maintenance of the basin is the responsibility of the development, unless otherwise agreed upon.

A specific maintenance plan shall be formulated for each facility outlining the schedule and scope of maintenance operations, as well as the data handling and reporting requirements. The following are general maintenance requirements:

1) The basin should be inspected annually and inspections after major storm events are encouraged (see Appendix I for guidance on facility maintenance inspections). Trash and debris should be removed as needed, but at least annually prior to the beginning of the wet season (see Appendix I for dry extended detention basin inspection and maintenance checklist).

2) Site vegetation should be maintained as follows:

3) Vegetation, large shrubs, or trees that limit access or interfere with basin operation should be pruned or removed.

4) Slope areas that have become bare should be revegetated and eroded areas should be regraded prior to being revegetated.

5) Grass should be mowed to 4”-9” high and grass clippings should be removed.

6) Fallen leaves and debris from deciduous plant foliage should be raked and removed.

7) Invasive vegetation, such as Alligatorweed (Alternanthera philoxeroides), Halogeton (Halogeton glomeratus), Spotted Knapweed (Centaurea maculosa), Giant Reed (Arundo donax), Castor Bean (Ricinus communis), Perennial Pepperweed (Lepidium latifolium), and Yellow Starthistle (Centaurea solstitalis) should be removed and replaced with non-invasive species. Invasive species should never contribute more than 25% of the vegetated area. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website or the California Invasive Plant Council website at www.cal-ipc.org.

8) Dead vegetation should be removed if it exceeds 10% of area coverage. Vegetation should be replaced immediately to maintain cover density and control erosion where soils are exposed.

9) No herbicides or other chemicals should be used to control vegetation.

10) Sediment buildup exceeding 50% of the forebay capacity should be removed. Sediment from the remainder of the basin should be removed when 6 inches of sediment accumulates. Sediments should be tested for toxic substance accumulation in compliance with current disposal requirements if land uses in the catchment include commercial or industrial zones, or if visual or olfactory indications of pollution are noticed. If toxic substances are encountered at concentrations exceeding thresholds of Title 22, Section 66261 of the California Code of Regulations, the sediment must be disposed of in a hazardous waste landfill.

11) Following sediment removal activities, replanting, and/or reseeding of vegetation may be required for reestablishment.

Construction Considerations

The use of treated wood or galvanized metal anywhere inside the facility is prohibited. The use of galvanized fencing is permitted if in accordance with the Fencing requirement above.

TCM-3: Constructed Wetland

A constructed treatment wetland is a system consisting of a sediment forebay and one or more permanent micro-pools with aquatic vegetation covering a significant portion of the basin. Constructed treatment wetlands typically include components such as an inlet with energy dissipation, a sediment forebay for settling out coarse solids and to facilitate maintenance, a base with shallow sections (1 to 2 feet deep) planted with emergent vegetation, deeper areas or micro pools (3 to 5 feet deep), and a water quality outlet structure. The interactions between the incoming stormwater runoff, aquatic vegetation, wetland soils, and the associated physical, chemical, and biological unit processes are a fundamental part of constructed treatment wetlands.

Constructed Wetlands

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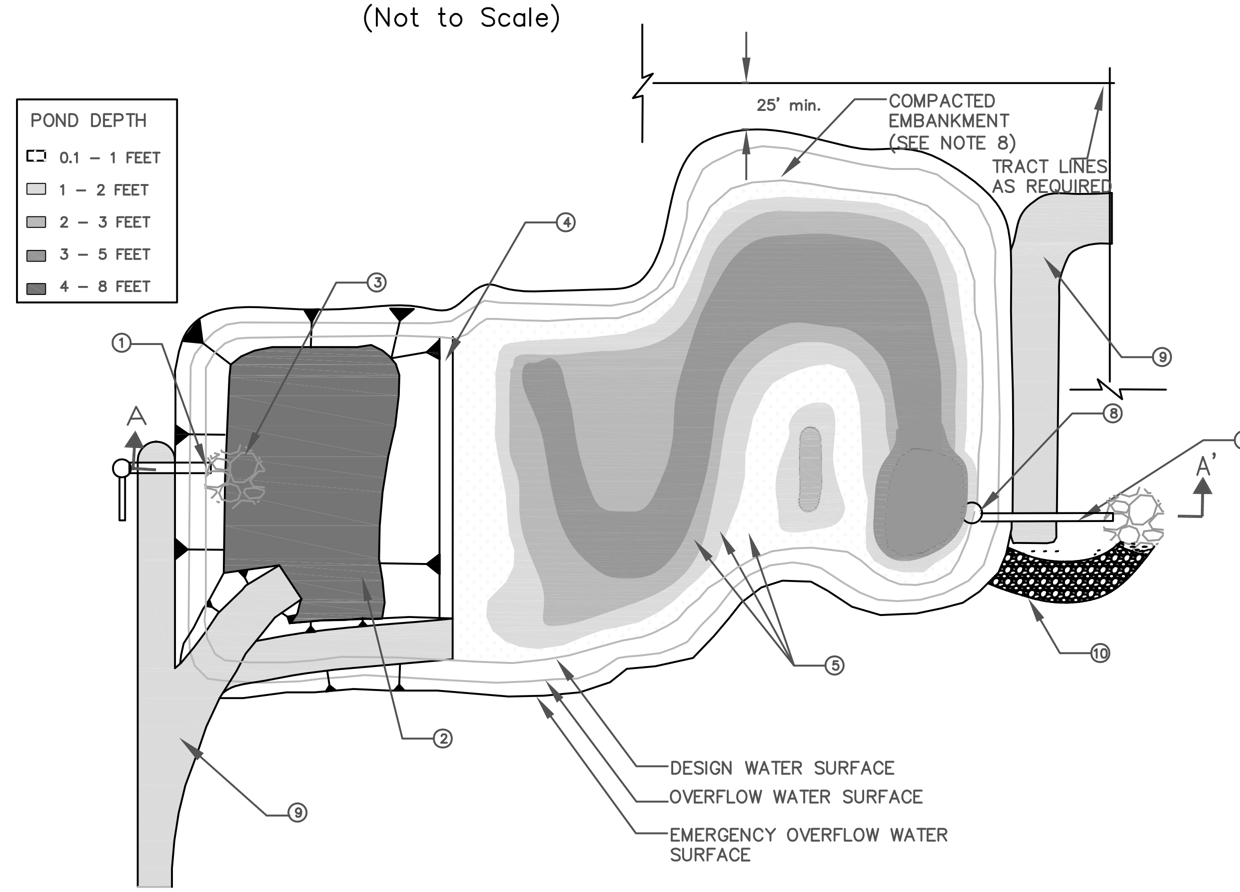
Application

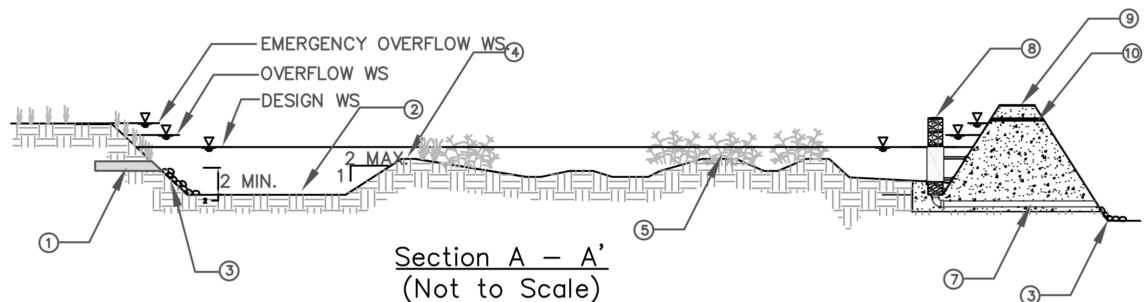
- Regional detention & treatment
- Roads, highways, parking lots, commercial, residential
- Parks, open spaces, and golf courses

Preventative Maintenance

- inspected at a minimum annually and inspections after major storm events
- Pruned or remove vegetation, large shrubs, or trees that limit access or interfere with basin operation
- Remove sediment buildup at inlets and outlets

Plan View
(Not to Scale)





NOTES:

1. INLET PIPE SHOULD BE SUBMERGED WITH A MINIMUM OF 2' DISTANCE FROM THE BOTTOM
2. SEDIMENT FOREBAY. FORE BAY VOLUME SHALL EQUAL 10% TO 20% OF TOTAL WETLAND VOLUME. FOREBAY DEPTH SHALL BE 4' MIN TO 8' MAX PLUS AN ADDITIONAL I' MIN SEDIMENT STORAGE DEPTH.
3. RIP RAP APRON OR OTHER INLET ENERGY DISSIPATION.
4. BERM AT DESIGN WATER SURFACE ELEVATION OR SUBMERGED 1' BELOW DESIGN WATER SURFACE ELEVAVTION. EXTEND BERM ACROSS ENTIRE WIDTH OF THE WETLAND.
5. WETLAND VEGETATION. PLANTING SCHEME MUST BE DESIGNED BY A WETLAND ECOLOGIST.
6. EMBANKMENT SIDE SLOPES SHALL BE NO STEEPER THAN 2H:1V OUTSIDE AND 3H:1V INSIDE
7. SIZE OUTLET PIPE TO PASS 100–YEAR PEAK FLOW FOR ONLINE AND WATER QUALTIY PEAK FLOW FOR OFFLINE BASINS.
8. WATER QUALITY OUTLET STRUCTURE. SEE FIGURE 7–2 AND FIGURE 7–3 FOR DETAILS.
9. MAINTENANCE RAMP SHOULD PROVIDE ACCESS TO BOTH THE FOREBAY AND MAIN BASIN.
10. INSTALL EMERGENCY OVERFLOW SPILWAY AS NEEDED. SEE FIGURE 2–4 FOR DETAILS

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Figure 6-22: Constructed Wetland

Limitations

- In theory, there are no limitations on the tributary area size draining to a constructed treatment wetland; however, constructed treatment wetlands usually require considerable land area. Typically, treatment wetlands capture runoff from tributary areas larger than 10 acres and less than 10 square miles. Smaller “pocket” wetlands can be feasible in areas where space is restricted.

- If the constructed treatment wetland is not used for flow control, the wetland must not interfere with flood control functions of existing conveyance and detention structures.

- Constructed treatment wetlands should not be permitted in areas with site slopes greater than 7% or within 200 feet (on the uphill side) of a steep slope hazard area or a mapped landslide area unless a geotechnical investigation and report is completed by a licensed civil engineer.

- Constructed treatment wetlands require a regular source of water (base flow) to maintain wetland vegetation and associated treatment processes. If adequate base flow is not available year-round, supplemental water may be needed during the summer months to maintain adequate base flow.

Design Criteria

The main challenge associated with constructed treatment wetlands is maintaining base flow to support vegetation. Constructed wetlands should be designed according to the requirements listed in Table 6-25 and outlined in the section below. Constructed wetland BMP sizing worksheets are presented in Appendix E.

Table 6-25: Constructed Wetland Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume, SQDV	acre-feet	See Section 2 and Appendix E for calculating SQDV.
Permanent pool volume	%	75% of SQDV
Drawdown time for extended detention (over permanent pool)	hours	48 ; 12 for 50% SQDV (minimum)
Sediment forebay volume	%	30 to 50% of permanent pool surface area
Depth of sediment forebay	feet	2-4 (1 foot of sediment storage required)
Wetland zone volume	%	50-70% of permanent pool surface area
Depth of wetland basin	feet	0.5 to 1.0 (30 to 50% should be 0.5 feet deep)

Design Parameter	Unit	Design Criteria
Wetland (littoral zone) bottom slope	%	10 maximum
Maximum residence time	Days	7 (dry weather)
Freeboard (minimum)	inches	12
Flow path length to width ratio	L:W	2:1, larger preferred
Side slope (maximum)	H:V	4:1 Interior; 3:1 Exterior
Vegetation Type	--	Varies see vegetation section below
Vegetation Height	--	Varies see vegetation section below
Buffer zone (minimum)	feet	25
Minimum outflow device diameter	inches	18

Sizing

In most cases, the constructed treatment wetland permanent pool should be sized to be greater than or equal to the stormwater quality design volume. If extended detention is provided above the permanent pool and the wetland is designed for water quality treatment only, then the permanent pool volume should be a minimum of 80 percent of the stormwater quality design volume and the surcharge volume (above the permanent pool) should make up the remaining 20 percent and provide at least 12 hours of detention. If extended detention is provided and the basin is designed for water quality treatment and peak flow attenuation, then the permanent pool volume should be equal to the water quality treatment volume and the surcharge volume should be sized to attenuate peak flows to meet the peak runoff discharge requirements. The extended detention portion of the wetland above the permanent pool, if provided, functions like a dry extended detention (ED) basin (see VEG-5: Dry Extended Detention Basin).

Step 1: Calculate the design volume

Constructed wetlands shall be sized to be greater than or equal to the SQDV volume (see Section 2 and Appendix E).

Step 2: Determine the Wetland Location, Wetland Type and Preliminary Geometry Based on Site Constraints

Based on site constraints, determine the wetland geometry and the storage available by developing an elevation-storage relationship for the wetland. The equations provided below assume a trapezoidal geometry for cell 1 (Forebay) and cell 2, and assumes that the wetland does not have extended detention.

1) Calculate the width of the wetland footprint, W_{tot}, as follows:

$$W_{tot} = \frac{A_{tot}}{L_{tot}} \qquad \text{(Equation 6-81)}$$

Where:

A_{tot} = total surface area of the wetland footprint (ft^2)

L_{tot} = total length of the wetland footprint (ft)

2) Calculate the length of the water quality volume surface area including the internal berm but excluding the freeboard, $L_{wq\text{-}tot}$:

$$L_{wq-tot} = L_{tot} - 2Zd_{fb} \qquad \text{(Equation 6-82)}$$

Where:

Z = interior side slope as length per unit height

d_{fb} = freeboard depth

3) Calculate the width of the water quality volume surface area including the internal berm but excluding freeboard, $W_{wq\text{-}tot}$:

$$W_{wq-tot} = W_{tot} - 2Zd_{fb} \qquad \text{(Equation 6-83)}$$

4) Calculate the total water quality volume surface area including the internal berm and excluding freeboard, $A_{wq\text{-}tot}$:

$$A_{wq-tot} = L_{wq-tot} \times W_{wq-tot} \qquad \text{(Equation 6-84)}$$

5) Calculate the area of the berm, A_{berm}:

$$A_{berm} = W_{berm} \times L_{berm} \qquad \text{(Equation 6-85)}$$

Where:

W_{berm} = width of the internal berm

L_{berm} = length of the internal berm

6) Calculate the water quality surface area excluding the internal berm and freeboard, A_{wq}:

$$A_{wq} = A_{wq\ =\ tot} - A_{berm}$$ (Equation 6-86)

Step 3: Determine Dimensions of Forebay

30-50% of the SQDV is required to be within the active volume of forebay.

1) Calculate the active volume of forebay, V_1:

$$V_1 = \frac{SQDV \times \%V_1}{100}$$ (Equation 6-87)

Where:

$\%V_1$ = percent of SQDV in forebay (%)

2) Calculate the surface area for the active volume of forebay, A_1:

$$A_1 = \frac{V_1}{d_1}$$ (Equation 6-88)

Where:

d_1 = average depth fo rhte active volume of forebay (2 -4 ft) (ft)

3) Calculate the length of forebay, L_1. Note, inlet and outlet should be configured to maximize the residence time.

$$L_1 = \frac{A_1}{W_1}$$ (Equation 6-89)

Where:

W_1 = width of forebay (ft), $W_1 = W_{av\text{-}tot} = L_{berm}$

Step 4: Determine Dimensions of Cell 2

Cell 2 will consist of the remainder of the basin's active volume.

1) Calculate the active volume of Cell 2, V_2:

$$V_2 = SQDV - V_1$$ (Equation 6-90)

2) Calculate the surface area of Cell 2, A_2:

$$A_2 = A_{wq} - A_1$$ (Equation 6-91)

3) Calculate the top length of Cell 2, L_2:

$$L_2 = \frac{A_2}{W_2} \qquad \text{(Equation 6-92)}$$

Where:

W_2 = width of Cell 2 (ft), $W_2 = W_1 = W_{wq\text{-}tot} = L_{berm}$

4) Verify that the length-to-width ratio of Cell 2, LW_2, is at least 3:1 with ≥ 4:1 preferred. If the length-to-width ratio is less than 3:1, modify input parameters until a ratio of at least 3:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the pond should be chosen.

$$LW_2 = \frac{L_2}{W_2} \qquad \text{(Equation 6-93)}$$

5) Calculate the very shallow zone surface area, A_{vs}:

$$A_{vs} = \frac{A_2 \bullet \%A_{vs}}{100} \qquad \text{(Equation 6-94)}$$

Where:

$\%A_{vs}$ = percent of surface area of very shallow zone

6) Calculate the volume of the shallow zone, V_{vs}:

$$V_{vs} = A_{vs} \bullet d_{vs} \qquad \text{(Equation 6-95)}$$

Where:

d_{vs} = average depth of the very shallow zone (0.1 – 1 ft)

7) Calculate the length of the very shallow zone, L_{vs}:

$$L_{vs} = \frac{A_{vs}}{W_{vs}} \qquad \text{(Equation 6-96)}$$

Where:

W_{vs} = width of the very shallow zone (ft), $W_{vs} = W_2$

8) Calculate the surface area of the shallow zone, A_s:

$$A_s = \frac{A_2 \bullet \%A_s}{100} \qquad \text{(Equation 6-97)}$$

Where:

$\%A_s$ = percent of surface area of shallow zone

9) Calculate the volume of the shallow zone, V_s:

$$V_s = A_s \bullet d_s \qquad \text{(Equation 6-98)}$$

Where:

d_s = average depth of shallow zone (1 - 3 ft)

10) Calculate length of the shallow zone, L_s:

$$L_s = \frac{A_s}{W_s} \qquad \text{(Equation 6-99)}$$

Where:

W_s = width of the shallow zone (ft), $W_s = W_2$

11) Calculate the surface area of the deep zone, A_{deep}:

$$A_{deep} = A_2 - A_{vs} - A_s \qquad \text{(Equation 6-100)}$$

12) Calculate the volume of the deep zone, V_{deep}:

$$V_{deep} = V_2 - V_{vs} - V_s \qquad \text{(Equation 6-101)}$$

13) Calculate the average depth of the deep zone (3-5 ft), d_{deep}:

$$d_{deep} = \frac{V_{deep}}{A_{deep}} \qquad \text{(Equation 6-102)}$$

14) Calculate length of the deep zone, L_{deep}:

$$L_{deep} = \frac{A_{deep}}{W_{deep}} \qquad \text{(Equation 6-103)}$$

Where:

W_{deep} = width of the deep zone (ft), $W_{deep} = W_2$

Step 5: Ensure design requirements and site constraints are achieved

Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the basin is inadequate to meet the design requirements, choose a new location or alternative treatment BMP.

Step 6: Size Outlet Structure

For wetlands with detention, the outlet structures should be designed to provide 12 hours emptying time for the water quality volume or the required detention necessary for achieving the peak runoff discharge requirements if the extended detention is designed for flow attenuation.

The wetland outlet pipe should be sized, at a minimum, to pass flows greater than the stormwater quality design peak flow for on-line basins or flows greater than the peak runoff discharge rate for the 100-year, 24-hr design storm for on-line basins.

Step 7: Determine Emergency Spillway Requirements

For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm in order to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the 100-yr, 24-hr post-development peak storm water runoff discharge rate directly to the downstream conveyance system or another acceptable discharge point. For sites where the emergency spillway discharges to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.

Sizing and Geometry

In most cases, the constructed treatment wetland permanent pool should be sized to be greater than or equal to the stormwater quality design volume. If extended detention is provided above the permanent pool and the wetland is designed for water quality treatment only, then the permanent pool volume should be a minimum of 80 percent of the stormwater quality design volume and the surcharge volume (above the permanent pool) should make up the remaining 20 percent and provide at least 12 hours of detention. If extended detention is provided and the basin is designed for water quality treatment and peak flow attenuation, then the permanent pool volume should be equal to the water quality treatment volume and the surcharge volume should be sized to attenuate peak flows to meet the peak runoff discharge requirements. A constructed treatment wetland design worksheets are presented in Appendix E. The extended detention portion of the wetland above the permanent pool, if provided, functions like a dry extended detention (ED) basin (see TCM-1: Dry Extended Detention Basin).

1) Constructed treatment wetlands should consist of at least two cells including a sediment forebay and a wetland basin.

2) The sediment forebay must contain between 10 and 20 percent of the total basin volume.

3) The depth of the sediment forebay should be between 4 and 8 feet.

4) One foot of sediment storage should be provided in the sediment forebay.

5) The "berm" separating the two basins should be uniform in cross-section and shaped such that its downstream side gradually slopes to the main wetland basin.

6) The top of berm should be either at the stormwater quality design water surface or submerged 1 foot below the stormwater quality design water surface, as with wet retention basins. Correspondingly, the side slopes of the berm should meet the following criteria:

    a. If the type of the berm is at the stormwater quality design water surface, the berm side slopes should be no steeper than 4H:1V.

    b. If the top of berm is submerged 1 foot, the upstream side slope may be a max of 3H:1V.

7) The constructed treatment wetlands should be designed with a "naturalistic" shape and a range of depths intermixed throughout the wetland basin to a maximum of 5 feet.

Depth Range (feet)	Percent by Area
0.1 to 1	15
1 to 3	55
3 to 5	30

8) The flowpath length-to-width ratio should be a minimum of 2:1, but preferably at least 4:1 or greater. *Intent: a high flow path length to width ratio will maximize fine sediment removal.*

9) The minimum freeboard should be 1 foot above the maximum water surface elevation for on-line basins (2 feet preferable) and 1 foot above the maximum water surface elevation for on-line basins.

10) Wetland pools should be designed such that the residence time for dry weather flows is no greater than 7 days. *Intent: Minimize vector and stagnation issues.*

Water Supply

Water balance calculations should be provided to demonstrate that adequate water supply will be present to maintain a permanent pool of water during a drought year when precipitation is 50% of average for the site. Water balance calculations should include evapotranspiration, infiltration, precipitation, spillway discharge, and dry weather flow (where appropriate).

Where water balance indicates that losses will exceed inputs, a source of water should be provided to maintain the wetland water surface elevation throughout the year. The water supply should be of sufficient quantity and quality to not have an adverse impact on the wetland water quality. Water that meets drinking water standards should be assumed to be of sufficient quality.

Soils Considerations

1) Implementation of constructed treatment wetlands in areas with high permeability soils (>0.1 in/hr) requires liners to increase the chances of maintaining permanent pools and/or micro-pools in the basin. Liners can be either synthetic materials or imported lower permeability soils (i.e., clays). The water balance assessment should determine whether a liner is required. The following conditions can be used as a guideline.

2) The wetland basin should retain water for at least 10 months of the year.

3) The sediment forebay should retain at least 3 feet of water year-round.

4) Many wetland plants can adapt to periods of summer drought, so a limited drought period is allowed in the wetland basin. This may allow for a soil liner rather than a geosynthetic liner. The sediment forebay should retain water year-round for presettling to be effective.

5) If low permeability soils are used for the liner, a minimum of 18 inches of native soil amended with good topsoil or compost (one part compost mixed with 3 parts native soil) should be placed over the liner (see soil amendment Section 5.10). If a synthetic material is used, a soil depth of 2 feet is recommended to prevent damage to the liner during planting.

Buffer Zone

A minimum of 25 feet buffer should be provided around the top perimeter of the constructed treatment wetlands.

Energy Dissipation

1) The inlet to the constructed treatment wetland should be submerged with the inlet pipe invert a minimum of two feet from the cell bottom (not including sediment storage). The top of the inlet pipe should be submerged at least 1 foot, if possible. *Intent: the inlet is submerged to dissipate energy of the incoming flow. The distance from the bottom is set to minimize resuspension of settled sediments. Alternative inlet designs that accomplish these objectives are acceptable.*

2) Energy dissipation controls must also be used at the outlet/spillway from the constructed treatment wetlands unless the wetland discharges to a stormwater conveyance system or hardened channel.

Vegetation

1) The wetland cell(s) should be planted with emergent wetland plants following the recommendations of a wetlands specialist.

2) Landscaping outside of the basin is required for all constructed wetlands and should adhere to the following criteria so as not to hinder maintenance operations:

   a. No trees or shrubs may be planted within 15 feet of inlet or outlet pipes or manmade drainage structures such as spillways, flow spreaders, or earthen embankments. Species with roots that seek water, such as willow or poplar, should not be used within 50 feet of pipes or manmade structures. Weeping willow (*Salix babylonica*) should not be planted in or near detention basins.

   b. Prohibited non-native plant species will not be permitted. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website or the California Invasive Plant Council website at www.cal-ipc.org.

3) Project-specific planting recommendations should be provided by a wetland ecologist or a qualified landscape professional including recommendations on appropriate plants, fertilizer, mulching applications, and irrigation requirements (if any) to ensure healthy vegetation growth.

Outlet Structure

An outlet pipe and outlet structure should be provided. The outlet pipe may be a perforated standpipe strapped to a manhole or placed in an embankment, suitable for extended detention, or may be back-sloped to a catch basin with a grated opening (jail house window) or manhole with a cone grate (birdcage). The grate or birdcage openings provide an overflow route should the basin outlet pipe become clogged. The outlet should be protected from clogging by a skimmer shield that starts at the bottom of the permanent pool and extends above the SQDV depth. A trash rack is also required.

For wetlands with detention, the outlet structures should be designed to provide 12 hours emptying time for the water quality volume or the required detention necessary for achieving the peak runoff discharge requirements if the extended detention is designed for flow attenuation.

The wetland outlet pipe should be sized, at a minimum, to pass flows greater than the stormwater quality design peak flow for on-line basins or flows greater than the peak runoff discharge rate for the 100-year, 24-hr design storm for on-line basins.

See the dry extended detention section (see ST-1: Dry Extended Detention Basin) and Appendix E for further detail on outlet sizing.

Emergency Spillway

An emergency overflow spillway in addition to the primary overflow outlet (as described above) is required. The emergency spillway should be sized for flows greater than the peak 100-year 24-hour storm if the basin is designed on-line or, if the basin is designed on-line, the spillway should be sized for flows greater than the basin design volume (e.g., stormwater quality design volume). The spillway provide for adequate energy dissipation downstream. The spillway should allow for at least 12 inches of freeboard above the emergency overflow water surface elevation if the basin is on-line. If the basin is on-line, 2 feet of freeboard is preferable.

Spillways shall meet the California Department of Water Resources, Division of Safety of Dams Guidelines for the Design and Construction of Small Embankment Dams (http://damsafety.water.ca.gov/docs/GuidelinesSmallDams.pdf). *Intent: Emergency overflow spillways are intended to control the location of basin overtopping and safely direct overflows back into the downstream conveyance system or other acceptable discharge point.*

On-line Basins

1) On-line basins must have an emergency overflow spillway to prevent overtopping of walls or berms should blockage of the primary outlet occur based on a downstream risk assessment.

2) The overflow spillway must be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm.

3) The minimum freeboard should be 1 foot (but preferably at least 2 feet) above the maximum water surface elevation over the emergency spillway.

Off-line Basins

1) Off-line basins must have either an emergency overflow spillway or an emergency overflow riser. The emergency overflow must be designed to pass the 100-yr 24-hr post-development peak stormwater runoff discharge rate (see Appendix E for further detail) directly to the downstream conveyance system or another acceptable discharge point. Where an emergency overflow spillway would discharge to a steep slope, an emergency overflow riser, *in addition* to the spillway should be provided.

2) The emergency overflow spillway should be armored to withstand the energy of the spillway flows. The spillway should be constructed of grouted rip-rap.

3) The minimum freeboard should be 1 foot above the maximum water surface elevation over the emergency spillway.

Side Slopes

1) Interior side slopes above the stormwater quality design depth and up to the emergency overflow water surface steeper than 4:1 (H:V) should be stabilized to prevent erosion with a method approved by the local permitting authority.

2) Exterior side slopes steeper than 2:1 (H:V) should be stabilized to prevent erosion with a method approved by the local permitting authority.

3) For any slope (interior or exterior) greater than 2:1 (H:V), a geotechnical investigation and report must be submitted and approved by the local permitting authority.

4) Landscaped slopes should be no steeper than 3:1 (H:V) to allow for maintenance.

5) Basin walls may be vertical retaining walls, provided: (a) they are constructed of reinforced concrete, (b) a fence is provided along the top of the wall (see fencing below) or further back, and (c) the design is stamped by a licensed civil engineer and approved by the local permitting authority.

Embankments

1) Earthworks and berm embankments should be performed in accordance with the latest edition of the "Greenbook Standard Specifications for Public Works Construction".

2) Embankments are earthen slopes or berms used for detaining or redirecting the flow of water.

3) Top of berm should be 2 feet minimum below the stormwater quality design water surface and should be keyed into embankment a minimum of 1 foot on both sides.

4) Typically, the top width of berm embankments are at least 20 feet, but narrower embankments may be plausible if approved by the civil engineer and the local permitting authority.

5) Basin berm embankments should be constructed on native consolidated soil (or adequately compacted and stable fill soils analyzed by a licensed civil engineer) free of loose surface soil materials, roots, and other organic debris.

6) Basin berm embankments greater than 4 feet in height should be constructed by excavating a key equal to 50% of the berm embankment cross-sectional height and width. This requirement may be waived if specifically recommended by a licensed civil engineer.

7) The berm embankment should be constructed of compacted soil (95% minimum dry density, modified proctor method per ASTM D1557), placed in 6-inch lifts.

8) Low growing native or non-invasive perennial grasses should be planted on downstream embankment slopes. See vegetation section below.

Fencing

Safety is provided either by fencing of the facility or by managing the contours of the basin to eliminate drop-offs and other hazards.

1) Provide fencing in accordance with the local permitting agency's requirements Perimeter fencing (minimum height of 42 inches) should be required on all basins exceeding two feet in depth or where interior side slopes are steeper than 6:1 (H:V).

2) If fences are required, fences should be designed and constructed in accordance with current policies of the local permitting agency and should be located at or above the overflow water surface elevation. Shrubs (approved, California-adapted species) can be used to hide the fencing. See vegetation section above.

Right-of-Way

1) Constructed treatment wetlands and associated access roads to be maintained by a public agency should be dedicated in fee or in an easement to the public agency with appropriate access.

Maintenance Access

1) Ownership of the basin and maintenance thereof is the responsibility of the developer/applicant. A maintenance agreement is required to ensure adequate performance and allow emergency access to the facilities.

2) Maintenance access road(s) should be provided to the control structure and other drainage structures associated with the basin (e.g., inlet, emergency overflow or bypass structures). Manhole and catch basin lids should be in or at the edge of the access road.

3) An access ramp into the basin should be constructed near the basin outlet. An access ramp is required for removal of sediment with a backhoe or loader and truck. The ramp should extend to the basin bottom to avoid damage to vegetation planted on the basin slope.

4) All access ramps and roads should be provided in accordance with the current policies of the Flood Control District.

Vector Control

1) A Mosquito Management Plan or Service Contract should be approved or waived by the local Vector Control District for any facility that maintains a pool of water for 72 hours or more.

Construction Considerations

The use of treated wood or galvanized metal anywhere inside the facility is prohibited. The use of galvanized fencing is permitted if in accordance with the Fencing requirement above.

Operations and Maintenance

Maintenance is of primary importance if constructed treatment wetlands basins are to continue to function as originally designed. A specific maintenance plan shall be formulated for each facility outlining the schedule and scope of maintenance operations, as well as the data handling and reporting requirements. The following are general maintenance requirements:

1) The constructed treatment wetlands basin should be inspected twice annually or more frequently, and inspections after major storm events are encouraged (see Appendix I for a constructed treatment wetland inspection and maintenance checklist). Trash and debris should be removed as needed, but at least annually prior to the beginning of the wet season.

2) Site vegetation should be maintained as frequently as necessary to maintain the aesthetic appearance of the site and to prevent clogging of outlets, creation of dead volumes, and barriers to mosquito fish to access pooled areas, and as follows:

3) Vegetation, large shrubs, or trees that limit access or interfere with basin operation should be pruned or removed.

4) Slope areas that have become bare should be revegetated and eroded areas should be regraded prior to being revegetated.

5) Invasive vegetation, such as Alligatorweed (*Alternanthera philoxeroides*), Halogeton (*Halogeton* glomeratus), Spotted Knapweed (*Centaurea maculosa*), Giant Reed (*Arundo donax*), Castor Bean (*Ricinus communis*), Perennial Pepperweed (*Lepidium latifolium*), and Yellow Starthistle (*Centaurea solstitalis*) should be removed and replaced with non-invasive species. Invasive species should never contribute more than 25% of the vegetated area. For more information on invasive weeds, including biology and control of listed weeds, look at the encycloweedia located at the California Department of Food and Agriculture website or the California Invasive Plant Council website at www.cal-ipc.org.

6) Dead vegetation should be removed if it exceeds 10% of area coverage. This does not include seasonal die-back where roots would grow back later in colder areas. Vegetation should be replaced immediately to maintain cover density and control erosion where soils are exposed.

7) Sediment buildup exceeding 6 inches over the storage capacity in the first cell should be removed. Sediments should be tested for toxic substance accumulation in compliance with current disposal requirements if land uses in the catchment include

commercial or industrial zones, or if visual or olfactory indications of pollution are noticed. If toxic substances are encountered at concentrations exceeding thresholds of Title 22, Section 66261 of the California Code of Regulations, the sediment must be disposed of in a hazardous waste landfill. Clean forebay every two years at a minimum, to avoid accumulation in main wetland area. Environmental regulations and permits may be involved with the removal of wetland deposits. When the main wetland area needs to be cleaned, it is suggested that the main area be cleaned one half at a time with at least one growing season in between cleanings. This will help to preserve the vegetation and enable the wetland to recover more quickly from the cleaning.

8) Repair erosion to banks and bottom as required.

9) Inspect outlet for clogging a minimum of twice a year, before and after the rainy season, after large storms, and more frequently if needed. Correct observed problems as necessary.

10) Following sediment removal activities, replanting, and/or reseeding of vegetation may be required for reestablishment.

TCM-4: Sand Filters

Sand filters operate much like bioretention facilities; however, instead of filtering stormwater through engineered soils, stormwater is filtered through a constructed sand bed with an underdrain system. Runoff enters the filter and spreads over the surface. As flows increase, water backs up on the surface of the filter where it is held until it can percolate through the sand. The treatment pathway is vertical (downward through the sand) to a perforated underdrain system that is connected to the downstream storm drainage system or to an infiltration facility. As stormwater passes through the sand, pollutants are trapped in the small pore spaces between sand grains or are adsorbed to the sand surface.

Sand filters connected to impervious surfaces

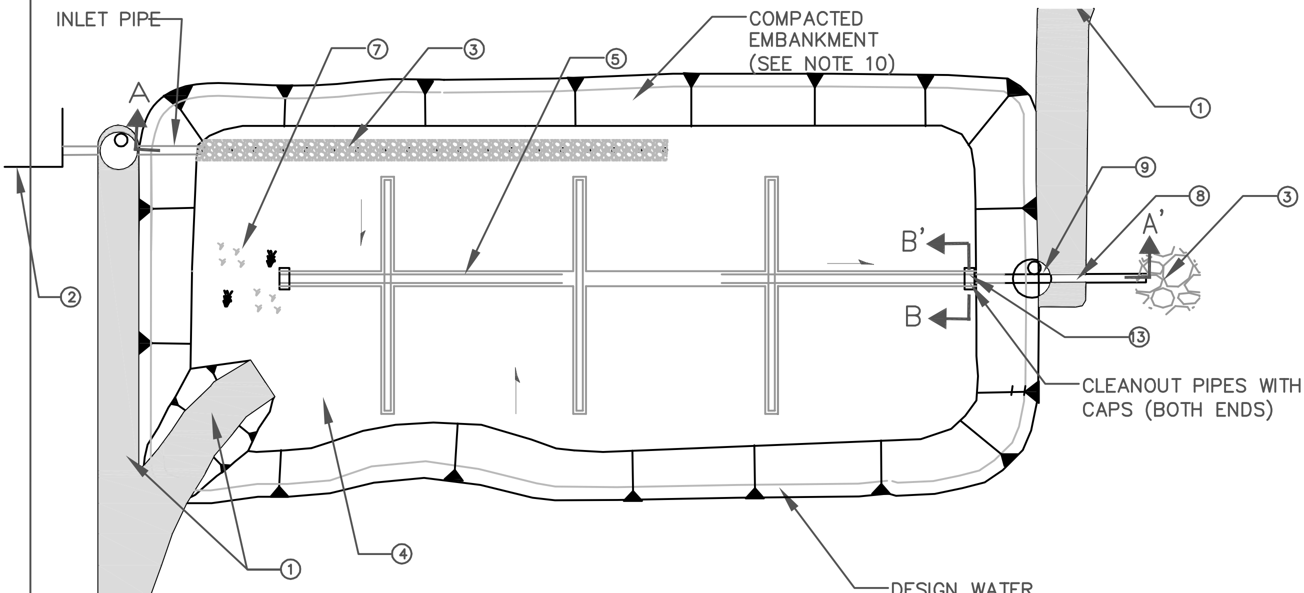
Photo Credits: Geosyntec Consultants

Application

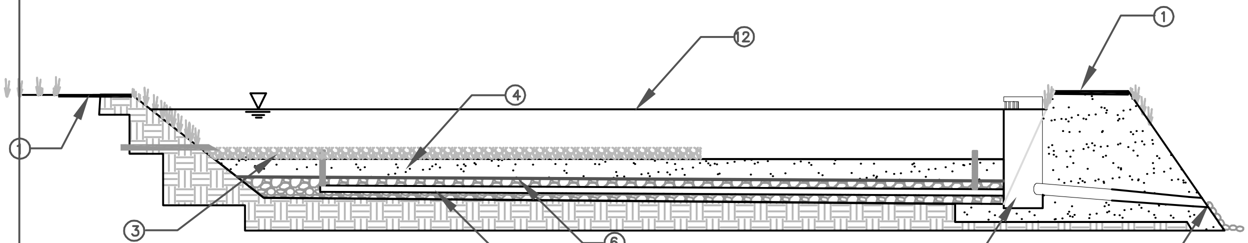
- Adjacent to parking lots
- Road medians and shoulders
- Within open areas or play fields

Preventative Maintenance

- Remove trash and debris, minor sediment accumulation, and obstructions near inlet and outlet structures
- Replace top 2" – 4" of sand
- Mow or weed surface of filter



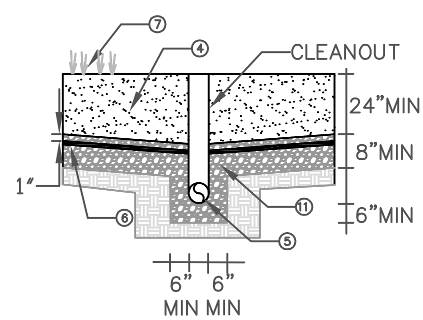
Plan View
(Not to Scale)



Section A – A'
(Not to Scale)

NOTES:

1. INSTALL MAINTENANCE ACCESS ROAD AND RAMP TO BOTTOM OF SAND FILTER.
2. UPSTREAM PRETREATMENT SHALL BE PROVIDED. IN THE ABSENCE OF PRETREATMENT, INCLUDE SEDIMENT FOREBAY WITH VOLUME EQUAL TO 10–20% OF TOTAL SAND FILTER VOLUME.
3. FLOW SPREADER TO EVENLY DISTRIBUTE FLOWS ALONG AT LEAST 20% OF PERIMETER.
4. FILTER BED SHALL BE A 24" MINIMUM SAND LAYER ON TOP OF 8" MINIMUM GRAVEL OR DRAIN ROCK BACKFILL.
5. 6" MINIMUM DIAMETER PERFORATED PIPE UNDERDRAIN SURROUNDED BY GRAVEL BEDDING. INSTALL AT 0.5% MINIMUM SLOPE
6. INSTALL GEOTEXTILE FABRIC OVERLAIN BY 1" OF DRAIN ROCK OR TRANSITIONALLY GRADED AGGREGRATE BETWEEN SAND AND GRAVEL LAYER.
7. VEGETATION MAY BE PLANTED ON TOP OF FILTER BED. NO TOP SOIL SHALL BE ADDED TO FILTER BED.
8. SIZE OUTLET PIPE STRUCTURE TO PASS WATER QUALITY DESIGN STORM AND INCLUDE AN EMERGENCY OVERFLOW.
9. EMERGENCY OVERFLOW STRUCTURE.
10. ¾" – 1½" WASHED DRAIN ROCK OR GRAVEL LAYER.
11. DESIGN WATER SURFACE. 6' MAX PONDING DEPTH.



Section B – B'
(Not to Scale)

Geosyntec consultants

Figure 6-23: Sand Filter

Limitations

Limitations for sand filters include:

- The sand filter should be located away from trees producing leaf litter or areas contributing significant eroded sediment to prevent clogging.
- Sand filters are should not be used in areas where heavy sediment loads are expected or in tributary areas that are not fully stabilized; high sediment loading rates may cause premature clogging of the filter. Pretreatment is essential.
- Site must have adequate relief between land surface and stormwater conveyance system to permit vertical percolation through the sand filter and collection and conveyance in the underdrain to stormwater conveyance system; four feet of elevation difference is recommended between the inlet and outlet of the filter.
- Not applicable in areas of high groundwater.
- Does not provide quantity control.

Design Criteria

The main challenge associated with sand filters is maintaining the filtration capacity, which is critical to the performance of this BMP. If flows entering the sand filter have high sediment concentrations, clogging of the sand filter is likely. Contribution of eroded soils or leaf litter may also reduce the infiltration and associated treatment capacity of the structure. Sand filters should be designed according to the requirements listed in Table 6-26 and outlined in the section below. BMP sizing worksheets are presented in Appendix E.

Table 6-26: Sand Filter Design Criteria

Design Parameter	Unit	Design Criteria
Stormwater quality design volume, SQDV	acre-feet	See Section 2 and Appendix E for calculating SQDV.
Max depth at SQDV	feet	3
Freeboard (minimum)	feet	1
Length to width ratio	L:W	2:1 (larger preferred)
Filter bed depth	inches	18 inches sand; 9 inches gravel
Max ponding depth above filter bed	feet	6
Drawdown time	Hours	?

Design Parameter	Unit	Design Criteria
Hydraulic conductivity of sand, k	in/hr	1 (equal to 2 ft/day)
Underdrains		6 inch minimum diameter; 0.5% minimum slope
Side slopes	H:V	4:1 (H:V) interior and 3:1 (H:V) exterior, unless stabilization has been approved by a licensed geotechnical engineer; or vertical concrete walls

Pretreatment

Pretreatment must be provided for sand filters in order to reduce the sediment load entering the filter. Pretreatment refers to design features that provide settling of large particles before runoff reaches the filter, easing the long-term maintenance burden. To ensure that pretreatment mechanisms are effective, designers shall incorporate pretreatment such as a biofiltration BMP, proprietary device, or sedimentation forebay. BMPs that are described in the 2011 TGM that may serve this purpose include:

For design specification of selected pre-treatment devices, refer to:

- VEG-3: Vegetated swale
- VEG-4: Vegetated filter strip
- PROP-1: Hydrodynamic separation device

Sizing Criteria

Background

Sand filter design is based on Darcy's law:

$$Q = KiA \qquad \text{(Equation 6-104)}$$

Where:

Q	=	water quality design flow (cfs)
K	=	hydraulic conductivity (fps)
A	=	surface area perpendicular to the direction of flow (ft^2)
i	=	hydraulic gradient (ft/ft) for a constant head and constant media depth, computed as follows:

$$i = \frac{h + l}{l} \qquad \text{(Equation 6-105)}$$

Where:

h	=	average depth of water above the filter (ft), defined for this design as $d/2$
d	=	maximum storage depth above the filter (ft)
l	=	thickness of sand media (ft)

Darcy's law underlies both the simple and the routing methods of design. The filtration rate V, or more correctly, $1/V$, is the direct input in the sand filter design. The relationship between the filtration rate V and hydraulic conductivity K is revealed by equating Darcy's law and the equation of continuity, $Q = VA$. Specifically:

$Q = KiA$ and $Q = VA$

So, $VA = KiA$

Or: $V = Ki$ (Equation 6-106)

Where,

V	=	filtration rate (ft/s)

Note that $V \neq K$. That is, the filtration rate is not the same as the hydraulic conductivity, but they do have the same units (distance per time). K can be equated to V by dividing V by the hydraulic gradient i, which is defined above.

The hydraulic conductivity K does not change with head nor is it dependent on the thickness of the media, only on the characteristics of the media and the fluid. A design hydraulic conductivity of 1 inch per hour (2 feet per day) used in this simple sizing method is based on bench-scale tests of conditioned rather than clean sand (KCSWDM, 2005) and represents the average sand bed condition as silt is captured and held in the sand bed.

Unlike the hydraulic conductivity, the filtration rate V changes with head and media thickness, although the media thickness is constant in the sand filter design.

Simple Sizing Method

The simple sizing method does not route flows through the filter. It determines the size of the filter based on the simple assumption that inflow is immediately discharged through the filter as if there were no storage volume. An adjustment factor (0.7) is applied to compensate for the greater filter size resulting from this method. Even with the adjustment factor, the simple method generally produces a larger filter size than the routing method.

Step 1: Determine the water quality design volume

Sand filters should be sized to capture and treat the stormwater quality design volume (see Section E.1).

Step 2: Determine maximum storage depth of water

Determine the maximum water storage depth (d) above the sand filter. This depth is defined as the depth at which water begins to overflow the reservoir pond, and it depends on the site topography and hydraulic constraints. The depth is chosen by the designer, but should be 6 feet or less.

Step 3: Calculate the sand filter area

Determine the sand filter area using the following equation:

$$A_{sf} = \frac{V_{wq}RL}{Kt(h+L)} \quad \text{(Equation 6-107)}$$

Where,

A_{sf}	=	surface area of the sand filter bed (ft^2)
V_{wq}	=	water quality design volume (ft^3)
R	=	routing adjustment factor (use $R = 0.7$)
L	=	sand bed depth (ft)
K_{des}	=	design hydraulic conductivity of media (use 2 ft/day)
t	=	drawdown time (use 1 day)
h	=	average depth of water above the filter (ft), [use (d/2) with d from Step 2]

Routing Method

A continuous runoff model, such as US EPA's Stormwater Management Model (SWMM) Model, can be used to optimally size a sand filter. A continuous simulation model consists of three components: a representative long term period of rainfall data (≈ 20 years or greater) as the primary model input; a model component representing the tributary area to the sand filter that takes into account the amount of impervious area, soil types of the pervious area, vegetation, evapotranspiration, etc.; and a component that simulates the sand filter. Using this method, the filter should be sized to capture and treat the WQ design volume from the post-development tributary area.

The continuous simulation model routes predicted tributary runoff to the sand filter, where treatment is simulated as a function of the infiltrative (flow) capacity of the sand filter and the available storage volume above the sand filter. In a continuous runoff model such as SWMM, the physical parameters of the sand filter are represented with stage-storage-discharge relationships. Due to the computational power of ordinary desktop computers, long-term continuous simulations generally take only minutes to run. This allows the modeler to run several simulations for a range of sand filter sizes, varying either the surface area of the filter (and resulting flow capacity) or the storage capacity above the sand filter, or both. Sufficient continuous model simulations should be completed so that results encompass the WQ design volume capture goal.

Model results should be plotted for both varying storage depths above the filter and for varying filter surface area (and resulting flow capacity) while keeping all other parameters constant. The resulting relationship of percent capture as a function of sand filter flow and storage capacity can be used to optimally size a sand filter based on site conditions and restraints.

In addition to continuous simulation modeling, routing spreadsheets and/or other forms of routing modeling that incorporate rainfall-runoff relationships and infiltrative (flow) capacities of sand filters may be used to size facilities. Alternative sizing methodologies should be prepared with good engineering practices.

Sizing and Geometry

1) Sand filters shall be sized to capture and filter the Stormwater quality design volume, SQDV (See Section 2 and Appendix E for further detail).

2) Sand filters may be designed in any geometric configuration, but rectangular with a 2:1 length-to-width ratio or greater is preferred.

3) Filter bed depth must be at least 24 inches, but 36 inches is preferred.

4) Depth of water storage over the filter bed should be 6 feet maximum. Minimum freeboard is one foot.

5) Sand filters should be placed off-line to prevent scouring of the filter bed by high flows. The overflow structure must be designed to pass the stormwater quality design storm.

Sand Specification

Ideally the effective diameter of the sand, d_{10} (the diameter corresponding to the sieve size that passes 10% of sand grains), should be just small enough to ensure a good quality effluent while preventing penetration of stormwater particles to such a depth that they cannot be removed by surface scraping (~2-3 inches). This effective diameter usually lies in the range 0.20-0.35 mm. In addition, the coefficient of uniformity, $Cu = d_{60}/d_{10}$, should be less than 3.

The sand in a filter should consist of medium sand with few fines meeting ASTM C 33 size gradation (by weight) or equivalent as given in the table below.

U.S. Sieve Size	Percent Passing
3/8 inch	100
U.S. No. 4	95 to 100
U.S. No. 8	80 to 100
U.S. No. 16	50 to 85
U.S. No. 30	25 to 60
U.S. No. 50	5 to 30
U.S. No. 100	Less than 10

Finally, the silica (SiO_2) content of the sand should be greater than 95% by weight.

Underdrain

1) There are several underdrain system options which can be used in the design of a sand filter:

    a. A central underdrain collection pipe with lateral collection pipes in an 8 inch minimum gravel backfill or drain rock bed.

    b. Longitudinal pipes in an 8 inch minimum gravel backfill or drain rock bed, with a collection pipe at the outfall.

    c. Small sand filters may use a single underdrain pipe in an 8 inch minimum gravel backfill or drain rock bed.

2) All underdrain pipes and connectors should be 6 inches or greater so they can be cleaned without damage to the pipe. Clean-out risers with diameters equal to the underdrain pipe should be placed at the terminal ends of all pipes and extend to the surface of the filter. A valve box should be provided for access to the cleanouts and the cleanout assembly should be water tight to prevent short circuiting of the sand filter.

3) The underdrain pipe should be sized and perforated as to ensure free draining of the sand filter bed. Round perforations should be at least 1/2-inch in diameter and the pipe should be laid with holes downward.

4) The maximum perpendicular distance between any two lateral collection pipes or from the edge of the filter and the collection pipes should be 9 feet.

5) All pipes should be placed with a minimum slope of 0.5%.

6) The invert of the underdrain outlet should be above the seasonal high groundwater level.

7) At least 8 inches of gravel backfill should be maintained over all underdrain piping, and at least 6 inches should be maintained on both side and beneath the pipe to prevent damage by heavy equipment during maintenance. Either drain rock or gravel backfill may be used between pipes.

8) The bottom gravel layer should have a diameter at least 2X the size of the openings into the drainage system. The grains should be hard, preferably rounded, with a specific gravity of at least 2.5, and free of clay, debris and organic impurities.

9) Either a geotextile fabric or a two-inch transition gradation layer (preferred) should be placed between the sand layer and the drain rock or gravel backfill layer. If a geotextile is used, one inch of drain rock or gravel backfill should be place above the fabric. This allows for a transitional zone between sand and gravel and may reduce pooling of water at the liner interface. The geotextile should meet the following minimum materials requirements.

Geotextile Property	Value	Test Method
Trapezoidal Tear (lbs)	40 (min)	ASTM D4533
Permeability (cm/sec)	0.2 (min)	ASTM D4491
AOS (sieve size)	#60 - #70 (min)	ASTM D4751
Ultraviolet resistance	70% or greater	ASTM D4355

Flow Spreader

1) A flow spreader should be installed at the inlet along one side of the filter to evenly distribute incoming runoff across the filter and to prevent erosion of the filter surface.

   a. If the sand filter is curved or an irregular shape, a flow spreader should be provided for a minimum of 20 percent of the filter perimeter.

   b. If the length-to-width ratio of the filter is 2:1 or greater, a flow spreader should be located on the longer side and for a minimum length of 20 percent of the facility perimeter.

   c. In other situations, use good engineering judgment in positioning the spreader.

2) Erosion protection should be provided along the first foot of the sand bed adjacent to the flow spreader. Geotextile weighted with sand bags at 15-foot intervals may be used. Quarry spalls may also be used.

Vegetation

1) The use of vegetation in sand filters is optional. However, no top soil should be added to the sand filter bed because the fine-grained materials (silt and clay) would reduce the hydraulic capacity of the filter.

2) Growing grass or other vegetation requires the selection of species that can tolerate the demanding environment of a sand filter bed. Plants not receiving sufficient dry weather flows should be able to withstand long periods of drought during summer periods, followed by periods of saturation during storm events. A horticultural specialist should be consulted for advice on species selection.

3) A sod grown in sand may be used on the sand surface as long as there is no clay in the sand substrate and the particle size gradation of the substrate meets the sand filter specifications. No other sod should be used due to the high clay content in most sod soils.

4) To prevent uses that could compact and damage the filter surface, permanent structures are not permitted on sand filters (e.g. playground equipment).

Emergency Overflow Structure

Sand filters may only be placed off-line, but an emergency overflow must still be provided in the event the filter becomes clogged. The overflow structure must be able to safely convey flows from the stormwater quality design storm to the downstream conveyance system or other acceptable discharge point.

Side Slopes

1) Interior side slopes above the stormwater quality design depth and up to the emergency overflow water surface steeper than 4:1 (H:V) should be stabilized to prevent erosion with a method approved by the local permitting authority.

2) Exterior side slopes steeper than 2:1 (H:V) should be stabilized to prevent erosion with a method approved by the local permitting authority.

3) For any slope (interior or exterior) greater than 2:1 (H:V), a geotechnical investigation and report must be submitted and approved by the local permitting authority.

4) Pond walls may be vertical retaining walls, provided: (a) they are constructed of reinforced concrete, (b) a fence, which prevents access, is provided along the top of the wall or further back, and (c) the design is stamped by a licensed civil engineer and approved by the County.

Embankments

1) Embankments (earthen slopes or berms) may be used for detaining or redirecting the flow of water.

2) The minimum top width of all berm embankments should be 20 feet, or as approved by the geotechnical engineer.

3) Basin berm embankments should be constructed on native consolidated soil (or adequately compacted and stable fill soils analyzed by a licensed geotechnical engineer) free of loose surface soil materials, roots, and other organic debris.

4) Earthworks should be in accordance with Section 300-6 of the Standard Specifications for Public Works Construction, most recent edition.

5) Basin berm embankments greater than 4 feet in height should be constructed by excavating a key equal to 50% of the berm embankment cross-sectional height and width. This requirement may be waived if specifically recommended by a licensed geotechnical engineer.

6) The berm embankment should be constructed of compacted soil (95% minimum dry density, modified proctor method per ASTM D1557), placed in 6-inch lifts.

Maintenance Access

Maintenance access road(s) shall be provided to the control structure and other drainage structures associated with the basin (e.g., inlet, emergency overflow or bypass structures). Manhole and catch basin lids should be in or at the edge of the access road.

An access ramp is required for removal of sediment with a backhoe or loader and truck. The ramp should extend to the bottom of the sand filter.

Landscaping Outside of the Facility

A sand filter can add aesthetics to a site and should be incorporated into a project's landscape design. Interior side slopes may be stepped with flat areas to provide informal seating with a game or play area below. Perennial beds may be planted above the overflow water surface elevation. Large shrubs and trees are not recommended, however, as shading limits evaporation and falling leaves can clog the filter surface. If a sand filter area is intended for recreational uses, such as a volleyball area, the interior side slopes of the filter embankment should be no steeper than 3:1 and may be stepped.

1) No trees or shrubs may be planted within 10 feet of inlet or outlet pipes or manmade drainage structures such as spillways, flow spreaders, or earthen embankments. Species with roots that seek water, such as willow or poplar, should not be used within 50 feet of pipes or manmade structures.

2) Prohibited non-native plant species will not be permitted. For more information on invasive weeds, including biology and control of listed weeds, look at the

encycloweedia located at the California Department of Food and Agriculture website at or the California Invasive Plant Council website at www.cal-ipc.org.

Operations and Maintenance

Sand filters are subject to clogging by fine sediment, oil and grease, and other debris (e.g., trash and organic matter such as leaves). Filters and pretreatment facilities should be inspected every 6 months during the first year of operation. Inspection should also occur immediately following a storm event to assess the filtration capacity of the filter. Once the filter is performing as designed, the frequency of inspection may be reduced to once per year.

Most of the maintenance should be concentrated on the pretreatment practices, such as buffer strips and swales upstream of the trench to ensure that sediment does not reach the infiltration trench. Regular inspection should determine if the sediment removal structures require preventative maintenance.

Inspect basin a minimum of twice a year, before and after the rainy season, after large storm events, or more frequently if needed. Some important items to check for include: differential settlement, cracking; erosion, leakage, or tree growth on the embankment; the condition of the riprap in the inlet, outlet and pilot channels; sediment accumulation in the basin; and the vigor and density of the vegetation on the basin side slopes and floor. Correct observed problems as necessary.

- Remove litter and debris from banks and basin bottom as required.
- Repair erosion to banks and bottom as required.
- Check infiltration rate of sand bed twice annually, once after significant rainfall.
- Scarify top 3 to 5 inches of filters surface by raking once annually or as required to restore infiltration rate of the filter.
- Clean forebay every two years at a minimum, to avoid accumulation in main basin.
- Inspect outlet for clogging a minimum of twice a year, before and after the rainy season, after large storms, and more frequently if needed. Correct observed problems as necessary.

TCM-5: Cartridge Media Filter

Cartridge media filters are manufactured devices that typically consist of a series of cylindrical vertical filters contained in a catch basin, manhole, or vault that provide treatment through filtration and sedimentation. The manhole or vault may be divided into multiple chambers where the first chamber acts as a pre-settling basin for removal of coarse sediment while another chamber acts as the filter bay and houses the filter cartridges.

Cartridge Media Filters

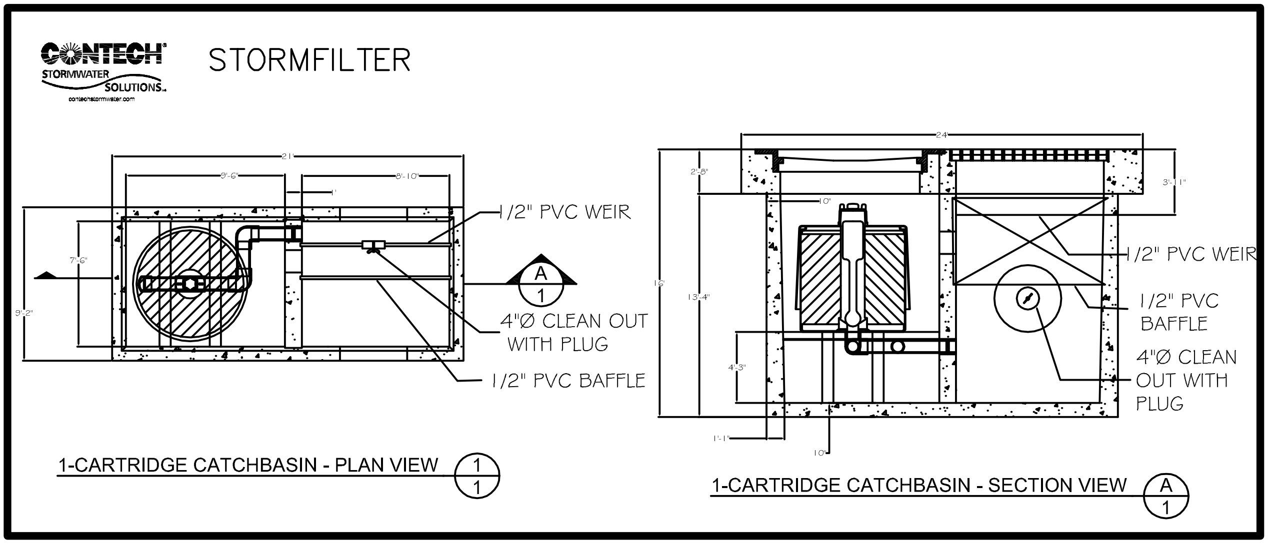
Photo Credits: Contech Stormwater Solutions, Inc.

Application

- Parking lots
- Roadways
- Playgrounds
- Outdoor eating areas

Preventative Maintenance

- Filter media replacement
- Solids removal from vault, manhole, or catch basin
- Inspect for inlet and outlet for clogging



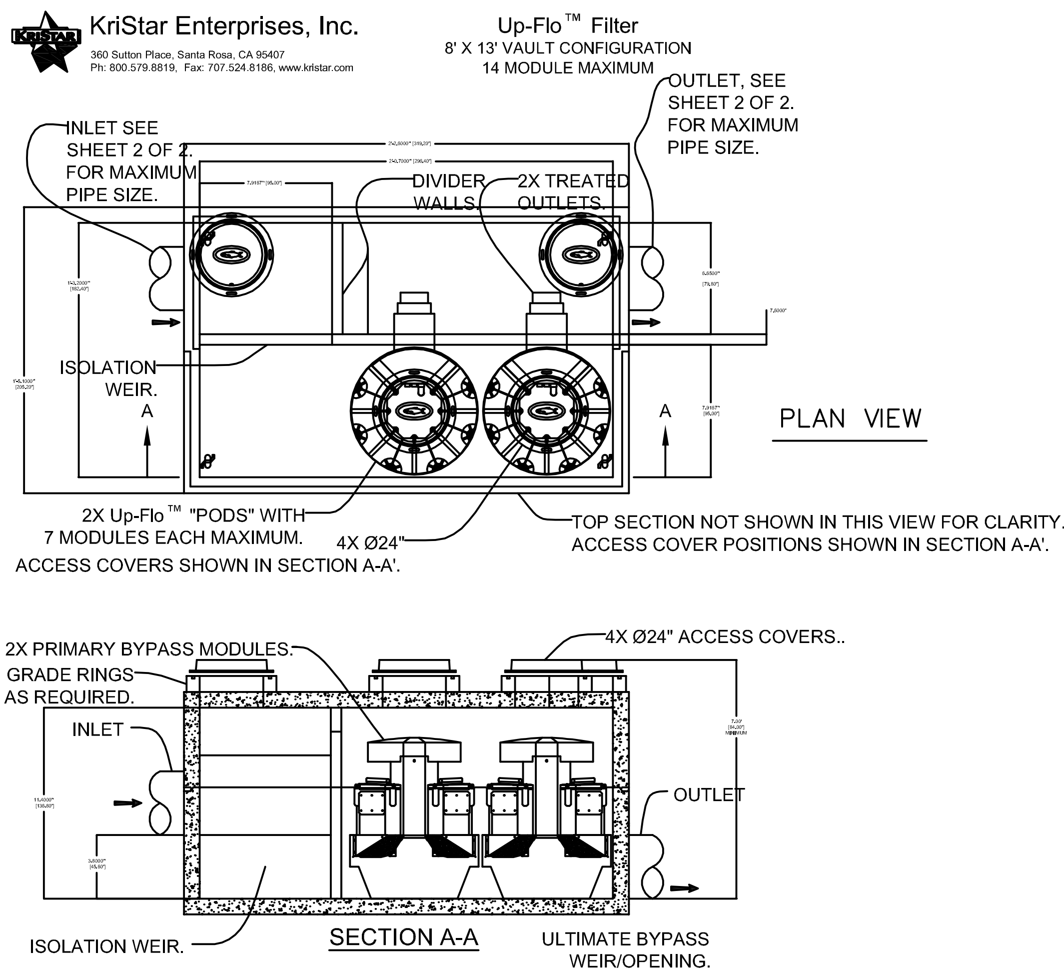


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Figure 6-24: Cartridge Media Filter

Table 6-27: Proprietary Cartridge Media Filter Manufacturer Websites

Device	Manufacturer	Website
BaySaver BayFilter	Baysaver Technologies Inc.	www.baysaver.com
ConTech StormFilter™	Contech® Construction Products Inc.	www.contech-cpi.com
CrystalStream	CrystalStream Technologies	www.crystalstream.com
KriStar Fossil Tee™ (media filter)	KriStar Enterprises Inc.	www.kristar.com
KriStar Up-Flo™ Filter and Perk™ Filter	KriStar Enterprises Inc.	www.kristar.com

Limitations

As with all filtration systems, use in catchments that have significant areas of non-stabilized soils can lead to premature clogging.

Design Criteria

1) Cartridge media filter BMP vendors are constantly updating and expanding their product lines, so refer to the latest design guidance from each of the vendors.

2) Selected filter media should target pollutants of concern. A combination of media is often recommended to maximize pollutant removal. Perlite is effective for removing TSS and oil and grease. Zeolite removes soluble metals, ammonium, and some organics. Vendors also offer proprietary medias (such as leaf compost or activated carbon) that are designed to remove soluble metals, organics, and other pollutants.

3) Manufacturers try to distinguish their products through innovative designs that aim at providing self cleaning and draining, uniformly loaded, and clog resistant cartridges that functional properly over a wide range of hydraulic loadings and pollutant concentrations.

4) All stormwater vaults containing cartridge filters that have standing water for longer than 72 hours can become a breeding area for mosquitoes. The selected BMP should have a system to completely drain the vault, such as weep holes in the bottom of the vault.

Sizing

1) Cartridge media filters should be sized to capture and treat the stormwater quality design flow rate.

2) Proprietary cartridge media filter devices, like most proprietary BMPs, and auxiliary components such as media, screens, baffles, and sumps are selected based onsite-specific conditions such as the loading that is expected and the desired frequency of maintenance. Sizing of proprietary devices is reduced to a simple process whereby a model can simply be selected from a table or a chart based on a few known quantities

(tributary area, location, design flow rate, etc). Most of the manufacturers either size the devices for potential clients or offer calculators on their websites that simplify the design process. For the latest sizing guidelines, refer to the manufacturer's website.

PT-1: Hydrodynamic Separation Device

Hydrodynamic separation devices (alternatively, swirl concentrators) are devices that remove trash, debris, and coarse sediment from incoming flows using screening, gravity settling, and centrifugal forces generated by forcing the influent into a circular motion. By having the water move in a circular fashion, rather than a straight line, it is possible to obtain significant removal of suspended sediments and attached pollutants with less space as compared to wet vaults and other settling devices. Hydrodynamic devices were originally developed for combined sewer overflows (CSOs), where they were used primarily to remove coarse inorganic solids. Hydrodynamic separation has been adapted for stormwater treatment by several manufacturers and is currently used to remove trash, debris, and other coarse solids down to sand-sized particles. Several types of hydrodynamic separation devices are also designed to remove floating oils and grease using sorbent media.

Hydrodynamic Separation

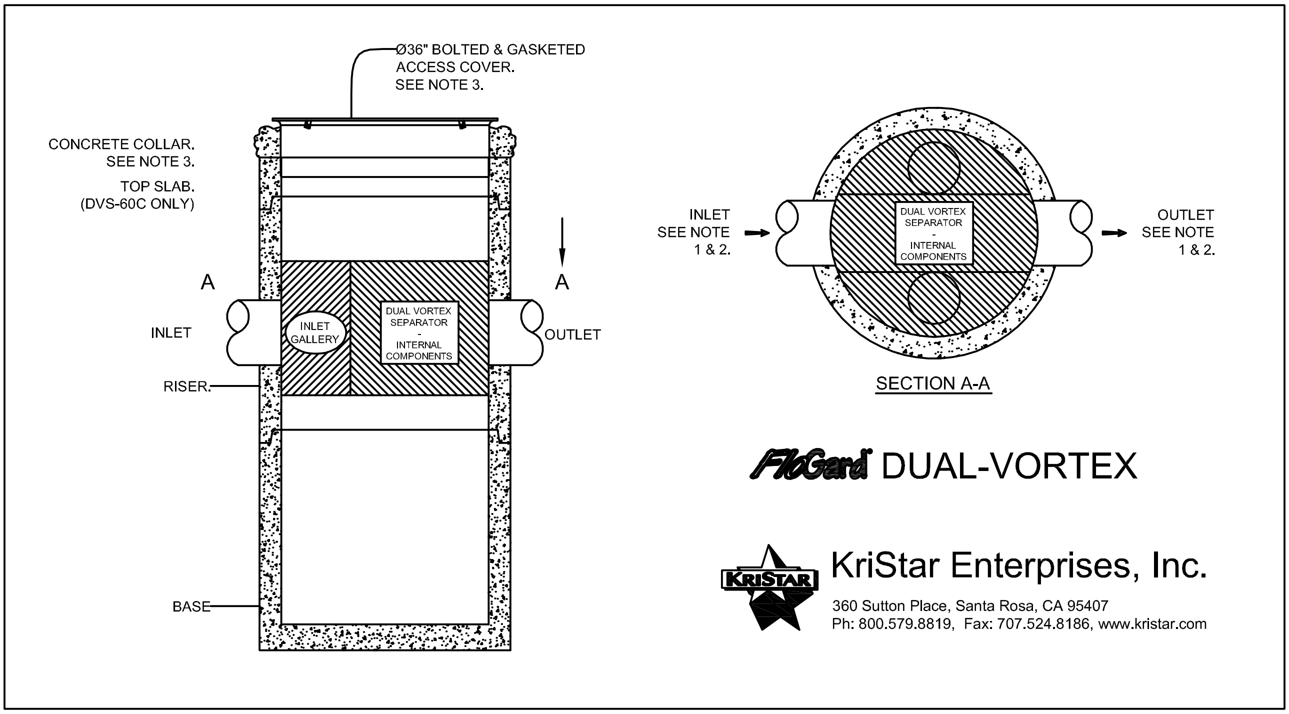
Photo Credits: 1. Contech Stormwater Solutions, Inc.; 2. Dave Weller, FedCo Construction

Application

- Parking lots
- Areas adjacent to parking lots
- Areas adjacent to buildings
- Road medians and shoulders

Preventative Maintenance

- Sediment, trash and debris removal
- Vector control



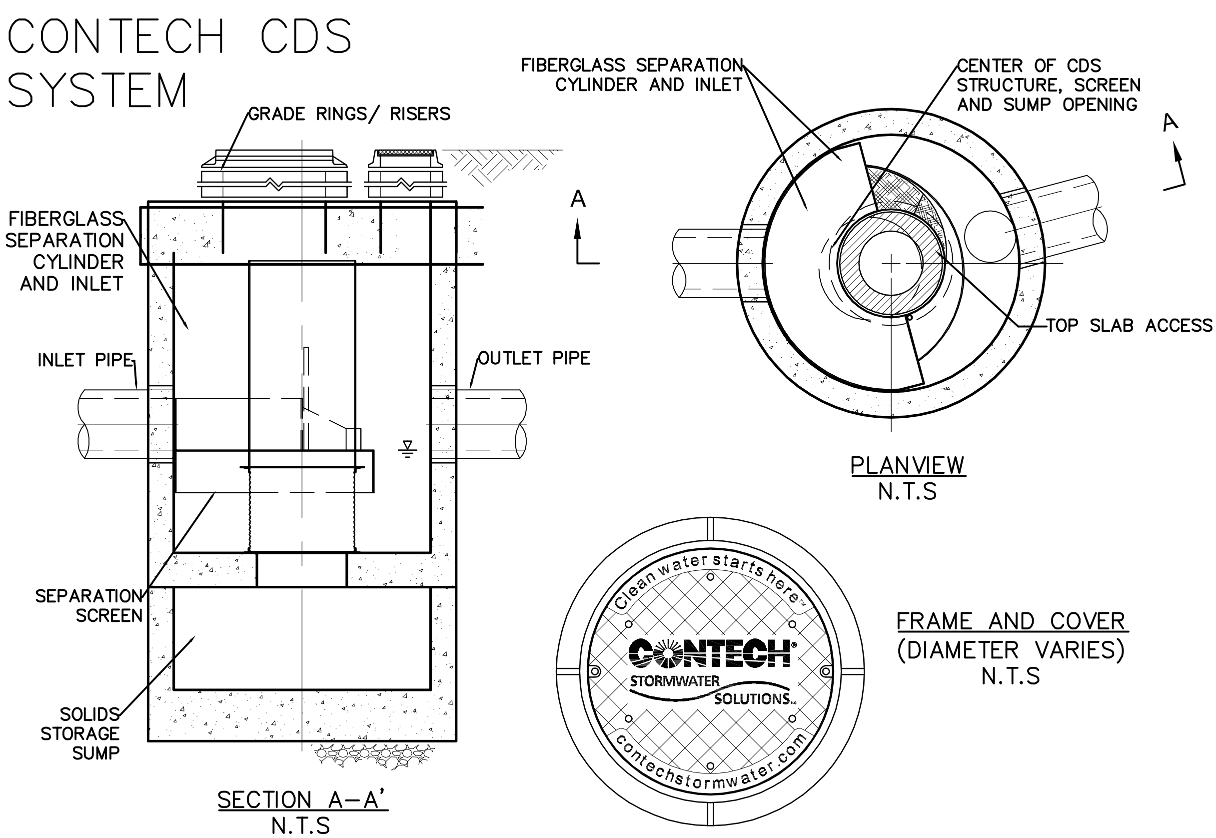


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Figure 6-25: Hydrodynamic Separation

Table 6-28: Proprietary Hydrodynamic Device Manufacturer Websites

Device	Manufacturer	Website
Rinker In-Line Stormceptor®	Rinker Materials™	www.rinkerstormceptor.com
FloGard® Dual-Vortex Hydrodynamic Separator	KriStar Enterprises Inc.	www.kristar.com
Contech® CDS[a]™	Contech® Construction Products Inc.	www.contech-cpi.com
Contech® Vortechs™	Contech® Construction Products Inc.	www.contech-cpi.com
Contech® VorSentry™	Contech® Construction Products Inc.	www.contech-cpi.com
Contech® VorSentry™ HS	Contech® Construction Products Inc.	www.contech-cpi.com
BaySaver BaySeparator	Baysaver Technologies Inc.	www.baysaver.com

Limitations

Hydrodynamic separation devices are effective for the removal of course sediment, trash, and debris, and are useful as pretreatment in combination with other BMP types that target smaller particle sizes.

Hydrodynamic devices represent a wide range of device types that have different unit processes and design elements (e.g., storage versus flow-through designs, inclusion of media filtration, etc.) that vary significantly within the category. These design features likely have significant effects on BMP performance; therefore, generalized performance data for hydrodynamic devices is not practical.

Design Criteria

Proprietary hydrodynamic device BMP vendors are constantly updating and expanding their product lines, so refer to the latest design guidance from each of the vendors. General guidelines on the performance, sizing, operations and maintenance of proprietary devices are provided by the vendors.

Sizing

Hydrodynamic devices shall be sized to capture and treat the stormwater quality design flow rate and to completely drain within 72 hours.

Sizing of proprietary devices is reduced to a simple process whereby a model can simply be selected from a table or a chart based on a few known quantities (tributary area, location, design flow rate, design volume, etc). A few of the manufacturers either size the devices for potential clients or offer calculators on their websites that simplify the design process even further and lessens the possibility of using obsolete design information. For the latest sizing guidelines, refer to the manufacturer's website.

The hydrodynamic separators listed in Table 6-28 are designed to have a permanent pool of water stored within the system. Various methods of vector control are available to prevent mosquito breeding including manhole cover screens and the use of mosquito dunks. In many designs, oil and grease is stored at the water surface and provides a deterrent to mosquito breeding.

Operations and Maintenance

Hydrodynamic devices should be inspected every 6 months during the first year of operation. Inspection should also occur immediately following a storm event to assess the function of the device. Once the device is performing as designed, the frequency of inspection may be reduced to once per year.

PT-2: Catch Basin Insert

Catch basin inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris and may include sorbent media (oil absorbent pouches) to remove floating oils and grease. Catch basin inserts are selected specifically based upon the orientation of the inlet.

Catch Basin Inserts

Photo Credits: 1. KriStar; 2. Aquashield

Application

- Parking lots
- Roads
- Athletic courts
- Outdoor food areas

Preventative Maintenance

- After storm inspection
- Sediment removal
- Trash removal
- Filter/sorbent media replacement

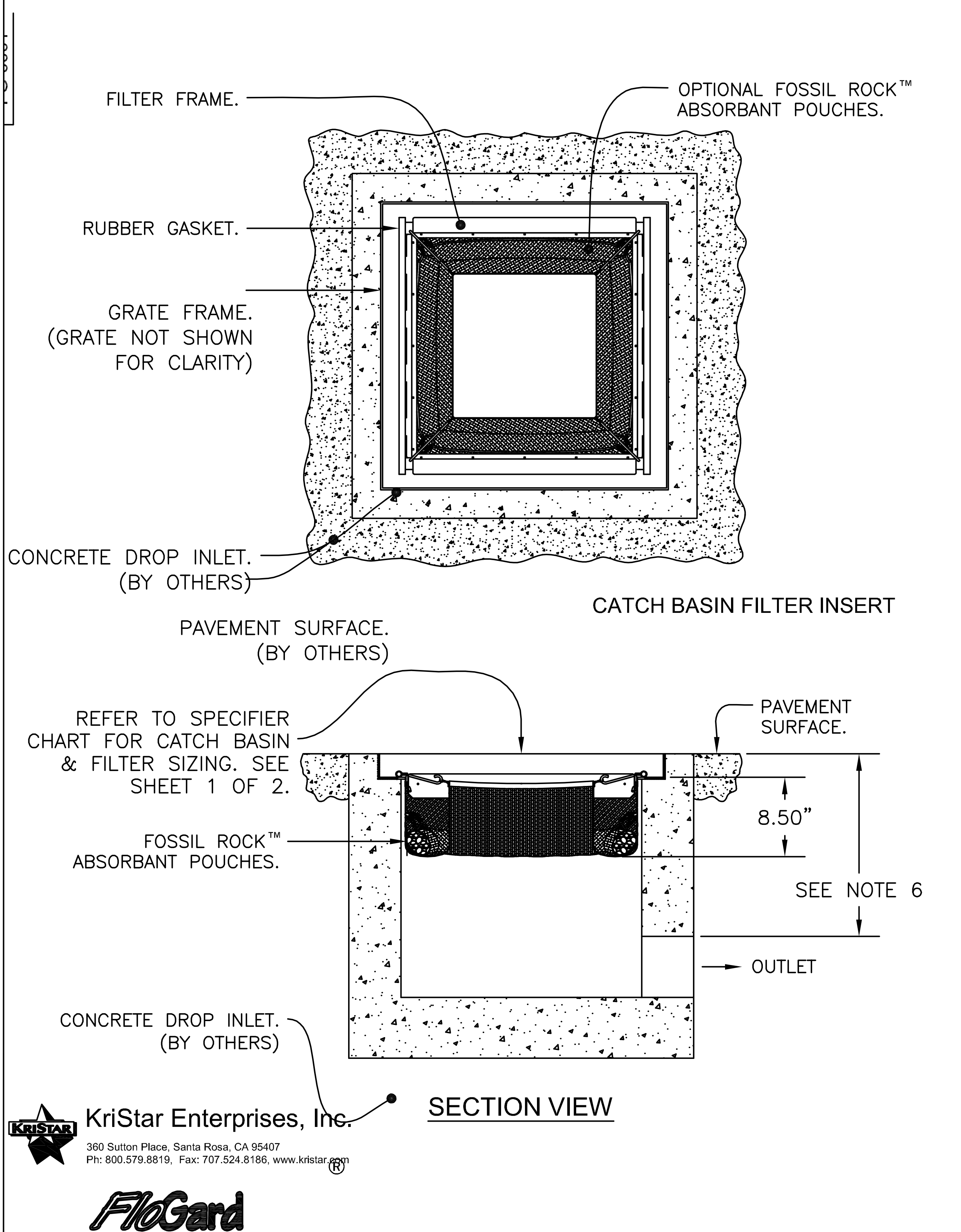

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Figure 6-26: Catch Basin

Table 6-29: Proprietary Catch Basin Insert Manufacturer Websites

Device	Manufacturer	Website
AbTech Industries Ultra-Urban Filter™	AbTech Industries	www.abtechindustries.com
Aquashield Aqua-Guardian™ Catch Basin Insert	Aquashield™ Inc.	www.aquashieldinc.com
Bowhead StreamGuard™	Aquashield™ Inc.	www.aquashieldinc.com
Contech® Triton Catch Basin Filter™	Contech® Construction Products Inc.	www.contech-cpi.com
Contech® Triton Curb Inlet Filter™	Contech® Construction Products Inc.	www.contech-cpi.com
Contech® Triton Basin StormFilter™	Contech® Construction Products Inc.	www.contech-cpi.com
Contech® Curb Inlet StormFilter™	Contech® Construction Products Inc.	www.contech-cpi.com
Curb Inlet Basket	SunTree Technologies Inc.	www.suntreetech.com
Curb Inlet Grates	EcoSense International™	www.ecosenseinternational.org
Grate Inlet Skimmer Box	SunTree Technologies Inc.	www.suntreetech.com
Hydro-Kleen™ Filtration System	Hydro Compliance Management Inc.	Not available
KriStar FloGard+PLUS®	KriStar Enterprises Inc.	www.kristar.com
KriStar FloGard®	KriStar Enterprises Inc.	www.kristar.com
KriStar FloGard LoPro Matrix Filter®	KriStar Enterprises Inc.	www.kristar.com
Nyloplast Storm-PURE Catch Basin Insert	Nyloplast Engineered Surface Drainage Products	www.nyloplast-us.com
StormBasin®	FabCo® Industries Inc.	www.fabco-industries.com
Stormdrain Solutions Interceptor	FabCo® Industries Inc.	www.fabco-industries.com
Stormdrain Solutions Inceptor®	Stormdrain Solutions	www.stormdrains.com
StormPod®	FabCo® Industries Inc.	www.fabco-industries.com
Stormwater Filtration Systems	EcoSense International™	www.ecosenseinternational.org
Ultra-CurbGuard®	UltraTech International Inc.	www.spillcontainment.com
Ultra-DrainGuard®	UltraTech International Inc.	www.spillcontainment.com
Ultra-GrateGuard®	UltraTech International Inc.	www.spillcontainment.com
Ultra-GutterGuard®	UltraTech International Inc.	www.spillcontainment.com
Ultra-InletGuard®	UltraTech International Inc.	www.spillcontainment.com

Limitations

Catch basin inserts come in such a wide range of configurations that it is practically impossible to generalize the expected performance. Inserts should mainly be used for catching coarse sediments and floatable trash, and are effective as pretreatment in combination with other types of structures that are recognized as water quality treatment BMPs. Trash and large objects can greatly reduce the effectiveness of catch basin inserts with respect to sediment and hydrocarbon capture. Frequent maintenance and the use of screens and grates to keep trash out may decrease the likelihood of clogging and prevent obstruction and bypass of incoming flows.

Design Criteria

Catch basin inserts shall be sized to capture and treat the stormwater quality design flow rate.

Operations and Maintenance

1) Trash, debris, and sediment around insert grate and inside chamber requiring trash to be cleared.

2) Repair filter media if damaged or severely clogged.

3) Inspection of catch basin insert after each storm greater than 0.2 inches is recommended.

7 MAINTENANCE PLAN

This chapter identifies the basic information that should be included in a maintenance plan. Refer to Fact Sheets for individual control measures in Chapter 6 regarding device-specific maintenance requirements.

7.1 Site Map

1) Provide a site map showing boundaries of the site, acreage and drainage patterns/contour lines. Show each discharge location from the site and any drainage flowing onto the site. Distinguish between soft and hard surfaces on the map.

2) Identify locations of existing and proposed storm drain facilities, private sanitary sewer systems and grade-breaks for purposes of pollution prevention.

3) With legend, show locations of expected sources of pollution generation (outdoor work and storage areas, heavy traffic areas, delivery areas, trash enclosures, fueling areas, industrial clarifiers, wash-racks, etc). Identify any areas having contaminated soil or where toxins are stored or have been stored/disposed of in the past.

4) With legend, indicate types and locations of stormwater management control measures which will be built to permanently control stormwater pollution. Distinguish between pollution prevention, treatment, sewer diversion, and containment devices.

7.2 Baseline Descriptions

1) List the property owners and persons responsible for operation and maintenance of the stormwater management control measures onsite. Include phone numbers and addresses.

2) Identify the intended method of providing financing for operation, inspection, routine maintenance and upkeep of stormwater control measures.

3) List all permanent stormwater control measures. Provide a brief description of stormwater management control measures selected and if appropriate, facts sheets or additional information.

4) As appropriate for each stormwater control measure provide:

   a. A written description and check list of all maintenance and waste disposal activities that will be performed. Distinguish between the maintenance appropriate for a 2-year establishment period and expected long-term maintenance. For example, maintenance requirements for vegetation in a constructed wetland may be more intensive during the first few years until the vegetation is established. The post-establishment maintenance plan should address maintenance needs (e.g., pruning, irrigation, weeding) for a larger, more stable system. Include maintenance performance procedures for facility components that require relatively unique maintenance knowledge, such as specific plant removal / replacement, landscape features, or constructed wetland maintenance. These procedures should provide enough detail for a person unfamiliar with maintenance to perform the activity, or identify the specific skills or knowledge necessary to perform and document the maintenance.

b. A description of site inspection procedures and documentation system, including record-keeping and retention requirements.

c. An inspection and maintenance schedule, preferably in the form of a table or matrix, for each activity for all facility components. The schedule should demonstrate how it will satisfy the specified level of performance, and how the maintenance / inspection activities relate to storm events and seasonal issues.

d. Identification of the equipment and materials required to perform the maintenance.

5) As appropriate, list all housekeeping procedures for prohibiting illicit discharges or potential illicit discharges to the storm drain. Identify housekeeping BMPs that reduce maintenance of Treatment Control Measures. These procedures are listed based on facility operations and can be found in the Ventura County Industrial/Commercial Clean Business Program document.

7.3 Spill Plan

1) Provide emergency notification procedures (phone and agency/persons to contact)

2) As appropriate for site, provide emergency containment and cleaning procedures.

3) Note downstream receiving water bodies or wetlands which may be affected by spills or chronic untreated discharges.

4) As appropriate, create an emergency sampling procedure for spills. (Emergency sampling can protect the property owner from erroneous liability for down-stream receiving area clean-ups).

7.4 Facility Changes

Operational or facility changes which significantly affect the character or quantity of pollutants discharging into the stormwater management control measures will require modifications to the Maintenance Plan and/or additional stormwater control measures.

7.5 Training

1) Identify appropriate persons to be trained and assure proper training.

2) Training to include:

   a. Good housekeeping procedures defined in the plan.

   b. Proper maintenance of all pollution mitigation devices.

   c. Identification and cleanup procedures for spills and overflows.

   d. Large-scale spill or hazardous material response.

   e. Safety concerns when maintaining devices and cleaning spills.

7.6 Basic Inspection and Maintenance Activities

1) Create and maintain onsite, a log for inspector names, dates and stormwater control measure devices to be inspected and maintained. Provide a checklist for each inspection and maintenance category.

2) Once annually, perform testing of any mechanical or electrical devices prior to wet weather.

3) Report any significant changes in stormwater management control measures to the site management. As appropriate, assure mechanical devices are working properly and/or landscaped BMP plantings are irrigated and nurtured to promote thick growth.

4) Note any significant maintenance requirements due to spills or unexpected discharges.

5) As appropriate, perform maintenance and replacement as scheduled and as needed in a timely manner to assure stormwater management control measures are performing as designed and approved.

6) Assure unauthorized low-flow discharges from the property do not by-pass stormwater control measures.

7) Perform an annual assessment of each pollution generation operation and its associated stormwater management control measures to determine if any part of the pollution reduction train can be improved.

7.7 Revisions of Pollution Mitigation Measures

If future correction or modification of past stormwater management control measures or procedures is required, the owner shall obtain approval from the governing stormwater agency prior to commencing any work. Corrective measures or modifications shall not cause discharges to bypass or otherwise impede existing stormwater control measures.

7.8 Monitoring & Reporting Program

1) The governing stormwater agency may require a Monitoring & Reporting Program to assure the stormwater management control measures approved for the site are performing according to design.

2) If required by local permitting agency, the Maintenance Plan shall include performance testing and reporting protocols.

APPENDIX A : ACRONYMS AND GLOSSARY OF TERMS

A.1 Acronyms and Abbreviations

303(d)	303(d) List of Impaired Water Bodies
API	American Petroleum Institute (oil/water separator type)
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CP	Coalescing Plate (oil/water separator type)
CTR	California Toxics Rule
CWA	Clean Water Act
CDFG	California Department of Fish and Game
EIA	Effective Impervious Area
EMC	Event Mean Concentration
ESA	Environmentally Sensitive Area
LID	Low Impact Development
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
RPAMP	Redevelopment Project Area Master Plan
SQDV	Stormwater Quality Design Volume
SQDF	Stormwater Quality Design Flow
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WERF	Water Environment Research Foundation

A.2 Glossary

Automotive Repair Shop: A facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

Backfill: Earth or engineered material used to refill a trench or an excavation.

Berm: An earthen mound used to direct the flow of runoff around or through a structure.

Best Management Practice (BMP): Any program, technology, process, siting criteria, operational methods or measures, or engineered systems, which when implemented prevent, control, remove, or reduce pollution.

Best Management Practices (BMPs): Includes schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Biofiltration: The simultaneous process of filtration, infiltration, adsorption, and biological uptake of pollutants in stormwater that takes place when runoff flows over and through vegetated areas.

Bioretention Facility: A facility that utilizes soil infiltration and both woody and herbaceous plants to remove pollutants from stormwater runoff. Runoff is typically captured and infiltrated or released over a period of 24 to 48 hours.

Blue Roof: A roof that is designed to store rainwater, typically in a cistern-type device.

Brown Roof: A type of green roof which focuses on biodiversity and locally-sourced material.

Buffer Strip or Zone: Strip of erosion-resistant vegetation over which stormwater runoff is directed.

Capacity: The capacity of a stormwater drainage facility is the flow volume or rate that the facility (e.g., pipe, basin, vault, swale, ditch, drywell, etc.) is designed to safely contain, receive, convey, reduce pollutants from, or infiltrate stormwater to meet a specific performance standard. There are different performance standards for pollution reduction, flow control, conveyance, and destination/ disposal, depending on location.

Catch Basin: Box-like underground concrete structure with openings in curbs and gutters designed to collect runoff from streets and pavements.

Check Dam: Small temporary barrier, grade control structure, or dam constructed across a swale, drainage ditch, or area of concentrated flow with the intent to slow or stop runoff.

Clean Water Act (CWA): (33 U.S.C. 1251 et seq.) requirement of the National Pollutant Discharge Elimination System (NPDES) program are defined under Sections 307, 402, 318 and 405 of the CWA.

Commercial Development: Any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, multi-apartment buildings, car wash facilities, mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes.

Conduit: Any channel or pipe for directing the flow of water.

Construction General Permit: A NPDES permit issued by the State Water Resources Control Board (SWRCB) for the discharge of stormwater associated with construction activity from soil disturbance of five (5) acres or more.

Control Device: A device used to hold back or direct a calculated amount of stormwater to or from a stormwater management facility. Typical control structures include vaults or manholes fitted with baffles, weirs, or orifices.

Conveyance System: Any channel or pipe for collecting and directing the Stormwater.

Culvert: A covered channel or a large diameter pipe that crosses under a road, sidewalk, etc.

Dead-end Sump: A below surface collection chamber for small drainage areas that is not connected to the public storm drainage system. Accumulated water in the chamber must be pumped and disposed in accordance with all applicable laws.

Designated Public Access Points: Any pedestrian, bicycle, equestrian, or vehicular point of access to jurisdictional channels in the area of Ventura County subject to permit requirements.

Detention: The temporary storage of stormwater runoff to allow treatment by sedimentation and metered discharge of runoff at reduced peak flow rates.

Detention Facility: A facility designed to receive and hold stormwater and release it at a slower rate, usually over a number of hours. The full volume of stormwater that enters the facility is eventually released.

Detention Tank, Vault, or Oversized Pipe: A structural subsurface facility used to provide flow control for a particular drainage basin.

Development: any construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail and any other non-residential projects, including public agency projects; or mass grading for future construction.

Directly Adjacent: Situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area.

Directly Connected Impervious Area (DCIA): The area covered by a building, impermeable pavement, and/ or other impervious surfaces, which drains directly into the storm drain without first flowing across permeable land area (e.g. turf buffers).

Directly Discharging: Outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject, property, development, subdivision, or industrial facility, and not commingled with the flows from adjacent lands.

Discharge: A release or flow of Stormwater or other substance from a conveyance system or storage container.

Disturbed Area: Any area that is altered as a result of land disturbance, such as: clearing, grading, grubbing, stockpiling and excavation.

Drainage Basin: A specific area that contributes stormwater runoff to a particular point of interest, such as a stormwater management facility, drainageway, wetland, river, or pipe.

Effective Impervious Area (EIA): That portion of the surface area that is hydrologically connected via sheet flow over a hardened conveyance or impervious surface without any intervening medium to mitigate flow volume.

Environmentally Sensitive Area (ESA): An area “in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments” (California Public Resources Code § 30107.5). Areas subject to stormwater mitigation requirements are: 303(d) listed water bodies in all reaches that are unimproved, all California Coastal Commission’s *Environmentally Sensitive Habitat Areas* as delineated on maps in Local Coastal Plans, and Regional Water Quality Control Board’s Basin Plan Rare, Threatened or Endangered Species (RARE) and Preservation of Biological Habitats (BIOL) designated waterbodies. The California Department of Fish and Game’s (CDFG) *Significant Natural Areas* map will be considered for inclusion as the department field-verifies the designated locations. Watershed restoration projects will be considered for inclusion as the department field verifies the designated locations.

Erosion: The wearing a way of land surface by wind or water. Erosion occurs naturally from weather or runoff, but can be intensified by land-clearing practices relating to farming; residential, commercial, or industrial development; road building; or timber cutting.

Excavation: The process of removing earth, stone, or other materials, usually by digging.

Existing Urban Area: Existing urban areas and corresponding maps in Appendix B are based on the cities' City Urban Restriction Boundaries (CURB) lines and the Existing Community designation in the unincorporated County. These boundaries are a growth management tool intended to channel growth and protect agricultural and open-space land. The 2011 TGM utilizes existing urban areas (as defined in Appendix B) to provide parameters around eligibility for alternative compliance in two areas: 1) Smart Growth and 2) low income housing projects.

Extended Detention Basin: A surface vegetated basin used to provide flow control for a particular drainage basin. Stormwater temporarily fills the extended detention basin during large storm events and is slowly released over a number of hours, reducing peak flow rates.

Facility: Is a collection of industrial process discharging stormwater associated with industrial activity within the property boundary or operational unit.

Filter Fabric: Geotextile of relatively small mesh or pore size that is used to: (a) allow water to pass through while keeping sediment out (permeable); or (b) prevent both runoff and sediment from passing through (impermeable).

Filter Strip: A gently sloping, densely grassed area used to filter, slow, and infiltrate stormwater.

Flow Control Facility: Any structure or drainage device that is designed, constructed, and maintained to collect, retain, infiltrate, or detain surface water runoff during and after a storm event for the purpose of controlling post-development quantity leaving the site.

Flow Control: The practice of limiting the release of peak flow rates, flow durations, and volumes from a site. Flow control is intended to protect downstream properties, infrastructure, and natural resources from the increased stormwater runoff flow rates and volumes resulting from development.

Grading: The cutting and/or filling of the land surface to a desired shape or elevation.

Green Roof: A roofing system that layers a soil/vegetative cover over a waterproofing membrane. Green roofs rely on highly porous media and moisture retention layers to store intercepted precipitation and to support vegetation that can reduce the volume of stormwater runoff via evapotranspiration

Hazardous Substance: (1) Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive; (2) Any substance named by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or if otherwise emitted into the environment.

Hazardous Waste: By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (flammable, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

Hillside: Property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25 percent or greater.

Hydrodynamic Separation: Flow-through structures with a settling or separation unit to remove sediments and other pollutants in which no outside power source is required, because the energy of the flowing water allows the sediments to efficiently separate. Depending on the type of unit, this separation may be by means of swirl action or indirect filtration.

Illegal Discharges: Any discharge to a municipal separate storm sewer that is not composed entirely of stormwater except discharges authorized by an NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

Impervious Surface / Area: A hard surface area which either prevents or retards the entry of water into the predevelopment soil mantle. A hard surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under predevelopment conditions. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, (impermeable) concrete or asphalt paving, gravel roads, packed earthen materials, and oiled macadam or other surfaces which similarly impede the natural infiltration of storm water.

Industrial General Permit: A NPDES permit issued by the State Water Resources Control Board for the discharge of Stormwater associated with industrial activity.

Infiltration: The downward entry of water into the surface of the soil.

Infiltration Trench: A linear excavation, backfilled with gravel, used to filter pollutants and infiltrate storm water.

Integrated Pest Management Plan (IPMP): A balanced approach to pest management which incorporates the many aspects of plant health care in ways that mitigate harmful environmental impacts and protect human health.

Inlet: An entrance into a ditch, storm sewer, or other waterway.

Legacy Pollutants: Pollutants that are no longer in production but remain in site soils and groundwater and still have the potential to cause ecological and water quality impacts.

Material Storage Areas: On site locations where raw materials, products, final products, by-products, or waste materials are stored.

Maximum Extent Practicable (MEP): The technology-based permit requirement established by Congress in CWA section 402(p)(3)(B)(iii) that municipal dischargers of stormwater must meet. Technology-based requirements, including MEP, establish a level of pollutant control that is derived from available technology or other controls. MEP requires municipal dischargers to perform at maximum level that is practicable. Compliance with MEP may be achieved by emphasizing pollution prevention and source control BMPs in combination with structural and treatment methods where appropriate. The MEP approach is an ever evolving and advancing concept, which considers technical and economic feasibility.

Municipal Separate Storm Sewer System (MS4) Permit: : A NPDES permit issued by the Regional Water Quality Control Board for the discharge of Stormwater from Municipal Separate Storm Sewer Systems.

New Development: Land disturbing activities; structural development, including construction or installation of a building or structure, creation and replacement of impervious surfaces; and land subdivision.

Non-Stormwater Discharge: Any discharge to municipal separate storm drain that is not composed entirely of stormwater. Discharges containing process wastewater, non-contact cooling water, or sanitary wastewater are non-stormwater discharges.

Non-Structural Source Control Measure: Low technology, low cost activities, procedures or management practices designed to prevent pollutants associated with site functions and activities from being discharged with Stormwater runoff. Examples include good housekeeping practices, employee training, standard operating practices, inventory control measures, etc.

Notice of Intent (NOI): A formal notice to State Water Resources Control Board submitted by the owner/developer that a construction project is about to begin. The NOI provides information on the owner, location, type of project, and certifies that the permittee will comply with the conditions of the construction general permit.

NPDES Permit: An authorization, license, or equivalent control document issued by EPA or an approved State agency to implement the requirements of the NPDES program.

Operations and Maintenance (O&M): The continuing activities required to keep storm water management facilities and their components functioning in accordance with design objectives.

Outfall: The point where stormwater discharges from a pipe, channel, ditch, or other conveyance to a waterway.

Parking Lot: Land area or facility for the temporary parking or storage of motor vehicles used personally, for business or for commerce with an impervious surface area of 5,000 square feet or more, or with 25 or more parking spaces.

Permeability: A property of soil that enables water or air to move through it. Usually expressed in inches/hour or inches/day.

Pervious Surface/Area: A surface or area with a surface (i.e., soil, loose rock, permeable pavement, etc.) that allows water to infiltrate (soak) into the ground.

Planter Box: A structural facility filled with topsoil and gravel and planted with vegetation. The planter is completely sealed, and a perforated collection pipe is placed under the soil and gravel, along with an overflow provision, and directed to an acceptable destination point. The storm water planter receives runoff from impervious surfaces, which is filtered and retained for a period of time.

Pollutant: An elemental or physical material that can be mobilized or dissolved by water or air and creates a negative impact to human health and/ or the environment. Pollutants include suspended solids (sediment), heavy metals (such as lead, copper, zinc, and cadmium), nutrients (such as nitrogen and phosphorus), bacteria and viruses, organics (such as oil, grease, hydrocarbons, pesticides, and fertilizers), floatable debris, and increased temperature.

Pollutants of Concern: constituents that have exceeded Basin Plan Objectives, and California Toxics Rule chronic or acute objectives during monitoring at mass emission, receiving water, and land use stations.

Pollution Reduction: The practice of filtering, retaining, or detaining surface water runoff during and after a storm event for the purpose of maintaining or improving surface and/or groundwater quality.

Precipitation: Any form of rain or snow.

Predevelopment: The existing land use condition prior to the proposed development activity.

Practicable: Available and capable of being done, after taking into consideration existing technology, legal issues, and logistics in light of overall project purpose.

Pre-developed Condition: the native vegetation and soils that existed at a site prior to first development. The pre-developed condition may be assumed to be the typical vegetation, soil, and stormwater runoff characteristics of open space areas in coastal Southern California unless reasonable historic information is provided that the area was atypical.

Pre-project Condition: the condition of the site at the time of the proposed project.

Pretreatment: Treatment of wastewater before it is discharged to a wastewater collection system.

Process Wastewater: Wastewater that has been used in one or more industrial processes.

Project: development, redevelopment, and land disturbing activities. The term is not limited to "project" as defined under CEQA (Reference: California Public Resources Code § 21065).

Public Facility: A street, right-of-way, park, sewer, drainage, storm water management, or other facility that is either currently owned by the City/County or will be conveyed to the City/County for maintenance responsibility after construction.

Rainwater Harvesting: Rainwater harvesting is a BMP that stores and uses rainwater or stormwater runoff. This is consistent with the use of the term "reuse" contained in Order R4-2010-0108.

Receiving Stream: (for purposes of this Manual only) any natural or man-made surface water body that receives and conveys stormwater runoff.

Redevelopment: Land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of a routine maintenance activity; and land disturbing activities related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety. Note: redevelopment as defined here is not the same as a "Redevelopment Project" as defined by California redevelopment law.

Redevelopment Project Area Master Plan (RPAMP): A plan submitted to the Regional Water Board for approval by a Permittee or a coalition of Permittees to establish standards for redevelopment projects within Redevelopment Project Areas, in consideration of exceptional site constraints that inhibit site-by-site or project-by-project implementation of post-construction requirements. See Section 4.E.IV.3 of Order R4-2010-0108.

Restaurant: A stand-alone facility that sells prepared foods and/or drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and/or drinks for immediate consumption (SIC code 5812).

Retail Gasoline Outlet: Any facility engaged in selling gasoline and lubricating oils.

Retention Facility: A facility designed to receive and hold stormwater runoff. Rather than storing and releasing the entire runoff volume, retention facilities permanently retain a portion of the water on-site, where it infiltrates, evaporates, or is absorbed by surrounding vegetation. In this way, the full volume of storm water that enters the facility is not released off-site.

Retrofit: Retrofit projects implement structural treatment BMPs as a stand-alone project, without other site improvements. The BMP sizing requirements of this Technical Guidance Manual do not apply to retrofit projects.

Runoff: Water originating from rainfall and other precipitations (e.g., sprinkler irrigation) that is found in drainage facilities, rivers, streams, springs, seeps, ponds, lakes, wetlands, and shallow groundwater.

Runon: Stormwater surface flow or other surface flow which enters property other than that where it originated.

Secondary Containment: Structures, usually dikes or berms, surrounding tanks or other storage containers and designed to catch spilled material from the storage containers.

Sedimentation: The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff.

Sediments: Soil, sand, and minerals washed from land into water usually after rain, that accumulate in reservoirs, rivers, and harbors, destroying aquatic animal habitat and clouding the water so that adequate sunlight might not reach aquatic plants.

Site: land or water area where any “facility” or “activity” is physically located or conducted including adjacent land used in connection with the facility or activity.

Source Control BMP or Measure: Any schedules of activities, structural devices, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent Stormwater pollution by reducing the potential for contamination at the source of pollution.

Source Control BMPs: Operational practices or design features that prevent pollution by reducing potential pollutants at the source.

Spill Guard: A device used to prevent spills of liquid materials from storage containers.

Spill Prevention Control and Countermeasures Plan (SPCC): Plan consisting of structures, such as curbing, and action plans to prevent and respond to spills of hazardous substances as defined in the Clean Water Act.

Storm Drains: Above and below ground structures for transporting stormwater to streams or outfalls for flood control purposes.

Storm Drain System: Network of above and below-ground structures for transporting stormwater to streams or outfalls.

Storm Event: A rainfall event that produces more than 0.1 inch of precipitation and is separated from the previous storm event by at least 72 hours of dry weather.

Stormwater Discharge Associated with Industrial Activity: Discharge from any conveyance which is used for collecting and conveying stormwater which is related to manufacturing processing or raw materials storage areas at an industrial plant [see 40 CFR 122.26(b)(14)].

Stormwater: Stormwater runoff, snow-melt runoff, surface runoff, and drainage, excluding infiltration and irrigation tailwater.

Structural BMP or Control Measure: Any structural facility designed and constructed to mitigate the adverse impacts of stormwater and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both Treatment Control BMPs and Source Control BMPs.

Total Project Area: Total project area (or "gross project area") for new development and redevelopment projects is the disturbed, developed, and undisturbed portions within the project's property (or properties) boundary, at the project scale submitted for first approval. Areas proposed to be permanently dedicated for open space purposes as part of the project are explicitly included in the "total project area." Areas of land precluded from development through a restrictive covenant, conservation easement, or other recorded document for the permanent preservation of open space prior to project submittal shall not be included in the "total project area."

Total Suspended Solids (TSS): Matter suspended in stormwater excluding litter, debris, and other gross solids exceeding 1 millimeter in diameter.

Treatment Control BMP or Measure: Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.

Treatment: The application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media adsorption, biodegradation, biological uptake, chemical oxidation and UV radiation.

Tributary Area: The area from which all runoff produced flows to the same specific discharge point.

Vegetated Facilities: Stormwater management facilities that rely on plantings to enhance their performance. Plantings can provide wildlife habitat and enhance many facility functions, including infiltration, pollutant removal, water cooling, flow calming, and prevention of erosion.

Vegetated Swale: A long and narrow, trapezoidal or semicircular channel, planted with a variety of trees, shrubs, and grasses or with a dense mix of grasses. Stormwater runoff from impervious surfaces is directed through the swale, where it is slowed and in some cases infiltrated, allowing pollutants to settle out. Check dams are often used to create small ponded areas to facilitate infiltration.

APPENDIX B : MAPS

NOTES:

1. Contact the local permitting authority for more detailed maps.
2. Existing Urban Area maps are current as of 11/2/10.

Legend

- River
- Lake
- National Forest
- 10-Digit Hydrologic Unit Boundary

Existing Urban Area

- Camarillo
- Fillmore
- Moorpark
- Oxnard
- Santa Paula
- Simi Valley
- Thousand Oaks
- Port Hueneme
- Ventura
- Ojai
- Urban County
- Non-Urban County
- Adjacent County

10 5 0 10 Miles

Hydrologic Areas

Ventura County, CA

Geosyntec consultants

Figure **B-1**

Oakland Office | April 2010

P:\GIS\Ventura_County_Manual\Projects\B-1_Ventura_County_Watersheds_MS4_Urban_Areas_042910.mxd, WHL, September 1, 2010

Legend

- BIOL Designated Waterbody
- 303(d) Listed Waterbody
- Environmentally Sensitive Habitat Areas
- Lake
- National Forest

Existing Urban Area

- Camarillo
- Fillmore
- Moorpark
- Oxnard
- Santa Paula
- Simi Valley
- Thousand Oaks
- Port Hueneme
- Ventura
- Ojai
- Urban County
- Non-Urban County
- Adjacent County

10 5 0 10 Miles

Environmentally Sensitive Areas
Ventura County, CA

Geosyntec consultants

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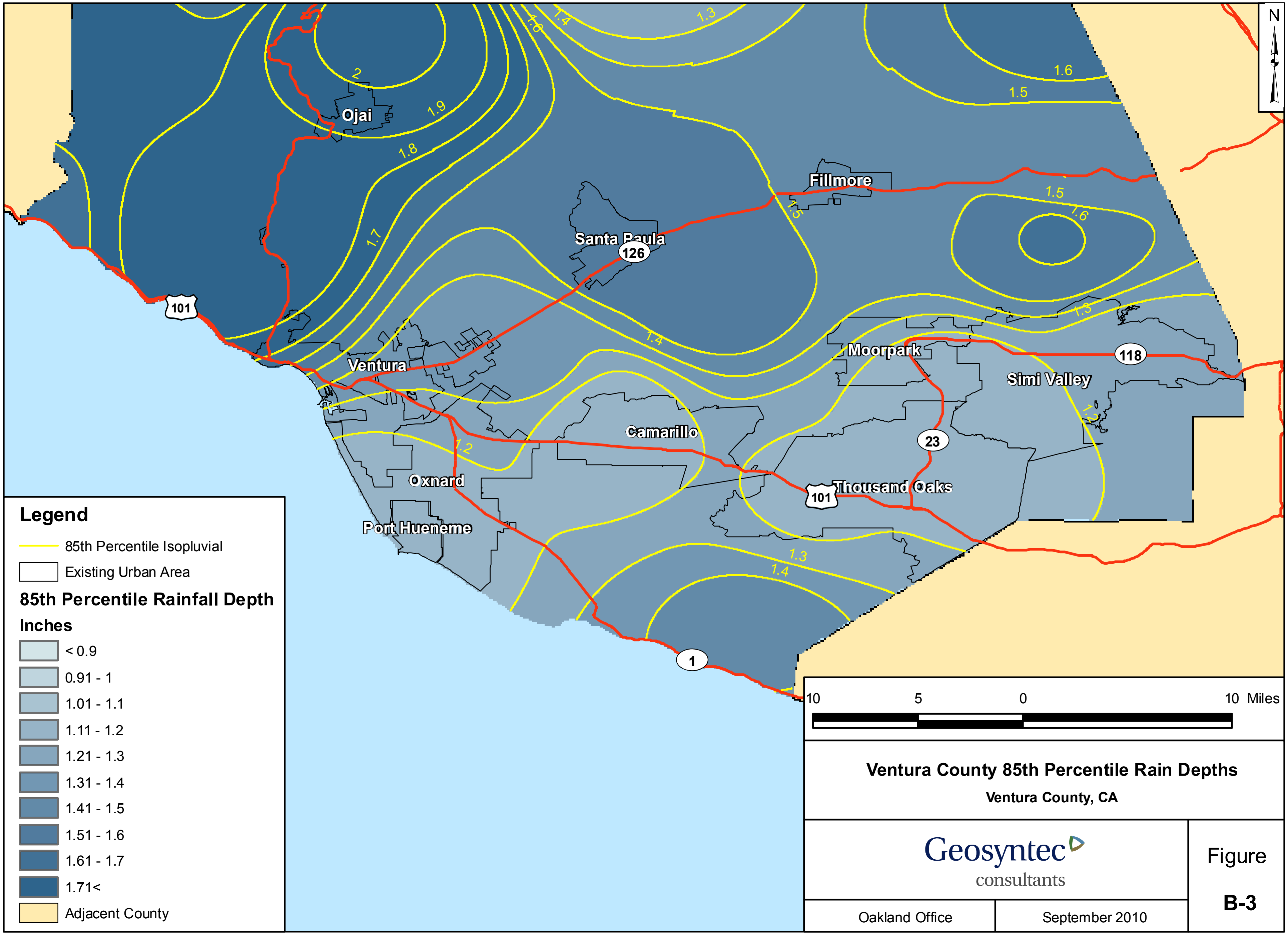
Figure **B-2**

B-2_Ventura_County_ESA_042910.mxd, WHL, September 1, 2010



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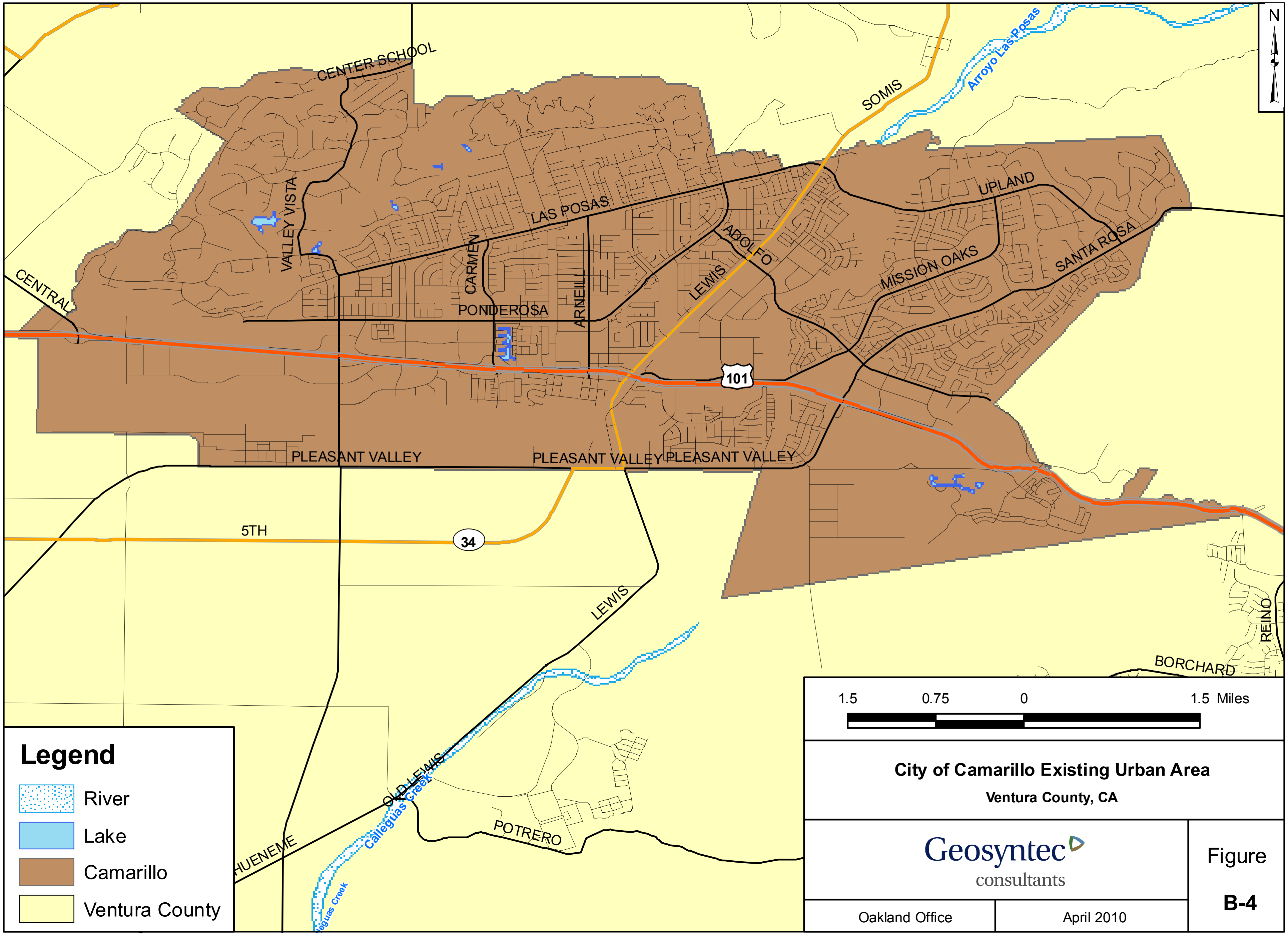

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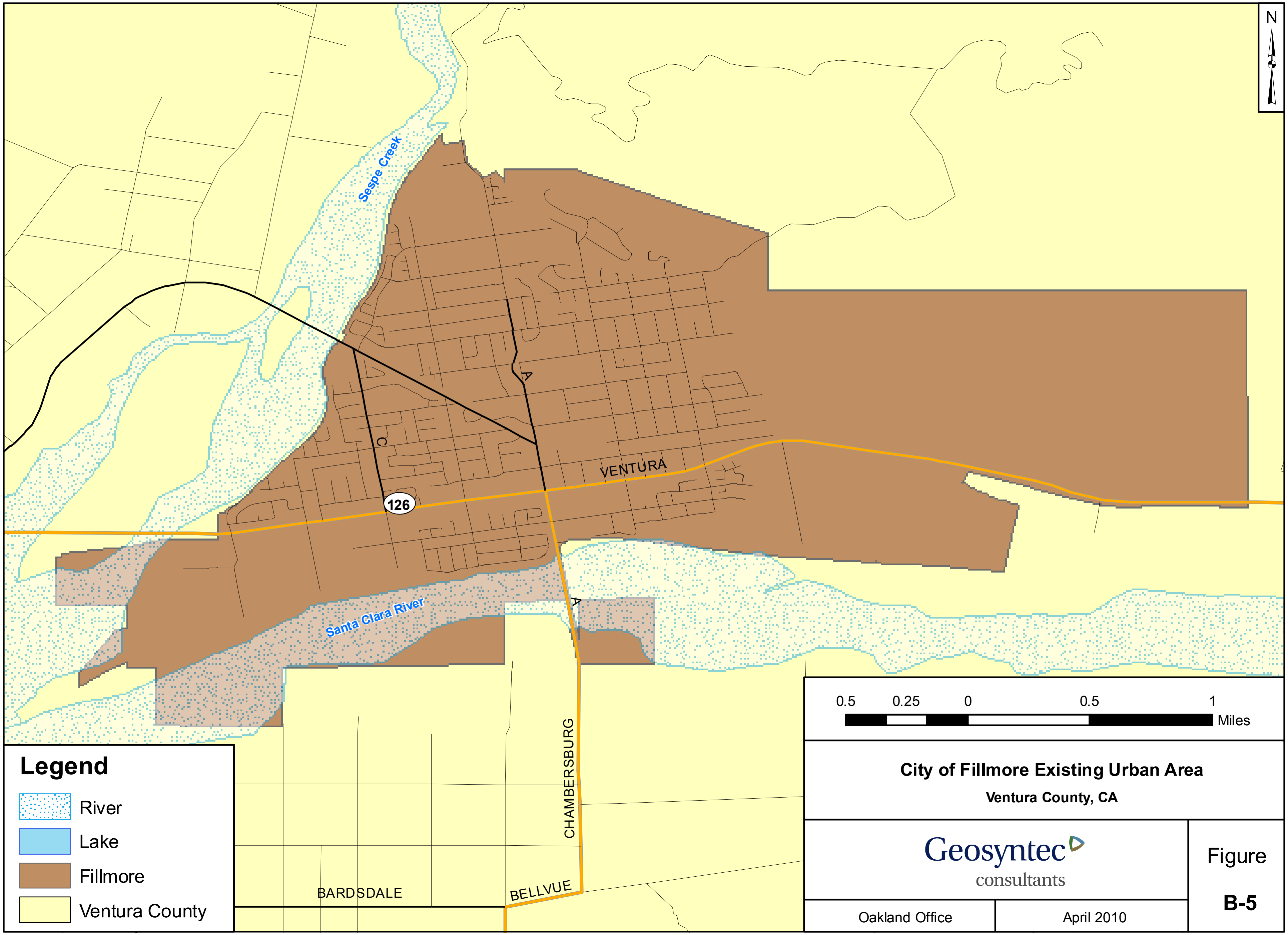

City of Fillmore Existing Urban Area

Ventura County, CA

Geosyntec consultants

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Figure **B-5**

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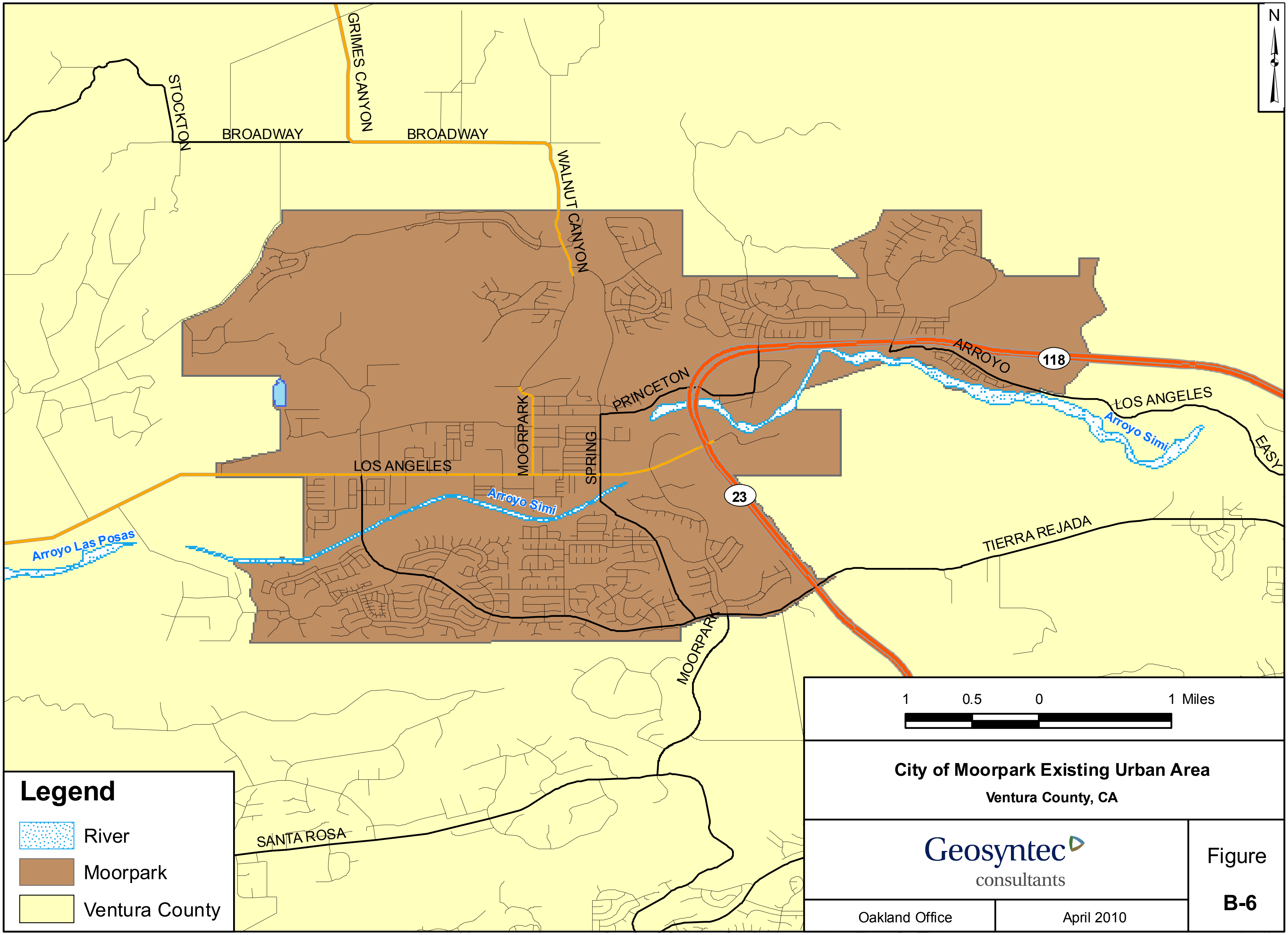

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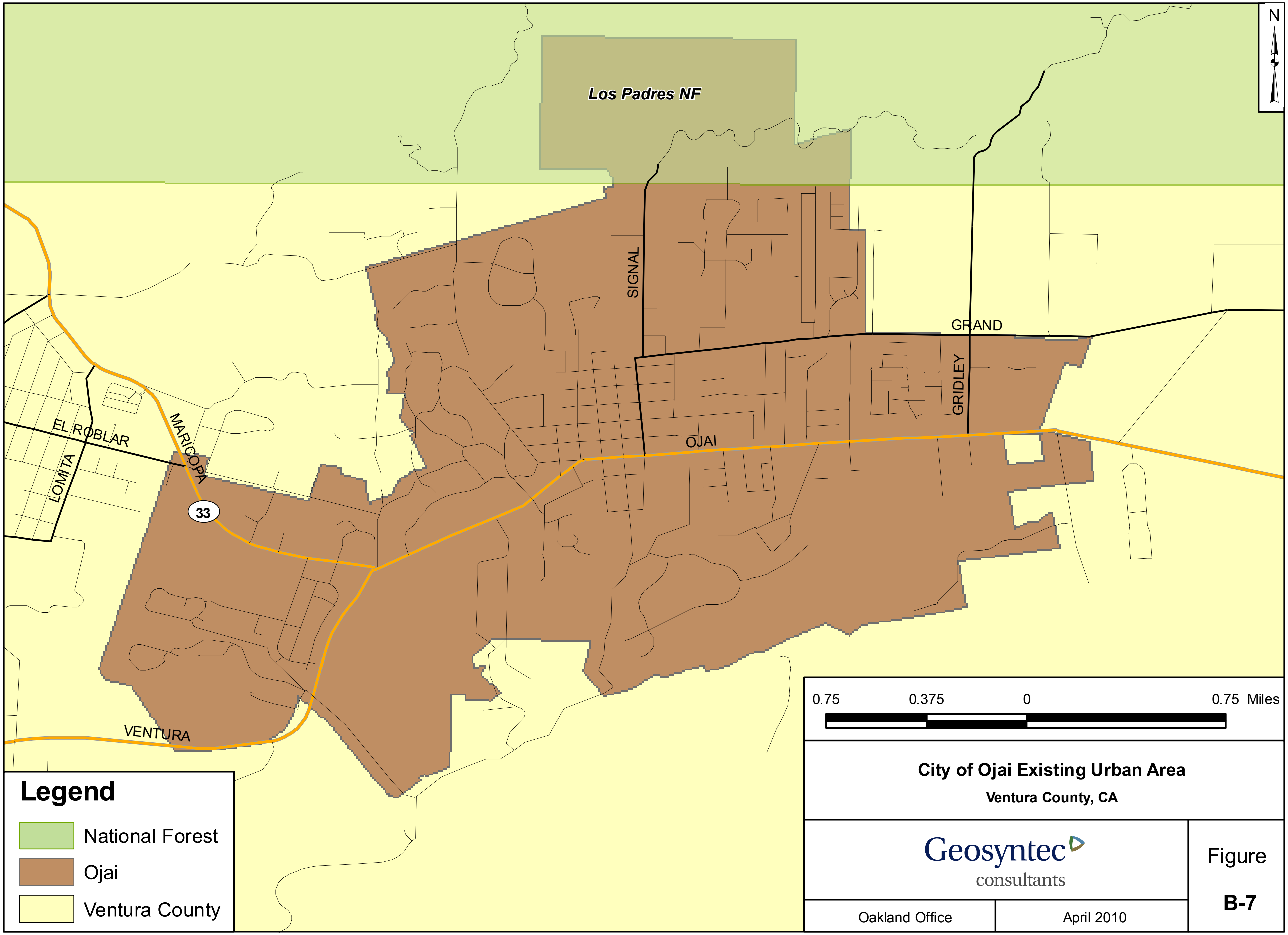

City of Ojai Existing Urban Area

Ventura County, CA

Geosyntec consultants

Figure **B-7**

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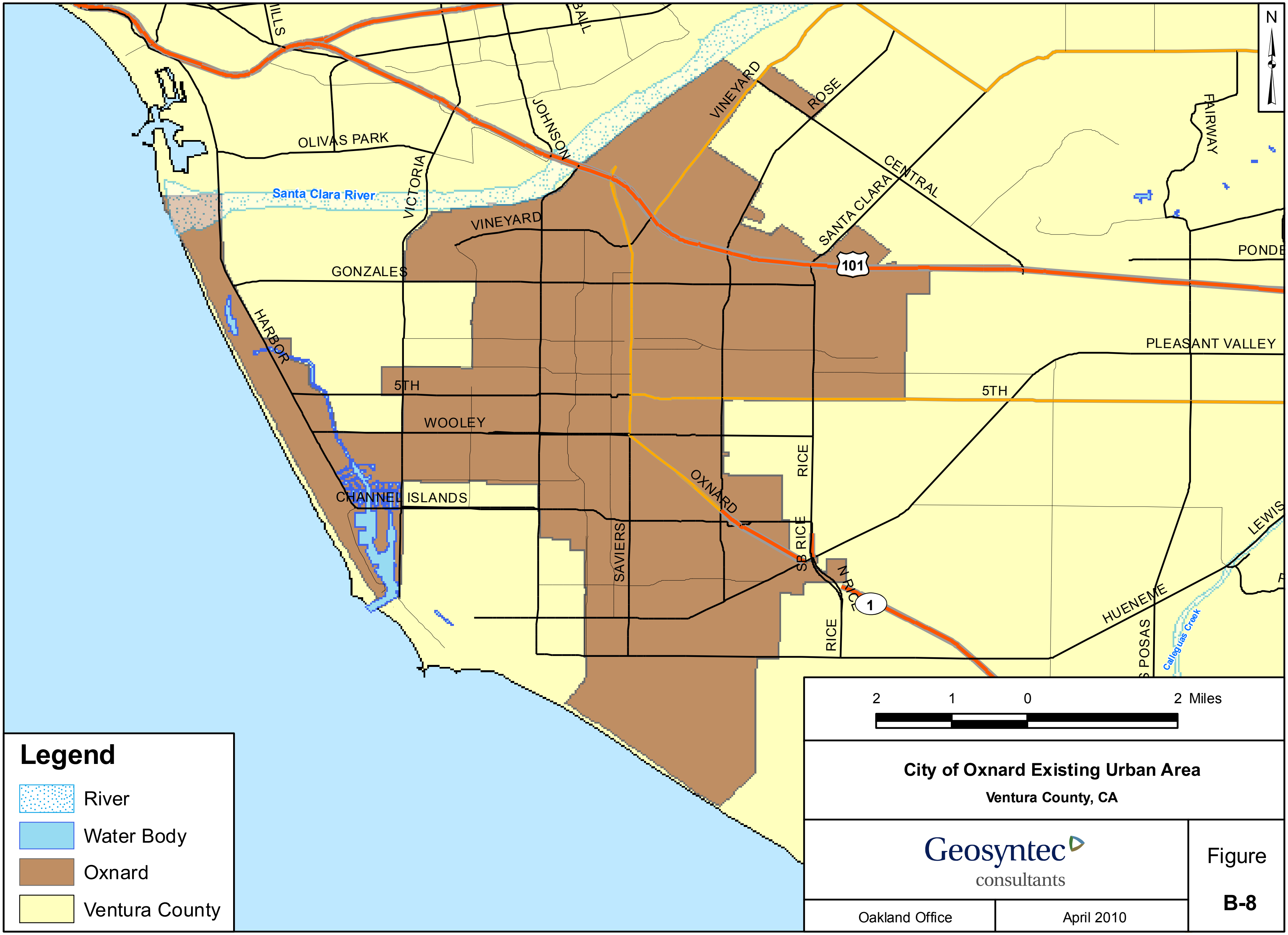

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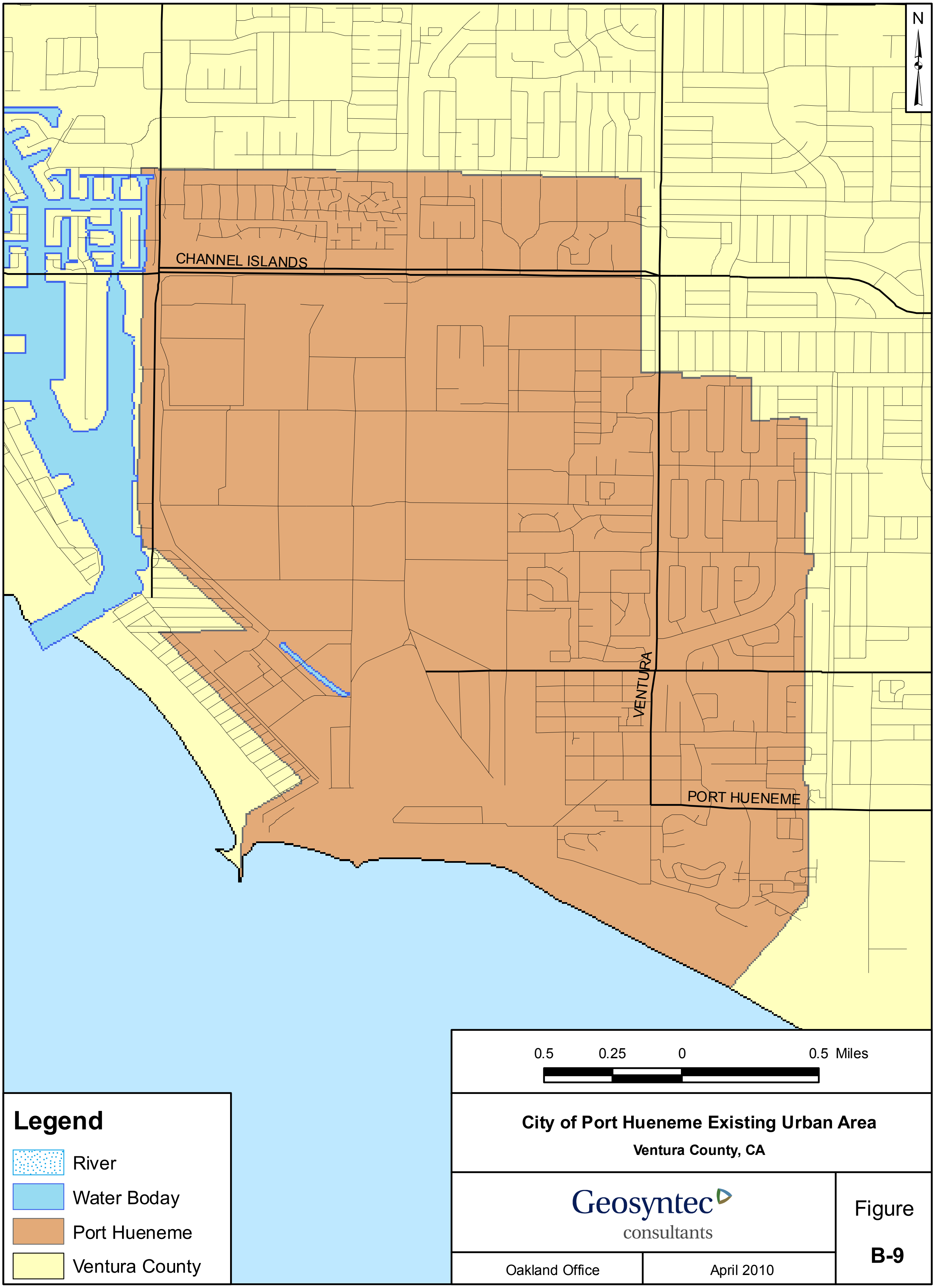

City of Port Hueneme Existing Urban Area

Ventura County, CA

Geosyntec consultants

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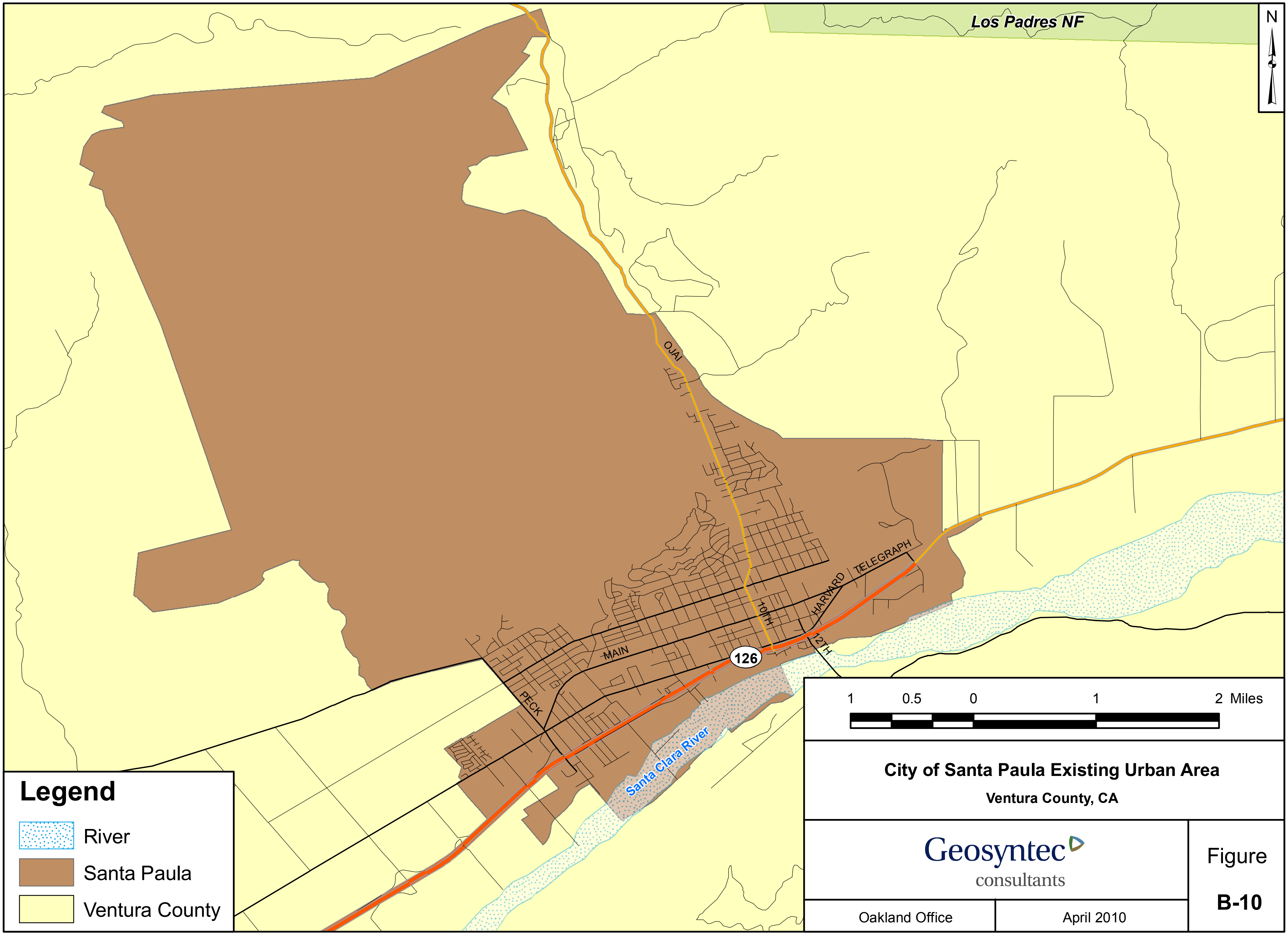
Figure **B-9**

P:\GIS\Ventura_County_Manual\Projects\B-9_Port_Hueneme_MS4_Urban_Areas_092310.mxd, WHL, September 23, 2010



City of Santa Paula Existing Urban Area

Ventura County, CA

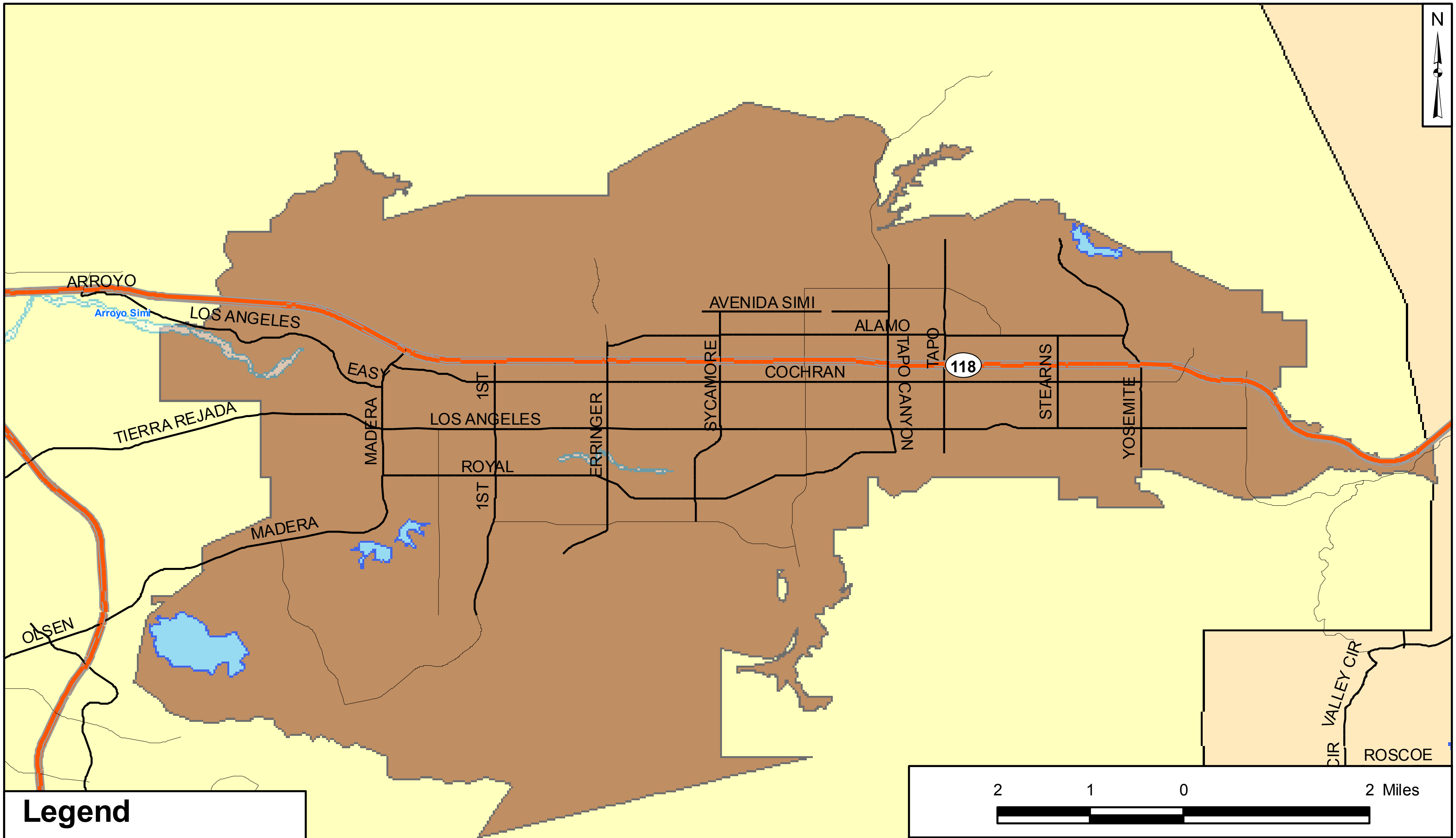
Geosyntec consultants

Figure

B-10

Oakland Office | April 2010

P:\GIS\Ventura_County_Manual\Projects\B-10_Santa_Paula_MS4_Pop_Areas_092310.mxd, WHL, September 23, 2010



Legend

- River
- Lake
- Simi Valley
- Ventura County
- Los Angeles County

City of Simi Valley Existing Urban Area

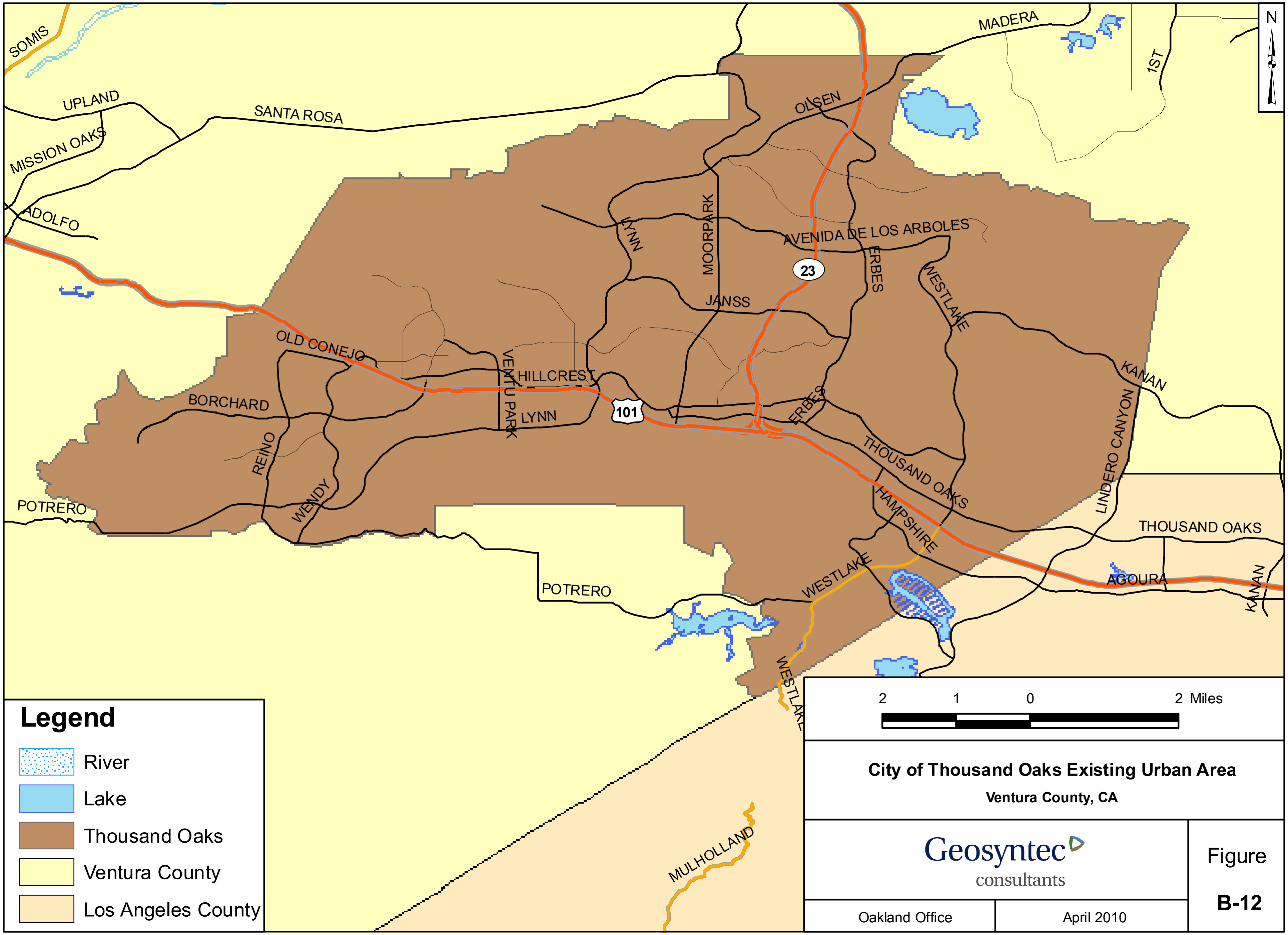
Ventura County, CA

Geosyntec consultants

Figure **B-11**

Oakland Office | April 2010

P:\GIS\Ventura_County_Manual\Projects\Simi_Valley_MS4_Pop_Areas_092310.mxd, WHL, September 23, 2010



City of Thousand Oaks Existing Urban Area

Ventura County, CA

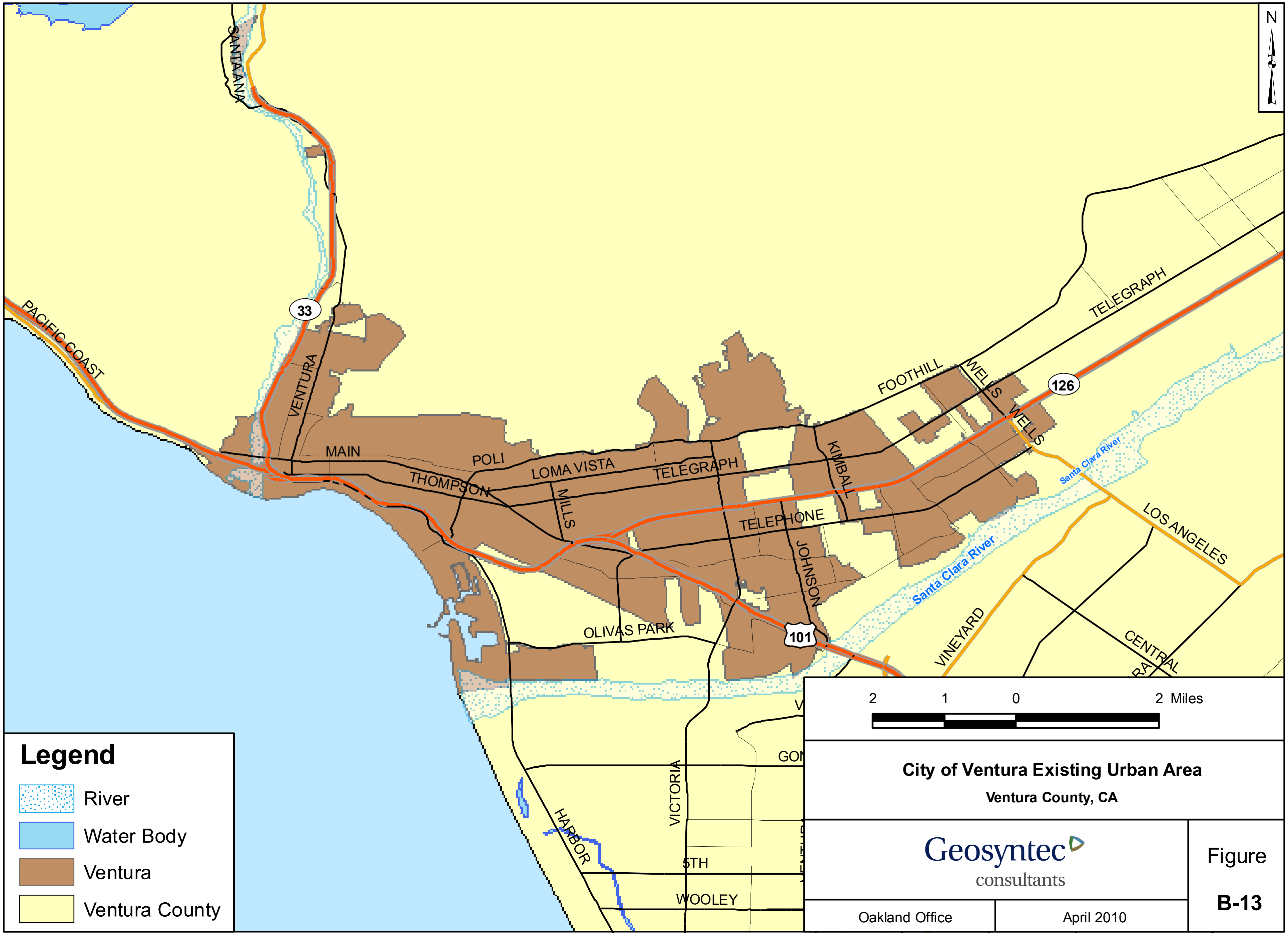
Geosyntec consultants

Figure

B-12

Oakland Office | April 2010

P:\GIS\Ventura_County_Manual\Projects\B-12_Thousand_Oaks_MS4_Pop_Areas_092310.mxd, WHL, September 23, 2010



City of Ventura Existing Urban Area

Ventura County, CA

Geosyntec consultants

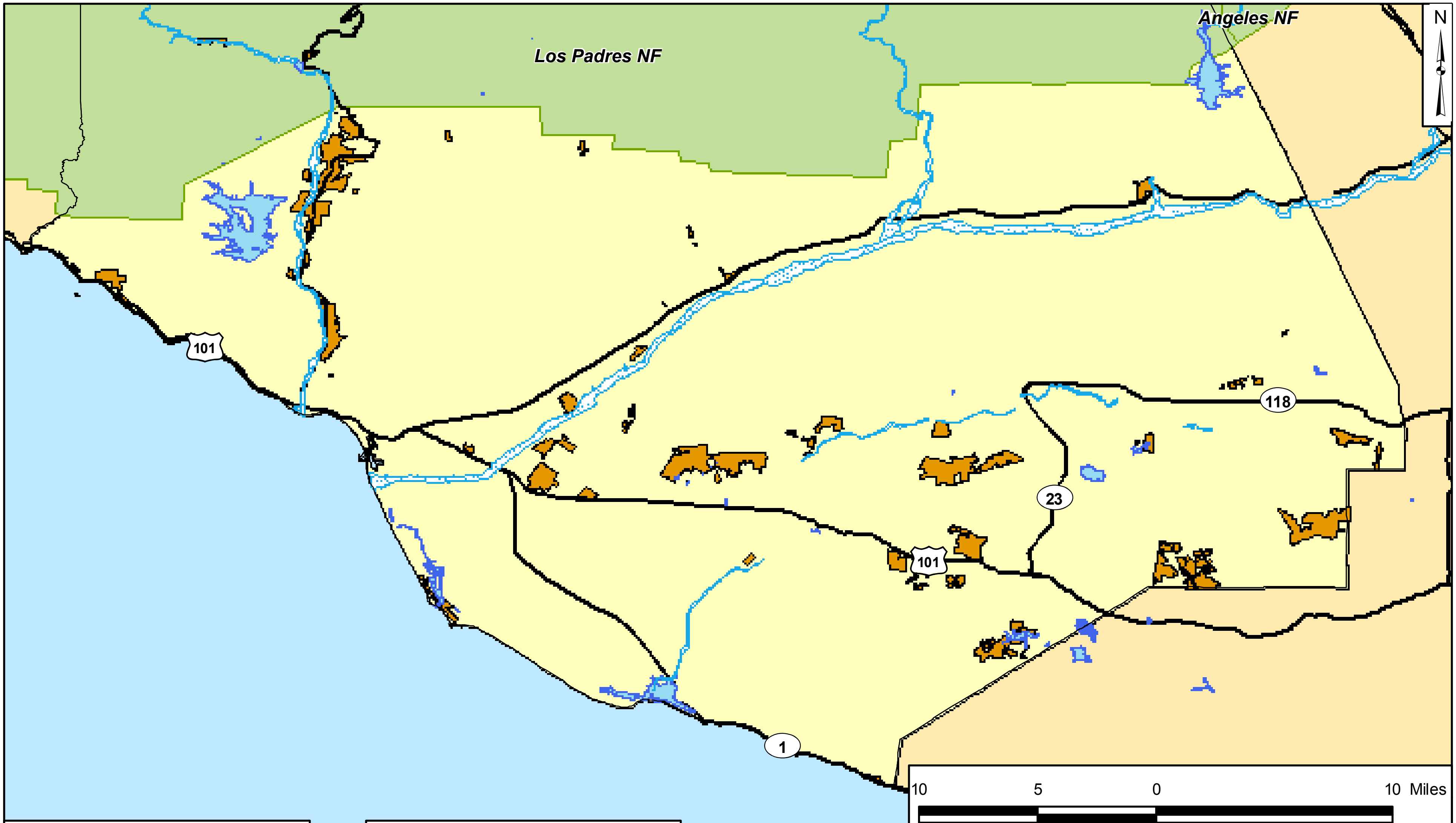
Figure

B-13

Oakland Office

April 2010

P:\GIS\Ventura_County_Manual\Projects\B-13_Ventura_MS4_Pop_Areas_092310.mxd, WHL, September 23, 2010



Legend

- River
- Lake
- Unincorporated Urban County
- National Forest
- Non-Urban County
- Adjacent County

Note: An Unincorporated Urban Center is an existing or planned community which is located in an Area of Interest where no city exists. The unincorporated urban center represents the focal center for community and planning activities within an Area of Interest. For example, the Community of Piru represents the focal center in the Piru Area of Interest. This map represents the existing Unincorporated Urban Centers as defined by the Ventura County General Plan.

Ventura County Unincorporated Urban Areas

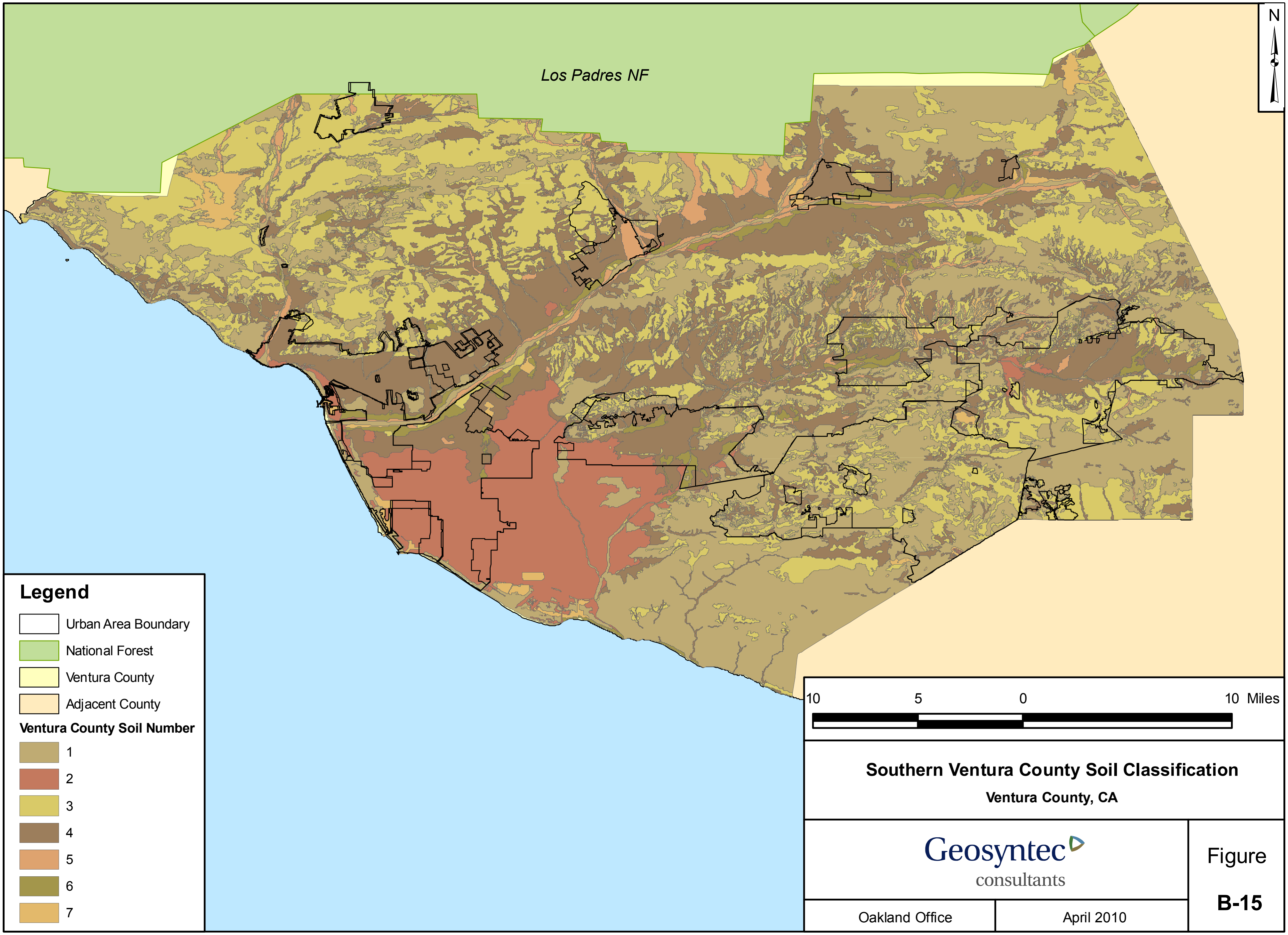
Ventura County, CA

Geosyntec consultants

Oakland Office | April 2010

Figure **B-14**

P:\GIS\Ventura_County_Manual\Projects\B-14_Ventura_County_Urban_092310.mxd, WHL, September 23, 2010



Southern Ventura County Soil Classification

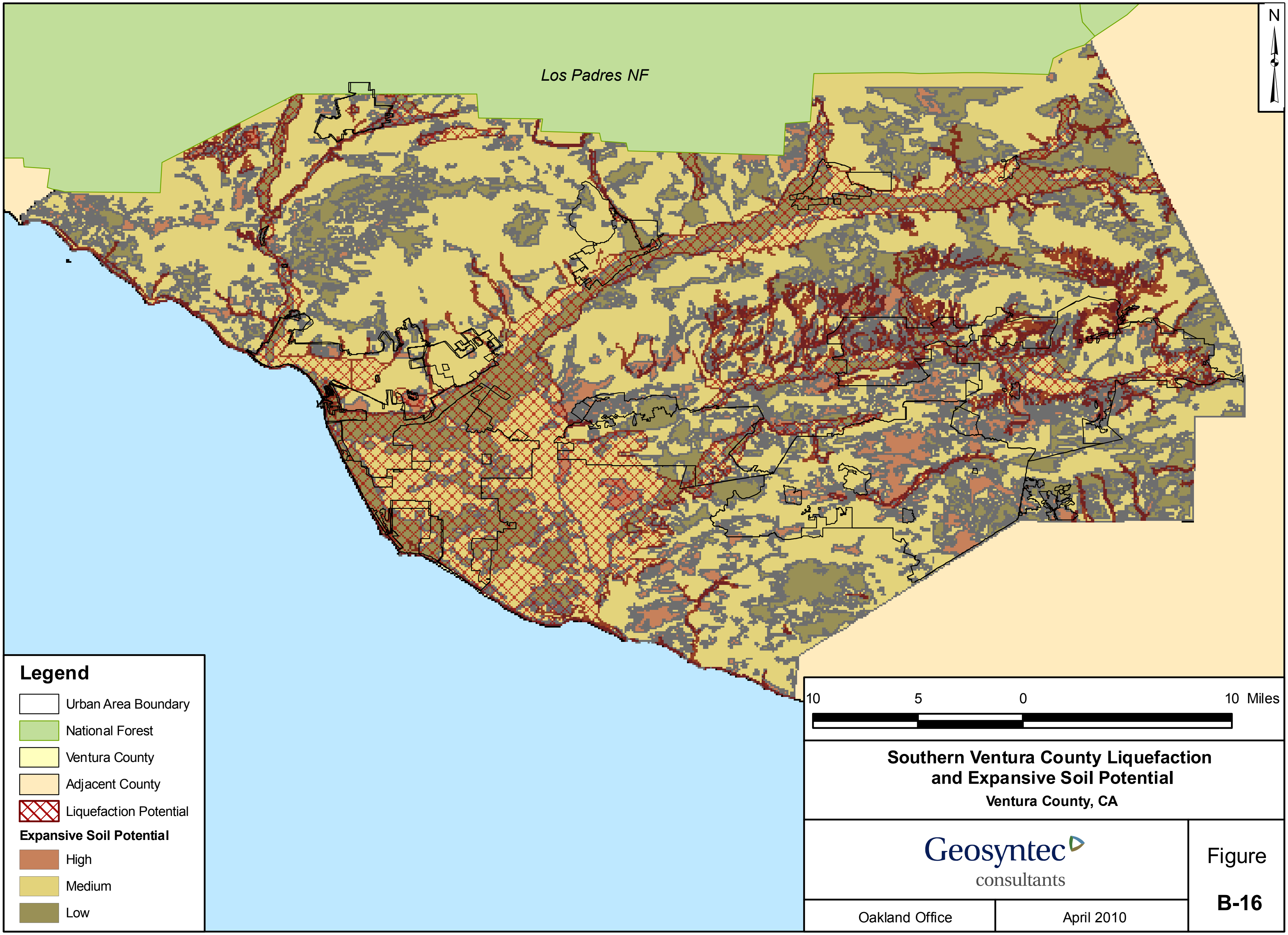
Ventura County, CA

Geosyntec consultants

Figure **B-15**

Oakland Office | April 2010

P:\GIS\Ventura_County_Manual\Projects\B-15_Ventura_Soils_092310.mxd, WHL, September 23, 2010



Southern Ventura County Liquefaction and Expansive Soil Potential

Ventura County, CA

Geosyntec consultants

Oakland Office | April 2010

Figure **B-16**

P:\GIS\Ventura_County_Manual\Projects\B-16_Liq_Expan_Soils_092310.mxd, WHL, September 23, 2010

APPENDIX C: SITE SOIL TYPE AND INFILTRATION TESTING

C.1 Introduction

The purpose of site soil and infiltration testing is to more accurately determine where LID and structural treatment BMPs should be located and if infiltration is feasible on the site. The preliminary site assessment, discussed in Section 3, will likely reduce the number of test pit investigations needed by identifying candidate test sites that are most amenable to infiltration. This section summarizes the methods for conducting (1) soil test pit investigations and (2) infiltration testing at key locations identified in the preliminary site assessment that require further investigation.

A qualified soil scientist or geotechnical professional should conduct the test pit investigation and infiltration tests. The professional should be experienced with the testing procedures as well as the hydraulic functioning of the potential BMPs to ensure that additional information regarding BMP siting is acquired during the test pit investigation and infiltration tests.

This appendix is not intended to be applied as a protocol for conducting soil and infiltration testing. Instead, this section is provided to assist in specifying and standardizing soil and infiltration testing techniques across sites within Ventura County where development is occurring.

C.2 Test Pit Investigations

A test pit investigation is an integral part of assessing site soil conditions. Soil maps and hydrologic soil groups are based on regional data and provide only a general understanding of what to expect; however, there are undoubtedly unknowns that will be discovered during these initial field observations. A test pit investigation involves digging or excavating a test pit (deep hole). By excavating a test pit, overall soil conditions (both vertically and horizontally) can be observed in addition to the soil horizons. To maximize the knowledge gained during the test pit investigation, many tests and observations should be conducted during this process.

Test pits should be excavated to a depth at least three feet deeper than the proposed bottom of non-infiltration BMPs and at least eleven feet deeper than the proposed bottom of infiltration BMPs. A project that imports fill must characterize the proposed soil profile at the specified depths. For example, if the proposed depth of fill is 5 feet below grade and an infiltration BMP is to be used in the location of the fill, both the fill and the native subsoil require soil characterization. Figure C-1 illustrates the proposed soil profile that would result with 3 feet of fill. Since the test pit must be excavated to a depth that is 11 feet deeper than the bottom of the proposed infiltration BMP, a test pit investigation of the top 8 feet of native subsoil is required, in addition to the laboratory sample of the fill material. Characterization of the fill material should be conducted in a laboratory. It is recommended that soil compaction is limited in the location of a proposed infiltration BMP.

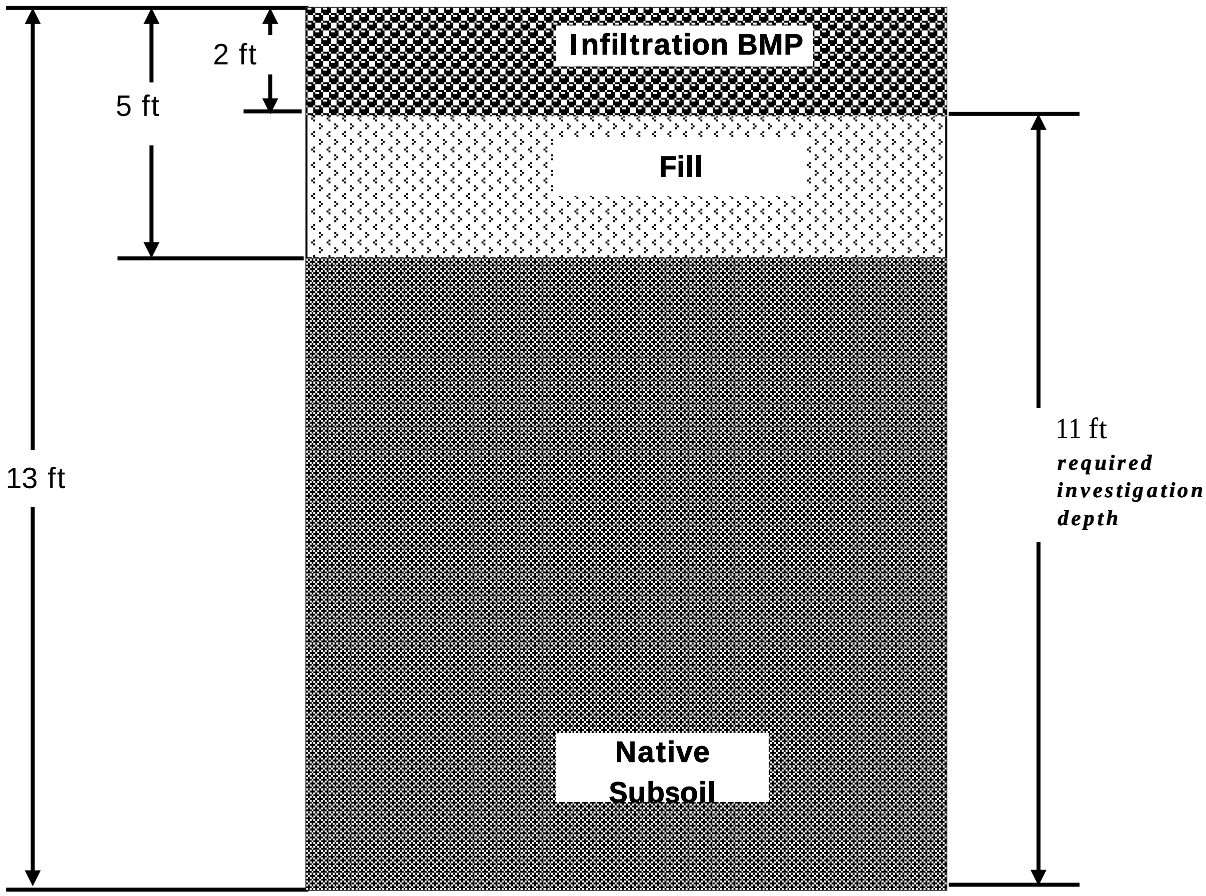


Figure C-1: Post-fill Soil Profile

As the test pit is excavated, the following measurements should be made:

Standard penetration testing to determined the relative density as it changes with depth (minimum intervals of 2 - 3 feet), and

Infiltration testing with at least one test occurring at the proposed bottom of the BMP and one test occurring of the bottom of the test pit (11 feet below the bottom of the infiltration BMP).

In addition, many observations should be made during and after the excavation of the soil pit, including:

- Elevation of groundwater table or indications of seasonally high groundwater table should be noted using the NRCS hydric soil field indicators guide (NRCS, 2003).
- Soil horizon observations, including: depths indicating upper and lower boundaries of the soil horizons, depths to limiting layers (i.e., bedrock and clay), soil textures, colors and their patterns, and estimates of the type and percent of coarse fragments.

- Locations and descriptions of macropores (i.e., pores and roots).
- Other pertinent information/observations.

The number of test pits required depends largely on the specific site and the proposed development plan. Additional tests should be conducted if local conditions indicate significant variability in soil types, geology, water table elevations, bedrock, topography, etc. Similarly, uniform site conditions may indicate that fewer test pits are required. Excessive testing and disturbance of the soil prior to construction is not recommended. When test pit investigations are complete, including infiltration testing, the pits should be refilled with the original soil and the surface replaced with the original topsoil.

C.3 Infiltration Testing

There are a variety of infiltration field test methodologies available to determine the infiltration rate of a soil. Infiltration tests should be conducted in the field in order to ensure that the measurements are representative of actual site conditions (including inherent heterogeneity). As mentioned above, usually infiltration rates should be determined at a minimum of two locations in each test pit and one must be conducted at the proposed bottom depth of the BMP. The actual number of infiltration tests required depends on the soil conditions; if the soils are highly variable, more tests may be required. To ensure groundwater is protected and that the infiltration BMP is not rendered ineffective by overload, it is important to periodically verify infiltration rates of the constructed BMP(s).

For BMPs that infiltrate water through the surface soil layer (e.g., bioretention areas, permeable pavement), choosing a method that measures infiltration in surface soils is important. For infiltration trenches and drywells, infiltration will occur at a greater depth in the soil matrix; therefore, borehole methods may be more appropriate.

Depending on the type of infiltration BMP and depth at which the infiltration test should be conducted, there are several types of infiltration tests that can be used including: disc permeameters, single and double ring infiltrometers, and borehole permeameters. Disc permeameters are typically used to provide estimates of soil near saturation but can prove to be difficult due to measures of three dimensional flow. This device is also commonly used for assessing infiltration rates of already constructed permeable pavements and is generally not used for assessing infiltration rates prior to site disturbance; therefore, the disc permeameter method will not be discussed further in this Appendix. Single and double ring infiltrometers directly measure vertical flow into the surface of the soil. Double ring infiltrometers account for lateral flow boundary affects with the addition of an outer water reservoir and are generally the preferred method for surface infiltration. Borehole permeameters are best suited to collect infiltration measurements below the soil surface. Two subsurface infiltration methods are discussed below including the Guelph and falling-head permeameters.

C.4 Double Ring Infiltrometer

The double ring infiltrometer method consists of driving two cylinders, one inside the other, into the ground and partially filling them with water and maintaining the liquid at a constant level (ASTM D3385-94). The volume of water added to the inner ring from a separate water reservoir, to maintain the constant head level is comparable to the volume of water infiltrating into the soil. The volume of water added to the inner ring divided by the time period for which the water was added is equal to the infiltration rate. A photograph of a common double ring infiltrometer is provided in Figure C-2.

Figure C-2: Double Ring Infiltrometer

Photo Credit: Geosyntec Consultants (Braga and Fitsik, 2008)

C.5 Borehole Guelph Infiltration Test

For shallow boreholes, the Guelph Permeameter has been developed as a field portable kit. This permeameter consists of a tube that is placed in a hand-drilled shallow borehole and water is provided to the tube through a separate reservoir. Water loss in the reservoir is used to estimate the hydraulic conductivity of the soil, which may be used to calculate infiltration based on various standard models (Soil Moisture Equipment, 2005). A photograph of a Guelph Permeameter is provided in Figure C-3. It is important to remember that this method will include vertical and lateral water flow from the borehole.

Figure C-3: Guelph Permeameter for Shallow Borehole Permeability

Photo Credit: USDA, 2005

C.6 Falling-Head Borehole Infiltration Test

The falling-head borehole infiltration test is commonly applied to assess infiltration at greater depths (e.g. 5 - 25 ft). The method is generally performed according to United States Bureau of Reclamation procedure 7300-89 (USBR, 1990). Caltrans has used the method to site stormwater infiltration structures (Caltrans, 2003). Essentially the method consists of boreholes, installing well casing with slots cut to release water at the target depths, backfilling the borehole, adding pre-soak water, and then filling again with water and recording the stage loss. An example diagram is shown in Figure C-4.

The testing procedures are summarized as follows:

1) Remove any smeared soil surfaces to provide a natural soil interface for testing the percolation of water. Remove all loose material. The U.S. EPA recommends scratching the sides with a sharp pointed instrument. (Note: upon tester's discretion, a 2-inch layer of coarse sand or fine gravel may be placed to protect the bottom from scouring and sediment.) Fill casing with clean water and allow to pre-soak for 24 hours or until the water has completely infiltrated.

2) Refill casing and monitor water level (distance from top of casing to top of water) for 1 hour. Repeat this procedure a total of four times. (Note: upon tester's discretion, the final field rate may either be the average of the four observations

or the value of the last observation. The final rate shall be reported in inches per hour.)

3) Testing may be done through a boring or open excavation.

4) The location of the test must be near the proposed facility.

5) Upon completion of the testing, the casings shall be immediately pulled and the test pit shall be back-filled.

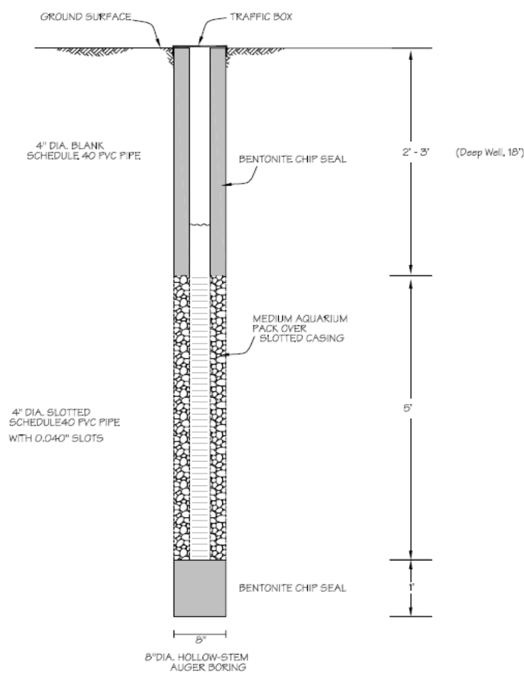


Figure C-4: Falling-Head Permeameter for Deep Borehole Permeability

Diagram Credit: Group Delta Consultants, 2008

C.7 Laboratory Soil Tests

If fill materials imported from off-site are part of an infiltration BMP design, a laboratory test is required to determine the infiltration rate of the fill soil. A sample of the fill soil from each area where a BMP will be located must be tested. The soil sample must be compacted to the same degree that will be present after final grading. Once prepared, the sample should be sent to a specialty laboratory to conduct a test of the infiltration rate. These results may then be used to assess the applicability of a specific BMP.

C.8 Assessment of Test Results

The results from field infiltration methods should be examined to consider data variability and sample distribution to determine if there has been adequate sampling. If the spatial variability (heterogeneity) is large, then additional field measurements may be necessary. The infiltration results should be compared to the information gathered on site soils and geology to see if they are consistent. The results of the site soils and infiltration testing may then be used in the siting, selection, sizing, and design of LID site design techniques and structural treatment BMPs.

C.9 References

ASTM D 3385-94, 2003. “Standard Test Method for Infiltration Rate of Soils Field Using Double-Ring Infiltrometer.” American Society for Testing Materials, Conshohocken, PA. 10 Jun, 2003.

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Natural Resources Conservation Service (NRCS), 2003. “Field Indicators of Hydric Soils in the United States Guide for Identifying and Delineating Hydric Soils”, Version 5.01, United States Department of Agriculture. 2003

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United States Environmental Protection Agency (USEPA). 1994. Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, Report No. EPA/600/R-94/051.

United States Department of Agriculture (USDA), 2005. “Water Movement in Soils - June 2005” website of Jay Jabro. http://fs-sdy2.sidney.ars.usda.gov/stationgallery/jayjabro/index.html

United States Department of the Interior, Bureau of Reclamation (USBR), 1990a, "Procedure for Performing Field Permeability Testing by the Well Permeameter Method (USBR 7300-89)," in Earth Manual, Part 2, A Water Resources Technical Publication, 3rd ed., Bureau of Reclamation, Denver, Colo.

Yerkes et al, 1965, “Geology, Los Angeles, California – An Introduction”. Geological Survey Professional Paper, 420-A.

APPENDIX D : BMP PERFORMANCE GUIDANCE

D.1 Permit Requirement

Part 3, Section A.3 of Order R4-2010-0108 states the following:

> 3. *Each Permittee shall require that treatment control BMPs being implemented under the provisions of this Order shall be designed, at a minimum, to achieve the BMP performance criteria for storm water pollutants likely to be discharged as identified in Attachment "C", for an 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area using a 48 to 72-hour draw down time, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998). Expected BMP pollutant removal performance for effluent quality was developed from the WERF-ASCE/ U.S. EPA International BMP Database. Permittees shall select Treatment BMPs based on the primary class of pollutants likely to be discharged from the site/facility (e.g. metals from an auto repair shop). Permittees may develop guidance for appropriate Treatment BMPs for project type based on Attachment "C". For the treatment of pollutants causing impairments within the drainage of the impaired waterbody, permittees shall select BMPs from the top three performing BMP categories or alternative BMPs that are designed to meet or exceed the performance of the highest performing BMP for the pollutant causing impairment.*

Attachment C contains the following table:

Effluent Concentrations as Median Values

BMP Category	Total Suspended Solids (mg/L)	Total Nitrate-Nitrogen (mg/L)	Total Copper (µg/L)	Total Lead (µg/L)	Total Zinc (µg/L)
Detention Pond	27	0.48	15.9	14.6	58.7
Wet Pond	10	0.2	5.8	3.4	21.6
Wetland Basin	13	0.13	3.3	2.5	29.2
Biofilter	18	0.36	9.6	5.4	27.9
Media Filter	11	0.66	7.6	2.6	32.2
Hydrodynamic Device	23	0.29	11.8	5	75.1

Expected BMP pollutant performance for effluent quality was developed from the WERF-ASCE/U.S. EPA International BMP Database, 2007

D.2 Using Performance Statistics for BMP Selection

The observed performance of stormwater BMPs provides valuable quantitative information that can be used to infer the potential water quality benefits of stormwater BMP implementation. However, water quality data sets and the statistical methods used to summarize them inherently contain a high level of uncertainty. Consideration of this uncertainty is fundamental to the proper and responsible use of statistics. Some of the key issues that should be considered when drawing conclusions from data contained in the ASCE International BMP Database for the purposes of developing BMP selection guidance are discussed below.

Number of Representative BMPs

Some BMP types are not well represented in the ASCE International BMP Database due to small data sets. For example, the "Wetland Basin" category only included nine studies nationwide as compared to over 50 for biofilters at the time the data analysis was conducted for the MS4 permit (2007). For some pollutants, such as total copper, data are only available for four Wetland Basin studies. While the BMP Database continues to grow, there are currently less than 300 BMP studies included, with only approximately 50 in California. The size of the data set provides an indicator of the reliability of that data in representing the "typical" effluent concentration for that BMP type.

BMP Categorization

The BMP studies within the BMP database represent a wide spectrum of BMP types with a variety of designs and sizing criteria. While some guidance is provided on how to categorize BMPs, data providers are responsible for categorizing their own BMPs. Some of these BMPs could be poorly categorized due to a variety of reasons, such as differences in terminology, missing or inadequately sized treatment components (e.g., forebays, vegetation, or permanent pools) or variable treatment function (e.g., a seasonal wet pond). Ideally, the BMPs should be grouped according to common design components and/or sizing criteria, but there currently aren't enough data with design information to support such analyses. However, the BMP Database is currently undergoing a restructuring that is redefining or sub-categorizing the current BMP categories within the database.

Statistical Significant Difference between BMP Influent/Effluent

Some of the median effluent values reported in the BMP Database are not statistically different than the median influent values (i.e., no concentration reductions on average). No significant difference may indicate either low influent concentrations or poor performing BMPs for that pollutant. In either case, the effluent value alone would not be a reliable indicator of BMP performance. For example, as summarized in Geosyntec and Wright Water (2008), the data for Wetland Basins, a "top performing" BMP according to Attachment C of the MS4 permit, did not conclusively show statistically significant removals of TSS, nitrate-nitrogen, or total lead. Data for hydrodynamic separators and media filters indicate they are also ineffective at reducing nitrate-nitrogen concentrations.

Statistical Significant Differences in Effluent between BMP Types

The median effluent concentrations of the various BMP types are not necessarily statistically significantly different from each other. Statistical significance can be determined by analyzing whether the 95th percent confidence intervals overlap. The number of data points and the variability of those data points determine the confidence interval of each median value. If the effluent medians are not statistically significantly different from each other, it may not be possible to determine the "top three" performing BMPs as specified in the MS4 Permit. Confidence intervals about the median effluent concentrations for each BMP type are provided in Geosyntec and Wright Water (2008) (see attached).

D.3 Comparison of the Performance of Biofiltration BMPs and Retention BMPs

Background

Projects that demonstrate technical infeasibility for reducing EIA to ≤5% using Retention BMPs are eligible to use Biofiltration BMPs to achieve the EIA performance standard. Section 4.E.III.1.(b) of Order R4-2010-0108 states:

> *If on-site retention is determined to be technically infeasible pursuant to 4.E.III.2(b), an on-site biofiltration system that achieves equivalent stormwater volume and pollutant load reduction as would have been achieved by on-site retention shall satisfy the EIA limitation.*

Volume-based biofiltration BMPs shall be sized to treat 1.5 times the volume not retained using Retention BMPs. The remaining EIA requirement may also be satisfied with flow-based Biofiltration BMPs. Flow-based Biofiltration BMPs shall be sized for the remaining drainage area from which runoff must be retained (A_{Retain}) with a rainfall intensity that varies with time of concentration for the catchment tributary to the flow-based Biofiltration BMP, according to the following. Using this flow-based sizing method will achieve or exceed capture and treatment of 80% of the average annual runoff volume.

Time of Concentration, minutes	Design Intensity for 150% Sizing, in/hr
30	0.24
20	0.25
15	0.28
10	0.31
5	0.35

Methodology

A planning-level analysis was conducted to assess whether the range of Biofiltration BMPs included in the 2010 TGM, sized per these volume- or flow-based sizing criteria, would achieve equivalent pollutant load reduction to Retention BMPs. The following describes the step-wise method taken for the analysis.

Step 1: Estimate the Catchment Annual Load

Assumptions:

- Average Annual Rainfall- 14.5 inches (Oxnard Gauge) (precipitation, P)
- One acre Catchment (area, A)

Calculations:

1) Determine developed runoff coefficients for single-family, multi-family, commercial, and industrial land use types

    - Use average imperviousness values from Ventura Hydrology Manual (Exhibit 14B)
    - Assume soil group 2/3 (Group C soils) for pervious runoff coefficient (Cp, conservative value = 0.1)
    - Use developed runoff coefficient (C_d) equation from hydrology manual:

$$C_d = 0.95*(\text{imperviousness}) + (Cp)*(1\text{-imperviousness})$$

2) Calculate Average Annual Runoff Volume (cu-ft) using:

$$V_{avg\ annual} = C_d*(P/12)*A*43560$$

3) Multiply average annual runoff volume by respective event mean concentrations (EMCs) for pollutants of concern to get average annual loads.

    - Look at “EMC Arithmetic Means” to see EMCs by land use type.
    - EMCs calculated based on LA County Land Use specific data (LACDPW, 2000). Descriptive statistics estimated using the parametric bootstrap method suggested by Singh, Singh, and Engelhardt (1997).
    - Pollutants of concern: Total Suspended Solids (TSS), Total Copper, Total Zinc, and Total Nitrogen. TSS is representative of the sediment pollutant class as well as pollutants that are associated with particulates (e.g., total phosphorous, some metals, pesticides, some organics). Copper and zinc represent metals – lead has been removed from the environment using True Source Control (removal of lead from gasoline) and thus is not an important POC for Biofiltration BMP selection and design. Total nitrogen is representative in that it includes all of the species of nitrogen (organic nitrogen, ammonia, nitrate, and nitrite) and instead of focusing on one species (nitrate).

Step 2: Estimate Retention BMP Load Reduction

1) Determine Retention BMP Design volume:

- Design storm = 0.75”
- Use land use-based coefficients
- $V_{design} = C_d*(0.75/12)*A*43560$

2) Determine Retention BMP capture volume using CASQA 48-hour Drawdown Figure for Oxnard Gauge (CASQA, 2003)

- Calculate Unit Basin Storage Volume using:
    - Unit Basin Storage Vol = V_{design}/ A
- Using developed runoff coefficients, interpolate between runoff coefficient lines to determine the percentage of total runoff captured by Retention BMP.

3) Determine Annual Load Reduction

- The percentage of the annual load that is reduced is the same as the percentage of runoff captured by the Retention BMP, assuming that all captured runoff is retained. The percent capture calculated in (2) can be multiplied by the catchment annual pollutant load to obtain the load reduction.

Step 3: Estimate Biofiltration BMP Load Reduction

1) Determine BMP Design volume as described in 2.a above, except:

- Design storm = 1.5*0.75 = 1.125 inches

2) Determine BMP capture volume using CASQA 24-hour Drawdown Figure for Oxnard Gauge (CASQA, 2003) as described in 2.b. above

3) Determine annual load reduction. Load reduction in Biofiltration BMPs can occur via two pathways: incidental infiltration and treatment.

- Incidental infiltration in Biofiltration BMPs was discussed in a publication by Strecker, Quigley, Urbonas, and Jones (Strecker et al, 2004). That study observed as much as 40% volume reduction through incidental infiltration. A recent summary of the studies in the ASCE BMP Database found the following average volume reductions: filter strips, 38%; vegetated swales, 48%; and bioretention with underdrain, 61% (Geosyntec, 2011; attached to this appendix).
- Pollutant Load reduction via incidental infiltration can be calculated as follows (20% is the percent of the captured volume assumed to be reduced via incidental infiltration for this discussion):

Load reduced = Average annual Load * Percent Runoff Captured by BMP * 20%

- Load reduction through treatment calculated based on published literature on pollutant removals from biofiltration facilities.

- Load reduction through treatment is calculated as follows:

Load reduced = Average annual Load * Percent Runoff Captured by BMP *80% * Assumed Average Percent Removal

Note: 80% = 100%-20%, i.e. the captured runoff that was not infiltrated via incidental infiltration

Constituent	Range of Reported Removal Efficiencies from Literature[1]	Selected Removal Efficiency for Effectiveness Evaluation[2]	Selected Removal Efficiency for Enhanced Nitrogen Removal[3]
TSS	54-89	79	79
Total Zinc	48-96	77	77
Total Copper	33-92	72	72
Total Nitrogen	21-54	25	50

[1] Range of values from literature cited below:

1. Hererra Consultants and Geosyntec Consultants, 2010. Filterra® Bioretention Systems: Technical Basis for High Flow Rate Treatment and Evaluation of Stormwater Quality Performance. September 2010.
2. University of New Hampshire, 2009. University of New Hampshire Stormwater Center 2009 Biannual Report. www.unh.edu/erg/cstev.
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5. Facility for Advancing Water Biofiltration. Online at: http://www.monash.edu.au/fawb/products/obtain.html.
6. Geosyntec Consultants and Wright Water Engineers, Inc., 2008. Overview of Performance by BMP Category and Common Pollutant Type, International Stormwater BMP Database Update. June 2008
7. Geosyntec Consultants and Wright Water Engineers, Inc., 2010. Categorical Summary of BMP Performance for Nutrient Concentration Data Contained in the International Stormwater BMP Database. December, 2010

[2] Removal efficiency for TSS, Total Zinc, and Total Copper represent average of values from literature. Removal efficiency for TN is that expected from a 'standard biofilter', that is, one not designed for enhanced nitrogen removal

[3] Removal efficiency for TN represented as average value of removals from bioretention systems with an anaerobic zone for enhanced removal of nitrogen

- The total load reduction is calculated as the sum of the reductions from these two pathways. The percent load reduction is calculated by dividing the total load reduction by the annual pollutant load from the catchment

Step 4: Comparison of Annual Load Reductions

1) Load reductions are compared by subtracting the load reduction calculated for Biofiltration BMPs from the load reduction calculated for Retention BMPs to determine the 'deficit' load reduction.

Results

Step 1: Estimate the Catchment Annual Load

1) Determine developed runoff coefficients for single-family, multi-family, commercial, and industrial land use types

Land Use	Imperviousness	Runoff Coefficient (C)
Single Family Residential	0.3	0.36
Multi Family Residential	0.69	0.69
Commercial	0.85	0.82
Industrial	0.93	0.89

2) Calculate Average Annual Runoff Volume (cu-ft), and

3) Multiply average annual runoff volume by respective event mean concentrations (EMCs) for pollutants of concern to get average annual loads.

Land Use	Arithmetic Means from Lognormal EMC Statistics			
	TSS (mg/L)	Total Zinc (mg/L)	Total Copper (mg/L)	Total Nitrogen (mg/L as N)
Single Family Residential	124.2	71.9	18.7	3.74
Multi Family Residential	39.9	125.1	12.1	3.31
Commercial	67	237.1	31.4	3.99
Industrial	219.2	537.4	34.5	3.74

Land Use	Average Annual Runoff Volume (cu-ft)	Catchment Pollutant Loads (kg/yr)			
		TSS	Total Zinc	Total Copper	Total Nitrogen
Single Family Residential	18,685	65,716	38	10	1,979
Multi Family Residential	36,134	40,826	128	12	3,387
Commercial	43,292	82,135	291	38	4,891
Industrial	46,871	290,933	713	46	4,964

Step 2: Estimate Retention BMP Load Reduction

1) Determine Retention BMP Design volume

Land Use	Design Volume (cu-ft)
Single Family Residential	967
Multi Family Residential	1869
Commercial	2239
Industrial	2424

2) Determine Retention BMP capture volume using CASQA 48-hour Drawdown Figure for Oxnard Gauge (CASQA, 2003)

Land Use	Design Volume (cu-ft)	Unit Basin Storage Volume (inches)	Approx % Capture
Single Family Residential	966	0.27	60.0%
Multi Family Residential	1,869	0.51	62.5%
Commercial	2,239	0.62	62.5%
Industrial	2,424	0.67	60.0%

3) Determine Annual Load Reduction

Land Use	Average Annual Pollutant Load Reduction (kg/yr) = Influent * Approx % Cap			
	TSS	Total Zinc	Total Copper	Total Nitrogen
Single Family Residential	39,429	23	5.9	1,187
Multi Family Residential	25,516	80	7.7	2,117
Commercial	51,335	182	24.1	3,057
Industrial	174,560	428	27.5	2,978

Land Use	Percent of Total Annual Loads			
	TSS	Total Zinc	Total Copper	Total Nitrogen
Single Family Residential	60.0%	60.0%	60.0%	60.0%
Multi Family Residential	62.5%	62.5%	62.5%	62.5%
Commercial	62.5%	62.5%	62.5%	62.5%
Industrial	60.0%	60.0%	60.0%	60.0%

Step 3: Estimate Biofiltration BMP Load Reduction

1) Determine Biofiltration BMP Design volume

Land Use	Design Volume (cu-ft)
Single Family Residential	1,450
Multi Family Residential	2,803
Commercial	3,359
Industrial	3,637

2) Determine BMP capture volume using CASQA 24-hour Drawdown Figure for Oxnard Gauge (CASQA, 2003)

Land Use	Design Volume (cu-ft)	Unit Basin Storage Volume (inches)	Approx % Capture
Single Family Residential	1,450	0.40	87.50%
Multi Family Residential	2,803	0.77	87.50%
Commercial	3,359	0.93	90.00%
Industrial	3,637	1.00	87.50%

3) Determine annual load reduction. Load reduction in Biofiltration BMPs can occur via two pathways: incidental infiltration and treatment.

Incidental Infiltration Scenario #1: 20% Volume Reduction

	Pollutant Load Reduction from 20% Incidental Infiltration (kg/yr)			
Land Use	TSS	Total Zinc	Total Copper	Total Nitrogen
Single Family Residential	11,500	7	2	346
Multi Family Residential	7,144	22	2	593
Commercial	14,784	52	7	880
Industrial	50,913	125	8	869

	Pollutant Load Reduction from Standard Treatment (kg/yr)				Enhanced Nitrogen Load Reduction (kg/yr)[1]
Land Use	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	36,341	21	5	346	693
Multi Family Residential	22,577	69	6	593	1,185
Commercial	46,719	161	20	880	1,761
Industrial	160,886	384	23	869	1,737

[1] Anticipated removal if an anaerobic zone is provided for Enhanced Nitrogen removal.

	Total Pollutant Load Reduction from Standard Treatment + Incidental Infiltration (20%) (kg/yr)				Enhanced Nitrogen Load Reduction + Incidental Infiltration (20%) (kg/yr)
Land Use	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	47,841	27	6.7	693	1,039
Multi Family Residential	29,721	91	8.4	1,185	1,778
Commercial	61,503	213	26.8	1,761	2,641
Industrial	211,799	509	31.0	1,737	2,606

Land Use	Percent of Total Annual Loads from Standard Treatment + Incidental Infiltration (20%)				Enhanced Nitrogen % Load Reduction + Incidental Infiltration (20%)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	72.8%	71.4%	67.7%	35.0%	52.5%
Multi Family Residential	72.8%	71.4%	67.7%	35.0%	52.5%
Commercial	74.9%	73.4%	69.6%	36.0%	54.0%
Industrial	72.8%	71.4%	67.7%	35.0%	52.5%

Step 4: Comparison of Annual Load Reductions

Load reductions are compared by subtracting the load reduction calculated for Biofiltration BMPs from the load reduction calculated for Retention BMPs to determine the 'deficit' load reduction.

Land Use	Biofiltration Pollutant Load Reduction Deficit - Standard Treatment + Incidental Infiltration (20%) (kg/yr)				Enhanced Nitrogen + Incidental Infiltration (20%) Pollutant Load Reduction Deficit (kg/yr)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	-8,412	-4	-0.8	495	148
Multi Family Residential	-4,205	-11	-0.6	931	339
Commercial	-10,168	-32	-2.7	1,296	416
Industrial	-37,239	-81	-3.5	1,241	372

Note: a negative deficit means Biofiltration has a higher pollutant load reduction than Retention.

Land Use	Biofiltration Pollutant Load Reduction Deficit - Standard Treatment + Incidental Infiltration (20%) (%)				Enhanced Nitrogen + Incidental Infiltration (20%) Pollutant Load Reduction Deficit (%)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	-12.8%	-11.4%	-7.7%	25.0%	7.5%
Multi Family Residential	-10.3%	-8.9%	-5.2%	27.5%	10.0%
Commercial	-12.4%	-10.9%	-7.1%	26.5%	8.5%
Industrial	-12.8%	-11.4%	-7.7%	25.0%	7.5%

Conclusion: Biofiltration BMPs sized for 1.5 times the SQDV, with an average incidental infiltration of 20% of the average annual runoff volume, which is a conservative estimate of incidental infiltration for all types of Biofiltration Treatment Measures, provide equivalent pollutant load reduction to Retention BMPs for TSS and metals.

Incidental Infiltration Scenario #2: 40% Volume Reduction

Land Use	Pollutant Load Reduction from 40% Incidental Infiltration (kg/yr)			
	TSS	Total Zinc	Total Copper	Total Nitrogen
Single Family Residential	23,000	13	3	693
Multi Family Residential	14,289	45	4	1,185
Commercial	29,569	105	14	1,761
Industrial	101,827	250	16	1,737

Land Use	Pollutant Load Reduction from Standard Treatment (kg/yr)				Enhanced Nitrogen Load Reduction (kg/yr)[1]
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	27,256	15	3.7	260	519
Multi Family Residential	16,932	52	4.7	445	889
Commercial	35,039	121	14.9	660	1,321
Industrial	120,665	288	17.2	652	1,303

[1] Anticipated removal if an anaerobic zone is provided for Enhanced Nitrogen removal.

Land Use	Total Pollutant Load Reduction from Standard Treatment + Incidental Infiltration (40%) (kg/yr)				Enhanced Nitrogen Load Reduction + Incidental Infiltration (40%) (kg/yr)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	50,256	29	7.2	952	1,212
Multi Family Residential	31,221	97	9.0	1,630	2,074
Commercial	64,608	225	28.8	2,421	3,082
Industrial	222,491	538	33.3	2,389	3,040

Land Use	Percent of Total Annual Loads from Standard Treatment + Incidental Infiltration (40%)				Enhanced Nitrogen % Load Reduction + Incidental Infiltration (40%)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	76.5%	75.4%	72.6%	48.1%	61.3%
Multi Family Residential	76.5%	75.4%	72.6%	48.1%	61.3%
Commercial	78.7%	77.6%	74.7%	49.5%	63.0%
Industrial	76.5%	75.4%	72.6%	48.1%	61.3%

Step 4: Comparison of Annual Load Reductions

Load reductions are compared by subtracting the load reduction calculated for Biofiltration BMPs from the load reduction calculated for Retention BMPs to determine the 'deficit' load reduction.

Land Use	Biofiltration Pollutant Load Reduction Deficit - Standard Treatment + Incidental Infiltration (40%) (kg/yr)				Enhanced Nitrogen + Incidental Infiltration (40%) Pollutant Load Reduction Deficit (kg/yr)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	-10,827	-6	-1.2	235	-25
Multi Family Residential	-5,705	-17	-1.3	487	42
Commercial	-13,273	-44	-4.7	636	-24
Industrial	-47,931	-110	-5.8	589	-62

Note: a negative deficit means Biofiltration has a higher pollutant load reduction than Retention.

Land Use	Biofiltration Pollutant Load Reduction Deficit - Standard Treatment + Incidental Infiltration (40%) (%)				Enhanced Nitrogen + Incidental Infiltration (40%) Pollutant Load Reduction Deficit (%)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	-16.5%	-15.4%	-12.6%	11.9%	-1.3%
Multi Family Residential	-14.0%	-12.9%	-10.1%	14.4%	1.2%
Commercial	-16.2%	-15.1%	-12.2%	13.0%	-0.5%
Industrial	-16.5%	-15.4%	-12.6%	11.9%	-1.3%

Conclusion: Biofiltration BMPs sized for 1.5 times the SQDV, with an average incidental infiltration of 40% of the average annual runoff volume, which is representative of vegetated swales and filter strips, provide equivalent pollutant load reduction to Retention BMPs for all of the pollutants of concern.

Incidental Infiltration Scenario #3: 60% Volume Reduction

Land Use	Pollutant Load Reduction from 60% Incidental Infiltration (kg/yr)			
	TSS	Total Zinc	Total Copper	Total Nitrogen
Single Family Residential	34,501	20	5	1,039
Multi Family Residential	21,433	67	6	1,778
Commercial	44,353	157	21	2,641
Industrial	152,740	374	24	2,606

Land Use	Pollutant Load Reduction from Standard Treatment (kg/yr)				Enhanced Nitrogen Load Reduction (kg/yr)[1]
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	18,170	10	2	173	346
Multi Family Residential	11,288	34	3	296	593
Commercial	23,359	81	10	440	880
Industrial	80,443	192	11	434	869

[1] Anticipated removal if an anaerobic zone is provided for Enhanced Nitrogen removal.

Land Use	Total Pollutant Load Reduction from Standard Treatment + Incidental Infiltration (60%) (kg/yr)				Enhanced Nitrogen Load Reduction + Incidental Infiltration (60%) (kg/yr)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	52,671	30	7.7	1,212	1,385
Multi Family Residential	32,722	102	9.6	2,074	2,371
Commercial	67,712	238	30.7	3,082	3,522
Industrial	233,183	567	35.5	3,040	3,475

Land Use	Percent of Total Annual Loads from Standard Treatment + Incidental Infiltration (60%)				Enhanced Nitrogen % Load Reduction + Incidental Infiltration (60%)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	80.2%	79.5%	77.6%	61.3%	70.0%
Multi Family Residential	80.2%	79.5%	77.6%	61.3%	70.0%
Commercial	82.4%	81.7%	79.8%	63.0%	72.0%
Industrial	80.2%	79.5%	77.6%	61.3%	70.0%

Step 4: Comparison of Annual Load Reductions

Load reductions are compared by subtracting the load reduction calculated for Biofiltration BMPs from the load reduction calculated for Retention BMPs to determine the 'deficit' load reduction.

Land Use	Biofiltration Pollutant Load Reduction Deficit - Standard Treatment + Incidental Infiltration (60%) (kg/yr)				Enhanced Nitrogen + Incidental Infiltration (60%) Pollutant Load Reduction Deficit (kg/yr)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	-13,242	-7	-1.7	-25	-198
Multi Family Residential	-7,206	-22	-1.9	42	-254
Commercial	-16,378	-56	-6.7	-24	-465
Industrial	-58,623	-139	-8.1	-62	-496

Note: a negative deficit means Biofiltration has a higher pollutant load reduction than Retention.

Land Use	Biofiltration Pollutant Load Reduction Deficit - Standard Treatment + Incidental Infiltration (60%) (%)				Enhanced Nitrogen + Incidental Infiltration (60%) Pollutant Load Reduction Deficit (%)
	TSS	Total Zinc	Total Copper	Total Nitrogen	Total Nitrogen
Single Family Residential	-20.2%	-19.5%	-17.6%	-1.3%	-10.0%
Multi Family Residential	-17.7%	-17.0%	-15.1%	1.2%	-7.5%
Commercial	-19.9%	-19.2%	-17.3%	-0.5%	-9.5%
Industrial	-20.2%	-19.5%	-17.6%	-1.3%	-10.0%

Conclusion: Biofiltration BMPs sized for 1.5 times the SQDV, with an average incidental infiltration of 60% of the average annual runoff volume, which is representative of bioretention with an underdrain, is equivalent to or exceeds the pollutant load reduction of Retention BMPs for all of the pollutants of concern.

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APPENDIX E : BMP SIZING WORKSHEETS

E.1 Structural Treatment BMP Sizing Criteria

The BMP sizing criteria for determining the design volume or design flow for a proposed BMP are discussed in this appendix. These criteria must be used for all stormwater BMPs installed in new and re-development projects in Ventura County. This section outlines the rainfall analyses, Ventura County MS4 Permit sizing criteria, and recommended sizing methods for both volumetric and flow-based analysis.

Sizing Criteria

The type of rainfall analysis required depends on whether the BMP is a volume-based or flow-based BMP. This distinction between volume-based and flow-based controls is not always clear, especially in a sequence of BMPs or a treatment train. The following are general guidelines for each type of control.

- Volume-based BMPs are designed to treat a volume of runoff, which is detained for a certain period of time to allow for the settling of solids and associated pollutants. Volume-based BMPs included in this manual are bioretention, planter boxes, infiltration systems, and retention/detention BMPs.

- Flow-based BMPs treat water on a continuous flow basis. Flow-based BMPs included in this manual are vegetated swales, filter strips, filtration systems, and hydrodynamic devices.

The four volume-based and three flow-based BMP sizing criteria included in the Ventura County MS4 Permit (Order No. 09-0057) are included below.

The water quality design volume for volume-based BMPs must be determined using one of the following options:

1) The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area using a 48 to 72-hour draw down time, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

2) The volume of annual runoff based on unit basin storage water quality volume to achieve 80 percent or more volume treatment; or

3) The volume of runoff produced from a 0.75 inch storm event; or

4) 80 percent of the average runoff volume using an appropriate public domain continuous flow model [such as Storm Water Management Model (SWMM) or Hydrologic Engineering Center – Hydrologic Simulation Program – Fortran (HEC-HSPF)], using the local rainfall record and relevant BMP sizing and design data.

Flow-based BMPs must be designed to capture and treat the water quality design flow rate generated from one of the following criterion:

1) The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity; or

2) The flow of runoff produced from a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity as determined from local rainfall records; or

3) Eight percent of the 50-year storm design flow rate as determined from the method provided below.

These sizing methods are explained below.

Methods for Determining the Water Quality Design Volume

Method 1: Urban Runoff Quality Management (URQM) Approach

The volume-based BMP sizing methodology described in Urban Runoff Quality Management (WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175-178) estimates the "maximized stormwater quality capture volume." The URQM approach is based on the translation of rainfall to runoff using two regression equations. The first regression equation, which relates rainfall to runoff, was developed using two years of data from more than 60 urban watersheds nationwide. The second regression equation relates mean annual runoff-producing rainfall depths to the "Maximized Water Quality Capture Volume" which corresponds to the "knee of the cumulative probability curve". This second regression was based on analysis of long-term rainfall data from seven rain gages representing climatic zones across the country. The Maximized Water Quality Capture Volume corresponds to approximately the 85th percentile runoff event, and ranges from 82 to 88%.

The two regression equations that form the URQM approach are as follows:

$$C = 0.858imp^3 - 0.78imp^2 + 0.774imp + 0.04 \quad \text{(Equation E-1)}$$

$$P_o = (a \cdot C) \cdot P_6 \quad \text{(Equation E-2)}$$

Where:

C	=	watershed runoff coefficient (unitless)
imp	=	watershed impervious ratio which is equal to the percent total imperviousness divided by 100 (ranges from 0 to 1)
P_o	=	maximized detention storage volume based on the volume capture ratio as its basis (watershed inches)

a	=	regression constant from least-squares analysis (unit less), a=1.582 and a=1.963 for 24 and 48 hour draw down, respectively
P_6	=	mean storm precipitation volume (watershed inches)

P_6 can be determined by two ways: Figure 5.3 in Urban Runoff Quality Management, or by performing analysis on local historical rainfall data. To determine the mean precipitation, EPA's Synoptic Rainfall Analysis Program – SYNOP – can be applied (see *Other Rainfall Analysis Methods* below).

The runoff coefficient equation in the URQM approach (Method 1) is not appropriate for the California BMP Handbook approach (Method 2), as Equation E-4 was developed in conjunction with the regression constants used in Method 1.

Method 2: Treatment of 80% or more of the Total Volume

Most water quality facilities are designed to treat only a portion of the runoff from a given site, as it is not economically feasible to capture 100% of the runoff. The percent of runoff treated by a basin is referred to as the "percent capture". There are a number of methods which allow calculation of the percent capture, including the California Stormwater Quality Association (CASQA) method (recommended by the 2002 Ventura County Manual), and using the EPA Stormwater Management Model (SWMM).

CASQA Method

The California Stormwater Quality Association (CASQA) BMP Handbook method estimates the basin volume to achieve various levels of volume capture (e.g., 80% for this sizing criterion). In the CASQA BMP Handbook New Development and Redevelopment (2003), a proprietary version of the Storage, Treatment, Overflow, Runoff Model (STORM) is used as the basis for the volume-based BMP sizing criteria. The model results are presented as the relationship between "unit basin storage volume" and "% volume capture" of the BMP", varying with drawdown time and runoff coefficient. Knowing the drawdown time, the runoff coefficient, and the desired percent capture will yield the "unit basin storage volume". The "unit basin storage volume" can then be used to size the BMP using the following equation (note that "unit basin storage volume" is given in inches, so units will have to be adjusted accordingly):

$$\text{BMP Volume} = \text{Unit Basin Storage Volume} \times \text{Tributary Area} \qquad \text{(Equation E-3)}$$

Results for several rain gauges are presented in Appendix D of the CASQA BMP Handbook New Development and Redevelopment (CASQA, 2003). Results are provided for a range of runoff coefficients and for 24 hour and 48 hour drawn down times. In order to use the curves provided in Appendix D, it is necessary to know the runoff coefficient for the area tributary to the BMP, the drawn down time (a.k.a. drain time) of the facility, and the percent capture goal (e.g., 80%).

Drawdown time is the time required to drain a facility that has reached its design capacity; usually expressed in hours. Drain time is important as it is a surrogate for residence time, which affects the particle settling in the basin. Estimates for design drain time vary, and ideally would be determined based on site-specific information on the size, shape, and density or settling velocity of suspended particulates in the runoff. Because this information is generally not available for a specific site, estimates of appropriate ranges for settling time have generally relied on settling column test information reported in the literature.

An important source of drain time information is settling column tests conducted by Grizzard et. al. (1986) as part of the Nationwide Urban Runoff Program (NURP). Grizzard found that settling times of 48 hours resulted in removals of 80% to 90% of total suspended solids (TSS). Rapid initial removal was also observed in stormwater samples with medium (100 to 215 mg/L) and high (721 mg/L) initial TSS concentrations. For example, at settling times of 24 hours, the 80% to 90% removals were already achieved in samples with medium and high initial TSS, whereas only 50% to 60% removal was achieved in those with low initial TSS.

Given the data provided above, a drain time of 36 to 48 hours is recommended for sizing volume-based BMPs. This is also consistent with the recommendation of vector control agencies that structures be designed to drain in less than 72 hours to minimize mosquito breeding.

The rain gauge that is recommended for use for the area permitted by the Ventura county MS4 Permit (Order No. 09-0057) is the Oxnard Equipment Yard Gauge (168), which has a 40 year rainfall record. The graph included in the CASQA handbook can be seen in Figure E-1 below.

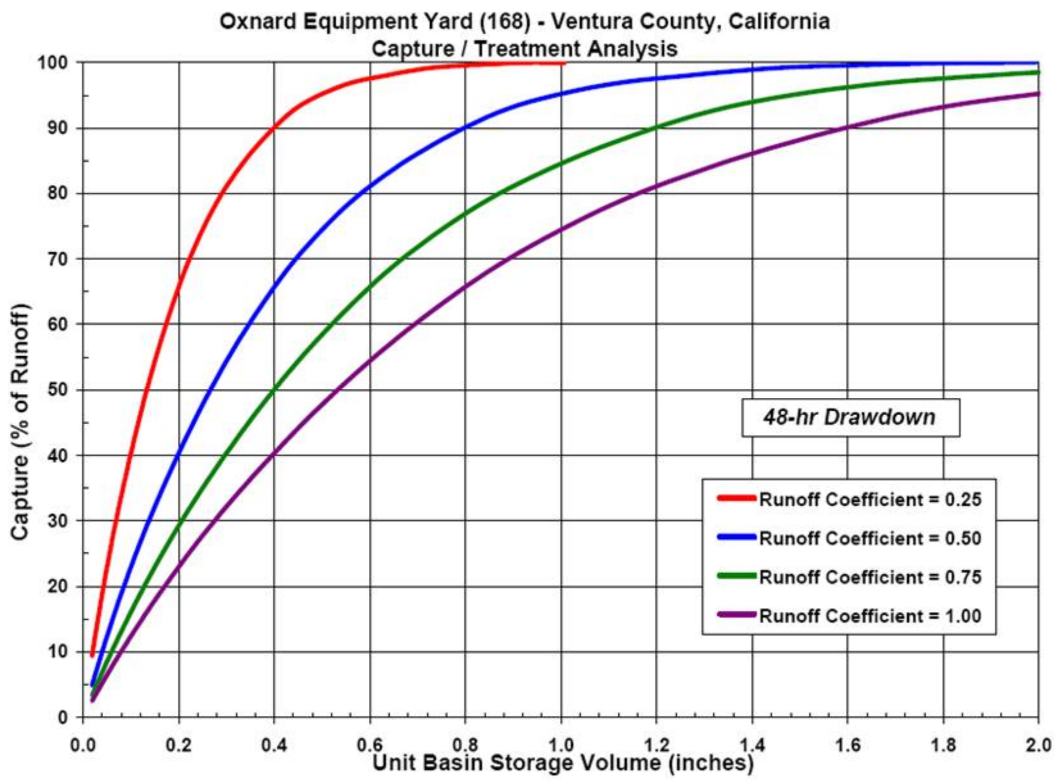

Figure E-1: CASQA 48-hour Drawdown Figure for Oxnard Gauge

This method has been modified for Ventura County. To use this method, follow the calculation procedure below. This refers to Figure E-3.

Ventura County Calculation Procedure

1) Review the area draining to the proposed treatment control measure. Determine the effective imperviousness (I_{WQ}) of the drainage area.

2) Estimate the total imperviousness (impervious percentage) of the site by the determining the weighted average of individual areas of like imperviousness.

3) Enter Figure E-2 along the horizontal axis with the value of total imperviousness calculated in Step 1. Move vertically up Figure E-2 until the appropriate curve (G-5.1 (filter strip) or G-5.2 (vegetated swale) employed individually or G-5.1 and G-5.2 employed together) is intercepted. Move horizontally across Figure E-2 until the vertical axis is intercepted. Read the Effective Imperviousness value along the vertical axis.

4) Note that if G-5.1 and/or G-5.2 are implemented on only a portion of the site, the site may be divided and effective imperviousness determined for the portion of the site for which site design controls have been implemented. The resulting effective imperviousness may be combined with total imperviousness of the

remainder of the site to determine a weighted average total imperviousness for the entire site.

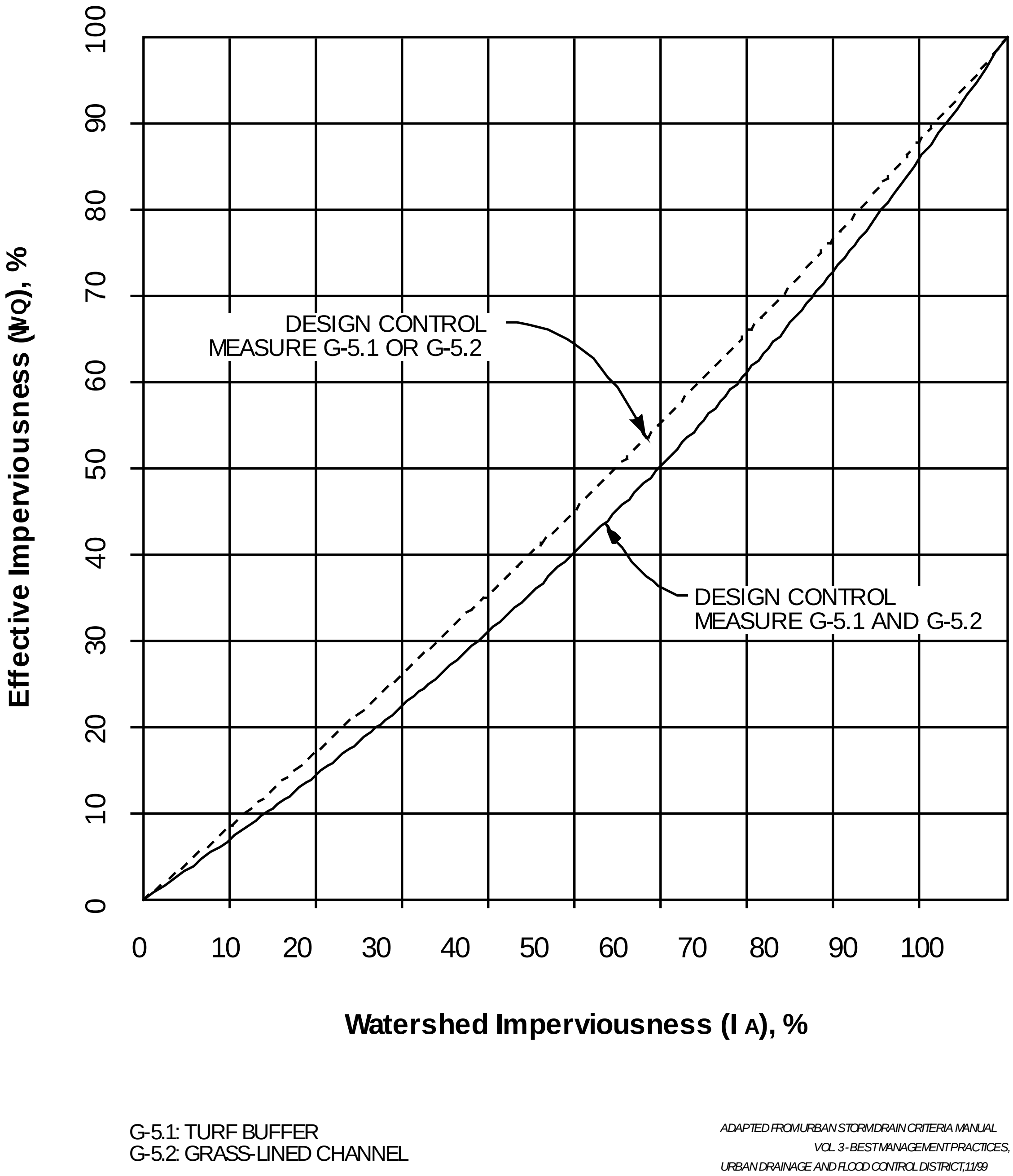

Figure E-2: Effective Imperviousness based on Watershed Imperviousness

5) Figure E-3 provides a direct reading of Unit Basin Storage Volumes required for 80% annual capture of runoff for values of "I_{WQ}" determined in Step 1. Enter the horizontal axis of Figure E-3 with the "I_{WQ}" value from Step 1. Move vertically up

Figure E-3 until the appropriate drawdown period line is intercepted. (The design drawdown period specified in the respective Fact Sheet for the proposed treatment control measure.) Move horizontally across Figure E-3 from this point until the vertical axis is intercepted. Read the Unit Basin Storage Volume along the vertical axis.

6) Figure E-3 is based on Precipitation Gage 168, Oxnard Airport. This gage has a data record of approximately 40 years of hourly readings and is maintained by Ventura County Flood Control District. Figure E-3 is for use only in the permit area specified in Regional Board Order No. 00-108, NPDES Permit No. CAS004002.

7) The SQDV for the proposed treatment control measure is then calculated by multiplying the Unit Basin Storage Volume by the contributing drainage area. Due to the mixed units that result (e.g., acre-inches, acre-feet) it is recommended that the resulting volume be converted to cubic feet for use during design.

Example Stormwater Quality Design Volume Calculation

1) Determine the drainage area contributing to control measure, A_t. Example: 10 acres.

2) Determine the area of impervious surfaces in the drainage area, A_i. Example: 6.4 acres.

3) Calculate the percentage of impervious, $I_A = (A_i/ A_t)*100$

   Example:

   Percent Imperviousness = $(A_i/ A_t)*100$ = (6.4 acres/10 acres)*100 = 64%

4) Determine Effective Imperviousness using Figure 3-4.

   $I_{WQ} = 60\%$

5) Determine design drawdown period for proposed control measure.

6) Determine the Unit Basin Storage Volume for 80% Annual Capture, V_u using Figure E-3.

   For $I_{WQ}/100 = 0.60$ and drawdown = 40 hrs, $V_u = 0.64$ in.

7) Calculate the volume of the basin, V_b, where

   $V_b = V_u * A_t$. (Equation E-4)

Where

V_b = Volume of basin

V_u = Unit basin storage volume

A_t = Total tributary area

8) V_b = (0.64 in)(10 ac)(ft/12 in(43,560 ft^2 / ac) = 23,232 ft^3.

9) Solution: Size the proposed control measure for 23,232 ft^3 and 40-hour drawdown.

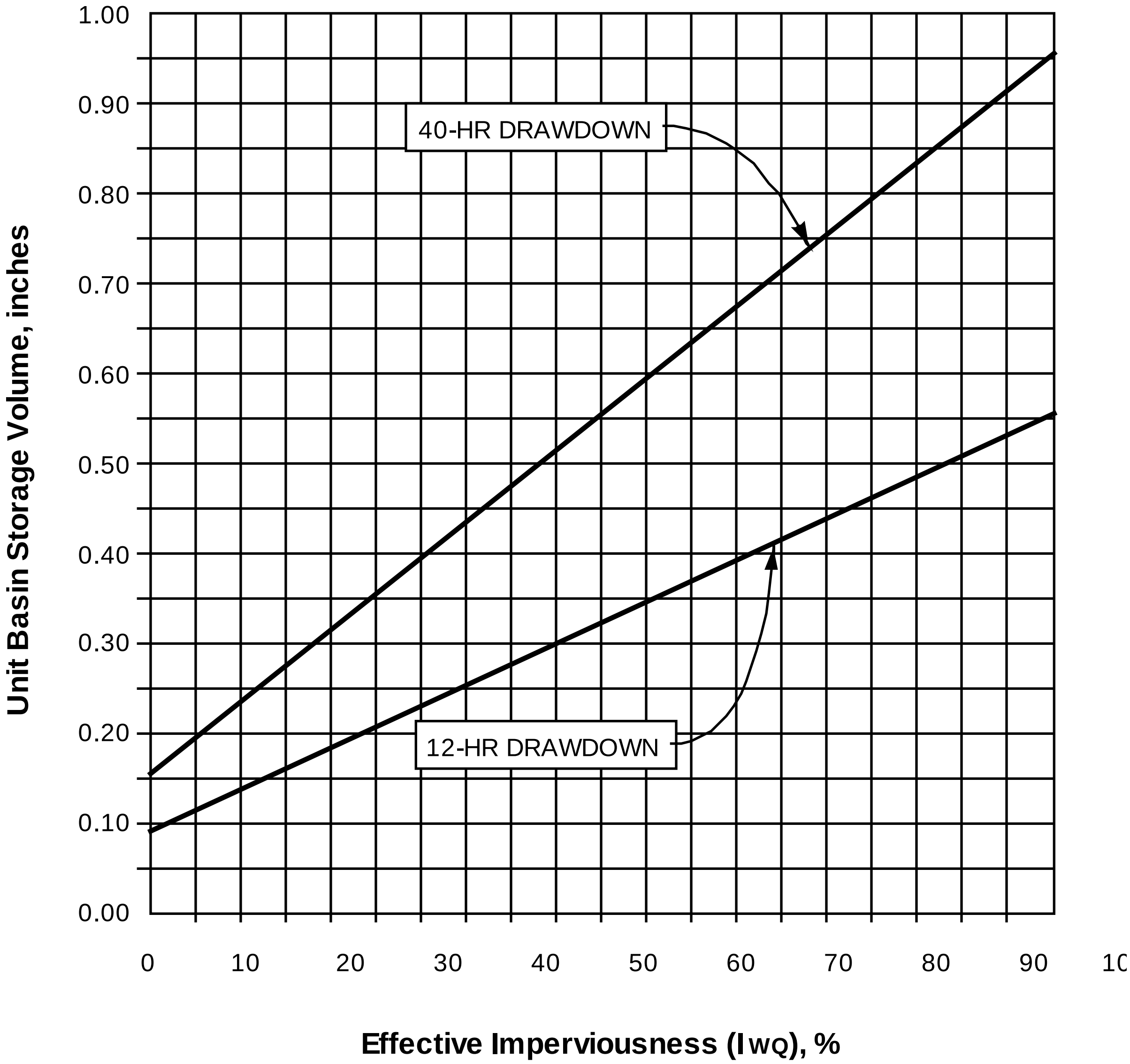

Figure E-3: Unit Basin Storage Volume for Design Volume Method 2

Method 3: 0.75 Inch Design Storm Approach

Equation E-8 can be used to determine the water quality design volume for Method 3.

Calculation Procedure

1) Determine the area from which runoff must be retained on-site (A_{retain}) using the method below:

   The allowable EIA for a project site can be calculated as follows:

   $EIA_{allowable} = (A_{project})*(\%_{allowable})$ (Equation E-5)

Where:

$EIA_{allowable}$	=	the maximum impervious area from which runoff can be treated and discharged off-site [and not retained on-site] (acres).
$A_{project}$	=	the total project area (acres). "Total project area" for new development and redevelopment projects is defined as the disturbed, developed, and undisturbed portions within the project's property (or properties) boundary, at the project scale submitted for first approval.
$\%_{allowable}$	=	ranges from 5 percent to 30 percent, based on a project specific assessment of technical feasibility for retaining runoff and whether the project is located in an existing urban area.

The drainage area from which Project generated runoff must be retained on-site is the total impervious area minus the $EIA_{allowable}$, which can be calculated as follows:

$A_{retain} = TIA - EIA_{allowable} = (P*A_{project}) - EIA_{allowable}$ (Equation E-6)

Where:

A_{retain}	=	the drainage area from which runoff must be retained (acres)
TIA	=	total impervious area (acres)
$EIA_{allowable}$	=	the maximum impervious area from which runoff can be treated and discharged off-site [and not retained on-site] (acres).
P	=	imperviousness of project area (%)/100
$A_{project}$	=	the total project area (acres)

Calculation Procedure

1) Determine the area from which runoff must be retained on-site (A_{retain}) using method above.

2) Determine the runoff coefficient per the following method:

$$C = 0.95*imp + C_p\,(1\text{-}imp) \qquad \text{(Equation E-7)}$$

Where:

C	=	runoff coefficient
imp	=	impervious fraction of watershed
C_p	=	pervious runoff coefficient, determined using table below

Table E-1: Pervious Runoff Coefficient Based on Ventura Soil Type

Ventura Soil Type (Soil Number)	Cp value
1	0.15
2	0.10
3	0.10
4	0.05
5	0.05
6	0
7	0

3) The volume can be calculated using equation E-8 below:

$$SQDV = C*(0.75/12)*A_{retain} \qquad \text{(Equation E-8)}$$

Where:

SQDV	=	the water quality design volume (acre-feet)
C_{imp}	=	runoff coefficient, calculated by equation (4) above
0.75	=	the design rainfall depth (in) [based on sizing method (c)]
A_{retain}	=	the drainage area from which runoff must be retained (acres)

Method 4: 80 percent of the average runoff volume using an appropriate public domain continuous flow model

Models that can be used for this calculation include the Storm Water Management Model (SWMM) or Hydrologic Engineering Center – Hydrologic Simulation Program – Fortran (HEC-HSPF)], using the local rainfall record and relevant BMP sizing and design data.

Sizing Method 4 allows for alternative sizing methods to be used as long as the selected method produces a water quality design volume based on historical rainfall records that achieves 80% capture of the average runoff volume. While sizing Methods 2 and 3 are appropriate for low lying areas within Ventura County, continuous simulation (using historical rainfall record) is well suited to sizing BMPs in locations with higher average rainfall. This method is the recommended sizing method for Ventura County, using appropriate local data inputs. For BMP locations at higher elevations, with larger rainfall, Method 1 is also better suited to sizing volume-based BMPs using rainfall representative of the site where the BMP will be located.

Continuous runoff modeling takes a long, uninterrupted record of observed rainfall data and transforms it into a record of runoff data. This is done by use of a set of mathematical algorithms that represent the rainfall-runoff processes. EPA's Stormwater Management Model (U.S. EPA, 2000) (SWMM) is one type of continuous runoff model. The runoff module of SWMM subdivides each drainage area into two inclined planes, one for impervious areas and one for pervious areas. Manning's equation is applied to estimate runoff taking into account rainfall intensity, initial losses, evapotranspiration, and infiltration (for pervious areas). The width and length of each plane is selected based on the drainage area configuration and existing and proposed drainage features. Hourly rainfall data is the primary model input for generating runoff volumes and rates. Additional input data are required to characterize imperviousness, soils, topography, and losses associated with evapotranspiration, infiltration, and initial losses.

Sizing BMPs using this type of alternative should only be conducted by qualified personnel with a thorough understanding of the simulated hydrologic processes and operation of the selected hydrology model.

Methods for Determining the Water Quality Design Flow

Each of the flow-based sizing alternatives is described in detail below.

Method 1: Runoff Produced by 0.2 Inches per Hour Rainfall Intensity

The rainfall analysis for flow-based controls focuses on estimating the design rainfall intensity, which is then converted to a design flow rate using the rational method shown in Equation E-9.

$$SQDF = CiA \quad \text{(Equation E-9)}$$

Where:

SQDF	=	design flow rate (cfs)
C	=	runoff coefficient, calculated with the Ventura County Hydrology Manual method (see Equation E-5) (unitless)
i	=	rainfall intensity (in/hr) (0.2 in/hr)
A	=	watershed area (acres)

Note that 1 acre-in/hr = 1.0083 cfs; this conversion factor can be used with Equation D-9, but is not necessary as the uncertainty for the other parameters is generally well above 0.8%.

Method 2: Runoff Produced by Twice the 85th Percentile Rainfall Intensity

This method is analogous to the rational method used in Method 1, except that twice the historical 85th percentile rainfall intensity for the site location is used for the design rainfall intensity. This method is expected to result in a higher design rainfall intensity and design flow rate compared to Method 1 for most of the rain gages in the District.

Method 3: Runoff Produced by eight percent of the 50-year storm design flow rate

The Stormwater Quality Design Flow (SQDF) is defined to be equal to 8 percent of the peak rate of runoff flow from the 50-year storm as determined using the procedures set forth in the *Hydrology Manual*.

Calculation Procedure

1) The Stormwater Quality Design Flow (SQDF) in Ventura County is defined as SQDF

2) Calculate the peak rate of flow from the 50-year storm ($Q_{P,\ 50\ yr.}$) using the procedures set forth in the *Hydrology Manual* or as directed by the local agency Drainage Master Plan.

3) Convert $Q_{P,\ 50yr}$ (Step 2) to $Q_{P,\ SQDF}$ (Step 1).

$$Q_{P,\ SQDF} = 0.1 \text{ x } Q_{P,\ 50yr} \quad \text{(Equation E-10)}$$

Example Stormwater Quality Design Flow Calculation

The steps below illustrate calculation of SQDF:

1) Calculate the peak rate of flow from a 50-year storm.

$Q_{p,\ 50\ yr.}$ = 10 cfs from the *Ventura County Hydrology Manual*

4) Convert $Q_{p,50\ yr}$ (Step 2) to $Q_{p,\ SQDF}$ (Step 1)

SQDF = 0.8 x 10 cfs (Equation E-11)

SQDF = 0.8 cfs

Rainfall Analysis Methods

The rainfall analysis methods listed below have the benefits of including the most recent rainfall data. Additionally, if the site is not close to an isohyet map rainfall gauge, these methods may be more accurate due to the variability of rainfall due to changing microclimates caused by elevation and distance from the ocean.

A resource available for obtaining rainfall data in Ventura County is the data collected and compiled by the National Climatic Data Center (NCDC).

There are many NCDC stations within Ventura County that collect or have collected hourly precipitation data. Some of these stations are no longer in operation and others may not have a sufficiently long period of record over which precipitation data has been collected to be of use for properly sizing treatment BMPs. NCDC data may be obtained online at the NCDC website http://www.ncdc.noaa.gov/oa/ncdc.html.

Rainfall Analysis Using EPA'S SYNOP Program

US EPA's Synoptic Rainfall Data Analysis Program (SYNOP) aggregates hourly rainfall data into individual storm events and computes event descriptive statistics. The SYNOP program calculates the duration, volume, and intensity for individual storms as well as average annual statistics. Recurrence interval and probability results are also available as output options. The SYNOP program allows the user to screen out storms that are not expected to result in runoff (see step 2 below).

The SYNOP rainfall analysis is conducted to output event-specific data in addition to average annual statistics. The individual storm event data can be ranked to give the 85th percentile storm or averaged to give the mean storm size.

Steps for conducting SYNOP rainfall analysis are as follows:

1) Obtain the hourly rainfall data for the gage of interest from the NCDC or other agency.

2) Run SYNOP for the available rain gage data. Model input parameters include the inter-event time and a minimum storm event size. The inter-event time specifies the minimum duration in which precipitation does not occur, used to define separate storm events, while the minimum storm event is the depth of precipitation generated by a storm below which runoff generally does not occur. Typically, an inter-event time of 6 hours (USEPA, 1989), and a minimum storm

event size of 0.10 inches are used (i.e., storms of 0.10 inches or less are not considered to produce runoff typically). Model results include event-specific and annual statistics during the period of record analyzed.

3) Rank and average the SYNOP storm event output.

References

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Schueler, T., 1987. "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs," Publication No. 87703, Metropolitan Washington Council of Governments, Washington, DC.

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E.2 INF-1 Infiltration Basin/ INF-2 Infiltration Trench/ INF-4 Drywell

This worksheet can be used for sizing INF-1 Infiltration Basins, INF-2 Infiltration Trenches, or INF-4 drywells. An infiltration basin is an earthen basin constructed into naturally pervious soils which retains the SQDV and allows the retained runoff to percolate into the underlying native soils over a specified period of time. Infiltration trenches are long, narrow, gravel-filled trenches, often vegetated, that infiltrate stormwater runoff from small drainage areas. Drywells are similar to infiltration trenches, but the geometry and materials are slightly different. A dry well may be either a small excavated pit filled with aggregate or a prefabricated storage chamber or pipe segment, with the depth of the drywell greater than the width.

Sizing Methodology

Infiltration facilities can be sized using one of two methods: a simple sizing method or a routing modeling method. With either method the SQDV volume must be completely infiltrated within 12 to 72 hours (see Appendix E, Section E.1 for a discussion on drawdown time and BMP performance). The simple sizing procedures provided below can be used for either infiltration basins, infiltration trenches (see INF-2: Infiltration Trench) or drywells (INF-4: Drywell). For the routing modeling method, refer to VEG-8 Sand Filters.

Step 1: Calculate the design volume

Infiltration facilities shall be sized to capture and infiltrate the SQDV volume (see Section 2 and Appendix E) with a 12 - 72 hour drawdown time (see Appendix E, Section E.1).

Step 2: Determine the Design Percolation Rate

The percolation rate will decline between maintenance cycles as particulates accumulate in the infiltrative layer and the surface becomes occluded. Additionally, monitoring of actual facility performance has shown that the full-scale infiltration rate is far lower than the rate measured by small-scale testing. It is important that adequate conservatism is incorporated in the selection of design percolation rates. For infiltration trenches, the design percolation rate discussed here is the percolation rate of the underlying soils, which will ultimately drive infiltration through the trench, and not the percolation rate of the filter media bed (refer to the "Geometry and Sizing" section of INF-2 for the recommended composition of the filter media bed for infiltration trenches). See INF-1: Infiltration Basin for guidance in developing design percolation rate correction factors.

Step 3: Calculate Surface Area

Determine the size of the required infiltrating surface by assuming the SQDV will fill the available ponding depth plus (for infiltration trenches/ drywells with aggregate) the void spaces within the filter media based on the computed porosity of the media (normally about 32%).

1) Determine the maximum depth of runoff that can be infiltrated within the required drain time as follows:

$$d_{\max} = \frac{P_{design}}{12} t$$ (Equation E-12)

Where:

d_{max} = the maximum depth of water that can be infiltrated within the required drain time (ft)

P_{design} = design percolation rate of underlying soils (in/hr)

t = required drain time (hrs)

2) Choose the ponding depth (d_p) and/or trench depth (d_t) such that:

$$d_{\max} \geq d_p$$ For Infiltration Basins (Equation E-13)

$$d_{\max} \geq n_t d_t + d_p$$ For Infiltration Trenches or aggregate-filled Drywells (Equation E-14)

Where:

d_{max} = the maximum depth of water that can be infiltrated within the required drain time (ft)

d_p = ponding depth (ft)

n_t = trench/drywell fill aggregate porosity (unitless)

d_t = depth of trench/drywell filter media (ft)

3) Calculate infiltrating surface area (filter bottom area) required:

$$A = \frac{SQDV}{((TP_{design}/12) + d_p)}$$ For Infiltration Basins (Equation E-15)

$$A = \frac{SQDV}{((TP_{design}/12) + n_t d_t + d_p)}$$ For Infiltration Trenches or aggregate-filled Drywells (Equation E-16)

Where:

$SQDV$ = stormwater quality design volume (ft^3)

n_t = trench fill aggregate porosity (unitless)

P_{design} = design percolation rate (in/hr)

d_p = ponding depth (ft)

d_t = depth of trench filter media (ft)

T = fill time (time to fill to max ponding depth with water) (hrs) [use 2 hours for most designs]

Step 4: Size the forebay (applies to infiltration basins and trenches)

Infiltration facilities require pre-treatment to reduce sediment load into the basin. If a separate pre-treatment unit is not used, a forebay should be constructed for the facility. If a forebay is used, all inlets must enter the sediment forebay. The sediment forebay must be sized to 25% of the basin volume. The forebay must have interior slopes no steeper than 4:1.

1) Calculate the volume of the sediment forebay:

$$V_{forebay} = 0.25 \times SQDV \qquad \text{(Equation E-17)}$$

Where:

$V_{forebay}$ = Volume of sediment forebay

SQDV = Stormwater Quality Design Volume of Infiltration Basin

2) Select the depth of forebay, $d_{forebay}$. This is recommended to be...

3) Determine bottom surface area of forebay:

$$A_{forebay} = \frac{V_{forebay}}{d_{forebay}} \qquad \text{(Equation E-18)}$$

Where:

$A_{forebay}$ = Bottom surface area of forebay

$V_{forebay}$ = Volume of forebay

$d_{forebay}$ = Depth of forebay

4) Size forebay outlet pipe. Pipe must 8 inches in diameter, minimum, and must be sized such that the forebay drains completely within 10 minutes.

Step 5: Provide conveyance capacity for filter clogging

The infiltration facility should be placed off-line, but an emergency overflow must still be provided in the event the filter becomes clogged. Spillway and overflow structures should be designed in accordance with applicable standards of the Ventura County Flood Control District or local jurisdiction.

Sizing Worksheet

Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	$A_{project}$ =	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	%
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\,(1-imp)$	C =	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	ft
1-11. Calculate water quality design volume (ft^3), $SQDV=43560\times C*P*A_{retain}$	SQDV=	ft^3
Step 2: Determine the design percolation rate		
2-1. Enter measured soil percolation rate (in/hr, 0.5 in/hr min.), $P_{measured}$	$P_{measured}$ =	in/hr
2-2. Determine percolation rate correction factor, S_A based on suitability assessment (see Section 6 INF-1)	S_A =	

2-3. Determine percolation rate correction factor, S_B based on design (see Section 6 INF-1)	S_b =
2-4. Calculate combined safety factor, $S = S_A \times S_b$	S =
2-5. Calculate the design percolation rate (in/hr), $P_{design} = P_{measured}/S$	P_{design} = in/hr
Step 3: Calculate the surface area	
3-1. Enter required drain time(hours,72 hrs max.), t	t = hrs
3-2. Calculate max. depth of runoff that can be infiltrated within the t (ft), $d_{max} = P_{design}\ t/12$	d_{max} = ft
3-3. For basins, select ponding depth (ft), d_p, such that $d_p \leq d_{max}$	d_p = ft
3-4. For trenches, enter trench fill aggregate porosity, n_t	n_t =
3-5. For trenches, enter depth of trench fill (ft), d_t	d_t = ft
3-5. For trenches, select ponding depth d_p such that $d_p \leq d_{max} - n_t d_t$	d_p= ft
3-6. Enter the time to fill infiltration basin or trench with water (Use 2 hours for most designs), T	T = hrs
3-7. Calculate infiltrating surface area for infiltration basin (ft²): $A_b = SQDV/(T\ P_{design}\ /12+d_p)$ OR Calculate infiltrating surface area for infiltration trenches or aggregate- filled drywells (ft²): $A_t = SQDV/(T\ P_{design}\ /12+n_t d_t+dp)$	A_b = ft² A_t = ft²
Step 4: Size the forebay (infiltration basins or trenches)	
If a separate pre-treatment unit is designed for the infiltration facility, skip to Step 5. If not, continue through 4-1 through 4-4.	

4-1. Calculate the volume of the forebay (ft^3), $V_{forebay}$=0.25*SQDV	$V_{forebay}$= ft^3
4-2. Determine forebay depth (ft), $d_{forebay}$	$d_{forebay}$= ft
4-3. Calculate forebay bottom surface area (ft^2), $A_{forebay}=V_{forebay}/d_{forebay}$	$A_{forebay}$= ft^2
4-4. Provide outlet pipe such that the forebay drains to the infiltration facility within 10 minutes.	
Step 5: Provide conveyance capacity for filter clogging	
5-1.The infiltration facility should be placed off-line, but an emergency overflow must still be provided in the event the filter becomes clogged. Design emergency overflow in accordance with applicable standards of the Ventura County Flood Control District or local jurisdiction.	

Design Example

Step 1: Determine water quality design volume

For this design example, a 10-acre residential development with a 60% total impervious area is considered to drain to an infiltration basin. The 85th percentile storm event for the project location is 0.75 inches.

Step 1: Determine water quality design volume			
1-1. Enter Project area (acres), $A_{project}$	A =	10	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	5	
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	0.5	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	0.6	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	6	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	5.5	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	0.05	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\,(1-imp)$	C =	0.59	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	0.75	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	0.06	ft
1-11. Calculate water quality design volume (ft^3), $SQDV=43560\times C*P*A_{retain}$	SQDV =	8,500	ft^3

Step 2: Calculate Design Infiltration Rate

Infiltration facilities require a minimum soil infiltration rate of 0.5 in/hr. If the rate exceeds 2.4 in/hr as in this example, then the runoff should be fully treated in an upstream BMP prior to infiltration to protect the groundwater quality.

Step 2: Determine the design percolation rate			
2-1. Enter measured soil percolation rate (0.5 in/hr min.), $P_{measured}$	$P_{measured}$ =	4.0	in/hr
2-2. Determine percolation rate correction factor, S_A, based on suitability assessment (see Section 6 INF-1)	S_A =	3	
2-3. Determine percolation rate correction factor, S_B, based on design (see Section 6 INF-1)	S_b =	3	
2-4. Calculate combined safety factor, $S = S_A \times S_b$	S =	9	
2-5. Calculate the design percolation rate, $P_{design} = P_{measured}/S$	P_{design} =	0.44	in/hr

Step 3: Determine Facility Size

The size of the infiltrating surface is determined by assuming the SQDV will fill the available ponding depth (plus the void spaces of the computed porosity (usually about 32%) of the gravel in the trench).

Step 3: Calculate the surface area			
3-1. Enter drawdown time (72 hrs max.), t_d	t =	72	hrs
3-2. Calculate max. depth of runoff that can be infiltrated within the t, $d_{max} = P_{design}\ t/12$	d_{max}=	2.4	ft
3-3. Enter trench fill aggregate porosity, n_t	n_t=	0.32	
3-4. Enter depth of trench fill, d_t	d_t =	4	ft
3-5. Select trench ponding depth d_p such that $d_p \leq d_{max} - n_t d_t$	d_p=	1.1	ft
3-6. Enter the time to fill infiltration basin or trench with water (Use 2 hours for most designs), T	T =	2	hrs

3-7. Calculate infiltrating surface area for infiltration basin: $A_b = SQDV/(T\ P_{design}\ /12+d_p)$	A_b = 7,250 ft^2

Step 4: Size the Forebay

A sediment forebay will be provided for this example as there is no separate pre-treatment unit provided.

Step 4: Size the forebay	
4-1. Calculate the volume of the forebay, $V_{forebay}$=0.25*SQDV	$V_{forebay}$= 2,100 ft^3
4-2. Determine forebay depth, $d_{forebay}$	$d_{forebay}$= 3 ft
4-3. Calculate forebay bottom surface area, $A_{forebay}=V_{forebay}/d_{forebay}$	$A_{forebay}$= 700 ft^2
4-4. Provide outlet pipe such that the forebay drains to the infiltration facility within 10 minutes.	

Step 5: Provide Conveyance Capacity for Flows Higher than Qwq

The infiltration facility should be placed off-line, but an emergency overflow for flows greater than the peak design storm must still be provided in the event the filter becomes clogged. Design emergency overflow in accordance with applicable standards of the Ventura County Flood Control District or local jurisdiction.

E.3 INF-3 Bioretention

Sizing Methodology

Bioretention areas can be sized using one of two methods: a simple sizing method or a routing method. The simple sizing procedure is summarized below. Continuous simulation modeling, routing spreadsheets, and/or other forms of routing modeling that incorporate rainfall-runoff relationships and infiltrative (flow) capacities of bioretention may be used to size facilities. Alternative sizing methodologies should be prepared with good engineering practices. For the routing modeling method, refer to the Sand Filter design guidance (FILT-1). A bioretention sizing worksheet and example are provided in this appendix. Planter boxes are sized the same as bioretention areas with underdrains using parameters appropriate for planter boxes.

With either method, the runoff entering the facility must completely drain the ponding area within 48 hours, and runoff must be completely infiltrated within 96 hours. Bioretention is to be sized, with or without underdrains, such that the SQDV will fill the available ponding depth, the void spaces in the planting soil, and the optional gravel layer below the media.

Step 1: Determine the stormwater quality design volume (SQDV)

Bioretention areas should be sized to capture and treat the water quality design volume (see Section E.1).

Step 2: Determine the Design Percolation Rate

The percolation rate will decline between maintenance cycles as particulates accumulate in the infiltrative layer and the surface becomes occluded. Additionally, monitoring of actual facility performance has shown that the full-scale infiltration rate is far lower than the rate measured by small-scale testing. It is important that adequate conservatism is incorporated in the selection of design percolation rates. For infiltrating bioretention facilities, the design percolation rate discussed here is the percolation rate of the underlying soils, which will drive infiltration through the facility. See INF-3: Bioretention for guidance in developing design percolation rate correction factors.

Step 3: Calculate the bioretention surface area

1) Determine the maximum depth of surface ponding that can be infiltrated within the required surface drain time:

$$d_{\max} = \frac{P_{design} \times t_{ponding}}{12\dfrac{in}{ft}}$$

Where:

$t_{ponding}$ = required drain time of surface ponding (48 hrs)

P_{design} = design percolation rate of underlying soils (in/hr) (see Step 2, above)

d_{max} = the maximum depth of surface ponding water that can be infiltrated within the required drain time (ft)

2) Choose surface ponding depth (dp) such that:

$$d_p \le d_{\max} \qquad \text{(Equation E-19)}$$

Where:

d_p = selected surface ponding depth (ft)

d_{max} = the maximum depth of water that can be infiltrated within the required drain time (ft)

3) Choose thickness(es) of amended media and aggregate layer(s) and calculate total effective storage depth of the bioretention area as follows:

$$d_{effective} \le d_p + n^*_{media} l_{media} + n_{gravel} l_{gravel} \qquad \text{(Equation E-20)}$$

Where:

$d_{effective}$ = total equivalent depth of water stored in bioretention area (ft)

d_p = surface ponding depth (ft)

n^*_{media} = available porosity of amended soil media (ft/ft), approximately 0.25 ft/ft accounting for antecedent moisture conditions

l_{media} = thickness of amended soil media layer (ft)

n_{gravel} = porosity of optional gravel layer (ft/ft), approximately 0.30 ft/ft

l_{gravel} = thickness of optional gravel layer (ft)

4) Check that entire effective depth (surface plus subsurface storage) infiltrates in no greater than 96 hours as follows:

$$t_{total} = \frac{d_{effective}}{P_{design}} \times 12 \frac{in}{ft} \le 96\ hr \qquad \text{(Equation E-21)}$$

Where:

$d_{effective}$ = total equivalent depth of water stored in bioretention area (ft)

P_{design} = design percolation rate of underlying soils (in/hr) (see Step 2, above)

If t_{total} > 96 hrs, then reduce surface ponding depth and/or amended media thickness and/or gravel thickness and return to Step [A].

If t_{total} ≤ 96 hrs, then proceed to Step [E].

5) Calculate required infiltrating surface area (filter bottom area):

$$A_{req} = \frac{SQDV}{d_{effective}} \qquad \text{(Equation E-22)}$$

Where:

$SQDV$ = stormwater quality design volume (ft3)

Step 4: Calculate the bioretention total footprint

Calculate total footprint required by including a buffer for side slopes and freeboard; A_{req} is measured at the as the filter bottom area (toe of side slopes).

Sizing Worksheet

Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	$A_{project}$ =	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	%
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p (1-imp)$	C =	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	ft
1-11. Calculate water quality design volume (ft^3), $SQDV=43560\times C*P*A_{retain}$	SQDV=	ft^3

Step 2: Determine the design percolation rate		
2-1. Enter measured soil percolation rate (in/hr) (0.5 in/hr minimum), $P_{measured}$	$P_{measured}$ =	in/hr
2-2. Determine percolation rate correction factor, S_A based on suitability assessment (see Section 6 INF-3)	S_A =	

2-3. Determine percolation rate correction factor, S_B based on design (see Section 6 INF-3)	S_B =
2-4. Calculate combined safety factor, $S = S_A \times S_b$	S =
2-5. Calculate the design percolation rate (in/hr), $P_{design} = P_{measured}/S$	P_{design} = in/hr
Step 3: Calculate Bioretention Infiltrating surface area	
3-1. Enter water quality design volume (ft^3), *SQDV*	SQDV = ft^3
3-2. Enter design percolation rate (in/hr), P_{design}	P_{design} = in/hr
3.3 Enter the required drain time (48 hours), $t_{ponding}$	$t_{ponding}$ = hours
3-3. Calculate the maximum depth of surface ponding that can be infiltrated within the required drain time (ft): $d_{max} = (P_{design} \times t_{ponding})/12$	d_{max} = ft
3-4. Select surface ponding depth (ft), d_p, such that $d_p \leq d_{max}$	d_p = ft
3-5. Select thickness of amended media (ft,2 feet minimum, 3 preferred), l_{media}	l_{media} = ft
3-6. Enter porosity of amended media (roughly 25% or 0.25 ft/ft), n_{media}	n_{media}= ft/ft
3-7. Select thickness of optional gravel layer (ft), l_{gravel}	l_{gravel} = ft
3-8. Enter porosity of gravel (roughly 30% or 0.3 ft/ft), n_{gravel}	n_{gravel}= ft/ft
3-9. Calculate the total effective storage depth of bioretention facility (ft): $d_{effective} \leq (d_p + n_{media} l_{media} + n_{gravel} l_{gravel})$	$d_{effective}$= ft

3-10. Check that the entire effective depth infiltrates in required drainage time, 96 hours: $t_{total} = (d_{effective}/P_{design}) \times 12$ If t_{total} > 96 hours, reduce surface ponding depth and/or amended media thickness and/or gravel thickness and return to 3-4. If $t_{total} \leq$ 96 hours, proceed to 3-11.	t_{total} = hours
3-11. Calculate the required infiltrating surface area (ft^2): $A_{req} = SQDV/d_{effective}$	A_{req} = ft^2
Step 4: Calculate Bioretention Area Total Footprint	
4-1. Calculate total footprint required by including a buffer for side slopes and freeboard (ft^2) [A_{req} is measured at the as the filter bottom area (toe of side slopes)], A_{tot}	A_{tot} = ft^2

Design Example

Bioretention areas have several components that allow the pretreatment, spreading, filtration, collection and discharge of the incoming flows.

Step 1: Determine water quality design volume

For this design example, a 10-acre site with soil type 4 and 60% total impervious area is considered. The 85th percentile storm event for the project location is 0.75 inches.

Step 1: Determine water quality design volume			
1-1. Enter Project area (acres), $A_{project}$	$A_{project}$ =	10	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	5	
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	0.5	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	0.6	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	6	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	5.5	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	0.05	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\ (1-imp)$	C =	0.59	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	0.75	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	0.06	ft
1-11. Calculate water quality design volume (ft^3), $SQDV=43560\times C*P*A_{retain}$	SQDV=	8,500	ft^3

Step 2: Determine the design percolation rate

For this design example, a native soil percolation rate of 1.5 in/hr is assumed.

Step 2: Determine the design percolation rate			
2-1. Enter measured soil percolation rate (in/hr, 0.5 in/hr minimum), $P_{measured}$	$P_{measured}$ =	4.0	in/hr
2-2. Determine percolation rate correction factor, S_A, based on suitability assessment (see Section 6 INF-1)	S_A =	3	
2-3. Determine percolation rate correction factor, S_B, based on design (see Section 6 INF-1)	S_b =	3	
2-4. Calculate combined safety factor, $S = S_A \times S_b$	S =	9	
2-5. Calculate the design percolation rate (in/hr), $P_{design} = P_{measured}/S$	P_{design} =	0.44	in/hr

Step 3: Determine bioretention/ planter box area footprint

A bioretention area is designed with two components: (1) temporary storage reservoir to store runoff, and (2) a plant mix filter bed (planting soil mixed with sand content = 70%) through which the stored runoff must percolate to obtain treatment.

Step 3: Calculate bioretention/planter box surface area			
3-1. Enter water quality design volume (ft^3), *SQDV*	SQDV =	8,500	ft^3
3-2. Enter design percolation rate (in/hr), P_{design}	P_{design} =	0.375	in/hr
3.3 Enter the required drain time (48 hours), $t_{ponding}$	$t_{ponding}$ =	48	hours
3-3. Calculate the maximum depth of surface ponding (ft) that can be infiltrated within the required drain time (48 hours): $d_{max} = (P_{design} \times t_{ponding})/12$	d_{max} =	1.5	ft
3-4. Select surface ponding depth d_p such that $d_p \leq d_{max}$	d_p =	1.5	ft
3-5. Select thickness of amended media (2 feet minimum, 3 preferred), l_{media}	l_{media} =	3	ft

Step 3: Calculate bioretention/planter box surface area	
3-6. Enter porosity of amended media (roughly 25% or 0.25 ft/ft), n_{media}	n_{media}= 0.25 ft/ft
3-7. Select thickness of optional gravel layer (ft), l_{gravel}	l_{gravel} = 1 ft
3-8. Enter porosity of gravel (roughly 30% or 0.3 ft/ft), n_{gravel}	n_{gravel}= 0.3 ft/ft
3-9. Calculate the total effective storage depth of bioretention facility (ft): $d_{effective} \leq (d_p + n_{media}l_{media} + n_{gravel}l_{gravel})$	$d_{effective}$= 2.6 ft
3-10. Check that the entire effective depth infiltrates in required drainage time, 96 hours: $t_{total} = (d_{effective}/P_{design}) \times 12$ If t_{total} > 96 hours, reduce surface ponding depth and/or amended media thickness and/or gravel thickness and return to 3-4. If $t_{total} \leq$ 96 hours, proceed to 3-11.	t_{total} = 82 hours
3-11. Calculate the required infiltrating surface area (ft^2), $A_{req} = SQDV/d_{effective}$	A_{req} = 3,300 ft^2

Step 4: Calculate Bioretention Area Total Footprint

For this design example, a natural-shaped bioretention area is assumed, with 3:1 side slopes. To calculate the total footprint, the side slopes would be added to the design geometry.

E.4 INF-5 Permeable Pavement

Sizing Methodology

Permeable pavement (including the base layers) shall be designed to drain in less than 72 hours. The basis for this is that soils must be allowed to dry out periodically in order to restore hydraulic capacity; this is essential in order to receive flows from subsequent storms, maintain infiltration rates, maintain adequate sub soil oxygen levels for healthy soil biota, and to provide proper soil conditions for biodegradation and retention of pollutants.

Permeable pavement must be built and designed by a licensed civil engineer in accordance with Ventura County roadway and pavement specifications.

Step 1: Calculate the design volume

Permeable pavement shall be sized to capture and treat the stormwater quality design volume, SQDV (see Section 2 and Appendix E).

Step 2: Determine the Design Percolation Rate

The percolation rate will decline between maintenance cycles as particulates accumulate in the infiltrative layer and the surface becomes occluded. Additionally, monitoring of actual facility performance has shown that the full-scale infiltration rate is far lower than the rate measured by small-scale testing. It is important that adequate conservatism is incorporated in the selection of design percolation rates. For infiltrating bioretention facilities, the design percolation rate discussed here is the percolation rate of the underlying soils, which will drive infiltration through the facility. See INF-5: Permeable Pavement for guidance in developing design percolation rate correction factors.

Step 3: Determine gravel drainage layer depth

Permeable pavement (including the base layers) shall be designed to drain in less than 72 hours. The basis for this is that soils must be allowed to dry out periodically in order to restore hydraulic capacity to receive flows from subsequent storms, maintain infiltration rates, maintain adequate sub soil oxygen levels for healthy soil biota, and to provide proper soil conditions for biodegradation and retention of pollutants.

1) Calculate the maximum depth of runoff, d_{max}, that can be infiltrated within the drawdown time:

$$d_{\max} = \frac{P_{design} \bullet t}{12} \qquad \text{(Equation E-23)}$$

Where:

d_{max} = maximum depth that can be infiltrated (ft)

P_{design} = design percolation rate of underlying soils (in/hr) (see Step 2, above)

t = drawdown time (72 hrs maximum) (hr)

1) Select the gravel drainage layer depth, l, such that:

$$d_{\max} \geq n \times l$$ (Equation E-24)

Where:

d_{max} = maximum depth that can be infiltrated (ft) (see 1) above)

n = gravel drainage layer porosity(unitless) (generally about 32% or 0.32 for gravel)

l = gravel drainage layer depth (ft)

Step 4: Determine infiltrating surface area

1) Calculate infiltrating surface area for permeable pavement, A:

$$A = \frac{SQDV}{\frac{TP_{design}}{12} + nl}$$ (Equation E-25)

Where:

P_{design} = design percolation rate of underlying soils (in/hr) (see Step 2, above)

n = gravel drainage layer porosity(unitless)[about 32% or 0.32 for gravel]

l = depth of gravel drainage layer (ft)

T = time to fill the gravel drainage layer with water (use 2 hours for most designs) (hr)

Step 5: Provide conveyance capacity for clogging

The permeable pavement must have an emergency overflow for storm events greater than the design and in the event the permeable pavement becomes clogged. See INF-5 Permeable Pavement for overflow details.

Sizing Worksheet

Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	$A_{project}$ =	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$	%
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	acres
1-7. Determine pervious runoff coefficient using <u>Table E-1</u>, C_p	C_p =	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\,(1-imp)$	C =	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	ft
1-11. Calculate water quality design volume (ft^3), $SQDV=43560\times C*P*A_{retain}$	SQDV=	ft^3
Step 2: Determine the design percolation rate		
2-1. Enter measured soil percolation rate (0.5 in/hr minimum), $P_{measured}$	$P_{measured}$ =	in/hr
2-2. Determine percolation rate correction factor, S_A based on suitability assessment (see Section 6 INF-5)	S_A =	

Step 2: Determine the design percolation rate	
2-3. Determine percolation rate correction factor, S_B based on design (see Section 6 INF-5)	S_B =
2-4. Calculate combined safety factor, $S = S_A \times S_b$	S =
2-5. Calculate the design percolation rate (in/hr), $P_{design} = P_{measured}/S$	P_{design} = in/hr
Step 3: Determine the Gravel Drainage Layer Depth	
3-1. Enter drawdown time (hours, 72 hrs max.), t	t = hours
3-2. Calculate max. depth of runoff (ft) that can be infiltrated within the t, $d_{max}=P_{design}t/12$	d_{max} = ft
3-3. Enter the gravel drainage layer porosity, n (typically 32% or 0.32 for gravel)	n =
3-4. Select the gravel drainage layer depth (ft) such that $d_{max} \geq n \times l$	l = ft
Step 4: Determine infiltrating surface area	
4-1. Enter gravel drainage layer porosity, n	n =
4-2. Enter depth of gravel drainage layer (ft), l	l = ft
4-3. Enter the time to fill the gravel drainage layer with water (Use 2 hours for most designs), T	T = hrs
4-4. Calculate infiltrating surface area (ft^3): $A=SQDV/((TP_{design}/12)+nl)$	A = ft^2
Step 5: Provide conveyance capacity for clogging	
5-1. The permeable pavement must have an emergency overflow for storm events greater than the design and in the event the permeable pavement becomes clogged.	

Design Example

Step 1: Determine Water Quality Design Volume

For this design example, a 10-acre residential development with a 60% total impervious area is considered. The 85th percentile storm event for the project location is 0.75 inches.

Step 1: Determine Water Quality Design Volume			
1-1. Enter Project area (acres), $A_{project}$	A =	10	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowableble}$ =	5	
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	0.5	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	0.6	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	6	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	5.5	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	0.05	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\ (1-imp)$	C =	0.59	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	0.75	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	0.06	ft
1-11. Calculate water quality design volume (ft^3), $SQDV=43560\times C*P*A_{retain}$	SQDV =	8,500	ft^3

Step 2: Calculate Design Percolation Rate

Permeable pavement with no underdrain requires a minimum soil infiltration rate of 0.5 in/hr. For this design example, a native soil percolation rate of 1.5 in/hr is assumed.

Step 2: Determine the design percolation rate			
2-1. Enter measured soil percolation rate (0.5 in/hr min.), $P_{measured}$	$P_{measured}$ =	4.0	in/hr
2-2. Determine percolation rate correction factor, S_A, based on suitability assessment (see Section 6 INF-1)	S_A =	3	
2-3. Determine percolation rate correction factor, S_B, based on design (see Section 6 INF-1)	S_b =	3	
2-4. Calculate combined safety factor, $S = S_A \times S_b$	S =	9	
2-5. Calculate the design percolation rate (in/hr), $P_{design} = P_{measured}/S$	P_{design} =	0.44	in/hr

Step 3: Determine maximum depth that can be infiltrated

Based on the design infiltration rate and the max drawdown, determine the maximum depth that can be infiltrated within the time constraints.

Step 3: Determine maximum depth that can be infiltrated			
3-1. Enter drawdown time (72 hrs max.), t	t =	72	hrs
3-2. Calculate max. depth of runoff (ft) that can be infiltrated within the t, $d_{max}=P_{design}t/12$	d_{max} =	2.6	ft
3-3. Enter the gravel drainage layer porosity, n (typically 32% or 0.32 for gravel)	n =	0.32	
3-4. Select the gravel drainage layer depth (ft) such that $d_{max} \geq n \times l$	l =	8	ft

Step 4: Determine the infiltrating surface area (pavement area)

Using the depth calculated in Step 3, the required infiltrating surface area of the pavement can be calculated.

Step 4: Determine the infiltrating surface area			
4-1. Enter gravel drainage layer porosity, *n*	n =	0.32	
4-2. Enter depth of gravel drainage layer (ft), *l*	l =	8	ft
4-3. Enter the time to fill the gravel drainage layer with water (Use 2 hours for most designs), *T*	T =	2	hrs
4-4. Calculate infiltrating surface area (ft^3): $A=SQDV/(TP_{design}/12)+n*l))$	A =	1,630	ft^2

Step 5: Provide conveyance capacity for clogging

The permeable pavement must have an emergency overflow for storm events greater than the design and in the event the permeable pavement becomes clogged.

E.5 VEG-1 Bioretention/VEG-2 Planter Box

Sizing Methodology

Bioretention areas can be sized using one of two methods: a simple sizing method or a routing method. The simple sizing procedure is summarized below. Continuous simulation modeling, routing spreadsheets, and/or other forms of routing modeling that incorporate rainfall-runoff relationships and infiltrative (flow) capacities of bioretention may be used to size facilities. Alternative sizing methodologies should be prepared with good engineering practices. For the routing modeling method, refer to the Sand Filter design guidance (FILT-1). A bioretention sizing worksheet and example are provided in this appendix. Planter boxes are sized the same as bioretention areas with underdrains using parameters appropriate for planter boxes.

With either method, the runoff entering the facility must completely drain the ponding area within 48 hours, and runoff must be completely infiltrated within 96 hours. Bioretention is to be sized, with or without underdrains, such that the SQDV will fill the available ponding depth, the void spaces in the planting soil, and the optional aggregate layer.

Step 1: Determine the stormwater quality design volume (SQDV)

Bioretention areas should be sized to capture and treat the water quality design volume (see Section E.1).

Step 2: Determine the Design Percolation Rate

Sizing is based on the design saturated hydraulic conductivity (K_{sat}) of the amended soil layer. A target K_{sat} of 5 inches per hour is recommended for newly installed non-proprietary amended soil media. The media K_{sat} will decline between maintenance cycles as the surface becomes occluded and particulates accumulate in the amended soil layer. A factor of safety of 2.0 should be applied such that the resulting recommended design percolation rate is 2.5 inches per hour. This value should be used for sizing unless sufficient rationale is provided to justify a higher design percolation rate.

Step 3: Calculate the bioretention or planter box surface area

Determine the size of the required infiltrating surface by assuming the SQDV will fill the available ponding depth plus the void spaces in the media, based on the computed porosity of the filter media and optional aggregate layer.

1) Select a surface ponding depth (d_p) that satisfies geometric criteria and congruent with the constraints of the site. Selecting a deeper ponding depth (18 inches maximum) generally yields a smaller footprint, however requires greater consideration for public safety and energy dissipation.

2) Compute time for selected ponding depth to filter through media:

$$t_{ponding} = \frac{d_p}{K_{design}} 12 \frac{in}{ft} \leq 48 \text{ hours} \qquad \text{(Equation E-26)}$$

Where:

$t_{ponding}$ = required drain time of surface ponding (48 hrs)

d_p = selected surface ponding water depth (ft)

K_{design} = design saturated hydraulic conductivity (in/hr) (see Step 2, above)

If $t_{ponding}$ exceeds 48 hours, return to (1) and reduce surface ponding or increase media K_{design}. Otherwise, proceed to next step.

Note: In nearly all cases, $t_{ponding}$ will not approach 48 hours unless a low Kdesign is specified.

3) Compute depth of water that may be considered to be filtered during the design storm event as follows:

$$d_{filtered} = Minimum\left[\frac{K_{design} \times T_{routing}}{12\, {}^{in}\!/_{ft}}, \frac{d_p}{2}\right] \qquad \text{(Equation E-27),}$$

Where:

$d_{filtered}$ = depth of water that may be considered to be filtered during the design storm event (ft) for routing calculations; this value should not exceed half of the surface ponding depth (d_p)

K_{design} = design saturated hydraulic conductivity (in/hr) (see Step 2, above)

$T_{routing}$ = storm duration that may be assumed for routing calculations; this should be assumed to be **3 hours** unless rationale for an alternative assumption is provided

d_p = selected surface ponding water depth (ft)

4) Calculate required infiltrating surface area (filter bottom area):

$$A_{req} = \frac{SQDV}{d_p + d_{filtered}} \qquad \text{(Equation E-28)}$$

Where:

A_{req}	=	required area at bottom of filter area (ft^2); does not account for side slopes and freeboard
$SQDV$	=	stormwater quality design volume (ft^3)
d_p	=	selected surface ponding water depth (ft)
$d_{filtered}$	=	depth of water that can be considered to be filtered during the design storm event (ft) for routing calculations (See previous step)

Step 4: Calculate the bioretention total footprint

Calculate total footprint required by including a buffer for side slopes and freeboard; A_{req} is measured at the filter bottom area (toe of side slopes).

Step 5: Calculate underdrain system capacity

Underdrains are required for planter boxes and bioretention with underdrains. For guidance on sizing, refer to step 5 of the worksheet below. Alternatively, the Ventura County Hydrology Manual can be used for pipe sizing guidance.

Sizing Worksheet

Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	$A_{project}$ =	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$	%
1-3. Determine the maximum allowed effective impervious area (ac), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain}=TIA\text{-}EIA_{allowable}$	A_{retain} =	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\ (1\text{-}imp)$	C =	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	ft
1-11. Calculate water quality design volume (ft^3), $SQDV=43560\bullet C*P*A_{retain}$	SQDV=	ft^3

Step 2: Determine the design percolation rate		
2-1. Enter the design saturated hydraulic conductivity of the amended filter media (2.5 in/hr recommended rate), K_{design}	K_{design} =	in/hr

Step 3: Calculate Bioretention/Planter Box surface area		
3-1. Enter water quality design volume (ft^3), *SQDV*	SQDV =	ft^3
3-2. Enter design saturated hydraulic conductivity (in/hr), K_{design}	K_{design} =	in/hr
3-3. Enter ponding depth (max 1.5 ft for Bioretention, 1 ft for Planter Box) above area, d_p	d_p =	ft
3-4. Calculate the drawdown time for the ponded water to filter through media (hours), $t_{ponding} = (d_p/K_{design}) \times 12$	$t_{ponding}$=	hrs
3-5. Enter the storm duration for routing calculations (use 3 hours unless there is rationale for an alternative), $T_{routing}$	$T_{routing}$ =	hrs
3-6. Calculate depth of water (ft) filtered by using the following two equations: $d_{filtered,1} = (K_{design} \times T_{routing})/12$ $d_{filteret,2} = d_p /2$	$d_{filtered,1}$ = $d_{filtered,2}$ =	ft ft
3.7 Enter the resultant depth (ft) (the lesser of the two calculated above), $d_{filtered}$	$d_{filtered}$ =	ft
3-8. Calculate the infiltrating surface area as follows (ft^2): $A_{req} = SQDV/(d_p + d_{filtered})$	A_{req} =	ft^2
Step 4: Calculate Bioretention Area Total Footprint		
4-1. Calculate total footprint required by including a buffer for side slopes and freeboard (ft^2) [A_{req} is measured at the as the filter bottom area (toe of side slopes)], A_{tot}	A_{tot} =	ft^2
Step 5: Calculate Underdrain System Capacity		
To calculate the underdrain system capacity, continue through steps 5-1 to 5-7.		

Step 5: Calculate Underdrain System Capacity		
5-1. Calculated filtered flow rate to be conveyed by the longitudinal drain pipe, $Q_f = K_{design} A_{req}/43{,}200$	Q_f =	cfs
5-2. Enter minimum slope for energy gradient, S_e	S_e =	
5-3. Enter Hazen-Williams coefficient for plastic, C_{HW}	C_{HW} =	
5-4. Enter pipe diameter (min 6 inches), D	D =	in
5-5. Calculate pipe hydraulic radius (ft), $R_h = D/48$	R_h =	ft
5-6. Calculate velocity at the outlet of the pipe (ft/s), $V_p = 1.318 C_{HW} R_h^{0.63} S_e^{0.54}$	V_p =	ft/s
5-7. Calculate pipe capacity (cfs), $Q_{cap} = 0.25\pi(D/12)^2 V_p$	Q_{cap} =	cfs

Design Example

Bioretention areas have several components that allow the pretreatment, spreading, filtration, collection and discharge of the incoming flows.

Step 1: Determine water quality design volume

For this design example, a 10-acre residential development with a 60% total impervious area is considered. The 85th percentile storm event for the project location is 0.75 inches.

Step 1: Determine Water Quality Design Volume			
1-1. Enter drainage area, A	A =	10	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowableble}$ =	5	
1-3. Determine the maximum allowed effective impervious area, $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	0.5	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	0.6	
1-5. Determine the Project Total Impervious area, $TIA=A_{project}*Imp$	TIA=	6	acres
1-6. Determine the total area from which runoff must be retained, $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	5.5	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	0.05	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\ (1-imp)$	C =	0.59	
1-9. Enter design rainfall depth of the storm, P_i (in)	P_i =	0.75	in
1-10. Calculate rainfall depth, $P = P_i/12$	P =	0.06	ft
1-11. Calculate water quality design volume, $SQDV = 43560 \bullet P*A_{retain}*C$	SQDV =	8,500	ft^3

Step 2: Determine the design percolation rate

For this design example, the recommended amended filter hydraulic conductivity is used, 2.5 in/hr.

Step 2: Determine the design percolation rate	
2-1. Enter the design saturated hydraulic conductivity of the amended filter media (2.5 in/hr recommended rate), K_{design}	K_{design} = 2.5 in/hr

Step 3: Determine bioretention/ planter box area footprint

A bioretention area is designed with two components: (1) temporary storage reservoir to store runoff, and (2) a plant mix filter bed (planting soil mixed with sand content = 70%) through which the stored runoff must percolate to obtain treatment.

Step 3: Calculate Bioretention/Planter Box surface area			
3-1. Enter water quality design volume (ft^3), *SQDV*	SQDV =	8,500	ac-ft
3-2. Enter design saturated hydraulic conductivity (in/hr), K_{design}	K_{design} =	2.5	in/hr
3-3. Enter ponding depth (max 1.5 ft for Bioretention, 1 ft for Planter Box) above area, d_p	d_p =	1.5	ft
3-4. Calculate the drawdown time for the ponded water to filter through media (hours), $t_{ponding} = (d_p/K_{design}) \times 12$	$t_{ponding}$=	7.2	hrs
3-5. Enter the storm duration for routing calculations (use 3 hours unless there is rationale for an alternative), $T_{routing}$	$T_{routing}$ =	3	hrs
3-6. Calculate depth of water (ft) filtered by using the minimum of the following two equations: $d_{filtered,1} = (K_{design} \times T_{routing})/12$ $d_{filteret,2} = d_p /2$	$d_{filtered,1}$ = $d_{filtered,2}$ =	0.63 0.75	ft ft
3.7 Enter the resultant depth (the minimum of the two calculated above), $d_{filtered}$	$d_{filtered}$ =	0.63	ft
3-8. Calculate the infiltrating surface area as follows (ft^2): $A_{req} = SQDV/(d_p + d_{filtered})$	A_{req} =	4,000	ft^2

Step 4: Calculate Bioretention Area Total Footprint

For this design example, a natural-shaped bioretention area is assumed, with 3:1 side slopes. To calculate the total footprint, the side slopes would be added to the design geometry.

Step 5: Calculate filter longitudinal underdrain collection pipe

All underdrain pipes must be 6 inches or greater in diameter to facilitate cleaning.

Step 5: Calculate underdrain system (required for planter box)			
To calculate the underdrain system capacity, continue through steps 5-1 to 5-7. If you don't need to calculate the underdrain capacity, skip this step.			
5-1. Calculated filtered flow rate to be conveyed by the longitudinal drain pipe (cfs), $Q_f = K_{design}\ A_{req}/43{,}200$	$Q_f =$	0.085	cfs
5-2. Enter minimum slope for energy gradient, S_e	$S_e =$	0.005	
5-3. Enter Hazen-Williams coefficient for plastic, C_{HW}	$C_{HW} =$	140	
5-4. Enter pipe diameter (min 6 in), D	$D =$	6	in
5-5. Calculate pipe hydraulic radius (ft), $R_h = D/48$	$R_h =$	0.13	ft
5-6. Calculate velocity at the outlet of the pipe (ft/s), $V_p = 1.318 C_{HW} R_h^{0.63} S_e^{0.54}$	$V_p =$	2.9	ft/s
5-7. Calculate pipe capacity (cfs), $Q_{cap} = 0.25\pi(D/12)^2 V_p$	$Q_{cap} =$	0.57	cfs

E.6 VEG-3 Vegetated Swale

Sizing Methodology

The flow capacity of a vegetated swale is a function of the longitudinal slope (parallel to flow), the resistance to flow (i.e. Manning's roughness), and the cross sectional area. The cross section is normally approximately trapezoidal and the area is a function of the bottom width and side slopes. The flow capacity of vegetated swales should be such that the design water quality flow rate will not exceed a flow depth of 2/3 the height of the vegetation within the swale or 4 inches at the water quality design flow rate. Once design criteria have been selected, the resulting flow depth for the design water quality design flow rate is checked. If the depth restriction is exceeded, swale parameters (e.g. longitudinal slope, width) are adjusted to reduce the flow depth.

Procedures for sizing vegetated swales are summarized below. A vegetated swale sizing worksheet and example are also provided.

Step 1: Select design flows

The swale sizing is based on the stormwater quality design flow SQDF (see Section E.1).

Step 2: Calculate swale bottom width

The swale bottom width is calculated based on Manning's equation for open-channel flow. This equation can be used to calculate discharges as follows:

$$Q = \frac{1.49 A R^{0.67} S^{0.5}}{n}$$

(Equation E-29)

Where:

Q	=	flow rate (cfs)
n	=	Manning's roughness coefficient (unitless)
A	=	cross-sectional area of flow (ft^2)
R	=	hydraulic radius (ft) = area divided by wetted perimeter
S	=	longitudinal slope (ft/ft)

For shallow flow depths in swales, channel side slopes are ignored in the calculation of bottom width. Use the following equation (a simplified form of Manning's formula) to estimate the swale bottom width:

$$b = \frac{SQDF * n_{wq}}{1.49 y^{0.67} s^{0.5}} \quad \text{(Equation E-30)}$$

Where:

b	=	bottom width of swale (ft)
$SQDF$	=	stormwater quality design flow (cfs)
n_{wq}	=	Manning's roughness coefficient for shallow flow conditions = 0.2 (unitless)
y	=	design flow depth (ft)
s	=	longitudinal slope (along direction of flow) (ft/ft)

Proceed to Step 3 if the bottom width is calculated to be between 2 and 10 feet. A minimum 2-foot bottom width is required. Therefore, if the calculated bottom width is less than 2 feet, increase the width to 2 feet and recalculate the design flow depth y using the Equation 4-13, where Q_{wq}, n_{wq}, and s are the same values as used above, but b = 2 feet.

The maximum allowable bottom width is 10 feet; therefore if the calculated bottom width exceeds 10 feet, then one of the following steps is necessary to reduce the design bottom width:

1) Increase the longitudinal slope (s) to a maximum of 6 feet in 100 feet (0.06 feet per foot).

2) Increase the design flow depth (y) to a maximum of 4 inches.

3) Place a divider lengthwise along the swale bottom (Figure 3-1) at least three-quarters of the swale length (beginning at the inlet), without compromising the design flow depth and swale lateral slope requirements. Swale width can be increased to an absolute maximum of 16 feet if a divider is provided.

Step 3: Determine design flow velocity

To calculate the design flow velocity through the swale, use the flow continuity equation:

$$V_{wq} = SQDF/A_{wq} \quad \text{(Equation E-31)}$$

Where:

V_{wq}	=	design flow velocity (fps)
$SQDF$	=	stormwater quality design flow (cfs)

A_{wq}	=	$by + Zy^2$ = cross-sectional area (ft^2) of flow at design depth, where Z = side slope length per unit height (e.g., Z = 3 if side slopes are 3H:1V)

If the design flow velocity exceeds 1 foot per second, go back to Step 2 and modify one or more of the design parameters (longitudinal slope, bottom width, or flow depth) to reduce the design flow velocity to 1 foot per second or less. If the design flow velocity is calculated to be less than 1 foot per second, proceed to Step 4. *Note: It is desirable to have the design velocity as low as possible, both to improve treatment effectiveness and to reduce swale length requirements.*

Step 4: Calculate swale length

Use the following equation to determine the necessary swale length to achieve a hydraulic residence time of at least 7 minutes:

$$L = 60t_{hr}V_{wq} \qquad \text{(Equation E-32)}$$

Where:

L	=	minimum allowable swale length (ft)
t_{hr}	=	hydraulic residence time (min)
V_{wq}	=	design flow velocity (fps)

The minimum swale length is 100 feet; therefore, if the swale length is calculated to be less than 100 feet, increase the length to a minimum of 100 feet, leaving the bottom width unchanged. If a larger swale can be fitted on the site, consider using a greater length to increase the hydraulic residence time and improve the swale's pollutant removal capability. If the calculated length is too long for the site, or if it would cause layout problems, such as encroachment into shaded areas, proceed to Step 5 to further modify the layout. If the swale length can be accommodated on the site (meandering may help), proceed to Step 6.

Step 5: Adjust swale layout to fit on site

If the swale length calculated in Step 4 is too long for the site, the length can be reduced (to a minimum of 100 feet) by increasing the bottom width up to a maximum of 16 feet, as long as the 10 minute retention time is retained. However, the length cannot be increased in order to reduce the bottom width because Manning's depth-velocity-flow rate relationships would not be preserved. If the bottom width is increased to greater than 10 feet, a low flow dividing berm is needed to split the swale cross section in half to prevent channelization.

Length can be adjusted by calculating the top area of the swale and providing an equivalent top area with the adjusted dimensions.

1) Calculate the swale treatment top area based on the swale length calculated in Step 4:

$$A_{top} = (b_i + b_{slope})L_i \qquad \text{(Equation E-33)}$$

Where:

A_{top} = top area (ft^2) at the design treatment depth

b_i = bottom width (ft) calculated in Step 2

b_{slope} = the additional top width (ft) above the side slope for the design water depth (for 3:1 side slopes and a 4-inch water depth, b_{slope} = 2 feet)

L_i = initial length (ft) calculated in Step 4

2) Use the swale top area and a reduced swale length L_f to increase the bottom width, using the following equation:

$$L_f = A_{top} / (b_f + b_{slope}) \qquad \text{(Equation E-34)}$$

Where:

L_f = reduced swale length (ft)

b_f = increased bottom width (ft).

3) Recalculate V_{wq} according to Step 3 using the revised cross-sectional area A_{wq} based on the increased bottom width b_f. Revise the design as necessary if the design flow velocity exceeds 1 foot per second.

4) Recalculate to assure that the 10 minute retention time is retained.

Step 6: Provide conveyance capacity for flows higher than SQDF

Vegetated swales may be designed as flow-through channels that convey flows higher than the water quality design flow rate, or they may be designed to incorporate a high-flow bypass upstream of the swale inlet. A high-flow bypass usually results in a smaller swale size. If a high-flow bypass is provided, this step is not needed. If no high-flow bypass is provided, proceed with the procedure below. Flow splitter structure design is described in Appendix G.

1) Check the swale size to determine whether the swale can convey the flood control design storm peak flows (Refer to the Ventura County Hydrology Manual, 2006).

2) The peak flow velocity of the flood control design storm (e.g., flood control design storm – see Ventura County Hydrology Manual, 2006)) must be less than 3.0 feet per second. If this velocity exceeds 3.0 feet per second, return to Step 2 and

increase the bottom width or flatten the longitudinal slope as necessary to reduce the flood control design storm peak flow velocity to 3.0 feet per second or less. If the longitudinal slope is flattened, the swale bottom width must be recalculated (Step 2) and must meet all design criteria.

Sizing Worksheet

Step 1: Determine water quality design flow		
1-1. Enter Project area (acres), $A_{project}$	A_{design} =	acres
1-2. Enter impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp =	
1-3. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	
1-4. Calculate runoff coefficient, $C = 0.95*imp + C_p\ (1\text{-}imp)$	C =	
1-5. Enter design rainfall intensity (in/hr), *i*	i =	in/hr
1-6. Calculate water quality design flow (cfs), *SQDF= CiA*	SQDF =	cfs
Step 2: Calculate swale bottom width		
2-1. Enter water quality design flow (cfs), *SQDF*	SQDF =	cfs
2-2. Enter Manning's roughness coefficient for shallow flow conditions, $n_{wq} = 0.2$	n_{wq} =	
2-3. Calculate design flow depth (ft), *y*	y =	ft
2-4. Enter longitudinal slope (ft/ft) (along direction of flow), *s*	s =	ft/ft
2-5. Calculate bottom width of swale (ft), $b = (SQDF*n_{wq})/(1.49y^{0.67}s^{0.5})$	b =	ft
2-6. If *b* is between 2 and 10 feet, go to Step 3		
2-7. If b is less than 2 ft, assume b = 2 ft and recalculate flow depth, $y = ((SQDF*n_{wq})/(2.98\ s^{0.5}))^{1.49}$	y =	ft

2-8. If b is greater than 10 ft, one of the following design adjustments must be made (recalculate variables as necessary): • Increase the longitudinal slope to a maximum of 0.06 ft/ft. • Increase the design flow depth to a maximum of 4 in (0.33 ft). • Place a divider lengthwise along the swale bottom (Figure 3-1) at least three-quarters of the swale length (beginning at the inlet). Swale width can be increased to an absolute maximum of 16 feet if a divider is provided.		
Step 3: Determine design flow velocity		
3-1. Enter side slope length per unit height (H:V) (e.g. 3 if side slopes are 3H :1V), *Z*	Z =	
3-2. Enter bottom width of swale (ft), *b*	b =	ft
3-3. Enter design flow depth (ft), *y*	y =	ft
3-4. Calculate the cross-sectional area of flow at design depth (ft^2), $A_{wq} = by + Zy^2$	A_{wq} =	ft^2
3-5. Calculate design flow velocity (ft/s), $V_{wq} = SQDF/ A_{wq}$	V_{wq} =	ft/s
3-6. If the design flow velocity exceeds 1 ft/s, go back to Step 2 and change one or more of the design parameters to reduce the design flow velocity. If design flow velocity is less than 1 ft/s, proceed to Step 4.		
Step 4: Calculate swale length		
4-1. Enter hydraulic residence time (minutes, minimum 7 min), t_{hr}	t_{hr} =	min
4-2. Calculate swale length (ft), $L = 60t_{hr}V_{wq}$	L =	ft

Step 4: Calculate swale length		
4-3. If L is too long for the site, proceed to Step 5 to adjust the swale layout If L is greater than 100 ft and will fit within the constraints of the site, skip to Step 6 If L is less than 100 ft, increase the length to a minimum of 100 ft, leaving the bottom width unchanged, and skip to Step 6		
Step 5: Adjust swale layout to fit within site constraints		
5-1. Enter the bottom width calculated in Step 2 (ft), $b_i = b$	b_i =	ft
5-2. Enter design flow depth (ft), y	y=	ft
5-3. Enter the swale side slope ratio (H:V), Z	Z =	ft:ft
5-4. Enter the additional top width above the side slope for the design water depth (ft), $b_{slope} = 2Zy$	b_{slope} =	ft
5-5. Enter the initial length calculated in Step 4 (ft), $Li = L$	L_i =	ft
5-6. Calculate the top area at the design treatment depth (ft^2), $A_{top} = (b_i + b_{slope}) \times L_i$	A_{top} =	ft^2
5-7. Choose a reduced swale length based on site constraints (ft), L_f	L_f =	ft
5-8. Calculate the increased bottom width (ft), $b_f = (A_{top}/L_f) - b_{slope}$	b_f =	ft
5-9. Recalculate the cross-sectional area of flow at design depth (ft2), $A_{wq,f} = b_f y + Zy^2$	$A_{wq,f}$ =	ft^2
5-10. Recalculate design flow velocity (ft/s), $V_{wq} = SQDF/\ A_{wq}$ Revise design as necessary if design flow velocity exceeds 1 ft/s.	V_{wq} =	ft/s

5-11. Recalculate the hydraulic residence time (min), $t_{hr} = L_f/(60V_{wq})$ Ensure that t_{hr} is greater or equal to 10 minutes.	t_{hr} = min
5-12. When V_{wq} and t_{hr} are recalculated to meet requirements, proceed to Step 6.	
Step 6: Provide conveyance capacity for flows higher than SQDF (if swale is on-line)	
6-1. If the swale already includes a high-flow bypass to convey flows higher than the water quality design flow rate, skip this step and verify that all parameters meet design requirements to complete sizing	
6-2. If swale does not include a high-flow bypass, determine that the swale can convey flood control design storm peak flows. Calculate the capital peak flow velocity per Ventura County requirements (ft/s), V_p	V_p = ft/s
6-3. If V_p > 3.0 feet per second, return to Step 2 and increase the bottom width or flatten the longitudinal slope as necessary to reduce the flood control design storm peak flow velocity to 3.0 feet per second or less. If the longitudinal slope is flattened, the swale bottom width must be recalculated (Step 2) and must meet all design criteria.	

Design Example

Step 1: Determine water quality design Flow

For this design example, a 10-acre site with Type 4 soil and 60% total imperviousness is considered. Flow-based sizing Method 1 is assumed. Therefore, the design intensity is 0.2 in/hr.

Step 1: Determine water quality design flow			
1-1. Enter Project area (acres), $A_{project}$	A =	10	acres
1-2. Enter impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp =	0.60	
1-3. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	0.05	
1-4. Calculate runoff coefficient, $C = 0.95*imp + C_p\,(1\text{-}imp)$	C =	0.59	
1-5. Enter design rainfall intensity (in/hr), *i*	i =	0.2	in/hr
1-6. Calculate water quality design flow (cfs), *SQDF= CiA*	*SQDF=*	1.18	cfs

Step 2: Calculate Swale Bottom Width

The swale bottom width is calculated based on Manning's equation. The grass height in the swale will be maintained at 6-inches. The design flow depth is assumed to be 2/3 of the grass height, or 4 inches (0.33 ft). The default Manning's roughness coefficient is assumed appropriate for expected vegetation density and design depth. The slope was assumed to be 0.04.

Step 2: Calculate swale bottom width			
2-1. Enter water quality design flow (cfs), *SQDF*	SQDF =	1.18	cfs
2-2. Enter Manning's roughness coefficient for shallow flow conditions, n_{wq} = 0.2	n_{wq} =	0.2	
2-3. Calculate design flow depth (ft), *y*	*y* =	0.33	ft
2-4. Enter longitudinal slope (along direction of flow) (ft/ft), *s*	s =	0.04	ft/ft
2-5. Calculate bottom width of swale (ft),	b =	5.0	ft

Step 2: Calculate swale bottom width	
$b = Q_{wq}n_{wq} / 1.49y^{0.67}s^{0.5}$	
2-6. If *b* is between 2 and 10 feet, go to Step 3	
2-7. If *b* is less than 2 ft, assume *b* = 2 ft and recalculate flow depth, $y = (Q_{wq}n_{wq} / 2.98s^{0.5})^{1.49}$	Not applicable
2-8. If *b* is greater than 10 ft, one of the following design adjustments must be made (and recalculate as necessary): Increase the longitudinal slope to a maximum of 0.06 ft/ft. Increase the design flow depth to a maximum of 4 in (0.33 ft). Place a divider lengthwise along the swale bottom (Figure 3-1) at least three-quarters of the swale length (beginning at the inlet). Swale width can be increased to an absolute maximum of 16 feet if a divider is provided.	Not applicable

Step 3: Determine Design Flow Velocity

For this design example, it is assumed the side slopes will be designed as 3H: 1V, so Z = 3.

Step 3: Determine design flow velocity			
3-1. Enter side slope length per unit height (H:V) (e.g. 3 if side slopes are 3H :1V), *Z*	Z =	3	
3-2. Enter bottom width of swale (ft), *b*	b =	5.0	ft
3-3. Enter design flow depth (ft), *y*	y =	0.33	ft
3-4. Calculate the cross-sectional area of flow at design depth (ft^2), $A_{wq} = by + Zy^2$	A_{wq} =	2.0	ft^2
3-5. Calculate design flow velocity (ft/s), $V_{wq} = SQDF/ A_{wq}$	V_{wq} =	0.59	ft/s
3-6. If the design flow exceeds 1 ft/s, go back to Step 2 and change one or more of the design parameters to reduce the design flow velocity. If design flow velocity is less than 1 ft/s, proceed to Step 4.			

Step 4: Calculate Swale Length

Using the design flow velocity and a minimum residence time of 7 minutes, the length of the swale is calculated as follows. The swale length must be a minimum of 100 ft.

Step 4: Calculate swale length			
4-1. Enter hydraulic residence time (min 7 min), t_{hr} (min)	t_{hr} =	10	min
4-2. Calculate swale length, $L = 60 t_{hr} V_{wq}$	L =	354	ft
4-3. If *L* is too long for the site, proceed to Step 5 to adjust the swale layout If *L* is greater than 100 ft and will fit within the constraints of the site, skip to Step 6 If *L* is less than 100 ft, increase the length to a minimum of 100 ft, leaving the bottom width unchanged, and skip to Step 6	Not Applicable		

Site constraints only allow a swale length of 300 feet. Therefore proceed to Step 5 to adjust the swale length.

Step 5: Adjust Swale Layout to Fit Within Site Constraints

To adjust swale length to 300 feet, the bottom width needs to be increased (up to a maximum of 16 ft if a divider is provided).

Step 5: Adjust swale layout to fit within site constraints			
5-1. Enter the bottom width calculated in Step 2 (ft), $b_i = b$	b_i =	5.0	ft
5-2. Enter design flow depth (ft), y	y=	0.33	ft
5-3. Enter the swale side slope ratio (H:V), Z	Z =	3	ft:ft
5-4. Enter the additional top width above the side slope for the design water depth (ft), $b_{slope} = 2Zy$	b_{slope} =	2	ft
5-5. Enter the initial length calculated in Step 4 (ft), $Li = L$	L_i =	354	ft
5-6. Calculate the top area at the design treatment depth (ft^2), $A_{top} = (b_i + b_{slope}) \times L_i$	A_{top} =	2,480	ft^2

5-7. Choose a reduced swale length based on site constraints (ft), L_f	L_f = 300 ft
5-8. Calculate the increased bottom width (ft), $b_f = (A_{top}/L_f) - b_{slope}$	b_f = 6.3 ft
5-9. Recalculate the cross-sectional area of flow at design depth (ft2), $A_{wq,f} = b_f y + Zy^2$	$A_{wq,f}$ = 2.4 ft^2
5-10. Recalculate design flow velocity (ft/s), $V_{wq} = SQDF/ A_{wq}$ Revise design as necessary if design flow velocity exceeds 1 ft/s.	V_{wq} = 0.49 ft/s
5-11. Recalculate the hydraulic residence time (min), $t_{hr} = L_f/(60V_{wq})$ Ensure that t_{hr} is greater or equal to 10 minutes.	t_{hr} = 10.2 min
5-12. When V_{wq} and t_{hr} are recalculated to meet requirements, proceed to Step 6.	

Since the new length and width yields V_{wq} and t_{hr} which meet requirements, continue to Step 6.

Step 6: Provide Conveyance Capacity for Flows Higher than SQDF

The swale will be offline such that all flows greater than SQDF will be bypassed.

E.7 VEG-4 Filter Strip

Sizing Methodology

The flow capacity of a vegetated filter strips (filter strips) is a function of the longitudinal slope (parallel to flow), the resistance to flow (e.g., Manning's roughness), and the width and length of the filter strip. The slope shall be small enough to ensure that the depth of water will not exceed 1 inch over the filter strip. Similarly, the flow velocity shall be less than 1 ft/sec. Procedures for sizing filter strips are summarized below. A filter strip sizing example is also provided.

Step 1: Calculate the design flow rate

The design flow is calculated based on the stormwater quality design flow rate, SQDF, as described in Section E.1.

Step 2: Calculate the minimum width

Determine the minimum width (i.e. perpendicular to flow) allowable for the filter strip and design for that width or larger.

$$W_{min} = (SQDF) / (q_{a,min}) \qquad \text{(Equation E-35)}$$

Where

W_{min}	=	minimum width of filter strip
$SQDF$	=	stormwater quality design flow (cfs)
$q_{a,min}$	=	minimum linear unit application rate, 0.005 cfs/ft

Step 3: Calculate the design flow depth

The design flow depth (d_f) is calculated based on the width and the slope (parallel to the flow path) using a modified Manning's equation as follows:

$$d_f = 12 * [SQDF * n_{wq} / 1.49 W_{trib} s^{0.5}]^{0.6} \qquad \text{(Equation E-36)}$$

Where:

d_f	=	design flow depth (inches)
$SQDF$	=	stormwater quality design flow (cfs)
W_{trib}	=	width (perpendicular to flow = width of impervious surface contributing area (ft))
s	=	slope (ft/ft) of strip parallel to flow, average over the whole width

n_{wq} = Manning's roughness coefficient (0.25-0.30)

If d_f is greater than 1 inch (0.083 ft), then a shallower slope is required, or a filter strip cannot be used.

Step 4: Calculate the design velocity

The design flow velocity is based on the design flow, design flow depth, and width of the strip:

$$V_{wq} = SQDF / (d_f W_{trib}) \qquad \text{(Equation E-37)}$$

Where:

$d_{f,ft}$ = design flow depth (ft) (d_f/12)

$SQDF$ = stormwater quality design flow (cfs)

W_{trib} = width (perpendicular to flow = width of impervious surface contributing area (ft))

Step 5: Calculate the desired length of the filter strip

Determine the required length (L) to achieve a desired minimum residence time of 7 minutes using:

$$L = 60 t_{hr} V_{wq} \qquad \text{(Equation E-38)}$$

Where:

L = minimum allowable strip length (ft)

t_{hr} = hydraulic residence time (s)

V_{wq} = design flow velocity (fps)

Sizing Worksheet

Step 1: Calculate the design flow		
1-1. Enter Project area (acres), $A_{project}$	A_{design} =	acres
1-2. Enter impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp =	
1-3. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	
1-4. Calculate runoff coefficient, $C = 0.95*imp + C_p\,(1\text{-}imp)$	C =	
1-5. Enter design rainfall intensity (in/hr), *i*	i =	in/hr
1-6. Calculate water quality design flow (cfs), *SQDF= CiA*	SQDF =	cfs
Step 2: Calculate the minimum width		
2-1. Enter the stormwater quality design flow (cfs), *SQDF*	SQDF =	cfs
2-2. Enter the minimum linear unit application rate (0.005 cfs/ft), $q_{a,min}$	$q_{a,min}$=	cfs/ft
2-3. Calculate the minimum width of filter strip (ft), W_{min}	W_{min}=	ft
Step 3: Calculate the design flow depth		
3-1. Enter filter strip longitudinal slope, *s* (ft/ft)	*s* =	ft/ft
3-2. Enter Manning roughness coefficient (0.25-0.30), n_{wq}	n_{wq} =	
3-3. Enter width of impervious surface contributing area (perpendicular to flow), *W* (ft)	W =	ft

Step 3: Calculate the design flow depth	
3-4. Calculate average depth of water using Manning equation (inches), $d_f = 12 * [SQDF * n_{wq} / 1.49 W_{trib} s^{0.5}]^{0.6}$	d_f = inches
3-5. If d_f > 1" (0.083 ft), go back step 3-1 and decrease the slope	
3-6. If the slope cannot be changed due to construction constraints, go to step 3-3 and increase the width perpendicular to flow.	
Step 4: Calculate the design velocity	
4-1. Enter depth of water (ft), $d_{f,ft} = d_f / 12$	d_f = ft
4-2. Enter width of strip (ft), W	W = ft
4-3. Calculate design flow velocity (ft/s), $V_{wq} = SQDF/(d_{f,ft} W)$	V_{wq}= ft/s
4-4. If the V_{wq} >1 ft/s, go back to step 3-1 and decrease the slope.	
Step 5: Calculate the length of the filter strip	
5-1. Enter desired residence time (minimum 7 minutes), t	t = min
5-2. Enter design flow velocity (ft/s), V_{wq}	V_{wq}= ft/s
5-3. Calculate length of the filter strip (ft), $L = 60tV_{wq}$	L = ft
5-4. If L < 4 ft, go to step 3-1 and increase the slope	

Design Example

Step 1: Determine water quality design Flow

For this design example, a 10-acre site with Type 4 soil and 60% total imperviousness is considered. Flow-based sizing Method 1 is used, as described in Section E.1.

Step 1: Calculate the design flow	
1-1. Enter Project area (acres), $A_{project}$	A_{design} = 10 acres
1-2. Enter impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp = 0.60
1-3. Determine pervious runoff coefficient using Table E-1, C_p	C_p = 0.05
1-4. Calculate runoff coefficient, $C = 0.95*imp + C_p\ (1-imp)$	C = 0.59
1-5. Enter design rainfall intensity (in/hr), *i*	i = 0.2 in/hr
1-6. Calculate water quality design flow (cfs), $SQDF = CiA$	SQDF = 1.18 cfs

Step 2: Calculate the minimum width of filter strip

Determine the minimum width (i.e. perpendicular to flow) allowable for the filter strip and design for that width or larger.

Step 2: Calculate the minimum width			
2-1. Enter the stormwater quality design flow (cfs), *SQDF*	SQDF =	1.18	cfs
2-2. Enter the minimum linear unit application rate (0.005 cfs/ft), $q_{a,min}$	$q_{a,min}$=	0.005	cfs/ft
2-3. Calculate the minimum width of filter strip (ft), $W_{min}=SQDF/q_{a,min}$	W_{min}=	240	ft

Step 3: Calculate the Design Flow Depth

A slope of 3% was assumed for the filter strip (2-4% recommended). The design water depth should not exceed 1 inch. For this design example a manning's coefficient of 0.27 was used.

Step 3: Calculate the design flow depth	
3-1. Enter filter strip longitudinal slope, *s* (ft/ft)	s = 0.03 ft/ft
3-2. Enter Manning roughness coefficient (0.25-0.30), n_{wq}	n_{wq} = 0.27
3-3. Enter width of strip (=impervious surface contributing area perpendicular to flow), at least W_{min} (ft), *W*	W = 240 ft
3-4. Calculate average depth of water using Manning equation (inches), $d_f = 12 * [SQDF * n_{wq} / 1.49 W s^{0.5}]^{0.6}$	d_f = 0.51 in
3-5. If d_f > 1" (0.083 ft), go back step 3-1 and decrease the slope	
3-6. If the slope cannot be changed due to construction constraints, go to step 3-3 and increase the width perpendicular to flow.	

Step 4: Calculate the Design Velocity

The designed flow velocity should not exceed 1 foot/second across the filter strip.

Step 4: Calculate the design velocity	
4-1. Enter depth of water (ft), $d_{f,ft} = d_f / 12$	d_f = 0.043 ft
4-2. Enter width of strip (ft), *W*	W= 240 ft
4-3. Calculate design flow velocity (ft/s), $V_{wq} = SQDF / (d_{f,ft} W)$	V_{wq} = 0.11 ft/s
4-4. If the V_{wq} >1 ft/s, go back to step 3-1 and decrease the slope.	

Step 5: Calculate the Length of the Filter Strip

The filter strip should be at least 4 feet long (in the direction of flow) and accommodate a minimum residence time of 7 minutes to provide adequate water quality treatment.

Step 5: Calculate the length of the filter strip	
5-1. Enter desired residence time (minimum 10 minutes), *t*	t = 10 min
5-2. Enter design flow velocity (ft/s), V_{wq}	V_{wq}= 0.11 ft/s
5-3. Calculate length of the filter strip (ft), $L = 60tV_{wq}$	L = 66 ft
5-4. If $L < 4$ ft, go to step 3-1 and increase the slope	

E.8 TCM-1 Dry Extended Detention Basin

Sizing Methodology

Dry extended detention (ED) basins are basins designed such that the stormwater quality design volume, SQDV, is detained for 36 to 48 hours. This allows sediment particles and associated pollutants to settle and be removed from stormwater. Procedures for sizing extended detention basins are summarized below. A sizing example is also provided.

Step 1: Calculate the design volume

Dry extended detention facilities shall be sized to capture and treat the water quality design volume (see Section E.1).

Step 2: Calculate the volume of the active basin

The total basin volume shall be increased an additional 20% of the stormwater quality design volume to account for sediment accumulation, at a minimum. If the basin is designed only for water quality treatment then the basin volume would be 120% of the stormwater quality design volume, SQDV. Freeboard is in additional to the total basin volume. Calculate the volume of the active basin, V_a:

$$V_a = 1.20*SQDV \qquad \text{(Equation E-39)}$$

Step 3: Determine detention basin location and preliminary geometry based on site constraints

Based on site constraints, determine the basin geometry and the storage available by developing an elevation-storage relationship for the basin. The cross-sectional geometry across the width of the basin shall be approximately trapezoidal with a maximum side slope of 4:1 (H:V) on interior slopes and 3:1 (H:V) on exterior slopes unless specifically permitted by Ventura County (see Side Slopes below). Shallower side slopes are necessary if the basin is designed to have recreational uses during dry weather conditions.

1) Calculate the width of the basin footprint, W_{tot}, as follows:

$$W_{tot} = \frac{A_{tot}}{L_{tot}} \qquad \text{(Equation E-40)}$$

Where:

A_{tot} = total surface area of the basin footprint (ft^2)

L_{tot} = total length of the basin footprint (ft)

2) Calculate the length of the active volume surface area including the internal berm but excluding the freeboard, $L_{av\text{-}tot}$:

$$L_{av-tot} = L_{tot} - 2Zd_{fb} \quad \text{(Equation E-41)}$$

Where:

Z = interior side slope as length per unit height

d_{fb} = freeboard depth

3) Calculate the width of the active volume surface area including the internal berm but excluding freeboard, $W_{av\text{-}tot}$:

$$W_{av-tot} = W_{tot} - 2Zd_{fb} \quad \text{(Equation E-42)}$$

4) Calculate the total active volume surface area including the internal berm and excluding freeboard, $A_{av\text{-}tot}$:

$$A_{av-tot} = L_{av-tot} \times W_{av-tot} \quad \text{(Equation E-43)}$$

5) Calculate the area of the berm, A_{berm}:

$$A_{berm} = W_{berm} \times L_{berm} \quad \text{(Equation E-44)}$$

Where:

W_{berm} = width of the internal berm

L_{berm} = length of the internal berm

6) Calculate the surface area excluding the internal berm and freeboard, A_{av}:

$$A_{av} = A_{av-tot} - A_{berm} \quad \text{(Equation E-45)}$$

Step 4: Determine Dimensions of Forebay

5-15% of the basin active volume, V_a, is required to be within the active volume of the forebay.

1) Calculate the active volume of forebay, V_1:

$$V_1 = \frac{V_a \times \%V_1}{100} \quad \text{(Equation E-46)}$$

Where:

$\%V_1$ = percent of V_a in forebay (%)

V_a = active volume (ft^3)

2) Calculate the surface area for the active volume of forebay, A_1:

$$A_1 = \frac{V_1}{d_1} \quad \text{(Equation E-47)}$$

Where:

d_1 = average depth for the active volume of forebay (ft)

3) Calculate the length of forebay, L_1:

$$L_1 = \frac{A_1}{W_1} \quad \text{(Equation E-48)}$$

Where:

W_1 = width of forebay (ft)

Step 5: Determine Dimensions of Cell 2

Cell 2 will consist of the remainder of the basin's active volume.

1) Calculate the active volume of Cell 2, V_2:

$$V_2 = V_a - V_1 \quad \text{(Equation E-49)}$$

Where:

V_a = total basin active volume (ft^3)

V_1 = volume of forebay (ft^3)

2) Calculate the surface area, A_2, for the active volume of Cell 2:

$$A_2 = A_{av} - A_1 \quad \text{(Equation E-50)}$$

Where:

A_{av} = basin surface area excluding berm and freeboard (ft^2)

A_1 = surface area of forebay (ft^2)

3) Calculate the average depth, d_2, for the active volume of Cell 2:

$$d_2 = \frac{V_2}{A_2} \quad \text{(Equation E-51)}$$

4) Calculate the length of Cell 2, L_2:

$$L_2 = \frac{A_2}{W_2}$$ (Equation E-52)

Where:

W_2 = width of Cell 2 (ft)

5) Verify that the length-to-width ratio of Cell 2 at half of d_2 is at least 1.5:1 with ≥ 2:1 preferred. If the length-to width ratio is less than 1.5:1, modify input parameters until a ratio of at least 1.5:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the basin should be chosen. Calculate the length-to width, LW_{mid2}, ratio of Cell 2 at half of d_2 follows:

$$LW_{mid2} = \frac{L_{mid2}}{W_{mid2}}$$ (Equation E-53)

Where:

$W_{mid2} = W_2 - Zd_2$ and (Equation E-54)

$L_{mid2} = L_2 - Zd_2$ (Equation E-55)

W_{mid2} = width of Cell 2 at half of d_2 (ft)

L_{mid2} = length of Cell 2 at half of d_2 (ft)

Z = interior side slope as length per unit height (H:V)

Step 6: Ensure Design Requirements and Site Constraints are achieved

Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the basin is inadequate to meet the design requirements, choose a new location or alternative treatment BMP.

Step 7: Size Outlet Structure

The total drawdown time for the basin should be 36-48 hours. The outlet structure shall be designed to release the bottom 50% of the detention volume (half-full to empty) over 24-32 hours, and the top half (full to half-full) in 12-16 hours. A primary overflow should be sized to pass the peak flow rate from the developed capital design storm. See Section 6 for outlet structure sizing methodologies.

Step 8: Determine Emergency Spillway Requirements

For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm in order to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the 100-yr, 24-hr post-development peak storm water runoff discharge rate directly to the downstream conveyance system or another acceptable discharge point. For sites where the emergency spillway discharges to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.

Sizing Worksheet

Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	A =	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	%
1-3. Determine the maximum allowed effective impervious area (ac), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	
1-5. Determine the Project Total Impervious area (acres), $TIA = A_{project} * Imp$	TIA=	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain} = TIA - EIA_{allowable}$	A_{retain} =	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\,(1-imp)$	C =	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	ft
1-11. Calculate water quality design volume (ft^3), $SQDV = 43560 \bullet C*P*A_{retain}$	SQDV =	ft^3
Step 2: Calculate the volume of the active basin		
2-1. Calculate basin active volume (includes water quality design volume + sediment storage volume) (ft^3), $V_a = 1.20 \times SQDV$	V_a =	ft^3

Step 3: Determine Detention Basin Location and Preliminary Geometry Based on Site Constraints		
3-1. Based on site constraints, determine the basin geometry and the storage available by developing an elevation-storage relationship for the basin. For this simple example, assume a trapezoidal geometry for cell 1 (forebay) and cell 2.		
3-2. Enter the total surface area of the basin footprint based on site constraints (ft^2), A_{tot}	A_{tot} =	ft^2
3-3. Enter the length of the basin footprint based on site constraints (ft), L_{tot}	L_{tot} =	ft
3-4. Calculate the width of the basin footprint (L:W = 1.5:1 min) (ft), $W_{tot} = A_{tot} / L_{tot}$	W_{tot} =	ft
3-5. Enter interior side slope as length per unit height (H:V, min = 3), Z	Z =	
3-6. Enter desired freeboard depth (ft), d_{fb} (min: 2 ft on-line; 1 ft offline)	d_{fb} =	ft
3-7. Calculate the length of the active volume surface area including the internal berm but excluding freeboard, $L_{av\text{-}tot} = L_{tot} - 2Zd_{fb}$	$L_{av\text{-}tot}$ =	ft
3-8. Calculate the width of the active volume surface area including the internal berm but excluding freeboard, $W_{av\text{-}tot} = W_{tot} - 2Zd_{fb}$	$W_{av\text{-}tot}$ =	ft
3-9. Calculate the total active volume surface area including the internal berm and excluding freeboard, $A_{av\text{-}tot} = L_{av\text{-}tot} \times W_{av\text{-}tot}$	$A_{av\text{-}tot}$ =	ft^2
3-10. Enter the width of the internal berm (6 ft min), W_{berm}	W_{berm} =	ft
3-11. Enter the length of the internal berm (ft), $L_{berm} = W_{av\text{-}tot}$	L_{berm} =	ft
3-12. Calculate the area of the berm (ft^2), $A_{berm} = W_{berm} \times L_{berm}$	A_{berm} =	ft^2
3-13. Calculate the surface area excluding the internal berm and freeboard (ft^2), $A_{av} = A_{av\text{-}tot} - A_{berm}$	A_{av} =	ft^2

Step 4: Determine Dimensions of forebay		
4-1. Enter the percent of V_a in forebay (5-15% required), $\%V_1$	$\%V_1$ =	%
4-2. Calculate the active volume of forebay, $V_1 = (V_a \bullet \%V_1)/100$	V_1 =	ft^3
4-3. Enter a desired average depth for the active volume of forebay, d_1	d_1 =	ft
4-4. Calculate the surface area for the active volume of forebay, $A_1 = V_1 / d_1$	A_1 =	ft^2
4-5. Enter the width of forebay, $W_1 = W_{av\text{-}tot} = L_{berm}$	W_1 =	ft
4-6. Calculate the length of forebay (<u>Note:</u> inlet and outlet should be configured to maximize the residence time), $L_1 = A_1 / W1$	L_1 =	ft
Step 5: Determine Dimensions of Cell 2		
5-1. Calculate the active volume of Cell 2, $V_2 = V_a - V_1$	V_2 =	ft^3
5-2. Calculate the surface area of the active volume of Cell 2, $A_2 = A_{av} - A_1$	A_2 =	ft^2
5-3. Calculate the average depth for the active volume of Cell 2, $d_2 = V_2 / A_2$	d_2 =	ft
5-4. Enter the width of Cell 2, $W_2 = W_1 = W_{av\text{-}tot} = L_{berm}$	W_2 =	ft
5-5. Calculate the length of Cell 2, $L_2 = A_2 / W_2$	L_2 =	ft
5-6. Calculate the width of Cell 2 at half of d_2, $W_{mid2} = W_2 - Zd_2$	W_{mid2} =	ft
5-7. Calculate the length of Cell 2 at half of d_{2}, $L_{mid2} = L_2 - Zd_2$	L_{mid2} =	ft

5-8. Verify that the length-to-width ratio of Cell 2 at half of d_2 is at least 1.5:1 with ≥ 2:1 preferred. If the length-to-width ratio is less than 1.5:1, modify input parameters until a ratio of at least 1.5:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the basin should be chosen, $LW_{mid2} = L_{mid2} / W_{mid2}$	LW_{mid2} =
Step 6: Ensure Design Requirements and Site Constraints are Achieved	
6-1. Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the basin is inadequate to meet the design requirements, choose a new location or alternative treatment BMP.	
Step 7: Size Outlet Structure	
7-1. The total drawdown time for the basin should be 36-48 hours. The outlet structure shall be designed to release the bottom 50% of the detention volume (half-full to empty) over 24-32 hours, and the top half (full to half-full) in 12-16 hours. A primary overflow should be sized to pass the peak flow rate from the developed capital design storm. See Section 6 for outlet structure sizing methodologies.	
Step 8: Determine Emergency Spillway Requirements	
8-1. For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm in order to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the 100-yr, 24-hr post-development peak storm water runoff discharge rate directly to the downstream conveyance system or another acceptable discharge point. For sites where the emergency spillway discharges to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.	

Design Example

Step 1: Determine water quality design volume

For this design example, a 10-acre residential development with a 60% total impervious area is considered. The 85th percentile storm event for the project location is 0.75 inches.

Step 1: Determine water quality design volume			
1-1. Enter Project area (acres), $A_{project}$	A =	10	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	5	
1-3. Determine the maximum allowed effective impervious area (ac), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	0.5	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	0.6	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	6	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	5.5	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	0.05	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p (1-imp)$	C =	0.59	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	0.75	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	0.06	ft
1-11. Calculate water quality design volume (ft^3), $SQDV=43560 \bullet C*P*A_{retain}$	SQDV =	8,500	ft^3

Step 2: Calculate Volume of the Active Basin and the Forebay Basin

Step 2: Calculate the design volume of the active basin	
2-1. Calculate basin active design volume (includes water quality design volume + sediment storage volume), $V_a = 1.20*SQDV$	$V_a =$ 10,000 ft^3

Step 3: Determine Detention Basin Location and Preliminary Geometry Based on Site Constraints

The detention basin in this example has an internal berm separating the forebay (Cell 1) and the main basin (Cell 2). The internal berm elevation is 2 ft below the elevation of the SUSMP volume within the entire basin. The berm length is equal to the width of the basin when filled to the active design volume.

Step 3: Determine Detention Basin Location and Preliminary Geometry Based on Site Constraints	
3-1. Based on site constraints, determine the basin geometry and the storage available by developing an elevation-storage relationship for the basin. For this simple example, assume a trapezoidal geometry for cell 1 (forebay) and cell 2.	
3-2. Enter the total surface area of the basin footprint based on site constraints, A_{tot}	$A_{tot} =$ 8,000 ft^2
3-3. Enter the length of the basin footprint based on site constraints, L_{tot} (L:W = 1.5:1 min)	$L_{tot} =$ 200 ft
3-4. Calculate the width of the basin footprint, $W_{tot} = A_{tot} / L_{tot}$	$W_{tot} =$ 40 ft
3-5. Enter interior side slope as length per unit height (min = 3), Z	Z = 3
3-6. Enter desired freeboard depth, d_{fb} (min: 2 ft on-line; 1 ft offline)	$d_{fb} =$ 2 ft
3-7. Calculate the length of the active volume surface area including the internal berm but excluding freeboard, $L_{av\text{-}tot} = L_{tot} - 2Zd_{fb}$	$L_{av\text{-}tot} =$ 188 ft

Step 3: Determine Detention Basin Location and Preliminary Geometry Based on Site Constraints			
3-8. Calculate the width of the active volume surface area including the internal berm but excluding freeboard, $W_{av\text{-}tot} = W_{tot} - 2Zd_{fb}$	$W_{av\text{-}tot}$ =	28	ft
3-9. Calculate the total active volume surface area including the internal berm and excluding freeboard, $A_{av\text{-}tot} = L_{av\text{-}tot} \bullet W_{av\text{-}tot}$	$A_{av\text{-}tot}$ =	5,300	ft^2
3-10. Enter the width of the internal berm (6 ft min), W_{berm}	W_{berm} =	6	ft
3-11. Enter the length of the internal berm, $L_{berm} = W_{av\text{-}tot}$	L_{berm} =	28	ft
3-12. Calculate the area of the berm, $A_{berm} = W_{berm} \bullet L_{berm}$	A_{berm} =	170	ft^2
3-13. Calculate the surface area excluding the internal berm and freeboard, $A_{av} = A_{av\text{-}tot} - A_{berm}$	A_{av} =	5,130	ft^2

Step 4: Calculate Dimensions of Cell 1

Calculate the dimensions of the forebay (Cell 1) based on the active design volume for Cell 1 (25% of V_a) and a desired average depth, d_1. The width of the forebay, W_1, is equivalent to the length of the berm, L_{berm}, and the width of Cell 2, W_2.

Step 4: Determine Dimensions of forebay			
4-1. Enter the percent of V_a in forebay (5-15% required), $\%V_1$	$\%V_1$ =	25	%
4-2. Calculate the active volume of forebay (including sediment storage), $V_1 = (V_a \bullet \%V_1)/100$	V_1 =	2,500	ft^3
4-3. Enter a desired average depth for the active volume of forebay, d_1	d_1 =	5	ft
4-4. Calculate the surface area for the active volume of forebay, $A_1 = V_1 / d_1$	A_1 =	500	ft^2

4-5. Enter the width of forebay, $W_1 = W_{wq\text{-}tot} = L_{berm}$	W_1 = 28 ft
4-6. Calculate the length of forebay (<u>Note:</u> inlet and outlet should be configured to maximize the residence time), $L_1 = A_1 / W1$	L_1 = 18 ft

Step 5: Calculate the Dimensions of Cell 2

Calculate the dimensions of the main basin (Cell 2) based on the active design volume for Cell 2 and a desired average depth, d_2. A calculation of the length, L_{mid2}, and width, W_{mid2}, at half basin depth, d_2, is conducted in order to verify that the length-to-width ratio at half d_2 is greater than 1.5:1.

Step 5: Calculate the dimensions of Cell 2			
5-1. Calculate the active volume of Cell 2, $V_2 = V_a - V_1$	V_2 =	7,500	ft^3
5-2. Calculate the surface area of the active volume of Cell 2, $A_2 = A_{av} - A_1$	A_2 =	4,630	ft^2
5-3. Calculate the average depth of the active volume of Cell 2, $d_2 = V_2 / A_2$	d_2 =	1.6	ft
5-4. Enter the width of Cell 2, $W_2 = W_1 = W_{av\text{-}tot} = L_{berm}$	W_2 =	28	ft
5-5. Calculate the length of Cell 2, $L_2 = A_2 / W_2$	L_2 =	166	ft
5-6. Calculate the width of Cell 2 at half of d_2, $W_{mid2} = W_2 - Zd_2$	W_{mid2} =	23	ft
5-7. Calculate the length of Cell 2 at half of d_2, $L_{mid2} = L_2 - Zd_2$	L_{mid2} =	161	ft
5-8. Verify that the length-to-width ratio of Cell 2 at half of d_2 is at least 1.5:1 with ≥ 2:1 preferred. If the length-to-width ratio is less than 1.5:1, modify input parameters until a ratio of at least 1.5:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the basin should be chosen, $LW_{mid2} = L_{mid2} / W_{mid2}$	LW_{mid2} =	7	

Step 6: Ensure Design Requirements and Site Constraints are Achieved

Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the basin is inadequate to meet the design requirements, choose a new location or an alternative treatment BMP.

Step 7: Size Outlet Structure

The total drawdown time for the basin should be 36-48 hours. The outlet structure shall be designed to release the bottom 50% of the detention volume (half-full to empty) over 24-32 hours, and the top half (full to half-full) in 12-16 hours. A primary overflow should be sized to pass the peak flow rate from the developed capital design storm. See Section 6 for outlet structure sizing methodologies.

Step 8: Determine Emergency Spillway Requirements

For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm in order to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the 100-yr, 24-hr post-development peak storm water runoff discharge rate directly to the downstream conveyance system or another acceptable discharge point. For sites where the emergency spillway discharges to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.

E.9 TCM-2 Wet Detention Basin

Sizing Methodology

Wet Detention basins may be designed with or without extended detention above the permanent pool. The extended detention portion of the wet detention basin above the permanent pool, if provided, functions like a dry extended detention (ED) basin (see VEG-5: Dry Extended Detention Basin). If there is no extended detention provided, wet detention basins shall be sized to provide a minimum wet pool volume equal to the stormwater quality design volume plus an additional 5% for sediment accumulation. If extended detention is provided above the permanent pool, the sizing is dependent of the functionality of the basin; the basin may function as water quality treatment only or water quality plus peak flow attenuation.

If and the basin is designed for water quality treatment only, then the permanent pool volume shall be a minimum of 10 percent of the stormwater quality design volume and the surcharge volume (above the permanent pool) shall make up the remaining 90 percent. If extended detention is provided above the permanent pool and the basin is designed for water quality treatment and peak flow attenuation, then the permanent pool volume shall be equal to the water quality treatment volume, and the surcharge volume shall be sized to attenuate peak flows in order to meet the peak runoff discharge requirements. The extended detention portion of the wet detention basin above the permanent pool, if provided, functions like a dry extended detention (ED) basin (see VEG-5: Dry Extended Detention Basin).

Step 1: Calculate the design volume

Wet detention basins shall be sized with a permanent pool volume equal to the SQDV volume (see Section 2 and Appendix E).

Step 2: Determine the active design volume for the wet detention basin without extended detention

The active volume of the wet detention basin, V_a, shall be equal to the SQFV plus an additional 5% for sediment accumulation.

$$V_a = 1.05 \times SQDV \qquad \text{(Equation E-56)}$$

Step 3: Determine pond location and preliminary geometry based on site constraints

Based on site constraints, determine the pond geometry and the storage available by developing an elevation-storage relationship for the pond. Note that a more natural geometry may be used and is in many cases recommended; the preliminary basin geometry calculations should be used for sizing purposes only.

1) Calculate the width of the pond footprint, W_{tot}, as follows:

$$W_{tot} = \frac{A_{tot}}{L_{tot}} \qquad \text{(Equation E-57)}$$

Where:

A_{tot} = total surface area of the pond footprint (ft^2)

L_{tot} = total length of the pond footprint (ft)

7) Calculate the length of the active volume surface area including the internal berm but excluding the freeboard, $L_{av\text{-}tot}$:

$$L_{av-tot} = L_{tot} - 2Zd_{fb} \qquad \text{(Equation E-58)}$$

Where:

Z = interior side slope as length per unit height

d_{fb} = freeboard depth

8) Calculate the width of the active volume surface area including the internal berm but excluding freeboard, $W_{av\text{-}tot}$:

$$W_{av-tot} = W_{tot} - 2Zd_{fb} \qquad \text{(Equation E-59)}$$

9) Calculate the total active volume surface area including the internal berm and excluding freeboard, $A_{av\text{-}tot}$:

$$A_{av-tot} = L_{av-tot} \times W_{av-tot} \qquad \text{(Equation E-60)}$$

10) Calculate the area of the berm, A_{berm}:

$$A_{berm} = W_{berm} \times L_{berm} \qquad \text{(Equation E-61)}$$

Where:

W_{berm} = width of the internal berm

L_{berm} = length of the internal berm

11) Calculate the active volume surface area excluding the internal berm and freeboard, A_{wq}:

$$A_{wq} = A_{wq=tot} - A_{berm} \qquad \text{(Equation E-62)}$$

Step 4: Determine Dimensions of Forebay

The wet detention basin shall be divided into two cells separated by a berm or baffle. The forebay shall contain between 5 and 10 percent of the total volume. The berm or baffle volume shall not count as part of the total volume. Calculate the active volume of forebay, V_1:

$$V_1 = \frac{V_a \times \%V_1}{100} \quad \text{(Equation E-63)}$$

Where:

$\%V_1$ = percent of SQDV in forebay (%)

1) Calculate the surface area for the active volume of forebay, A_1:

$$A_1 = \frac{V_1}{d_1} \quad \text{(Equation E-64)}$$

Where:

d_1 = average depth fo rhte active volume of forebay (ft)

2) Calculate the length of forebay, L_1. Note, inlet and outlet should be configured to maximize the residence time.

$$L_1 = \frac{A_1}{W_1} \quad \text{(Equation E-65)}$$

Where:

W_1 = width of forebay (ft), $W_1 = W_{av\text{-}tot} = L_{berm}$

Step 5: Determine Dimensions of Cell 2

Cell 2 will consist of the remainder of the basin's active volume.

3) Calculate the active volume of Cell 2, V_2:

$$V_2 = V_a - V_1 \quad \text{(Equation E-66)}$$

4) The minimum wetpool surface area includes 0.3 acres of wetpool per acre-foot of permanent wetpool volume. Calculate A_{min2}:

$$A_{min2} = (V_2 \times 0.3 \, \frac{acres}{acre-feet}) \quad \text{(Equation E-67)}$$

5) Calculate the actual wetpool surface area, A_2:

$$A_2 = A_{av} - A_1 \quad \text{(Equation E-68)}$$

Verify that A_2 is greater than A_{min2}. If A_2 is less than A_{min2}, then modify input parameters to increase A_2 until it is greater than A_{min2}. If site constraints limit this criterion, then another site for the pond should be chosen.

6) Calculate the top length of Cell 2, L_2:

$$L_2 = \frac{A_2}{W_2} \qquad \text{(Equation E-69)}$$

Where:

W_2 = width of Cell 2 (ft), $W_2 = W_1 = W_{wq\text{-}tot} = L_{berm}$

7) Verify that the length-to-width ratio of Cell 2 is at least 1.5:1 with ≥ 2:1 preferred. If the length-to-width ratio is less than 1.5:1, modify input parameters until a ratio of at least 1.5:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the pond should be chosen.

$$LW_2 = \frac{L_2}{W_2} \qquad \text{(Equation E-70)}$$

8) Calculate the emergent vegetation surface area, A_{ev}:

$$A_{ev} = \frac{A_2 \bullet \%A_{ev}}{100} \qquad \text{(Equation E-71)}$$

Where:

$\%A_{ev}$ = percent of surface area that will be planted with emergent vegetation

9) Calculate the volume of the emergent vegetation shallow zone (1.5 – 3 ft), V_{ev}:

$$V_{ev} = A_{ev} \bullet d_{ev} \qquad \text{(Equation E-72)}$$

Where:

d_{ev} = average depth of the emergent vegetation shallow zone (1.5 – 3 ft)

10) Calculate the length of the emergent vegetation shallow zone, L_{ev}:

$$L_{ev} = \frac{A_{ev}}{W_{ev}} \qquad \text{(Equation E-73)}$$

Where:

W_{ev} = width of the emergent vegetation shallow zone (ft), $W_{ev} = W_2$

11) Calculate the volume of the deep zone, V_{deep}:

$$V_{deep} = V_2 - V_{ev} \qquad \text{(Equation E-74)}$$

12) Calculate the surface area of the deep (>3 ft) zone, A_{deep}:

$$A_{deep} = A_2 - A_{ev} \quad \text{(Equation E-75)}$$

13) Calculate the average depth of the deep zone (4-8 ft), d_{deep}:

$$d_{deep} = \frac{V_{deep}}{A_{deep}} \quad \text{(Equation E-76)}$$

14) Calculate length of the deep zone, L_{deep}:

$$L_{deep} = \frac{A_{deep}}{W_{deep}} \quad \text{(Equation E-77)}$$

Where:

W_{deep} = width of the deep zone (ft), $W_{deep} = W_2$

Step 6: Ensure design requirements and site constraints are achieved

Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the basin is inadequate to meet the design requirements, choose a new location for the BMP.

Step 7: Size Outlet Structure

For extended detention wet detention basin, outlet structures shall be designed to provide 12 to 48 hour emptying time for the water quality volume above the permanent pool.

The basin outlet pipe shall be sized, at a minimum, to pass flows greater than the stormwater quality design peak flow for off-line basins or flows greater than the peak runoff discharge rate for the 100-year, 24-hr design storm for on-line basins.

Step 8: Determine Emergency Spillway Requirements

For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the water quality design storm. For sites where the emergency spillway discharges to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.

Sizing Worksheet

Step 1: Determine water quality design volume		
1-1. Enter drainage area, A	A =	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	%
1-3. Determine the maximum allowed effective impervious area, $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	
1-5. Determine the Project Total Impervious area, $TIA=A_{project}*Imp$	TIA=	acres
1-6. Determine the total area from which runoff must be retained, $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p (1-imp)$	C =	
1-9. Enter design rainfall depth of the storm, P_i (in)	P_i =	in
1-10. Calculate rainfall depth, $P = P_i/12$	P =	ft
1-11. Calculate water quality design volume, $SQDV = 43560 \bullet P*A_{retain}*C$	SQDV =	ft^3
Step 2: Determine active design volume for the wet pond without extended detention		
2-1. Calculate the active design volume (without extended detention), $V_a = 1.05*SQDV$	V_a =	ft^3

Step 3: Determine Pond Location and Preliminary Geometry Based on Site Constraints	
3-1. Based on site constraints, determine the pond geometry and the storage available by developing an elevation-storage relationship for the pond. For this simple example, assume a trapezoidal geometry for cell 1 (forebay) and cell 2.	
3-2. Enter the total surface area of the pond footprint based on site constraints, A_{tot}	A_{tot} = ft^2
3-3. Enter the length of the pond footprint based on site constraints, L_{tot}	L_{tot} = ft
3-4. Calculate the width of the pond footprint, $W_{tot} = A_{tot} / L_{tot}$	W_{tot} = ft
3-5. Enter interior side slope as length per unit height (min = 3), Z	Z =
3-6. Enter desired freeboard depth, d_{fb} (1 ft min)	d_{fb} = ft
3-7. Calculate the length of the water quality volume surface area including the internal berm but excluding freeboard, $L_{av\text{-}tot} = L_{tot} - 2Zd_{fb}$	$L_{av\text{-}tot}$ = ft
3-8. Calculate the width of the water quality volume surface area including the internal berm but excluding freeboard, $W_{av\text{-}tot} = W_{tot} - 2Zd_{fb}$	$W_{av\text{-}tot}$ = ft
3-9. Calculate the total water quality volume surface area including the internal berm and excluding freeboard, $A_{av\text{-}tot} = L_{av\text{-}tot} \bullet W_{av\text{-}tot}$	$A_{av\text{-}tot}$ = ft^2
3-10. Enter the width of the internal berm (6 ft min), W_{berm}	W_{berm} = ft
3-11. Enter the length of the internal berm, $L_{berm} = W_{av\text{-}tot}$	L_{berm} = ft
3-12. Calculate the area of the berm, $A_{berm} = W_{berm} \bullet L_{berm}$	A_{berm} = ft^2

3-13. Calculate the water quality volume surface area excluding the internal berm and freeboard, $A_{av} = A_{av\text{-}tot} - A_{berm}$	$A_{av} =$	ft^2
Step 4: Determine Dimensions of forebay		
4-1. Enter the percent of V_a in forebay (5-10% required), $\%V_1$	$\%V_1 =$	%
4-2. Calculate the active volume of forebay (includes sediment storage volume), $V_1 = (V_a \bullet \%V_1) /100$	$V_1 =$	ft^3
4-3. Enter desired average depth of forebay (5-9 ft including sediment storage of 1 ft), d_1	$d_1 =$	ft
4-4. Calculate the surface area for the active volume of forebay, $A_1 = V_1 / d_1$	$A_1 =$	ft^2
4-5. Enter the width of forebay, $W_1 = W_{av\text{-}tot} = L_{berm}$	$W_1 =$	ft
4-6. Calculate the length of forebay (<u>Note:</u> inlet and outlet should be configured to maximize the residence time), $L_1 = A_1 / W1$	$L_1 =$	ft
Step 5: Determine Dimensions of Cell 2		
5-1. Calculate the active volume of Cell 2, $V_2 = V_a - V_1$	$V_2 =$	ft^3
5-2. Determine minimum wetpool surface area, $A_{min2} = V_2 \bullet 0.3$	$A_{min2} =$	ft^2
5-3. Determine actual wetpool surface area, $A_2 = A_{av} - A_1$	$A_2 =$	ft^2
5-4. • If A_2 is greater than A_{min2} then move on to step 5-5. • If A_2 is less than A_{min2}, then modify input parameters to increase A_2 until it is greater than A_{min2}. If site constraints limit this criterion, then another site for the pond should be chosen.		
5-5. Enter width of Cell 2, $W_2 = W_1 = W_{av\text{-}tot} = L_{berm}$	$W_2 =$	ft

5-6. Calculate top length of Cell 2, $L_2 = A_2 / W_2$	L_2 = ft
5-7. Verify that the length-to-width ratio of Cell 2 is at least 1.5:1 with ≥ 2:1 preferred. If the length-to-width ratio is less than 1.5:1, modify input parameters until a ratio of at least 1.5:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the pond should be chosen, $LW_2 = L_2 / W_2$	LW_2 =
5-8. Enter percent of surface area that will be planted with emergent vegetation (25-75%), $\%A_{ev}$	$\%A_{ev}$ = %
5-9. Calculate emergent vegetation surface area, $A_{ev} = (A_2 \bullet \%A_{ev})/100$	A_{ev} = ft^2
5-10. Enter average depth of emergent vegetation shallow zone (1.5 – 3 ft), d_{ev}	d_{ev} = ft
5-11. Calculate volume of emergent vegetation shallow zone (1.5 – 3 ft), $V_{ev} = A_{ev} \bullet d_{ev}$	V_{ev} = ft^3
5-12. Enter width of emergent vegetation shallow zone, $W_{ev} = W_2$	W_{ev}= ft
5-13. Calculate length of emergent vegetation shallow zone, $L_{ev} = A_{ev} / W_{ev}$	L_{ev} = ft
5-14. Calculate volume of deep zone, $V_{deep} = V_2 - V_{ev}$	V_{deep} = ft^3
5-15. Calculate surface area of deep (>3 ft) zone, $A_{deep} = A_2 - A_{ev}$	A_{deep} = ft^2
5-16. Calculate average depth of deep zone (4 - 8 ft), $d_{deep} = V_{deep} / A_{deep}$	d_{deep} = ft
5-17. Enter width of deep zone, $W_{deep} = W_2$	W_{deep} = ft
5-18. Calculate length of deep zone, $L_{deep} = A_{deep} / W_{deeo}$	L_{deep} = ft

Step 6: Ensure Design Requirements and Site Constraints are Achieved
6-1. Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the basin is inadequate to meet the design requirements, choose a new location for the BMP.
Step 7: Size Outlet Structure
7-1. The basin outlet pipe shall be sized, at a minimum, to pass flows greater than the stormwater quality design peak flow for off-line basins or flows greater than the peak runoff discharge rate for the 100-year, 24-hr design storm for on-line basins.
Step 8: Determine Emergency Spillway Requirements
8-1. For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the water quality design storm. For sites where the emergency spillway discharges to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.

Design Example

Wet detention basin siting requires the following considerations prior to construction: (1) availability of base flow – wet detention basins require a regular source of water if water level is to be maintained, (2) surface space availability – large footprint area is required, and (3) compatibility with flood control – basins must not interfere with flood control functions of existing conveyance and detention structures.

The wet detention basin in this example does not have extended detention. An internal berm separates the forebay (Cell 1) and the main basin (Cell 2). The berm is at the elevation of the active volume design surface which is also the permanent wetpool elevation.

Step 1: Determine Water Quality Design Volume

For this design example, a 20-acre residential development with a 60% total impervious area is considered. The 85th percentile storm event for the project location is 0.75 inches.

Step 1: Determine water quality design volume			
1-1. Enter drainage area, A	A =	20	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	5	
1-3. Determine the maximum allowed effective impervious area, $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	1.0	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	0.6	
1-5. Determine the Project Total Impervious area, $TIA=A_{project}*Imp$	TIA=	12	acres
1-6. Determine the total area from which runoff must be retained, $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	11	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	0.05	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\,(1-imp)$	C =	0.59	
1-9. Enter design rainfall depth of the storm, P_i (in)	P_i =	0.75	in
1-10. Calculate rainfall depth, $P = P_i/12$	P =	0.06	ft

1-11. Calculate water quality design volume, *SQDV = 43560•P*A*$_{retain}$**C*	SQDV = 17,000 ft^3

Step 2: Determine Active Design Volume for a Wet Detention Basin without Extended Detention

If there is no extended detention provided, wet detention basins shall be sized to provide a minimum wet pool volume equal to the water quality design volume plus an additional 5% for sediment accumulation.

Step 2: Determine Active Design Volume for a Wet Detention Basin without Extended Detention	
2-1. Calculate the active design volume (without extended detention), $V_a = 1.05*SQDV$	V_a = 17,800 ft^3

Step 3: Determine Pond Location and Preliminary Geometry Based on Site Constraints

A total footprint area and total length available for the basin is provided. This step calculates the total active volume surface area which is equivalent to the permanent wetpool surface area. This step also calculates the dimensions of the internal berm.

Step 3: Determine Pond Location and Preliminary Geometry Based on Site Constraints	
3-1. Based on site constraints, determine the pond geometry and the storage available by developing an elevation-storage relationship for the pond. For this simple example, assume a trapezoidal geometry for cell 1 (forebay) and cell 2.	
3-2. Enter the total surface area of the pond footprint based on site constraints, A_{tot}	A_{tot} = 7,500 ft^2
3-3. Enter the length of the pond footprint based on site constraints, L_{tot}	L_{tot} = 150 ft
3-4. Calculate the width of the pond footprint, $W_{tot} = A_{tot} / L_{tot}$	W_{tot} = 50 ft
3-5. Enter interior side slope as length per unit height (min = 3), Z	Z = 3

Step 3: Determine Pond Location and Preliminary Geometry Based on Site Constraints			
3-6. Enter desired freeboard depth, d_{fb} (1 ft min)	d_{fb} =	2	ft
3-7. Calculate the length of the water quality volume surface area including the internal berm but excluding freeboard, $L_{av\text{-}tot} = L_{tot} - 2Zd_{fb}$	$L_{av\text{-}tot}$ =	138	ft
3-8. Calculate the width of the water quality volume surface area including the internal berm but excluding freeboard, $W_{av\text{-}tot} = W_{tot} - 2Zd_{fb}$	$W_{av\text{-}tot}$ =	38	ft
3-9. Calculate the total water quality volume surface area including the internal berm and excluding freeboard, $A_{av\text{-}tot} = L_{av\text{-}tot} \bullet W_{av\text{-}tot}$	$A_{av\text{-}tot}$ =	4,940	ft^2
3-10. Enter the width of the internal berm (6 ft min), W_{berm}	W_{berm} =	6	ft
3-11. Enter the length of the internal berm, $L_{berm} = W_{av\text{-}tot}$	L_{berm} =	38	ft
3-12. Calculate the area of the berm, $A_{berm} = W_{berm} \bullet L_{berm}$	A_{berm} =	230	ft^2
3-13. Calculate the water quality volume surface area excluding the internal berm and freeboard, $A_{av} = A_{av\text{-}tot} - A_{berm}$	A_{av} =	4,710	ft^2

Step 4: Determine Dimensions of forebay

It should be assumed that the forebay should be 5-10% of the total active design volume, V_a.

Step 4: Determine Dimensions of Cell 1			
4-1. Enter the percent of V_a in forebay (5-10% required), $\%V_1$	$\%V_1$ =	20	%
4-2. Calculate the active volume of forebay (includes sediment storage volume), $V_1 = (V_a \bullet \%V_1) / 100$	V_1 =	3,560	ft^3
4-3. Enter desired average depth of forebay (5-9 ft including sediment storage of 1 ft), d_1	d_1 =	8	ft

4-4. Calculate the surface area for the active volume of forebay, $A_1 = V_1 / d_1$	A_1 =	440	ft^2
4-5. Enter the width of forebay, $W_1 = W_{av\text{-}tot} = L_{berm}$	W_1 =	38	ft
4-6. Calculate the length of forebay (Note: inlet and outlet should be configured to maximize the residence time), $L_1 = A_1 / W1$	L_1 =	12	ft

Step 5: Determine Dimensions of Cell 2

Verify that the surface area and length-to-width ratio of Cell 2 meet the design criteria. Calculate volumes, depths and surface areas for the emergent vegetation shallow zone and the deep zone.

Step 5: Determine Dimensions of Cell 2			
5-1. Calculate the active volume of Cell 2, $V_2 = V_a - V_1$	V_2 =	14,200	ft^3
5-2. Determine minimum wetpool surface area, $A_{min2} = V_2 \bullet 0.3$	A_{min2} =	4,270	ft^2
5-3. Determine actual wetpool surface area, $A_2 = A_{av} - A_1$	A_2 =	4,270	ft^2
5-4. If A_2 is greater than A_{min2} then move on to step 5-5. If A_2 is less than A_{min2}, then modify input parameters to increase A_2 until it is greater than A_{min2}. If site constraints limit this criterion, then another site for the pond should be chosen.			
5-5. Enter width of Cell 2, $W_2 = W_1 = W_{av\text{-}tot} = L_{berm}$	W_2 =	38	ft
5-6. Calculate top length of Cell 2, $L_2 = A_2 / W_2$	L_2 =	110	ft
5-7. Verify that the length-to-width ratio of Cell 2 is at least 1.5:1 with ≥ 2:1 preferred. If the length-to-width ratio is less than 1.5:1, modify input parameters until a ratio of at least 1.5:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the pond should be chosen, $LW_2 = L_2 / W_2$	LW_2 =	2.9	
5-8. Enter percent of surface area that will be planted with emergent vegetation (25-75%), $\%A_{ev}$	$\%A_{ev}$ =	25	%

Step 5: Determine Dimensions of Cell 2			
5-9. Calculate emergent vegetation surface area, $A_{ev} = (A_2 \bullet \%A_{ev})/100$	A_{ev} =	1,070	ft^2
5-10. Enter average depth of emergent vegetation shallow zone (1.5 – 3 ft), d_{ev}	d_{ev} =	2	ft
5-11. Calculate volume of emergent vegetation shallow zone (1.5 – 3 ft), $V_{ev} = A_{ev} \bullet d_{ev}$	V_{ev} =	2,130	ft^3
5-12. Enter width of emergent vegetation shallow zone, $W_{ev} = W_2$	W_{ev}=	38	ft
5-13. Calculate length of emergent vegetation shallow zone, $L_{ev} = A_{ev} / W_{ev}$	L_{ev} =	56	ft
5-14. Calculate volume of deep zone, $V_{deep} = V_2 - V_{ev}$	V_{deep} =	13,100	ft^3
5-15. Calculate surface area of deep (>3 ft) zone, $A_{deep} = A_2 - A_{ev}$	A_{deep} =	3,200	ft^2
5-16. Calculate average depth of deep zone (4 - 8 ft), $d_{deep} = V_{deep} / A_{deep}$	d_{deep} =	4.1	ft
5-17. Enter width of deep zone, $W_{deep} = W_2$	W_{deep} =	28	ft
5-18. Calculate length of deep zone, $L_{deep} = A_{deep} / W_{deeo}$	L_{deep} =	114	ft

Step 6: Ensure Design Requirements and Site Conditions are Achieved

Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the basin is inadequate to meet the design requirements, choose a new location for the BMP.

Step 7: Size Outlet Structure

The basin outlet pipe shall be sized, at a minimum, to pass flows greater than the stormwater quality design peak flow for off-line basins or flows greater than the peak runoff discharge rate for the 100-year, 24-hr design storm for on-line basins.

Step 8: Determine Emergency Spillway Requirements

For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the water quality design storm. For sites where the emergency spillway discharges to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.

E.10 TCM-3 Constructed Wetland

Sizing Methodology

In most cases, the constructed treatment wetland permanent pool shall be sized to be greater than or equal to the stormwater quality design volume. If extended detention is provided above the permanent pool and the wetland is designed for water quality treatment only, then the permanent pool volume shall be a minimum of 80 percent of the stormwater quality design volume and the surcharge volume (above the permanent pool) shall make up the remaining 20 percent and provide at least 12 hours of detention. If extended detention is provided and the basin is designed for water quality treatment and peak flow attenuation, then the permanent pool volume shall be equal to the water quality treatment volume and the surcharge volume shall be sized to attenuate peak flows to meet the peak runoff discharge requirements. The extended detention portion of the wetland above the permanent pool, if provided, functions like a dry extended detention (ED) basin (see VEG-5: Dry Extended Detention Basin).

Step 1: Calculate the design volume

Constructed wetlands shall be sized to be greater than or equal to the SQDV volume (see Section 2 and Appendix E).

Step 2: Determine the Wetland Location, Wetland Type and Preliminary Geometry Based on Site Constraints

Based on site constraints, determine the wetland geometry and the storage available by developing an elevation-storage relationship for the wetland. The equations provided below assume a trapezoidal geometry for cell 1 (Forebay) and cell 2, and assumes that the wetland does not have extended detention.

1) Calculate the width of the wetland footprint, W_{tot}, as follows:

$$W_{tot} = \frac{A_{tot}}{L_{tot}} \qquad \text{(Equation E-78)}$$

Where:

A_{tot} = total surface area of the wetland footprint (ft^2)

L_{tot} = total length of the wetland footprint (ft)

12) Calculate the length of the water quality volume surface area including the internal berm but excluding the freeboard, L_{wq-tot}:

$$L_{wq-tot} = L_{tot} - 2Zd_{fb} \qquad \text{(Equation E-79)}$$

Where:

Z = interior side slope as length per unit height

d_{fb} = freeboard depth

13) Calculate the width of the water quality volume surface area including the internal berm but excluding freeboard, $W_{wq\text{-}tot}$:

$$W_{wq-tot} = W_{tot} - 2Zd_{fb} \qquad \text{(Equation E-80)}$$

14) Calculate the total water quality volume surface area including the internal berm and excluding freeboard, $A_{wq\text{-}tot}$:

$$A_{wq-tot} = L_{wq-tot} \times W_{wq-tot} \qquad \text{(Equation E-81)}$$

15) Calculate the area of the berm, A_{berm}:

$$A_{berm} = W_{berm} \times L_{berm} \qquad \text{(Equation E-82)}$$

Where:

W_{berm} = width of the internal berm

L_{berm} = length of the internal berm

16) Calculate the water quality surface area excluding the internal berm and freeboard, A_{wq}:

$$A_{wq} = A_{wq=tot} - A_{berm} \qquad \text{(Equation E-83)}$$

Step 3: Determine Dimensions of Forebay

30-50% of the SQDV is required to be within the active volume of forebay.

1) Calculate the active volume of forebay, V_1:

$$V_1 = \frac{SQDV \times \%V_1}{100} \qquad \text{(Equation E-84)}$$

Where:

$\%V_1$ = percent of SQDV in forebay (%)

2) Calculate the surface area for the active volume of forebay, A_1:

$$A_1 = \frac{V_1}{d_1} \qquad \text{(Equation E-85)}$$

Where:

d_1 = average depth fo rhte active volume of forebay (2 -4 ft) (ft)

3) Calculate the length of forebay, L_1. Note, inlet and outlet should be configured to maximize the residence time.

$$L_1 = \frac{A_1}{W_1} \qquad \text{(Equation E-86)}$$

Where:

W_1 = width of forebay (ft), $W_1 = W_{av\text{-}tot} = L_{berm}$

Step 4: Determine Dimensions of Cell 2

Cell 2 will consist of the remainder of the basin's active volume.

1) Calculate the active volume of Cell 2, V_2:

$$V_2 = SQDV - V_1 \qquad \text{(Equation E-87)}$$

2) Calculate the surface area of Cell 2, A_2:

$$A_2 = A_{wq} - A_1 \qquad \text{(Equation E-88)}$$

3) Calculate the top length of Cell 2, L_2:

$$L_2 = \frac{A_2}{W_2} \qquad \text{(Equation E-89)}$$

Where:

W_2 = width of Cell 2 (ft), $W_2 = W_1 = W_{wq\text{-}tot} = L_{berm}$

4) Verify that the length-to-width ratio of Cell 2, LW_2, is at least 3:1 with ≥ 4:1 preferred. If the length-to-width ratio is less than 3:1, modify input parameters until a ratio of at least 3:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the pond should be chosen.

$$LW_2 = \frac{L_2}{W_2} \qquad \text{(Equation E-90)}$$

5) Calculate the very shallow zone surface area, A_{vs}:

$$A_{vs} = \frac{A_2 \bullet \%A_{vs}}{100} \qquad \text{(Equation E-91)}$$

Where:

$\%A_{vs}$ = percent of surface area of very shallow zone

6) Calculate the volume of the shallow zone, V_{vs}:

$$V_{vs} = A_{vs} \bullet d_{vs} \qquad \text{(Equation E-92)}$$

Where:

d_{vs} = average depth of the very shallow zone (0.1 – 1 ft)

7) Calculate the length of the very shallow zone, L_{vs}:

$$L_{vs} = \frac{A_{vs}}{W_{vs}} \qquad \text{(Equation E-93)}$$

Where:

W_{vs} = width of the very shallow zone (ft), $W_{vs} = W_2$

8) Calculate the surface area of the shallow zone, A_s:

$$A_s = \frac{A_2 \bullet \%A_s}{100} \qquad \text{(Equation E-94)}$$

Where:

$\%A_s$ = percent of surface area of shallow zone

9) Calculate the volume of the shallow zone, V_s:

$$V_s = A_s \bullet d_s \qquad \text{(Equation E-95)}$$

Where:

d_s = average depth of shallow zone (1 - 3 ft)

10) Calculate length of the shallow zone, L_s:

$$L_s = \frac{A_s}{W_s} \qquad \text{(Equation E-96)}$$

Where:

W_s = width of the shallow zone (ft), $W_s = W_2$

11) Calculate the surface area of the deep zone, A_{deep}:

$$A_{deep} = A_2 - A_{vs} - A_s \qquad \text{(Equation E-97)}$$

12) Calculate the volume of the deep zone, V_{deep}:

$$V_{deep} = V_2 - V_{vs} - V_s \qquad \text{(Equation E-98)}$$

13) Calculate the average depth of the deep zone (3-5 ft), d_{deep}:

$$d_{deep} = \frac{V_{deep}}{A_{deep}} \qquad \text{(Equation E-99)}$$

14) Calculate length of the deep zone, L_{deep}:

$$L_{deep} = \frac{A_{deep}}{W_{deep}} \qquad \text{(Equation E-100)}$$

Where:

W_{deep} = width of the deep zone (ft), $W_{deep} = W_2$

Step 5: Ensure design requirements and site constraints are achieved

Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the basin is inadequate to meet the design requirements, choose a new location or alternative treatment BMP.

Step 6: Size Outlet Structure

For wetlands with detention, the outlet structures shall be designed to provide 12 hours emptying time for the water quality volume or the required detention necessary for achieving the peak runoff discharge requirements if the extended detention is designed for flow attenuation.

The wetland outlet pipe shall be sized, at a minimum, to pass flows greater than the stormwater quality design peak flow for on-line basins or flows greater than the peak runoff discharge rate for the 100-year, 24-hr design storm for on-line basins.

Step 7: Determine Emergency Spillway Requirements

For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm in order to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the 100-yr, 24-hr post-development peak storm water runoff discharge rate directly to the downstream conveyance system or another acceptable discharge point. For sites where the emergency spillway discharges to a steep slope, an emergency overflow riser, in addition to the spillway should be provided.

Sizing Worksheet

Step 1: Determine water quality design volume	
1-1. Enter drainage area, A	A = acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ = %
1-3. Determine the maximum allowed effective impervious area, $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$= acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=
1-5. Determine the Project Total Impervious area, $TIA=A_{project}*Imp$	TIA= acres
1-6. Determine the total area from which runoff must be retained, $A_{retain}=TIA-EIA_{allowable}$	A_{retain} = acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\ (1-imp)$	C =
1-9. Enter design rainfall depth of the storm, P_i (in)	P_i = in
1-10. Calculate rainfall depth, $P = P_i/12$	P = ft
1-11. Calculate water quality design volume, $SQDV = 43560 \bullet P*A_{retain}*C$	SQDV = ft^3
Step 2: Determine Wetland Location, Wetland Type and Preliminary Geometry Based on Site Constraints	
2-1. Based on site constraints, determine the wetland geometry and the storage available by developing an elevation-storage relationship for the wetland. For this simple example, assume a trapezoidal geometry for cell 1 (forebay) and cell 2. The wetland does not have extended detention.	

2-2. Enter the total surface area of the wetland footprint based on site constraints, A_{tot}	A_{tot} = ft²
2-3. Enter the length of the wetland footprint based on site constraints, L_{tot}	L_{tot} = ft
2-4. Calculate the width of the wetland footprint, $W_{tot} = A_{tot} / L_{tot}$	W_{tot} = ft
2-5. Enter interior side slope as length per unit height (min = 3), Z	Z =
2-6. Enter desired freeboard depth, d_{fb}	d_{fb} = ft
2-7. Calculate the length of the water quality volume surface area including the internal berm but excluding freeboard, $L_{wq\text{-}tot} = L_{tot} - 2Zd_{fb}$	$L_{wq\text{-}tot}$ = ft
2-8. Calculate the width of the water quality volume surface area including the internal berm but excluding freeboard, $W_{wq\text{-}tot} = W_{tot} - 2Zd_{fb}$	$W_{wq\text{-}tot}$ = ft
2-9. Calculate the total water quality volume surface area including the internal berm and excluding freeboard, $A_{wq\text{-}tot} = L_{wq\text{-}tot} \bullet W_{wq\text{-}tot}$	$A_{wq\text{-}tot}$ = ft²
2-10. Enter the width of the internal berm (6 ft min), W_{berm}	W_{berm} = ft
2-11. Enter the length of the internal berm, $L_{berm} = W_{wq\text{-}tot}$	L_{berm} = ft
2-12. Calculate the area of the berm, $A_{berm} = W_{berm} \bullet L_{berm}$	A_{berm} = ft²
2-13. Calculate the water quality volume surface area excluding the internal berm and freeboard, $A_{wq} = A_{wq\text{-}tot} - A_{berm}$	A_{wq} = ft²
Step 3: Determine Dimensions of forebay	
3-1. Enter the percent of SQDV in forebay (30-50% required), $\%V_1$	$\%V_1$ = %
3-2. Calculate the active volume of forebay (includes water quality volume + sediment storage volume),	V_1 = ft³

$V_1 = (SQDV \bullet \%V_1) / 100$		
3-3. Enter desired average depth of forebay1 (2-4 ft including sediment storage of 1 ft), d_1	d_1 =	ft
3-4. Calculate the surface area for the water quality volume of forebay, $A_1 = V_1 / d_1$	A_1 =	ft^2
3-5. Enter the width of forebay, $W_1 = W_{av\text{-}tot} = L_{berm}$	W_1 =	ft
3-6. Calculate the length of forebay (Note: inlet and outlet should be configured to maximize the residence time), $L_1 = A_1 / W1$	L_1 =	ft
Step 4: Determine Dimensions of Cell 2		
4-1. Calculate the active volume of Cell 2, $V_2 = SQDV - V_1$	V_2 =	ft^3
4-2. Calculate surface area of Cell 2, $A_2 = A_{wq} - A_1$	A_2 =	ft^2
4-3. Enter width of Cell 2, $W_2 = W_1 = W_{wq\text{-}tot} = L_{berm}$	W_2 =	ft
4-4. Calculate top length of Cell 2, $L_2 = A_2 / W_2$	L_2 =	ft
4-5. Verify that the length-to-width ratio of Cell 2 is at least 3:1 with ≥ 4:1 preferred. If the length-to-width ratio is less than 3:1, modify input parameters until a ratio of at least 3:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the pond should be chosen, $LW_2 = L_2 / W_2$	LW_2 =	
4-6. Enter percent of surface area of very shallow zone, $\%A_{vs}$	$\%A_{vs}$ =	%
4-7. Calculate very shallow zone surface area, $A_{vs} = (A_2 \bullet \%A_{vs})/100$	A_{vs} =	ft^2
4-8. Enter average depth of very shallow zone (0.1 - 1 ft), d_{vs}	d_{vs} =	ft
4-9. Calculate volume of very shallow zone, $V_{vs} = A_{vs} \bullet d_{vs}$	V_{vs} =	ft^3
4-10. Enter width of very shallow zone, $W_{vs} = W_2$	W_{vs} =	ft

4-11. Calculate length of very shallow zone, $L_{vs} = A_{vs} / W_{vs}$	L_{vs} = ft
4-12. Enter percent of surface area of shallow zone, $\%A_s$	$\%A_s$ = %
4-13. Calculate surface area of shallow zone, $A_s = (A_2 \bullet \%A_s)/100$	A_s = ft^2
4-14. Enter average depth of shallow zone (1 - 3 ft), d_s	d_s = ft
4-15. Calculate volume of shallow zone, $V_s = A_s \bullet d_s$	V_s = ft^3
4-16. Enter width of shallow zone, $W_s = W_2$	W_s = ft
4-17. Calculate length of shallow zone, $L_s = A_s / W_s$	L_s = ft
4-18. Calculate surface area of deep zone, $A_{deep} = A_2 - A_{vs} - A_s$	A_{deep} = ft^2
4-19. Calculate volume of deep zone, $V_{deep} = V_2 - V_{vs} - V_s$	V_{deep} = ft^3
4-20. Calculate average depth of deep zone (3 - 5 ft), $d_{deep} = V_{deep} / A_{deep}$	d_{deep} = ft
4-21. Enter width of deep zone, $W_{deep} = W_2$	W_{deep} = ft
4-22. Calculate length of deep zone, $L_{deep} = A_{deep} / W_{deeo}$	L_{deep} = ft
Step 5: Ensure Design Requirements and Site Constraints are Achieved	
5-1. Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the wetland is inadequate to meet the design requirements, choose a new location for the wetland or select an alternative treatment BMP.	

Step 6: Size Outlet Structure
6-1. The wetland outlet pipe shall be sized, at a minimum, to pass flows greater than the stormwater quality design peak flow for off-line basins or flow from the capital storm for on-line basins.
Step 7: Determine Emergency Spillway Requirements
7-1. For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm in order to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the 100-yr, 24-hr post-development peak storm water runoff discharge rate directly to the downstream conveyance system or another acceptable discharge point.

Design Example

Wetland siting requires the following considerations prior to construction: (1) availability of base flow – stormwater wetlands require a regular source of water to support wetland biota, (2) slope stability – stormwater wetlands are not permitted near steep slope hazard areas, (3) surface space availability – large footprint area is required, and (4) compatibility with flood control – basins must not interfere with flood control functions of existing conveyance and detention structures.

The wetland in this example does not have extended detention. An internal berm separates the forebay (Cell 1) and the main basin (Cell 2). The berm is at the elevation of the active volume (SQDV plus sediment storage volume) design surface which is also the permanent wetpool elevation.

Step 1: Determine Water Quality Design Volume

For this design example, a 20-acre residential development with a 60% total impervious area is considered. The 85th percentile storm event for the project location is 0.75 inches.

Step 1: Determine water quality design volume			
1-1. Enter drainage area, A	A =	20	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	5	
1-3. Determine the maximum allowed effective impervious area, $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	1.0	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	0.6	
1-5. Determine the Project Total Impervious area, $TIA=A_{project}*Imp$	TIA=	12	acres
1-6. Determine the total area from which runoff must be retained, $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	11	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	0.05	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\,(1-imp)$	C =	0.59	
1-9. Enter design rainfall depth of the storm, P_i (in)	P_i =	0.75	in

1-10. Calculate rainfall depth, $P = P_i/12$	P = 0.06 ft
1-11. Calculate water quality design volume, $SQDV = 43560 \bullet P * A_{retain} * C$	SQDV = 17,000 ft^3

Step 2: Determine Pond Location and Preliminary Geometry Based on Site Constraints

A total footprint area and total length available for the wetland is provided. This step calculates the total active volume surface area which is equivalent to the permanent wetpool surface area. This step also calculates the dimensions of the internal berm.

Step 2: Determine Wetland Location, Wetland Type and Preliminary Geometry Based on Site Constraints	
2-1. Based on site constraints, determine the wetland geometry and the storage available by developing an elevation-storage relationship for the wetland. For this simple example, assume a trapezoidal geometry for cell 1 (forebay) and cell 2. The wetland does not have extended detention.	
2-2. Enter the total surface area of the wetland footprint based on site constraints, A_{tot}	A_{tot} = 7,500 ft^2
2-3. Enter the length of the wetland footprint based on site constraints, L_{tot}	L_{tot} = 200 ft
2-4. Calculate the width of the wetland footprint, $W_{tot} = A_{tot} / L_{tot}$	W_{tot} = 38 ft
2-5. Enter interior side slope as length per unit height (min = 3), Z	Z = 3
2-6. Enter desired freeboard depth, d_{fb}	d_{fb} = 2 ft
2-7. Calculate the length of the water quality volume surface area including the internal berm but excluding freeboard, $L_{wq\text{-}tot} = L_{tot} - 2Zd_{fb}$	$L_{wq\text{-}tot}$ = 188 ft
2-8. Calculate the width of the water quality volume surface area including the internal berm but excluding freeboard, $W_{wq\text{-}tot} = W_{tot} - 2Zd_{fb}$	$W_{wq\text{-}tot}$ = 26 ft

Step 2: Determine Wetland Location, Wetland Type and Preliminary Geometry Based on Site Constraints			
2-9. Calculate the total water quality volume surface area including the internal berm and excluding freeboard, $A_{wq\text{-}tot} = L_{wq\text{-}tot} \cdot W_{wq\text{-}tot}$	$A_{wq\text{-}tot}$ =	4,900	ft^2
2-10. Enter the width of the internal berm (6 ft min), W_{berm}	W_{berm} =	6	ft
2-11. Enter the length of the internal berm, $L_{berm} = W_{wq\text{-}tot}$	L_{berm} =	26	ft
2-12. Calculate the area of the berm, $A_{berm} = W_{berm} \cdot L_{berm}$	A_{berm} =	160	ft^2
2-13. Calculate the active volume surface area excluding the internal berm and freeboard, $A_{wq} = A_{wq\text{-}tot} - A_{berm}$	A_{wq} =	4,740	ft^2

Step 3: Determine Dimensions of Forebay

It should be assumed that the forebay should be 30-50% of the SQDV.

Step 3: Determine Dimensions of forebay			
3-1. Enter the percent of SQDV in forebay (30-50% required), $\%V_1$	$\%V_1$ =	30	%
3-2. Calculate the active volume of forebay (including sediment storage), $V_1 = (SQDV \cdot \%V_1)/100$	V_1 =	5,100	ft^3
3-3. Enter desired average depth of forebay (2-4 ft including sediment storage of 1 ft), d_1	d_1 =	4	ft
3-4. Calculate the surface area for the water quality volume of forebay, $A_1 = V_1 / d_1$	A_1 =	1,275	ft^2
3-5. Enter the width of forebay, $W_1 = W_{av\text{-}tot} = L_{berm}$	W_1 =	38	ft
3-6. Calculate the length of forebay (<u>Note:</u> inlet and outlet should be configured to maximize the residence time), $L_1 = A_1 / W1$	L_1 =	34	ft

Step 4: Determine Dimensions of Cell 2

Verify that the surface area and length-to-width ratio of Cell 2 meet the design criteria. Calculate volumes, depths and surface areas for the very shallow, shallow and deep zones.

Step 4: Determine Dimensions of Cell 2			
4-1. Calculate the active volume of Cell 2, V_2 = SQDV - V_1	V_2 =	11,900	ft^3
4-2. Calculate surface area of Cell 2, $A_2 = A_{wq} - A_1$	A_2 =	3,460	ft^2
4-3. Enter width of Cell 2, $W_2 = W_1 = W_{wq\text{-}tot} = L_{berm}$	W_2 =	26	ft
4-4. Calculate top length of Cell 2, $L_2 = A_2 / W_2$	L_2 =	130	ft
4-5. Verify that the length-to-width ratio of Cell 2 is at least 3:1 with ≥ 4:1 preferred. If the length-to-width ratio is less than 3:1, modify input parameters until a ratio of at least 3:1 is achieved. If the input parameters cannot be modified as a result of site constraints, another site for the pond should be chosen, $LW_2 = L_2 / W_2$	LW_2 =	5	
4-6. Enter percent of surface area of very shallow zone, $\%A_{vs}$	$\%A_{vs}$ =	15	ft^2
4-7. Calculate very shallow zone surface area, $A_{vs} = (A_2 \bullet \%A_{vs})/100$	A_{vs} =	520	ft^2
4-8. Enter average depth of very shallow zone (0.1 - 1 ft), d_{vs}	d_{vs} =	1	ft
4-9. Calculate volume of very shallow zone, $V_{vs} = A_{vs} \bullet d_{vs}$	V_{vs} =	520	ft^3
4-10. Enter width of very shallow zone, $W_{vs} = W_2$	W_{vs} =	26	ft
4-11. Calculate length of very shallow zone, $L_{vs} = A_{vs} / W_{vs}$	L_{vs} =	20	ft
4-12. Enter percent of surface area of shallow zone, $\%A_s$	$\%A_s$ =	55	
4-13. Calculate surface area of shallow zone, $A_s = (A_2 \bullet \%A_s)/100$	A_s =	1,900	ft^2
4-14. Enter average depth of shallow zone (1 - 3 ft), d_s	d_s =	3	ft
4-15. Calculate volume of shallow zone, $V_s = A_s \bullet d_s$	V_s =	5,700	ft^3
4-16. Enter width of shallow zone, $W_s = W_2$	W_s =	26	ft
4-17. Calculate length of shallow zone, $L_s = A_s / W_s$	L_s =	220	ft

Step 4: Determine Dimensions of Cell 2			
4-18. Calculate surface area of deep zone, $A_{deep} = A_2 - A_{vs} - A_s$	A_{deep} =	1,040	ft^2
4-19. Calculate volume of deep zone, $V_{deep} = V_2 - V_{vs} - V_s$	V_{deep} =	5,680	ft^3
4-20. Calculate average depth of deep zone (3 - 5 ft), $d_{deep} = V_{deep} / A_{deep}$	d_{deep} =	5	ft
4-21. Enter width of deep zone, $W_{deep} = W_2$	W_{deep} =	26	ft
4-22. Calculate length of deep zone, $L_{deep} = A_{deep} / W_{deeo}$	L_{deep} =	40	ft

Step 5: Ensure Design Requirements and Site Conditions are Achieved

Check design requirements and site constraints. Modify design geometry until requirements are met. If the chosen site for the wetland is inadequate to meet the design requirements, choose a new location for the wetland or select an alternative treatment BMP.

Step 6: Size Outlet Structure

6-1. The wetland outlet pipe shall be sized, at a minimum, to pass flows greater than the stormwater quality design peak flow for off-line basins or flow from the capital storm for on-line basins.

Step 7: Determine Emergency Spillway Requirements

For online basins, an emergency overflow spillway should be sized to pass flows greater than the design peak runoff discharge rate for the 100-yr, 24-hr storm in order to prevent overtopping of the walls or berms in the event that a blockage of the riser occurs. For offline basins, an emergency spillway or riser should be sized to pass the 100-yr, 24-hr post-development peak storm water runoff discharge rate directly to the downstream conveyance system or another acceptable discharge point.

E.11 TCM-4 Sand Filters

Sizing Methodology

A sand filter is designed with two parts: (1) a temporary storage reservoir to store runoff, and (2) a sand filter bed through which the stored runoff must percolate. Usually the storage reservoir is simply placed directly above the filter, and the floor of the reservoir pond is the top of the sand bed. For this case, the storage volume also determines the hydraulic head over the filter surface, which increases the rate of flow through the sand.

Two methods are available for sizing sand filters: a simple method and a routing modeling method. The simple method uses standard values to define filter hydraulic characteristics for determining the sand surface area. This method is useful for planning purposes, for a first approximation to begin iterations in the detailed method, or when use of the detailed computer model is not desired or not available. The simple method very often results in a larger filter than the routing method.

Background

Sand filter design is based on Darcy's law:

$$Q = KiA \qquad \text{(Equation E-101)}$$

Where:

Q = water quality design flow (cfs)

K = hydraulic conductivity (fps)

A = surface area perpendicular to the direction of flow (ft^2)

i = hydraulic gradient (ft/ft) for a constant head and constant media depth, computed as follows:

$$i = \frac{h + l}{l} \qquad \text{(Equation E-102)}$$

Where:

h = average depth of water above the filter (ft), defined for this design as $d/2$

d = maximum storage depth above the filter (ft)

l = thickness of sand media (ft)

Darcy's law underlies both the simple and the routing methods of design. The filtration rate *V*, or more correctly, 1/*V*, is the direct input in the sand filter design. The relationship between the filtration rate *V* and hydraulic conductivity *K* is revealed by equating Darcy's law and the equation of continuity, $Q = VA$. Specifically:

$Q = KiA$ and $Q = VA$

So, $VA = KiA$

Or: $V = Ki$ (Equation E-103)

Where,

V = filtration rate (ft/s)

Note that $V \neq K$. That is, the filtration rate is not the same as the hydraulic conductivity, but they do have the same units (distance per time). *K* can be equated to *V* by dividing *V* by the hydraulic gradient *i*, which is defined above.

The hydraulic conductivity *K* does not change with head nor is it dependent on the thickness of the media, only on the characteristics of the media and the fluid. A design hydraulic conductivity of 1 inch per hour (2 feet per day) used in this simple sizing method is based on bench-scale tests of conditioned rather than clean sand (KCSWDM, 2005) and represents the average sand bed condition as silt is captured and held in the sand bed.

Unlike the hydraulic conductivity, the filtration rate *V* changes with head and media thickness, although the media thickness is constant in the sand filter design.

Simple Sizing Method

The simple sizing method does not route flows through the filter. It determines the size of the filter based on the simple assumption that inflow is immediately discharged through the filter as if there were no storage volume. An adjustment factor (0.7) is applied to compensate for the greater filter size resulting from this method. Even with the adjustment factor, the simple method generally produces a larger filter size than the routing method.

Step 1: Determine the water quality design volume

Sand filters should be sized to capture and treat the stormwater quality design volume (see Section E.1).

Step 2: Determine maximum storage depth of water

Determine the maximum water storage depth (*d*) above the sand filter. This depth is defined as the depth at which water begins to overflow the reservoir pond, and it depends on the site topography and hydraulic constraints. The depth is chosen by the designer, but shall be 6 feet or less.

Step 3: Calculate the sand filter area

Determine the sand filter area using the following equation:

$$A_{sf} = \frac{V_{wq} R L}{K t (h + L)} \qquad \text{(Equation E-104)}$$

Where,

A_{sf}	=	surface area of the sand filter bed (ft^2)
V_{wq}	=	water quality design volume (ft^3)
R	=	routing adjustment factor (use R = 0.7)
L	=	sand bed depth (ft)
K	=	design hydraulic conductivity (use 2 ft/day)
t	=	drawdown time (use 1 day)
h	=	average depth of water above the filter (ft), (use $d/2$ with d from Step 1)

Routing Method

A continuous runoff model, such as US EPA's Storm Water Management Model (SWMM) Model, can be used to optimally size a sand filter. A continuous simulation model consists of three components: a representative long term period of rainfall data (≈ 20 years or greater) as the primary model input; a model component representing the tributary area to the sand filter that takes into account the amount of impervious area, soil types of the pervious area, vegetation, evapotranspiration, etc.; and a component that simulates the sand filter. Using this method, the filter should be sized to capture and treat the WQ design volume from the post-development tributary area.

The continuous simulation model routes predicted tributary runoff to the sand filter, where treatment is simulated as a function of the infiltrative (flow) capacity of the sand filter and the available storage volume above the sand filter. In a continuous runoff model such as SWMM, the physical parameters of the sand filter are represented with stage-storage-discharge relationships. Due to the computational power of ordinary desktop computers, long-term continuous simulations generally take only minutes to run. This allows the modeler to run several simulations for a range of sand filter sizes, varying either the surface area of the filter (and resulting flow capacity) or the storage capacity above the sand filter, or both. Sufficient continuous model simulations should be completed so that results encompass the WQ design volume capture goal.

Model results should be plotted for both varying storage depths above the filter and for varying filter surface area (and resulting flow capacity) while keeping all other parameters constant. The resulting relationship of percent capture as a function of sand filter flow and storage capacity can be used to optimally size a sand filter based on site conditions and restraints.

In addition to continuous simulation modeling, routing spreadsheets and/or other forms of routing modeling that incorporate rainfall-runoff relationships and infiltrative (flow) capacities of sand filters may be used to size facilities. Alternative sizing methodologies should be prepared with good engineering practices.

Sizing Worksheet

Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	$A_{project}$ =	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	%
1-3. Determine the maximum allowed effective impervious area (ac), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\,(1-imp)$	C =	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	ft
1-11. Calculate water quality design volume (ft^3), $SQDV=43560\bullet C*P*A_{retain}$	SQDV=	ac-ft
Step 2: Determine maximum storage depth of water		
2-1. Determine the maximum storage depth (max 6 ft) of water above the sand filter, *d* (ft)	*d* = ft	

Step 3: Calculate sand filter area	
3-1. Enter water quality design volume, *SQDV*	SQDV = ft^3
3-2. Enter routing adjustment factor (use R =0.7), R	R =
3-3. Enter thickness of sand filter (min. 2 ft, 3 ft preferred), L	L = ft
3-4. Enter design hydraulic conductivity of media (use 2 ft/day), K_{des}	K = ft/day
3-5. Enter drawdown time, t	t = day
3-6. Calculate average depth of water above the filter, $h = d/2$	h = ft
3-7. Calculate sand filter area, $A_{sf} = (SQDV*RL)/(Kt\ (h+L))$	A_{sf} = ft^2
Step 4: Determine filter dimensions	
4-1. Sand filter area, A_{sf}	A_{sf} = ft^2
4-2. Enter geometric configuration, LR:W ratio (2:1 or greater), L_R	L_R =
4-3. Select the width of the sand filter, W	W = ft
4-4. Calculate the length of the sand filter, $L = WL_R$	L = ft
4-5. Calculate rate of filtration, $r_{wq} = K_i$; where $i = \frac{h+l}{l}$	r_{wq} = ft/d
Step 5: Calculate filter longitudinal underdrain collection pipe	
5-1. Calculated filtered flow rate, $Q_f = r_{wq}A_{sf}/86400$	Q_f = cfs
5-2. Enter minimum slope for energy gradient, S_e	S_e =

5-3. Enter Hazen-Williams coefficient for plastic, *C*	C =
5-4. Enter pipe diameter (6” min.), *D*	D = in
5-5. Calculate pipe hydraulic radius, $R_h = D/48$	R_h = ft
5-6. Calculate velocity at the outlet of the pipe, $V_p = 1.318CR_h0.63S_e0.54$	V_p = ft/s
5-7. Calculate pipe capacity, $Q_{cap} = 0.25\pi(D/12)^2V_p$	Q_{cap} = cfs
Step 7: Provide conveyance capacity for filter clogging	
7-1. The sand filters should be placed off-line, but an emergency overflow must still be provided in the event the filter becomes clogged.	

Design Example

Step 1: Determine water quality design volume

For this design example, a 10-acre site with soil type 4 and 60% total impervious area is considered. The 85th percentile storm event for the project location is 0.75 inches.

Step 1: Determine water quality design volume			
1-1. Enter Project area (acres), $A_{project}$	$A_{project}$ =	10	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	5	
1-3. Determine the maximum allowed effective impervious area (ac), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	0.5	acres
1-4. Enter Project impervious fraction, *Imp* (e.g. 60% = 0.60)	Imp=	0.6	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	6	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain}=TIA-EIA_{allowable}$	A_{retain} =	5.5	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	0.05	
1-8. Calculate runoff coefficient, $C = 0.95*imp + C_p\,(1-imp)$	C =	0.59	
1-9. Enter design rainfall depth of the storm (in), P_i	P_i =	0.75	in
1-10. Calculate rainfall depth (ft), $P = P_i/12$	P =	0.06	ft
1-11. Calculate water quality design volume (ft^3), $SQDV=43560 \bullet C*P*A_{retain}$	SQDV=	0.20	ac-ft

Step 1a: Determine maximum storage depth of water

Determine the maximum storage depth of water above the sand filter.

Step 1a: Determine maximum storage depth of water			
1a-1. Determine the maximum storage depth (max 6 ft) of water above the sand filter, *d* (ft)	*d* =	6	ft

Step 2: Calculate Sand Filter Area

A sand filter is designed with two components: (1) temporary storage reservoir to store runoff, and (2) a sand filter bed through which the stored runoff must percolate getting treatment.

The simple sizing method does not rout flows through the filter. The size of the filter is determined based on the simple assumption that inflow is immediately discharged through the filter. The adjustment factor, R, is applied to compensate for the greater filter size resulting from this method.

Step 2: Calculate sand filter area			
2-1. Enter water quality design volume, *SQDV*	SQDV =	o.20	ac-ft
2-2. Enter routing adjustment factor (use R =0.7), *R*	*R* =	0.7	
2-3. Enter thickness of sand filter (min. 2 ft, 3 ft preferred), *L*	*L* =	2	ft
2-4. Enter design hydraulic conductivity (use 2 ft/day), *K*	*K* =	2	ft/day
2-5. Enter drawdown time (use 1 day), *t*	*t* =	2	day
2-6. Calculate average depth of water above the filter, $h = d/2$	h =	3	ft
2-7. Calculate sand filter area, $A_{sf} = (SQDV*RL)/(Kt\,(h+L))$	A_{sf} =	0.014	acre

Step 3: Determine Filter Dimensions

Step 3: Determine filter dimensions			
3-1. Sand filter area in ft², $A_{sf(feet)}=A_{sf(acre)}*43{,}560$	A_{sf} =	610	ft²
3-2. Enter geometric configuration, LR:W ratio (2:1 min.), L_R	L_R =	2	
3-3. Calculate the width of the sand filter, *W*	W =	18	ft

Step 3: Determine filter dimensions	
3-4. Calculate the length of the sand filter, *L*	L = 36 ft
3-5. Calculate rate of filtration, $r_{wq} = Ki$, where $i = \frac{h+l}{l}$	r_{wq} = 2.3 ft/d

Step 4: Calculate Filter Longitudinal Underdrain Collection Pipe

All underdrain pipes must be 6 inches or greater to facilitate cleaning.

Step 5: Calculate filter longitudinal underdrain collection pipe	
5-1. Calculated filtered flow rate, $Q_f = r_{wq}A_{sf}/86400$	Q_f = 0.01 cfs
5-2. Enter minimum slope for energy gradient, *Se*	S_e = 0.005
5-3. Enter Hazen-Williams coefficient for plastic, *C*	C = 140
5-4. Enter pipe diameter (6" min), *D*	D = 6 in
5-5. Calculate pipe hydraulic radius, $R_h = D/48$	R_h = 0.13
5-6. Calculate velocity at the outlet of the pipe, $V_p = 1.318CR_h^{0.63}S_e^{0.54}$	V_p = 2.9 ft/s
5-7. Calculate pipe capacity, $Q_{cap} = 0.25\pi(D/12)^2V_p$	Q_{cap} = 0.57 cfs

Step 5: Provide Conveyance Capacity for Filter Clogging

The sand filters should be placed off-line, but an emergency overflow must still be provided in the event the filter becomes clogged.

APPENDIX F : FLOW SPLITTER DESIGN SPECIFICATIONS

F.1 Flow Splitter Introduction

Flow splitters must be provided for off-line facilities to divert the water quality design flow to the BMP and bypass higher flows. In most cases, it is a designer's choice whether storm water treatment BMPs described in this manual are designed as on-line or off-line; exceptions are vegetated strip filters, permeable pavement, and building BMPs which are designed on-line.

A crucial factor in designing flow splitters is to ensure that low flows are delivered to the treatment facility up to the water quality design flow rate. Above this rate, additional flows remain in the storm drain or are diverted to a bypass drain with minimal increase in head at the flow splitter structure to avoid surcharging the water quality facility under high flow conditions.

Flow splitters are typically manholes or vaults with baffles. In place of baffles, the splitter mechanism may be a half tee section with a solid top and an orifice in the bottom of the tee section. A full tee option may also be used (see "Design Criteria" below). Two possible design options for flow splitters are shown in the figures in this Appendix. Other equivalent designs that achieve the result of splitting low flows, up to the WQ design flow, into the WQ treatment facility and divert higher flows around the facility are also acceptable.

Flow splitters may be modeled using standard level pool routing techniques, as described in the Handbook of Applied Hydrology (Ven te Chow; 1964) and elsewhere. The stage/discharge relationship of the outflow pipes shall be determined using backwater analysis techniques. Weirs shall be analyzed as sharp-crested weirs.

Design Criteria

1) A flow splitter shall be designed to deliver the required water quality design flow rate to the storm water treatment facility.

17) The top of the weir shall be located at the water surface for the design flow. Remaining flows enter the bypass line.

18) The maximum head shall be minimized for flow in excess of the water quality design flow. Specifically, flow to the treatment facility at the flood control design storm water surface shall not increase the design water quality design flow by more than 10%.

19) Example designs are shown in the figures in this Appendix. Equivalent designs are also acceptable.

20) Special applications, such as roads, may require the use of a modified flow splitter. The baffle wall may be fitted with a notch and adjustable weir plate to proportion runoff volumes other than high flows.

21) For ponding facilities, backwater effects must be included in designing the height of the standpipe in the manhole.

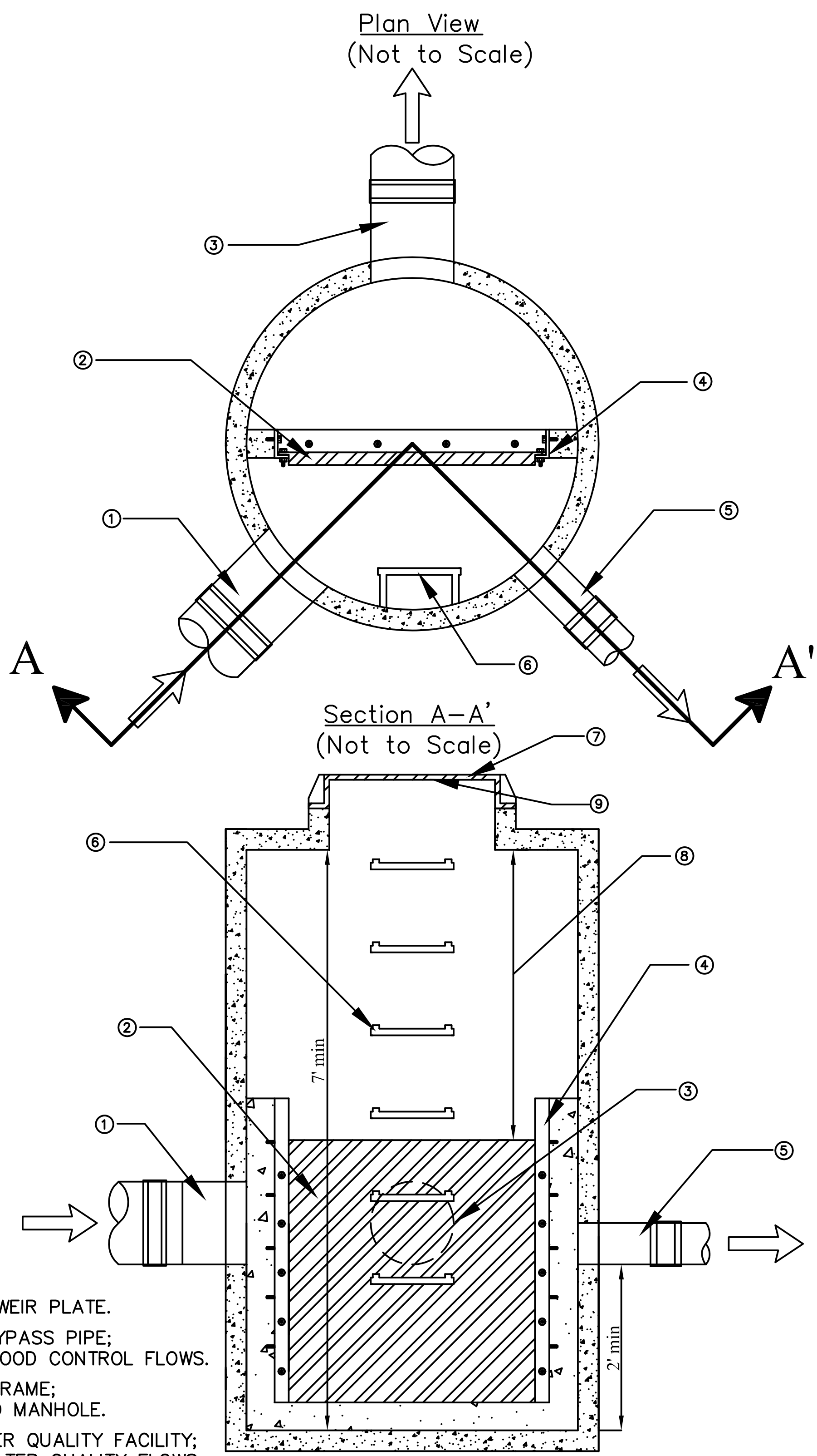
22) Ladder or step and handhold access shall be provided. If the weir wall is higher than 36 inches, two ladders, on the either side of the wall, are required.

F.2 Material Requirements

1) The splitter baffle shall be installed in a standard manhole or vault. The baffle wall shall be made of material resistant to corrosion (minimum 4-inch thick reinforced concrete, Type 302 or Type 316 stainless steel plate, or equivalent).

23) The minimum clearance between the top of the baffle wall and the bottom of the manhole or vault cover shall be 4 feet; otherwise, dual access points shall be provided.

24) All metal parts shall be corrosion resistant. Examples of preferred materials include aluminum, stainless steel, and plastic. Zinc and galvanized materials are not permitted because of aquatic toxicity. Painting metal parts shall not be allowed because of poor longevity.



NOTES:

① INLET PIPE.

② ADJUSTABLE WEIR PLATE.

③ HIGH FLOW BYPASS PIPE;
SIZED FOR FLOOD CONTROL FLOWS.

④ WEIR PLATE FRAME;
ANCHORED TO MANHOLE.

⑤ PIPE TO WATER QUALITY FACILITY;
SIZED FOR WATER QUALITY FLOWS.

⑥ ACCESS STEPS.

⑦ 24" ROUND FRAME AND SOLID LID.

⑧ 4' MIN DISTANCE OR PROVIDE SEPARATE ACCESS ON BOTH SIDES OF WEIR.

⑨ AFFIX PERMANENT IDENTIFICATION TAG.

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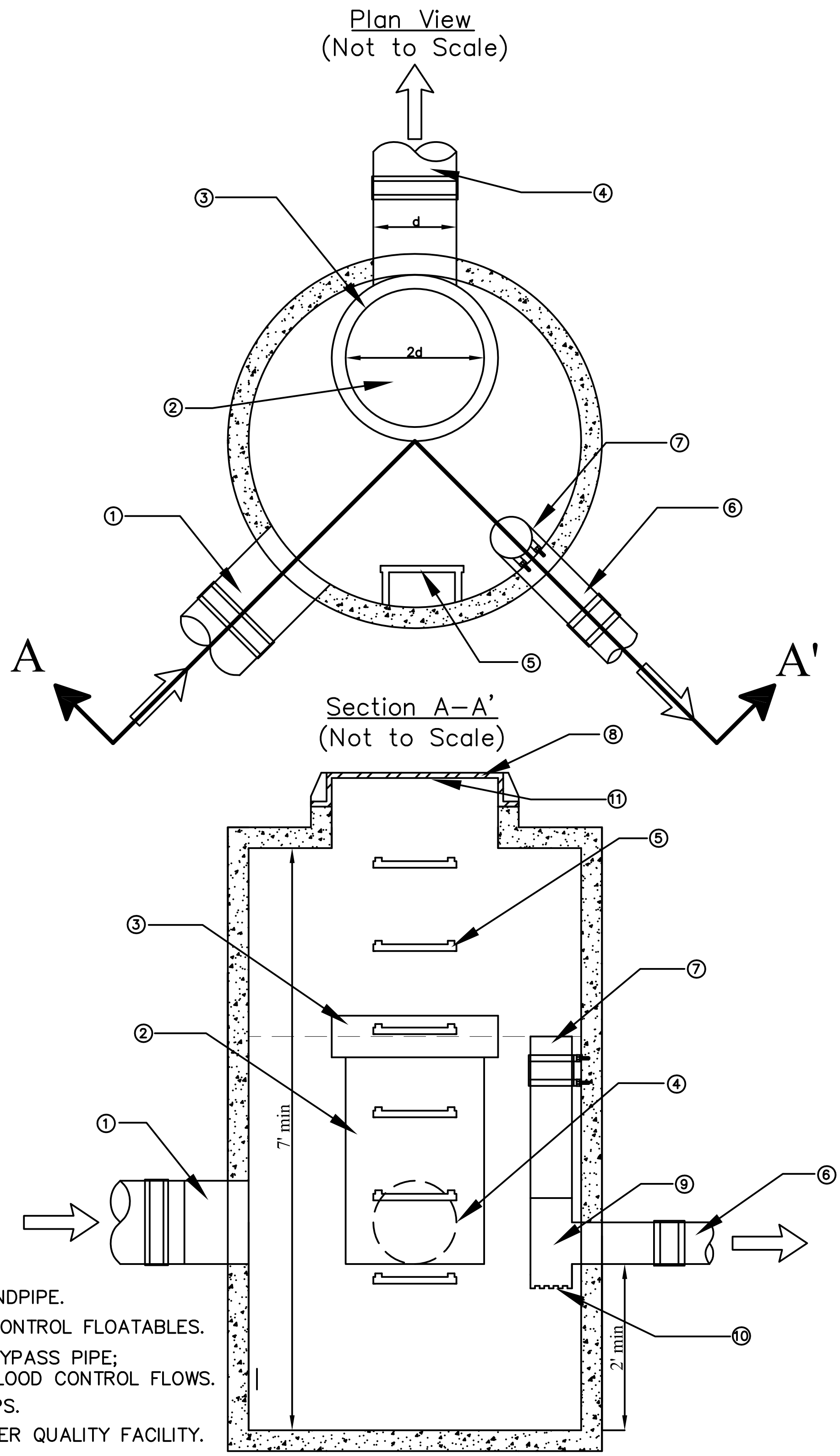
Figure F-1: Flow Splitter Option A



NOTES:

① INLET PIPE.
② BYPASS STANDPIPE.
③ BAFFLE TO CONTROL FLOATABLES.
④ HIGH FLOW BYPASS PIPE; SIZED FOR FLOOD CONTROL FLOWS.
⑤ ACCESS STEPS.
⑥ PIPE TO WATER QUALITY FACILITY.
⑦ RISER PIPE; TOP OF PIPE AT DESIGN ELEVATION FOR WATER QUALITY FLOWS.
⑧ 24" ROUND FRAME AND SOLID LID.
⑨ REMOVABLE "TEE" SECTION FOR CLEANOUT.
⑩ RISER PIPE ORIFICE SIZED FOR WATER QUALITY FLOWS.
⑪ AFFIX PERMANENT IDENTIFICATION TAG.

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Figure F-2: Flow Splitter Option B

APPENDIX G: DESIGN CRITERIA CHECKLISTS FOR STORMWATER RUNOFF BMPS

BIO-1 Bioretention Checklist

- ☐ Has the bioretention facility been sized to treat the water quality design volume, SQDV (see worksheet)?
- ☐ Does the bioretention have a maximum ponding depth of 18 in.?
- ☐ Is the planting soil depth at least 2 feet?
- ☐ Has an underdrain been provided if native soil permeability is less than 0.5 in/hr and infiltration is not possible/allowed?
- ☐ Has a gravel drainage layer been provided if native soil permeability is greater than 0.5 in/hr and infiltration is possible/allowed?
- ☐ Does the bioretention ponding depth drain below the planting soil in less than 48 hours?
- ☐ Is the gravel drainage layer sized to adequately meet the maximum drawdown time of 96 hours?
- ☐ Has the bioretention facility been properly sized as recommended in the manual?
- ☐ Does the flow entrance meet specifications (dispersed, low velocity flow; dispersed flow across pavement; flow spreading trench; cuts or wheel slots for parking lots)?
- ☐ Does the pipe flow entrance include erosion protection material to dissipate flow energy?
- ☐ Is the flow path unblocked by trees and shrubs?
- ☐ Is the underdrain at least 6 inches in diameter?
- ☐ Is the underdrain pipe made of accepted material (slotted PVC pipe conforming to ASTM C 3034 or equivalent HDPE pipe conforming to AASHTO 252M)?
- ☐ Does the slotted pipe have correct sizing and spacing of slots?
- ☐ Is the underdrain sloped at 0.5% or more?
- ☐ Are rigid observation pipes connected to underdrain every 250 to 300 feet of installed pipe?
- ☐ Do the observation pipe wells/clean outs extend 6 inches above top elevation of bioretention facility mulch and are they capped as required?

- ☐ Does the gravel underdrain bedding consist of the correct aggregate?
- ☐ If geotextile fabric is placed between the planting media and gravel layer, does it meet the specifications outlined in the manual?
- ☐ Does the gravel underdrain bedding extend at least 6 inches below the underdrain pipe (if needed) and does it provide 1 foot depth around top and sides of pipe?
- ☐ Does the underdrain drain freely to the accepted discharge point?
- ☐ Is an overflow device consisting of vertical PVC pipe included in design?
- ☐ Has the overflow device been installed at the 18-inch ponding depth?
- ☐ Is the overflow riser at least 6 inches in diameter?
- ☐ Has the inlet to the riser been positioned at least 6 inches above the planting media and capped with a spider cap?
- ☐ If bioretention is close to roads or infrastructure, have infiltration pathways been restricted with geomembrane (at least 30 mm) or clay liners?
- ☐ Is planting soil composed of correct aggregate (60-70% sand; 30-40% compost) and free of stones, stumps and roots?
- ☐ Does compost have acceptable characteristics?
- ☐ Is constructed bioretention facility covered with well-aged mulch, free of seeds, weeds, soil and roots, and at least 2-3 inches thick?
- ☐ Is all bioretention vegetation tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 to 72 hours?
- ☐ Have an adequate number of different plant species been incorporated into the bioretention (It is recommended that 3 tree, 3 shrub, and 3 herbaceous groundcover species be included)?
- ☐ Have native plants been used to the maximum extent practicable?

BIO- 2 Planter Box Checklist

☐ Is the planter box tributary area less than 15,000 ft2?

☐ Is the groundwater level at least 2 feet below the bottom of the planter box?

☐ Is there adequate relief between land surface and stormwater conveyance system to permit vertical percolation?

☐ Is the planter box located in an area with adequate sunlight to support selected vegetation?

☐ Is the planter box sized to treat the water quality design volume, Vwq (see worksheet)?

☐ Does the planter box have a maximum ponding depth of 12 inches?

☐ Is the planting soil depth at least 2 feet (3 feet preferred)?

☐ Does the ponded water drain below the planting soil in less than 48 hours?

☐ Has the distance between the downspouts and the overflow outlet been maximized?

☐ Has the planter box been sized the same as a Bioretention facility with planter box parameters?

☐ Has the planter box been constructed with an appropriate non-leaching permanent material?

☐ Has the planter box structure been adequately sealed to ensure that water exits only via the underdrain?

☐ Has an underdrain been provided?

☐ If the entrance to the planter box is piped, has erosion protection been included in the design (erosion protection includes rock, splash blocks, etc.)?

☐ Is the entrance flow path unimpeded by woody plants (trees, shrubs)?

☐ Is the underdrain at least 6 inches in diameter?

☐ Is the underdrain pipe made of accepted material (slotted PVC pipe conforming to ASTM C 3034 or equivalent HDPE pipe conforming to AASHTO 252M)?

☐ Does the slotted pipe have correct sizing and spacing of slots?

☐ Is the underdrain sloped at 0.5% or more?

- ☐ Are rigid observation pipes connected to underdrain every 250 to 300 feet of installed pipe?
- ☐ Do the observation pipe wells/clean outs extend 6 inches above top elevation of the planter box mulch and are they capped as required?
- ☐ Does the gravel underdrain bedding consist of the correct aggregate?
- ☐ Does the gravel underdrain bedding extend at least 6 inches below the underdrain and does it provide 1 foot depth around top and sides of pipe?
- ☐ If geotextile fabric is used in the underdrain design, does it meet minimum materials requirements?
- ☐ Is the underdrain elevated from the bottom of the planter box by 6 inches?
- ☐ Does the underdrain drain freely to the intended discharge point?
- ☐ Is an overflow device consisting of vertical PVC pipe included in design?
- ☐ Is the overflow riser at least 6 inches in diameter?
- ☐ Is the inlet to the riser 6 inches above planting soil and capped with a spider cap?
- ☐ Has a waterproof barrier consisting of a 30 mil geomembrane or equivalent been provided to protect foundations from moisture?
- ☐ Is planting soil composed of correct aggregate (60-70% sand; 30-40% compost) and gradation, and free of stones, stumps and roots?
- ☐ Does compost have acceptable characteristics (see planting/storage media)?
- ☐ Is planter box covered with well-aged mulch, free of seeds, weeds, grass clippings, bark, soil and roots, and at least 2-3 inches thick?
- ☐ Do all soil minerals meet requirements?
- ☐ Is all planter box vegetation tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 to 72 hours?
- ☐ Have an adequate number of different plant species been incorporated into the planter box design (It is recommended that 3 tree, 3 shrub, and 3 herbaceous groundcover species be included)?
- ☐ Have native plants been used to the maximum extent practicable?
- ☐ Have only slow-release fertilizers been included in the design?
- ☐ Have arrangements been made to replace planter box mulch layer annually?

- ☐ Have low-maintenance plants been selected for design?
- ☐ Has an effort been made to ensure that no treated wood or galvanized metal is used anywhere within the planter box design?

BIO-3 Proprietary Biotreatment Device Checklist

- ☐ Has the proprietary biotreatment device been selected from the list provided in the manual of from another Ventura County- approved list?
- ☐ Has the vendor been contacted for the latest design guidance on cartridge selection?
- ☐ Has the proprietary biotreatment device been installed as directed by the vendor?
- ☐ Have appropriate maintenance and operation arrangements been made to ensure upkeep of the device?
- ☐ Has the biotreatment device been sized to capture and treat the water quality design flow?

BIO-4 Vegetated Swale Checklist

- ☐ Does the climate provide adequate conditions for maintaining a vegetative cover? Has adequate vegetation been chosen given the climate?
- ☐ Is the grade in the area shallow so as to not allow ponding?
- ☐ Is the swale compatible with existing flood control functions?
- ☐ Has the swale been designed with a depth of one foot or less?
- ☐ Is the overall depth from the top of the side walls to the bottom of the swale at least 12 inches?
- ☐ Is the swale bottom width at least 2 feet?
- ☐ Is the swale bottom width no greater than 10 feet, or 16 feet with a dividing berm?
- ☐ If the swale is required to convey flood flows in addition to the water quality design flow, has the swale been designed for the flood control design storm and does it include 2 feet of freeboard?
- ☐ Have gradual meandering bends been incorporated into the design?
- ☐ Is the longitudinal slope (in direction of flow) between 1% and 6%?
- ☐ Has an underdrain been provided if soils are poorly drained and longitudinal slope is less than 1.5%? Has a soils report been provided if this is the case?
- ☐ If the longitudinal slope is greater than 6%, have appropriate check dams with vertical drops of 12 inches or less been provided in the design to reduce the slope?
- ☐ Is the horizontal slope at the bottom of the swale flat to discourage channeling?
- ☐ Has the swale been designed so that the water depth does not exceed 4 inches or 2/3 the height of vegetation (2 inches in frequently mowed turf swales?
- ☐ Does the swale length provide a minimum hydraulic residence time of 7 minutes?
- ☐ If soil and slope conditions require it, has an acceptable low flow drain been installed?
- ☐ Has the swale been designed to convey the SQDF?

- ☐ Has the swale been sized as recommended in Chapter 6 (also see worksheet, Appendix E)?
- ☐ Has the swale been designed as a flow-through channel or has a high-flow bypass been incorporated into the design for flows higher than the water quality design flow?
- ☐ Has inflow been directed towards the upstream end of the swale or, at a minimum, evenly over the length of the swale?
- ☐ If the swale is online, has it been designed to convey flows up to the post-development 100 year 24 hour storm, with freeboard, and velocities below 3 ft/s?
- ☐ If the swale is off-line, has it been designed to convey the water quality design flow rate using a flow splitter with velocities below 1 ft/s?
- ☐ If check dams are incorporated in the design, have flow spreaders been added at the toe of each vertical drop?
- ☐ If curb cuts are used, has pavement been placed 1 – 2 inches above the elevation of the vegetated area?
- ☐ Is the swale inflow designed to function long term with minimal maintenance?
- ☐ Has flow spreading at the inlet of the swale been achieved by a leveled anchored flow spreader or similar method?
- ☐ Does the flow spreader project a minimum of 2 inches above the ground surface with appropriately spaced notches and extend horizontally beyond facility to prevent erosion
- ☐ If an underdrain is required, does it meet appropriate criteria (PVC or equivalent, correct slot spacing and sizing, 6 inches minimum in diameter, sloped at 0.5%)?
- ☐ Is there gravel bedding at least 6 inches below and 1 foot to the top and sides of the underdrain?
- ☐ If a geotextile is included in the design, does it meet requirements?
- ☐ Does gravel drainage layer meet recommended criteria?
- ☐ Does swale divider, if included, meet criteria (minimum height of 1 inch above flow, slopes no steeper than 2H:1V, stable foundation)?

- ☐ Has swale soil been amended with compost if organic content is less than 10%?
- ☐ Have appropriate, hardy and native plants been used to the maximum extent practical?
- ☐ Is vegetative cover at least 4 inches in height (ideally 6 inches)?
- ☐ Has the swale been located away from trees that may drop leaves or provide insufficient sunlight?

BIO-5 Vegetated Filter Strip Checklist

- ☐ Is the slope of the filter strip designed to avoid both erosive flows and ponding?
- ☐ Has the strip been designed to evenly distribute flow across width and promote sheet flow?
- ☐ Does the width of the filter strip extend across the full width of the tributary area?
- ☐ Is the upstream boundary of the filter located contiguous to developed area?
- ☐ If filter strip is used for water quality purposes, is the length between 15 and 150 feet (25 feet preferred)? If the strip is used for pretreatment, is it at least 4 feet in length?
- ☐ Is the slope of the strip parallel to the direction of flow between 2% and 6%?
- ☐ Is the lateral slope (perpendicular to flow) of the strip 4% or less?
- ☐ Is grading across strip even?
- ☐ Has the top of the strip been installed 2 to 5 inches below any adjacent pavement (a beveled transition is also acceptable)?
- ☐ Are the top and toe of the slope as flat as possible (graded flat for engineered filter strips) to encourage sheet flow and prevent erosion?
- ☐ Has the design flow been calculated using the SQDF (see worksheet)?
- ☐ Has the design flow depth been calculated using a modified Manning's equation (see worksheet)?
- ☐ Have the design velocity and length been calculated using the design flow and design flow depth as recommended (see worksheet)?
- ☐ Has a flow spreader been implemented to uniformly distribute contributing flow along width of filter strip?
- ☐ If a gravel flow spreader is used, is it at least 6 inches deep, 12 inches wide and a minimum or 1 inch below the paved surface?
- ☐ Has the gravel flow spreader been leveled even where ground is not level?
- ☐ If the gravel flow spreader is placed along a roadway, have LA county design specifications been consulted and implemented?

- ☐ If a notched curb spreader and through-curb spreader are used, have they been used in conjunction with a gravel spreader?
- ☐ Have curb port/interrupted curb openings been spaced at intervals of at least every 6 feet?
- ☐ Do the curb port/interrupted curb openings have a width of at least 11 inches?
- ☐ Does 15% or more of the curb length consist of open ports and does each port discharge no more than 10% of the flow?
- ☐ Have energy dissipaters (such as a riprap pad) been used if a sudden slope drop occurs?
- ☐ Has access been provided at the upper edge of filter strip for mowing equipment and to enable maintenance of spreader?
- ☐ Is the design water depth 1 inch or less?
- ☐ Does the design velocity not exceed 1 foot per second?
- ☐ If the organic content of the filter strip soil does not exceed 10%, has the soil been amended with at least 2 inches of well-rotted acceptable compost at a depth of 6 inches?
- ☐ Is filter strip uniformly graded and densely vegetated with erosion-resistant grasses (preferably native or adapted species)?
- ☐ Has irrigation been provided to establish grasses?
- ☐ Have maintenance arrangements been made to maintain grass at a height of 2 to 4 inches?
- ☐ Have trees and shrubs been limited along the filter strip?
- ☐ Has an effort been made to ensure that no treated wood or galvanized metal is used anywhere within the design?

BIO-6 Green Roof Checklist

- ☐ Is the roof shallow enough to support a green roof (<25% slope)?
- ☐ Are the roof supports sufficient to support additional weight of soil, water, vegetation, and a drainage layer (if needed) [a licensed structural engineer should be consulted]?
- ☐ Has an appropriate waterproof membrane been placed below the green roof?
- ☐ Has an appropriate drainage layer been incorporated in the design (if required)?
- ☐ Has an appropriate soil mix been used in the design to allow for drainage, support vegetative growth, and that is not excessively heavy when wet?
- ☐ Has vegetation been carefully selected to improve aesthetics, resist erosion, withstand extreme environments, and tolerate drought without the need for fertilizers and pesticides and without a lot of maintenance requirements (see Appendix H for a recommended plant list)?
- ☐ Have native plants been chosen to the maximum extent practical?
- ☐ If trees or shrubs are incorporated, has an adequate soil depth been provided and is the additional soil depth supported by the roof structure?
- ☐ Has irrigation been provided to establish vegetation?
- ☐ Does vegetation cover 90% of the total area?
- ☐ Is the green roof located in an area without excessive shade to avoid poor vegetative growth?
- ☐ Is there an appropriate drain pipe or gutter to convey any runoff from roof to a stormwater BMP or stormwater conveyance system?

FILT-1 Sand Filter Checklist

☐ Has sand filter been located away from trees and areas that could contribute eroded sediment?

☐ If there is a chance for sediment to be present in flow to be treated, has pretreatment been provided?

☐ Does site have adequate relief to permit vertical percolation through sand filter and into conveyance system?

☐ Has pretreatment (vegetated swale or filter strip, hydrodynamic separator) been adequately provided to reduce the sediment load entering the filter?

☐ Has the sand filter been sized to capture the SQDV?

☐ Has the sand filter been designed with a 1.5:1 length to width ratio or greater?

☐ Is the filter bed depth at least 2 feet (3 feet preferred)?

☐ Is the depth of water storage over the filter bed 6 feet or less?

☐ Is the overflow structure designed to pass the water quality design storm?

☐ Has the sizing of the filter been determined using the adapted Darcy's Law equation recommended in the sizing methodology section in Chapter 6 (also see worksheet, Appendix E)?

☐ Does the sand meet the recommended specifications (0.2-0.35 mm diameter, Cu < 3, ASTM C 33 size gradation, etc.)?

☐ Has an underdrain been employed in the design? [Examples: central underdrain w/lateral pipes, longitudinal pipes, single pipe for small filters]

☐ Is the underdrain placed in an 8 inch minimum gravel backfill or drain rock bed?

☐ Are all underdrain pipes and connectors 6 inches or greater with clean-out risers of equal diameter?

☐ Have clean-out risers been placed at the terminal ends of all pipes and extend to the surface of the filter?

☐ Has a valve box been provided for access to the clean-outs and is it water tight?

☐ Are underdrain pipes laid with perforations downward, and are perforations at least ½ inch in diameter?

- ☐ Are all lateral collection pipes within 9 feet or less of each other (perpendicular distance)?
- ☐ Have all pipes been placed with a minimum slope of 0.5%?
- ☐ Is the invert of the underdrain outlet above the seasonal high groundwater level?
- ☐ Is gravel backfill present around the underdrain pipe at least 6 inches below and to the sides of the pipe and 8 inches above the pipe?
- ☐ Does the bottom gravel have a diameter of at least 2 times the size of the perforated openings to the drainage system and meet other specifications (specific gravity of 2.5 or more, rounded, free of debris)?
- ☐ Has an appropriate geotextile layer (see underdrain section) or 2-inch transition layer been placed between the sand layer and the drain rock/ gravel backfill layer?
- ☐ Has a flow spreader been installed at the inlet along one side of the filter (long side of the filter if L: W is 2:1 or greater; 20% of perimeter for curved or irregular shape)?
- ☐ Has erosion protection been provided along the first foot of the sand bed adjacent to the flow spreader (i.e. geotextile weighted with sand bags; quarry spalls)?
- ☐ Has no topsoil, clay, or sod (except sod grown in sand) has been added to the sand filter bed?
- ☐ Has vegetation been selected properly (i.e. must withstand drought, heavy saturation, etc.)?
- ☐ Are no permanent structures built on top of the sand filter bed?
- ☐ No large shrubs or trees should be planted in sand filter bed or within 15 feet of inlet or outlet pipes
- ☐ Have native plants been used to the maximum extent practicable?
- ☐ Has an emergency overflow structure been provided?
- ☐ Are interior side slopes above water quality design depth no steeper than 3:1 H:V?
- ☐ Are exterior side slopes no steeper than 2:1 H:V?
- ☐ If pond walls are vertical retaining walls, do they meet recommended specifications (see side slopes section)?

- ☐ Do embankments meet appropriate criteria [top width or 20 feet, constructed on native consolidated soil, in accordance with standard specifications, proper excavation, constructed of appropriate compacted soil]?
- ☐ Are maintenance access roads/ramps to filter provided?
- ☐ Have trees and shrubs been planted further than 10 feet away from inlet and outlet pipes (50 feet for 'water-seeking' plants such as willows and poplars)?
- ☐ Have prohibited non-native plants been removed from the site?
- ☐ Has an effort been made to ensure that no treated wood or galvanized metal is used anywhere within the planter box design?

FILT-2 Cartridge Media Filter

- ☐ Has the vendor been contacted for the latest design guidance on cartridge selection?
- ☐ Has the cartridge media filter been provided with a system to completely drain the system and prevent vector annoyances?
- ☐ Has the cartridge media filter been sized to capture and treat the SQDF?
- ☐ Have site considerations been taken into account when sizing the cartridge media filter and selecting features (often vendor websites offer assistance with this)?

INF-1 Infiltration Trench Checklist

- ☐ Has the infiltration trench been located away from steep slopes (>25%)?
- ☐ Is the infiltration trench set back from structures and leach fields?
- ☐ Is there at least 10 feet or vertical separation between the bottom of the infiltration trench and the shallow groundwater table?
- ☐ Is the depth to bedrock adequate to provide proper infiltration?
- ☐ Has the site been checked to ensure that no preexisting contamination is present?
- ☐ Does the site have low sediment loading rates to prevent infiltration trench clogging?
- ☐ Has a soil assessment report been completed, which determines the suitability of the site for an infiltration trench, recommends a design infiltration rate, identifies the high depth to groundwater table surface elevation, and examines how the stormwater runoff will move in the soil?
- ☐ Has a geotechnical investigation and report been provided if needed?
- ☐ Has the infiltration trench been located at a site that does not receive run off from sites that store or use chemicals or hazardous waste outside?
- ☐ Has the infiltration trench been set back from existing septic system drain fields and drinking water wells?
- ☐ Has pretreatment been provided with a vegetated swale, filter strip, sand filter or proprietary device?
- ☐ Is the trench at least 2 feet wide and 3 to 5 feet deep?
- ☐ Is the longitudinal slope of the trench 3% or less?
- ☐ Is the top layer of the media filter gravel/choking stone/geotextile fabric if flow is sheet flow and 12 inches of surface soil if flow enters through an underground pipe?
- ☐ Is middle layer of media filter 3-5 feet of washed 1.5 to 3 in. gravel with void space of 30 to 40%?
- ☐ Is bottom layer of media filter 6” of clean, washed sand?
- ☐ Have one or more observation wells been installed?

- ☐ Do observation wells consist of recommended slotted 4-6 inch diameter PVC well screen capped with lockable, above-ground lid?
- ☐ Has the infiltration trench been sized to capture and infiltrate the SUSMP defined water quality design volume?
- ☐ Has the infiltration trench been designed to infiltrate all runoff within 72 hours?
- ☐ Has the maximum depth of runoff, ponding depth/trench depth and infiltrating surface area been calculated using recommended design equations (see sizing methodology section/worksheet)?
- ☐ Is the bottom of the infiltration bed native soil, over-excavated to at least one foot in depth and replaced uniformly (with 2-4 inches of coarse sand amendments) without compaction?
- ☐ Has all vertical piping been classified correctly (see drainage section in manual)?
- ☐ Has an observation well been incorporated into the design to ensure that the 72 hour maximum drawdown time is met?
- ☐ Has an overflow route been provided to safely convey flows that overtop the facility or in the case that the facility becomes clogged?
- ☐ Has the overflow channel been designed to safely convey flows from peak design storm to a downstream conveyance system or acceptable discharge point?
- ☐ Has the infiltration trench been kept free of vegetation, and is all existing vegetation surrounding the trench been planted away from trench to avoid drip lines overhanging the facility?
- ☐ Is there safe maintenance access provided to the site for both wet and dry conditions?
- ☐ Has an access road along the length of the trench been provided if there is no existing road or parking lot that can be used for maintenance access?
- ☐ Has access to "operate a backhoe at 'arms length'" been provided?
- ☐ Was the entire area draining to the facility stabilized before construction began?
- ☐ Have you ensured that the infiltration trench is not hydraulically connected to the storm water conveyance system?

- ☐ If heavy construction material was used to compact subgrade (not recommended), has the infiltrative capacity of the soil been restored via tilling or aerating prior to placing the infiltration bed?
- ☐ Were the exposed subgrade soils inspected by a civil engineer prior to construction to confirm suitable soil conditions for the infiltration facility?

INF-2 Drywell Checklist

- ☐ Has the drywell been located away from steep slopes (>25%)?
- ☐ Is the drywell set back from structures and leach fields?
- ☐ Is there at least 10 feet or vertical separation between the bottom of the drywell and the shallow groundwater table?
- ☐ Is the depth to bedrock adequate to provide proper infiltration?
- ☐ Has the site been checked to ensure that no preexisting contamination is present?
- ☐ Does the site have low sediment loading rates to prevent drywell from clogging?
- ☐ Has pretreatment been provided for all non-rooftop runoff flowing to the drywell?
- ☐ Has a geotechnical investigation and report been provided to ensure site meets specifications for an infiltration facility (including soil infiltration rate, groundwater separation, and no steep slopes)?
- ☐ Has a soil assessment report been completed, which determines the suitability of the site for an drywell, recommends a design infiltration rate, identifies the high depth to groundwater table surface elevation, and examines how the stormwater runoff will move in the soil?
- ☐ Has the drywell been located at a site that does not receive run off from sites that store or use chemicals or hazardous waste outside?
- ☐ Has the drywell been set back from existing septic system drain fields and drinking water wells?
- ☐ Has pretreatment been provided to prevent sediment and other large particulates?
- ☐ Is the surface area of the drywell large enough to infiltrate the storage volume in 72 hours based on maximum allowable depth?
- ☐ Is the top layer of the media filter gravel/choking stone/geotextile fabric if flow is sheet flow and 12 inches of surface soil if flow enters through an underground pipe (pipe should be fitted with a screen)?
- ☐ Is middle layer of media filter 3-5 feet of washed 1.5 to 3 in. gravel with void space of 30 to 40%?
- ☐ Is bottom layer of media filter 6" of clean, washed sand?

- ☐ Have one or more observation wells been installed?
- ☐ Do observation wells consist of recommended slotted 4-6 inch diameter PVC well screen capped with lockable, above-ground lid?
- ☐ Has the drywell been sized to capture and infiltrate the SUSMP defined water quality design volume?
- ☐ Has the drywell been designed to infiltrate all runoff within 72 hours?
- ☐ Has a long term percolation rate of 10% of the measured percolation rate been used in design (due to occlusion and particulate accumulation)?
- ☐ Has the maximum depth of runoff, ponding depth/trench depth and infiltrating surface area been calculated using recommended design equations (see sizing methodology section/worksheet)?
- ☐ Is the bottom of the infiltration bed native soil, over-excavated to at least one foot in depth and replaced uniformly (with 2-4 inches of coarse sand amendments) without compaction?
- ☐ Has all vertical piping been classified correctly (see drainage section in manual)?
- ☐ Has an observation well been incorporated to ensure that the 72 hour maximum drawdown time is met?
- ☐ Has an overflow route been provided to safely convey flows that overtop the facility or in the case that the facility becomes clogged?
- ☐ Has the overflow channel been designed to safely convey flows from peak design storm to a downstream conveyance system or acceptable discharge point?
- ☐ Has the drywell been kept free of vegetation, and is all existing vegetation surrounding the trench been planted away from trench to avoid drip lines overhanging the facility?
- ☐ Is there safe maintenance access provided to the site for both wet and dry conditions?
- ☐ Has maintenance access been provided?
- ☐ Was the entire area draining to the facility stabilized before construction began?
- ☐ Have you ensured that the infiltration trench is not hydraulically connected to the storm water system?

☐ If heavy construction material was used to compact subgrade (not recommended), has the infiltrative capacity of the soil been restored via tilling or aerating prior to placing the infiltration bed?

☐ Were the exposed subgrade soils inspected by a civil engineer prior to construction to confirm suitable soil conditions for the infiltration facility?

INF-3 Proprietary Infiltration BMPs Checklist

- ☐ Has the infiltration facility been located away from steep slopes (>25%)?
- ☐ Is the infiltration facility set back from structures and leach fields?
- ☐ Is there at least 10 feet or vertical separation between the bottom of the infiltration facility and the shallow groundwater table?
- ☐ Is the depth to bedrock adequate to provide proper infiltration?
- ☐ Has the site been checked to ensure that no preexisting contamination is present?
- ☐ Does the site have low sediment loading rates to prevent infiltration facility clogging?
- ☐ Has pretreatment been provided to prevent premature failure (If infiltration facility fails, complete construction is required)?
- ☐ Has infiltration facility been designed to receive runoff only from sections of the site that have been stabilized?
- ☐ If infiltration facility fails, complete construction is required
- ☐ Has a geotechnical investigation and report been provided to ensure site meets specifications for an infiltration facility (including soil infiltration rate, groundwater separation, and no steep slopes)?
- ☐ Has a soil assessment report been completed, which determines the suitability of the site for an infiltration trench, recommends a design infiltration rate, identifies the high depth to groundwater table surface elevation, and examines how the stormwater runoff will move in the soil?
- ☐ Has the infiltration trench been located at a site that does not receive run off from sites that store or use chemicals or hazardous waste outside?
- ☐ Has the infiltration BMP been sized to capture and treat the water quality design volume?
- ☐ Has a long term percolation rate of 10% of the measured percolation rate been used in design (due to occlusion and particulate accumulation)?
- ☐ Have the recommended sizing guidelines set by the vendor been referenced and used for selection and use of infiltration facility?

INF-4 Permeable Pavement Checklist

- ☐ Has the permeable pavement been located away from steep slopes (>25%)?
- ☐ Is the permeable pavement set back from structures and leach fields?
- ☐ Is there at least 10 feet or vertical separation between the bottom of the permeable pavement and the shallow groundwater table?
- ☐ Is the depth to bedrock adequate to provide proper infiltration?
- ☐ Has the site been checked to ensure that no preexisting contamination is present?
- ☐ Does the site have low sediment loading rates to prevent infiltration trench clogging?
- ☐ Has the permeable pavement been designed to receive runoff only from sections of the site that have been stabilized?
- ☐ Has a geotechnical investigation and report been provided to ensure site meets specifications for an infiltration facility (including soil infiltration rate, groundwater separation, and no steep slopes)?
- ☐ Has a soil assessment report been completed, which determines the suitability of the site for an infiltration trench, recommends a design infiltration rate, identifies the high depth to groundwater table surface elevation, and examines how the stormwater runoff will move in the soil?
- ☐ Has the permeable pavement been located at a site that does not receive run off from sites that store or use chemicals or hazardous waste outside?
- ☐ Has the run off been assessed for necessity of pretreatment?
- ☐ If pretreatment is required, has it been provided to treat run on before it reaches permeable pavement?
- ☐ Has the infiltration BMP been sized to capture and treat the water quality design volume?
- ☐ Have the infiltration capabilities of the site been assessed (i.e. full, partial, or no infiltration allowed)?
- ☐ If no infiltration is allowed, has an underdrain been prohibited?

- ☐ If permeable pavement is located on a site with a slope greater than 2%, has the area been terraced to prevent lateral flow through subsurface?
- ☐ Has the permeable pavement been designed to infiltrate flows through four different layers (incl. top wearing layer, stone reservoir, and transition layers) of material (or through a similar system)?
- ☐ Has the depth of each layer (and void space), along with the hydrology, hydraulics, and structural requirements of the site been determined and approved by a licensed civil engineer?
- ☐ If proprietary permeable pavement is used (i.e. concrete or other pavers), have the design requirements and installation steps been obtained from the vendor and referenced in the selection and construction of the permeable pavement?
- ☐ Has the permeable pavement been designed to drain in less than 72 hours and allowed to dry out periodically?
- ☐ Has a long term percolation rate of 10% of the measured percolation rate been used in design (due to occlusion and particulate accumulation)?
- ☐ Has an overflow mechanism been included in the pavement design?
- ☐ If the overflow mechanism employed is perimeter control, have controls such as a perimeter vegetated swale, perimeter Bioretention, storm drain inlets, or other acceptable control been implemented?
- ☐ If the overflow mechanism employed are overflow pipes, have the pipes been connected to the underdrain, are they located away from vehicular traffic, and is the top of the pipe fitted with a screen?
- ☐ Has the pavement been laid close to level with bottom of base layers level to ensure uniform infiltration?
- ☐ Are site materials stored away from permeable pavement?
- ☐ Has landscaping and stabilization of adjacent areas been completed before installation of pavement?

GS-1 Hydrodynamic Separation Device Checklist

- ☐ Has the vendor been contacted for the latest model and design guidance prior to selection of device?
- ☐ Has the device been sized to capture and treat the water quality design flow rate?
- ☐ Has the vendor been contacted for sizing and installation guidance?
- ☐ Has periodic maintenance been scheduled and budgeted for?

GS-2 Catch Basin Insert Checklist

- ☐ Has the vendor been contacted for the latest model and design guidance prior to selection of device?
- ☐ Has the insert been sized to capture and treat the water quality design flow rate?
- ☐ Has the vendor been contacted for sizing and installation guidance?
- ☐ Has periodic maintenance been scheduled and budgeted for?

APPENDIX H : STORMWATER CONTROL MEASURE ACCESS AND MAINTENANCE AGREEMENTS

(Long Form)

Recorded at the request of:

City of ____

After recording, return to:

City of ____

City Clerk

Stormwater Treatment Device Access and Maintenance Agreement

OWNER:

PROPERTY ADDRESS:____

APN:

THIS AGREEMENT is made and entered into in____________________, California, this___day of_________________, by and between_________________ ______________________, hereinafter referred to as "Owner" and the CITY OF____ ____________________, a municipal corporation, located in the County of Ventura, State of California hereinafter referred to as "CITY";

WHEREAS, the Owner owns real property ("Property") in the City of __________, County of Ventura, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of which exhibits is attached hereto and incorporated herein by this reference;

WHEREAS, at the time of initial approval of development project known as____ ____within the Property described herein, the City required the project to employ on-site control measures to minimize pollutants in urban runoff;

WHEREAS, the Owner has chosen to install a ______________________________ ____, hereinafter referred to as "Device", as the on-site control measure to minimize pollutants in urban runoff;

WHEREAS, said Device has been installed in accordance with plans and specifications accepted by the City;

WHEREAS, said Device, with installation on private property and draining only private property, is a private facility with all maintenance or replacement, therefore, the sole responsibility of the Owner in accordance with the terms of this Agreement;

WHEREAS, the Owner is aware that periodic and continuous maintenance, including, but not necessarily limited to, filter material replacement and sediment removal, is required to assure peak performance of Device and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining to confined space and waste disposal methods, in effect at the time such maintenance occurs;

NOW THEREFORE, it is mutually stipulated and agreed as follows:

1) Owner hereby provides the City of City's designee complete access, of any duration, to the Device and its immediate vicinity at any time, upon reasonable notice, or in the event of emergency, as determined by City's Director of Public Works no advance notice, for the purpose of inspection, sampling, testing of the Device, and in case of emergency, to undertake all necessary repairs or other preventative measures at owner's expense as provided in paragraph 3 below. City shall make every effort at all times to minimize or avoid interference with Owner's use of the Property.

2) Owner shall use its best efforts diligently to maintain the Device in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of material(s) from the Device and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the City, the Owner shall provide the City with documentation identifying the material(s) removed, the quantity, and disposal destination.

3) In the event Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, within five (5) days of being given written notice by the City, the City is hereby authorized to cause any maintenance necessary to be done and charge the entire cost and expense to the Owner or Owner's successors or assigns, including administrative costs, attorneys fees and interest thereon at the maximum rate authorized by the Civil Code from the date of the notice of expense until paid in full.

4) The City may require the owner to post security in form and for a time period satisfactory to the city of guarantee of the performance of the obligations stated herein. Should the Owner fail to perform the obligations under the Agreement, the City may, in the case of a cash bond, act for the Owner using the proceeds from it, or in the case of a surety bond, require the sureties to perform the obligations of the Agreement. As an additional remedy, the Director may withdraw any previous stormwater related approval with respect to the

property on which a Device has been installed until such time as Owner repays to City it's reasonable costs incurred in accordance with paragraph 3 above.

5) This agreement shall be recorded in the Office of the Recorder of Ventura County, California, at the expense of the Owner and shall constitute notice to all successors and assigns of the title to said Property of the obligation herein set forth, and also a lien in such amount as will fully reimburse the City, including interest as herein above set forth, subject to foreclosure in event of default in payment.

6) In event of legal action occasioned by any default or action of the Owner, or its successors or assigns, then the Owner and its successors or assigns agree(s) to pay all costs incurred by the City in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.

7) It is the intent of the parties hereto that burdens and benefits herein undertaken shall constitute covenants that run with said Property and constitute a lien there against.

8) The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an interest in all or part of the Property. Owner shall provide a copy of such notice to the City at the same time such notice is provided to the successor.

9) Time is of the essence in the performance of this Agreement.

10) Any notice to a party required or called for in this Agreement shall be served in person, or by deposit in the U.S. Mail, first class postage prepaid, to the address set forth below. Notice(s) shall be deemed effective upon receipt, or seventy-two (72) hours after deposit in the U.S. Mail, whichever is earlier. A party may change a notice address only by providing written notice thereof to the other party.

IF TO CITY:	IF TO OWNER:
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________

IN WITNESS THEREOF, the parties hereto have affixed their signatures as of the date first written above.

APPROVED AS TO FORM:

____

City Attorney

OWNER:

____

Owner

Name: ________________________

Title: ________________________

CITY OF__________________:

____

Name:__________________

Title:__________________

OWNER:

____

Name:_________________________

Title:_________________________

ATTEST:

____

City Clerk   Date

Notaries on Following Page

EXHIBIT A

(Legal Description)

EXHIBIT B

(Map/illustration)

(Short Form)

Recorded at the request of and mail to:

____

____

____

Covenant and Agreement Regarding

Stormwater Treatment Device Maintenance

The undersigned hereby certify that we are the owners of hereinafter legally described real property located in the City of ________________________, County of Ventura, State of California.

Legal Description: ____

____

as recorded in Book ____________________, Page________, Records of Ventura County,

which property is located and known as **(Address):** ____________________________

____.

And in consideration of the City of ____________ allowing________________________

____

on said property, we do hereby covenant and agree to and with said City to maintain according to the Maintenance Plan (Attachment 1), all structural stormwater treatment devices including the following:

____

____.

This Covenant and Agreement shall run all of the above described land and shall be binding upon ourselves, and future owners, encumbrances, their successors, heirs, or assignees and shall continue in effect until released by the authority of the City upon submittal of request, applicable fees, and evidence that this Covenant and Agreement is no longer required by law.

NOTARIES ON FOLLOWING PAGE

APPENDIX I : STORMWATER CONTROL MEASURE MAINTENANCE PLAN GUIDELINES AND CHECKLISTS

Included in this appendix are a series of checklists that can be used by both inspectors and maintenance personnel to ensure that observed deficiencies in BMPs are maintained appropriately. The BMP Inspection/Maintenance Checklists are presented in the following order:

1) Bioretention/Planter Box

25) Vegetated Swale Filter

26) Vegetated Filter Strip

27) Sand Filter

28) Infiltration BMPs

29) Permeable Pavement

30) Constructed Treatment Wetland

31) Wet Retention Basin

32) Dry Extended Detention Basin

33) Proprietary Devices

I.1 Bioretention/Planter Box Inspection and Maintenance Checklist

Date: ______________________ Work Order # __________

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: _____________________ Inspector(s): _________________

Defect	Conditions When Maintenance Is Needed	Inspection Result (0, 1, or 2)†	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue
Appearance	Untidy			
Trash and Debris Accumulation	Trash, plant litter and dead leaves accumulated on surface.			
Vegetation	Unhealthy plants and appearance.			
Irrigation	Functioning incorrectly (if applicable).			
Inlet	Inlet pipe blocked or impeded.			
Splash Blocks	Blocks or pads correctly positioned to prevent erosion.			
Overflow	Overflow pipe blocked or broken.			
Filter media	Infiltration design rate is met (e.g., drains 36-48 hours after moderate - large storm event).			

†Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.

I.2 Vegetated Swale Filter Inspection and Maintenance Checklist

Date: ____________________ Work Order # ________________

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: ____________________ Inspector(s): ________________

Defect	Conditions When Maintenance Is Needed	Inspection Result (0, 1, or 2)†	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue
Appearance	Untidy			
Trash and Debris Accumulation	Trash and debris accumulated in the swale.			
Vegetation	When the grass becomes excessively tall (greater than 10-inches); when nuisance weeds and other vegetation start to take over.			
Excessive Shading	Vegetation growth is poor because sunlight does not reach swale. Evaluate vegetation suitability.			
Poor Vegetation Coverage	When vegetation is sparse or bare or eroded patches occur in more than 10% of the swale bottom. Evaluate vegetation suitability.			
Sediment Accumulation	Sediment depth exceeds 2 inches or covers more than 10% of design area.			
Standing Water	When water stands in the swale between storms and does not drain freely.			
Flow spreader or Check Dams	Flow spreader or check dams uneven or clogged so that flows are not uniformly distributed through entire swale width.			

Defect	Conditions When Maintenance Is Needed	Inspection Result (0, 1, or 2)†	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue
Constant Baseflow	When small quantities of water continually flow through the swale, even when it has been dry for weeks and an eroded, muddy channel has formed in the swale bottom.			
Inlet/Outlet	Inlet/outlet areas clogged with sediment and/or debris.			
Erosion/ Scouring	Eroded or scoured swale bottom due to flow channelization, or higher flows. Eroded or rilled side slopes.			
	Eroded or undercut inlet/outlet structures			

†Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.

I.3 Vegetated Filter Strip Inspection and Maintenance Checklist

Date: ____________________ Work Order # ________________

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: ____________________ Inspector(s): ________________

Defect	Conditions When Maintenance Is Needed	Inspection Result (0, 1 or 2)†	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue
Appearance	Untidy			
Trash and Debris Accumulation	Trash and debris accumulated on the filter strip.			
Vegetation	When the grass becomes excessively tall (greater than 10-inches); when nuisance weeds and other vegetation starts to take over.			
Excessive Shading	Grass growth is poor because sunlight does not reach swale. Evaluate grass species suitability.			
Poor Vegetation Coverage	When grass is sparse or bare or eroded patches occur in more than 10% of the swale bottom. Evaluate grass species suitability.			
Erosion/Scouring	Eroded or scoured areas due to flow channelization, or higher flows.			
Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.			
Flow spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire filter width.			

†Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.

I.4 Sand Filter Inspection and Maintenance Checklist

Date: ______________________ Work Order # ________________

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: ______________________ Inspector(s): ________________

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Trash & Debris	Any trash and debris which exceed 5 cubic feet per 1,000 square feet of filter bed area (one standard garbage can). In general, there shall be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.			
Inlet erosion	Visible evident of erosion occurring near flow spreader outlets.			
Slow drain time	Standing water long after storm has passed (after 24 to 48 hours) and/or flow through the overflow pipes occurs frequently.			
Concentrated Flow	Flow spreader uneven or clogged so that flows are not uniformly distributed across the sand filter.			
Appearance of poisonous, noxious or nuisance vegetation	Excessive grass and weed growth. Noxious weeds, woody vegetation establishing, Turf growing over rock filter			
Standing Water	Standing water long after storm has passed (after 24 to 48 hours), and/or flow through the overflow pipes occurs frequently.			

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Tear in Filter Fabric	When there is a visible tear or rip in the filter fabric allowing water to bypass the fabric.			
Pipe Settlement	If piping has visibly settled more than 1 inch.			
Filter Media	Drawdown of water through the media takes longer than 1 hour and/or overflow occurs frequently.			
Short Circuiting	Flows do not properly enter filter cartridges.			

†Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.

I.5 Infiltration BMP Inspection and Maintenance Checklist

Date: ____________________ Work Order # ________________

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: ____________________ Inspector(s): ________________

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue
Appearance, vegetative health	Mowing and trimming vegetation is needed to prevent establishment of woody vegetation, and for aesthetic and vector reasons.			
Vegetation	Poisonous or nuisance vegetation or noxious weeds.			
	Excessive loss of turf or ground cover (if applicable).			
Trash & Debris	Trash and debris > 5 cf/1,000 sf (one standard size garbage can).			
Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.			
Erosion	Undercut or eroded areas at inlet or outlet structures.			
Sediment and Debris	Accumulation of sediment, debris, and oil/grease on surface, inflow, outlet or overflow structures.			
Sediment and Debris	Accumulation of sediment and debris, in sediment forebay and pretreatment devices.			
Water drainage rate	Standing water, or by visual inspection of wells (if available), indicates design drain times are not being achieved (i.e., within 72 hours).			

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue
Media clogging surface layer	Lift surface layer (and filter fabric if installed) and check for media clogging with sediment (function may be able to be restored by replacing surface aggregate/filter cloth).			
Media clogging	Lift surface layer (and filter fabric if installed) and check for media clogging with sediment (partial or complete clogging which may require full replacement).			

†Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.

I.6 Permeable Pavement Inspection and Maintenance Checklist

Date: ____________________ Work Order # ________________

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: ____________________ Inspector(s): ________________

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Sediment Accumulation	Sediment is visible			
Missing gravel/sand fill	There are noticeable gaps in between pavers			
Weeds/mosses filling voids	Vegetation is growing in/on permeable pavement			
Trash and Debris Accumulation	Trash and debris accumulated on the permeable pavement.			
Dead or dying vegetation in adjacent landscaping	Vegetation is dead or dying leaving bare soil prone to erosion			
Surface clog	Clogging is evidenced by ponding on the surface			
Overflow clog	Excessive build up of water accompanied by observation of low flow in observation well (connected to underdrain system) If a surface overflow system is used, observation of an obvious clog			
Visual contaminants and pollution	Any visual evidence of oil, gasoline, contaminants or other pollutants.			
Erosion	Tributary area Exhibits signs of erosion Noticeably not completely stabilized			

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Deterioration/ Roughening	Integrity of pavement is compromised (i.e., cracks, depressions, crumbling, etc.)			
Subsurface Clog	Clogging is evidenced by ponding on the surface and is not remedied by addressing surface clogging.			
†Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.				

I.7 Constructed Treatment Wetland Inspection and Maintenance Checklist

Date: ______________________ Work Order # ________________

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: _____________________ Inspector(s): _________________

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Trash & Debris	Any trash and debris which exceed 5 cubic feet per 1,000 sf of basin area (one standard garbage can). In general, there shall be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance. If trash and debris is observed blocking or partially blocking an outlet structure or inhibiting flows between cells, it shall be removed quickly			
Sediment Accumulation	Sediment accumulation in basin bottom that exceeds the depth of sediment zone plus 6 inches in the sediment forebay. If sediment is blocking an inlet or outlet, it shall be removed.			
Erosion	Erosion of basin's side slopes and/or scouring of basin bottom.			
Oil Sheen on Water	Prevalent and visible oil sheen.			

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Noxious Pests	Visual observations or receipt of complaints of numbers of pests that would not be naturally occurring and could pose a threat to human or aquatic health.			
Water Level	First cell empty, doesn't hold water.			
Aesthetics	Minor vegetation removal and thinning. Mowing berms and surroundings			
Noxious Weeds	Any evidence of noxious weeds.			
Tree Growth	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering, do not remove. Dead, diseased, or dying trees shall be removed.			
Settling of Berm	If settlement is apparent. Settling can be an indication of more severe problems with the berm or outlet works. A geotechnical engineer shall be consulted to determine the source of the settlement if the dike/berm is serving as a dam.			
Piping through Berm	Discernable water flow through basin berm. Ongoing erosion with potential for erosion to continue. A licensed geotechnical engineer shall be called in to inspect and evaluate condition and recommend repair of condition.			

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Tree and Large Shrub Growth on Downstream Slope of Embankments	Tree and large shrub growth on downstream slopes of embankments may prevent inspection and provide habitat for burrowing rodents.			
Erosion on Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.			
Gate/Fence Damage	Damage to gate/fence, including missing locks and hinges			
†Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.				

I.8 Wet Retention Basin Inspection and Maintenance Checklist

Date: ______________________________ Work Order # ______________________

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: ____________________________ Inspector(s): _______________________

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Trash & Debris	Any trash and debris which exceed 5 cubic feet per 1,000 sf of basin area (one standard garbage can) or if trash and debris is excessively clogging the outlet structure. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.			
Sediment Accumulation	Sediment accumulation in basin bottom that exceeds the depth of the design sediment zone plus 6 inches, usually in the first cell.			
Erosion	Erosion of basin's side slopes and/or scouring of basin bottom.			
Oil Sheen on Water	Prevalent and visible oil sheen.			
Noxious Pests	Visual observations or receipt of complaints of numbers of pests that would not be naturally occurring and could pose a threat to human or aquatic health.			
Water Level	First cell empty, doesn't hold water.			
Algae Mats	Algae mats over more than 20% of the water surface.			
Aesthetics	Minor vegetation removal and thinning. Mowing berms and surroundings			

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Noxious Weeds	Any evidence of noxious weeds.			
Tree Growth	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering, do not remove. Dead, diseased, or dying trees shall be removed.			
Settling of Berm	If settlement is apparent. Settling can be an indication of more severe problems with the berm or outlet works. A geotechnical engineer shall be consulted to determine the source of the settlement if the dike/berm is serving as a dam.			
Piping through Berm	Discernable water flow through basin berm. Ongoing erosion with potential for erosion to continue. A licensed geotechnical engineer shall be called in to inspect and evaluate condition and recommend repair of condition.			
Tree and Large Shrub Growth on Downstream Slope of Embankments	Tree and large shrub growth on downstream slopes of embankments may prevent inspection and provide habitat for burrowing rodents.			
Erosion on Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.			
Gate/Fence Damage	Damage to gate/fence, including missing locks and hinges			

†Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.

I.9 Dry Extended Detention Basin Inspection and Maintenance Checklist

Date: ______________________ Work Order # ________________

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: _____________________ Inspector(s): ____________

Defect	Conditions When Maintenance Is Needed	Inspection Result (0, 1 or 2)†	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue
General				
Appearance	Untidy, un-mown (if applicable)			
Vegetation	Access problems or hazards; dead or dying trees			
	Poisonous or nuisance vegetation or noxious weeds			
Insects	Insects such as wasps and hornets interfere with maintenance activities.			
Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes			
Trash and Debris	Trash and debris > 5 cf/1,000 sf (one standard size garbage can).			
Pollutants	Any evidence of oil, gasoline, contaminants or other pollutants			
Inlet/Outlet Pipe	Inlet/Outlet pipe clogged with sediment and/or debris. Basin not draining.			
Erosion	Erosion of the basin's side slopes and/or scouring of the basin bottom that exceeds 2-inches, or where continued erosion is prevalent.			

Defect	Conditions When Maintenance Is Needed	Inspection Result (0, 1 or 2)†	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue
Piping	Evidence of or visible water flow through basin berm.			
Settlement of Basin Dike/Berm	Any part of these components that has settled 4-inches or lower than the design elevation, or inspector determines dike/berm is unsound.			
Overflow Spillway	Rock is missing and/or soil is exposed at top of spillway or outside slope.			
Sediment Accumulation in Basin Bottom	Sediment accumulations in basin bottom that exceeds the depth of sediment zone plus 6-inches.			
Tree or shrub growth	Trees > 4 ft in height with potential blockage of inlet, outlet or spillway; or potential future bank stability problems			
Debris Barriers (e.g., Trash Racks)				
Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.			
Damaged/ Missing Bars	Bars are bent out of shape more than 3 inches.			
	Bars are missing or entire barrier missing.			
	Bars are loose and rust is causing 50% deterioration to any part of barrier.			
Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe.			
Fencing				
Missing or broken parts	Any defect in the fence that permits easy entry to a facility.			

Defect	Conditions When Maintenance Is Needed	Inspection Result (0, 1 or 2)†	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue
Erosion	Erosion more than 4 inches high and 12-18 inches wide, creating an opening under the fence.			
Damaged Parts	Damage to gate/fence, posts out of plumb, or rails bent more than 6 inches.			
Deteriorating Paint or Protective Coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.			
Gates				
Damaged or missing member	Missing gate or locking devices, broken or missing hinges, out of plum more than 6 inches and more than 1 foot out of design alignment, or missing stretcher bar, stretcher bands, and ties.			

†Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.

I.10 Proprietary Device Inspection and Maintenance Checklist

Date: ______________________ Work Order # ________________

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: ____________________ Inspector(s): _________________

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Refer to the manufacturer's instructions for maintenance/inspection requirements, below are generic guidelines to supplement manufacturer's recommendations.				
Underground Vault				
Sediment Accumulation on Media	Sediment depth exceeds 0.25-inches.			
Sediment Accumulation in Vault	Sediment depth exceeds 6-inches in first chamber.			
Trash/Debris Accumulation	Trash and debris accumulated on compost filter bed.			
Sediment in Drain Pipes or Cleanouts	When drain pipes, clean-outs, become full with sediment and/or debris.			
Damaged Pipes	Any part of the pipes that are crushed or damaged due to corrosion and/or settlement.			
Access Cover Damaged/Not Working	Cover cannot be opened; one person cannot open the cover using normal lifting pressure, corrosion/deformation of cover.			
Vault Structure Includes Cracks in Wall, Bottom, Damage to	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.			

Defect	Conditions When Maintenance Is Needed	Inspection Result (0,1, or 2) †	Date Maintenance Performed	Comments or Action(s) taken to resolve issue
Frame and/or Top Slab	Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.			
Baffles	Baffles corroding, cracking warping, and/or showing signs of failure as determined by maintenance/inspection person.			
Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, or misaligned.			
Below Ground Cartridge Type				
Filter Media	Drawdown of water through the media takes longer than 1 hour and/or overflow occurs frequently.			
Short Circuiting	Flows do not properly enter filter cartridges.			

†Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.

Walsh, Laurie@Waterboards

From:	Laura Eisenberg <lcoleyeisenberg@ranchomv.com>
Sent:	Friday, September 14, 2012 11:49 AM
To:	Walsh, Laurie@Waterboards
Subject:	Rancho Mission Viejo Comments on Admin Draft Order R9-2012-0011
Attachments:	RMV Comments on Admin Draft Order R9-2012-001.pdf

Dear Ms. Walsh, please find attached for your consideration Rancho Mission Viejo's comments on Admin Draft Order R9-2012-0011. Should you have any questions regarding our comments, please feel free to contact me at (949) 240-3363 Ext 297.

Laura Coley Eisenberg
Vice President, Open Space & Resource Management
Rancho Mission Viejo
(949) 240-3363 Ext 297

RANCHO MISSION VIEJO

September 14, 2012

VIA EMAIL

Ms. Laurie Walsh, Senior Engineer
Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4353

Reference: Tentative Order R9-2012-0011 Administrative Draft

Subject: Rancho Mission Viejo Comments

Dear Ms. Walsh:

Thank you for providing Rancho Mission Viejo (RMV) with the opportunity to review and comment on the referenced Administrative Draft Tentative Order ("Order"). We have participated in the meetings held to date on this Order. The discussions during the Sept 5th public meeting indicate that many provisions of the Order are still evolving, including the provisions specific to Development Planning. We are therefore focusing in this letter on the concept of watershed-scale planning.

In our opinion, the drafting of this Order represents an opportunity for the Regional Board to continue to recognize how the protection of water quality at the watershed scale can provide equal or greater benefits than the protection of water quality at a site-specific scale. The South Orange County municipal storm water permits have, since the first term permit, directed the co-permittees to implement methods of coordinating land use planning at the watershed scale and to address the impacts of development on water resources as early in the planning process as possible. As we have commented on prior orders and we discuss further below, RMV has been working diligently over many years in coordination with the County of Orange ("County") and the state and Federal resources agencies to implement these requirements. The County's approval of the Ranch Plan embodies the results of this process, and exemplifies what can be achieved when the co-permittees and the development community embrace the goals and intent of the water quality regulatory program. Our comments in this letter are intended to insure that the Order continues the Regional Board's recognition of this process as they have done in the current South Orange County MS4 permit.

Background

Over the past several years, RMV in cooperation with the County, U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) has undertaken three coordinated watershed-level planning efforts to determine the future land uses for south Orange County. These planning processes have resulted in approval of the Ranch Plan by the County, the San Juan Watershed/Western San Mateo Watershed Special Area Management Plan (SAMP) by the USACE, the Southern Subregion Habitat Conservation Plan (SSHCP) by USFWS and a Master Streambed Alteration Agreement (MSAA) for the Ranch Plan by CDFG.

Within your jurisdiction and the SSHCP Study Area, 32,818 acres are planned for protection as Habitat Reserve lands and a further 45,524 acres are identified as Supplemental Open Space. 6,928 acres have been identified as Future Development most of which will occur on RMV and 2,545 acres have been identified as Potential Development. Thus, new development within the Regional Board's jurisdiction within south Orange County will be very limited in the future, and significant protection of receiving water bodies within this area has occurred. The extent of protected receiving water bodies is illustrated by the attached SAMP figure titled Aquatic Resource Conservation Areas (Exhibit A).

To support the water quality, geomorphic, and habitat goals of the Ranch Plan, SAMP and SSHCP planning processes, RMV developed a comprehensive Water Quality Management Plan (WQMP) that addresses:

- pollutants and conditions of concern through consideration of the existing hydrologic/geomorphic conditions of the RMV watersheds and sub-watersheds,
- pre- and post project flow duration modeling to address hydromodification, and pollutant loading modeling.

The Conceptual WQMP set the framework for the future levels of WQMP preparation and identified the site design, source control, treatment control, and hydromodification control WQMP elements that will be implemented for each sub-basin within the RMV Ranch Plan. We believe, as do the participating Federal, state and local agencies, that implementation of the Ranch Plan, SSHCP, SAMP and MSAA and the associated Conceptual WQMP is key to protection of water quality and water bodies in the San Juan Creek and San Mateo watersheds.

Comment

RMV has previously submitted comments in support of watershed planning (see for example our letter of comment dated May 14, 2009 which we incorporate herein by reference) that the Regional Board recognized and acknowledged by including language in the current South Orange County Permit that provides for Alternative Compliance for Watershed-Based Planning (see Page 40-41 of Order R9-2009-0002). We respectfully request that the Regional Board continue to define Watershed Planning as an alternative and co-equal approach to the project-specific requirements by inserting the following language into the Section E - Development Planning as follows:

(5) Alternative Compliance for Watershed-Based Planning

Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the Regional Board, such standards shall govern review of projects with respect to Provision E.3. of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in Provision E.3.c. and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration sized for the design capture volume that has not been retained. Where regional LID implementation has been shown to be technically infeasible (per Section E.3.c.(4)(b)) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section E.3.c.(2)(d) and participation in the mitigation program in Section E.3.c.(4)(c).

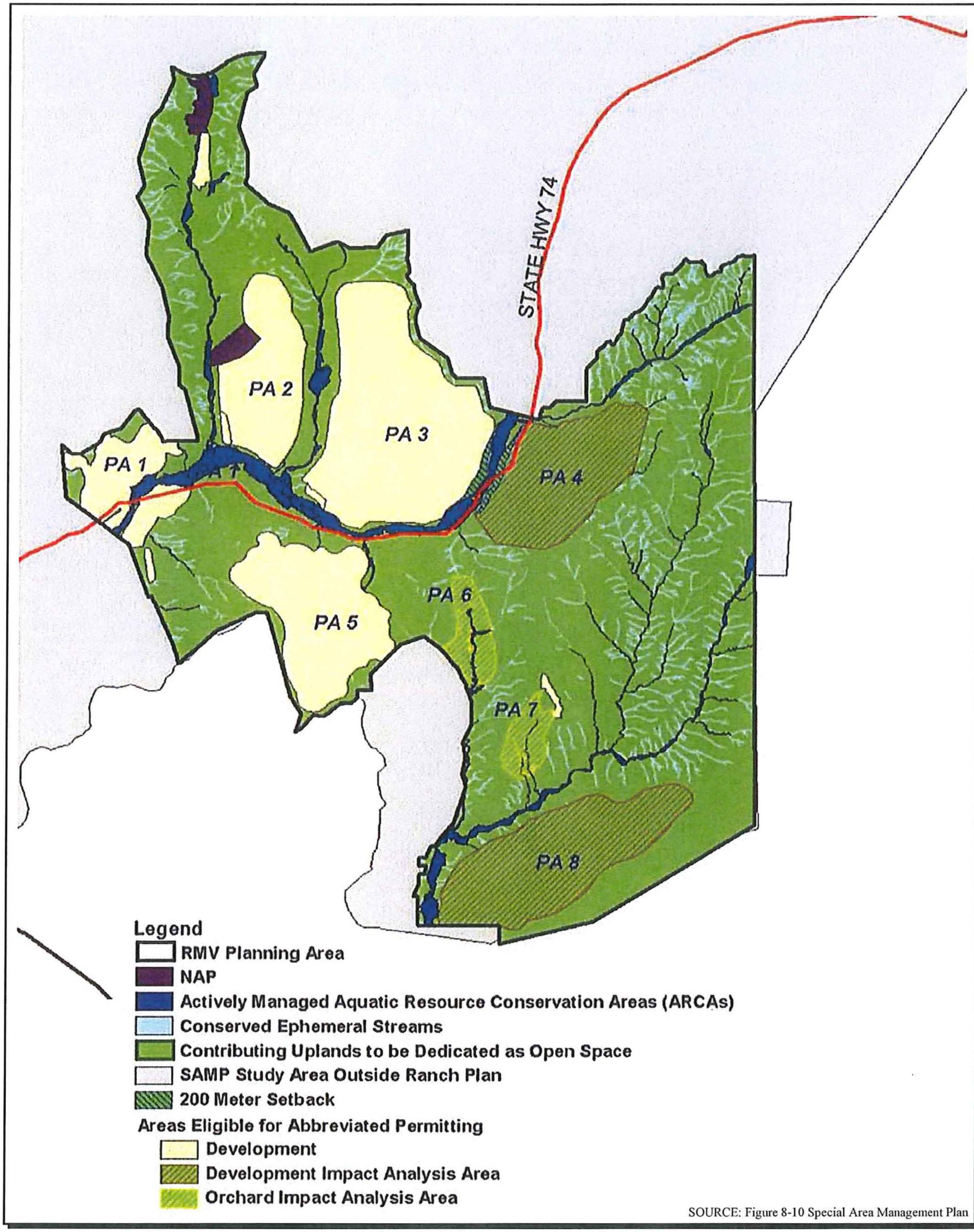
We look forward to working with the Regional Board to further our collective desires to protect water quality through watershed planning. We also wish to indicate our support for the comments submitted by the Building Industry Association of Southern California, Inc. (BIA/SC) and the Construction Industry Coalition on Water Quality (CICWQ).

Should you have questions regarding our comments, please feel free to contact me at (949) 240-3363 or lcoleyeisenberg@ranchomv.com.

Sincerely,

Laura Coley Eisenberg
Vice President, Open Space & Resource Management

Attachment: Exhibit A



SOURCE: Figure 8-10 Special Area Management Plan

Aquatic Resources Conservation Areas

Exhibit A

Walsh, Laurie@Waterboards

From:	McPherson, Sheri <Sheri.McPherson@sdcounty.ca.gov>
Sent:	Friday, September 14, 2012 12:53 PM
To:	Walsh, Laurie@Waterboards; Chiu, Wayne@Waterboards; Becker, Eric@Waterboards; Barker, David@Waterboards
Cc:	Tesoro, Cid; Brownyard, Teresa; Snyder, Todd
Subject:	San Diego Copermittee Comments on Administrative Draft Permit (R9-2012-0011)
Attachments:	CP_Comment_CL_091012.pdf; Final ADTO R9-2012-0011 Redline - SD Copermittees-9-14-2012.docx; Final ADTO R9-2012-0011 Redline - SD Copermittees-9-14-2012.pdf; Final ADTO R9-2012-0011 Clean - SD Copermittees- 9-14-2012.pdf; Final Draft Alt Prov D Rationale 9-14-12.pdf; Final ADTO R9-2012-2011 Comment Table-SD Copermittees- 9-14-2012.pdf

Laurie,

On behalf of the San Diego Copermittees, please find the following attached files for submittal on Administrative Draft MS4 Permit (R9-2012-0011):

- Signed cover letter
- Administrative Draft Permit with redline-strikeout Copermittee changes (MS Word version)
- Administrative Draft Permit with redline-strikeout Copermittee changes (pdf version)
- Administrative Draft Permit with Copermittee changes accepted (pdf version)
- Rationale supporting the proposed Alternate Provision D
- Comments table with explanations of proposed Copermittee changes

We will be delivering a CD of these documents this afternoon along with a hardcopy of the cover letter.

We hope that this will provide basis for continued discussion. Please let me know if you have questions.

Thank you,

Sheri

Sheri McPherson
County of San Diego
Watershed Protection Program
(858) 495-5285
sheri.mcpherson@sdcounty.ca.gov

****As of August 10, 2012 our offices will be relocated to 5510 Overland Avenue, Suite 410, San Diego, CA 92123. All email addresses, phone numbers and fax numbers will remain the same.**

County of San Diego

RICHARD E. CROMPTON
DIRECTOR

DEPARTMENT OF PUBLIC WORKS

5510 OVERLAND AVE, SUITE 410
SAN DIEGO, CALIFORNIA 92123-1295

(858) 694-2212 FAX: (858) 694-3597
Web Site: www.sdcounty.ca.gov/dpw/

September 14, 2012

Ms. Laurie Walsh
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Ms. Walsh:

SAN DIEGO COUNTY COPERMITTEE COMMENT SUBMITTAL ON THE ADMINISTRATIVE DRAFT MUNICIPAL SEPARATE STORM SEWER (MS4) PERMIT (TENTATIVE ORDER NO. R9-2012-0011)

Thank you for the opportunity to comment on the Administrative Draft Municipal Separate Storm Sewer (MS4) Permit that is proposed to cover portions of San Diego County, Orange County, and Riverside County (Tentative Order No. R9-2012-0011). The County of San Diego, as Principal Permittee, submits the attached comments on behalf of the 21 Copermittees subject to Regional Water Quality Control Board (Regional Board) Order 2007-0001, the existing San Diego County MS4 Permit. Our comments reflect a general consensus of the San Diego Copermittees. However, although we have strived to obtain unanimity in our proposed permit revisions, individual Copermittees do sometimes have differing opinions. These will be expressed in separate written comments provided by individual Copermittees.

The San Diego Copermittees commend the Regional Board for expanding public involvement in the development of a revised MS4 permit. We greatly appreciate that staff has provided an early draft for review as well as an opportunity to provide alternative language prior to the formal comment period. The focused meetings held between June and August of 2012 allowed the Copermittees and other stakeholders to share thoughts on how the permit can be structured to most effectively and efficiently improve water quality. We are confident that this will ultimately result in an improved permit for the region. The San Diego Copermittees' recommended edits to the Administrative Draft Permit are attached. The supporting rationale for each is provided in a separate comment table. Most edits are in the form of redline-strikeout changes. However, as discussed during the focused meetings, we have in some cases developed entirely new language for certain permit provisions (Provision D – Water Quality Monitoring & Assessment, and major portions of Provision E – Jurisdictional Runoff Management Programs).

We understand that Regional Board staff will be considering input from a variety of parties, and that the recommendations provided here must be viewed in that overall context. We expect that additional explanation and discussion will be needed to fully understand the Copermittees' specific reasoning for many of these recommended edits. We look forward to continuing dialogue with Regional Board staff and stakeholders while revised Permit language is being drafted.

A few of the key areas of proposed input are highlighted below.

1. **Provision A.** Modifications must be made to Provision A to ensure that implementation of the iterative process continues to serve as the basis for compliance with the MS4 Permit. In light of the recent 9th Circuit Court of Appeals opinion that Receiving Water Limitations are separately enforceable permit provisions, regardless of fulfillment of the iterative process, Copermittees face significant exposure to third party lawsuits in any instance that an MS4 is found to be "causing or contributing to a violation of water quality standards." Such exposure is unreasonable in cases where Copermittees are addressing prioritized issues through a Water Quality Improvement Plan that has been publically vetted and approved by the Regional Board Executive Officer. In recommending changes to Provision A, the San Diego Copermittees are requesting more certainty with regard to what constitutes permit compliance. Although we have provided recommended changes to Provision A language, we request Regional Board staff and counsel to actively participate in the pending statewide dialogue on this important issue. An initial workshop on Receiving Water Limitations language in MS4 permits has been scheduled for November 20, 2012, in Sacramento. The San Diego Copermittees recommend that any precedential language developed as part of this statewide process be incorporated into the proposed permit as soon as possible.

2. **Adaptive Management.** Adaptive management provisions are critical to fostering ongoing program improvement during this and future permit cycles. Suggested edits have been made to clarify and simplify proposed adaptive management provisions. In particular, text has been added to the introductory portion of Provision E stating the conditions under which modifications to baseline jurisdictional requirements can be made. Other suggested language within Section B clarifies how such modifications can be made as part of a Water Quality Improvement Plan.

3. **Numeric Targets and Action Levels.** Regional Board staff indicated during the focused meetings that numeric targets will be required as part of Water Quality Improvement Plans only to guide Copermittee activities, rather than as enforceable permit standards. Similarly, staff indicated that Non-Stormwater Action Levels (NALs) and Stormwater Action Levels (SALs) are intended as tools to support priority-setting and assessment; not as triggers for immediate follow-up action or enforceable permit standards. The Copermittees support this interpretation, and look forward to reviewing modified permit language that supports it.

4. **Water Quality Monitoring.** The San Diego Copermittees were very encouraged to hear at the September 5th workshop that the revised permit will likely feature a monitoring program very similar to the one we proposed at the July 25th Focused Meeting. We very much appreciate staff's openness to considering a more strategic alternative. We believe that these changes will better complement the adaptive management approach supported by the Regional Board, Copermittees, and other stakeholders. As discussed, based on 15-20 years of monitoring experience, the Copermittees have an understanding of receiving water quality issues, and now want to focus on identifying and prioritizing sources and designing special studies to determine how to best implement solutions to address water quality problems.

5. **Development Planning.** Revisions to the Development Planning section are proposed in a number of key areas to clarify these requirements and to allow Copermittees to more efficiently implement programs within their jurisdictions. Key items include: (1) the ability to exempt single family residential and street projects incorporating designated minimum BMPs from Priority Development Project processing requirements, (2) the addition of a second tier standard allowing equal pollutant removal to meet the retention standard prior to requiring mitigation, and (3) clarification of alternative compliance program timing and project types to improve the effectiveness of mitigation programs.

6. **Existing Development.** Significant edits are proposed for this section. First, source inventory requirements are modified to strategically focus Copermittee inspection and oversight resources on the most important industrial, commercial, and municipal sources. Residential sources have also been given their own subsection. These changes maintain the increased emphasis on residential areas contained in the Administrative Draft, but provide the flexibility needed to more efficiently and effectively address them. Finally, Enforcement Response Plan requirements are simplified to eliminate redundancies and to allow Copermittees to best utilize existing approaches and documentation.

Again, the Copermittees thank the Regional Board for creating an open and transparent permit reissuance process and for encouraging public input on this early draft. Please contact Todd Snyder (858) 694-3482 if you have any questions on our suggested changes and to schedule meetings with Copermittee representatives to continue this important dialogue.

Sincerely,

CID TESORO, LUEG Program Manager
Department of Public Works

CT:sm

SAN DIEGO COPERMITTEE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Permit Section	**Permit Page (Original)**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
Cover Page	1-2	Cover Page	The Copermittees request clarification that waste discharge requirements are for their respective jurisdictions, in order to limit the entire permit to within each Copermittee's jurisdictional boundaries and preempt any such clauses that would extend requirements beyond the Copermittee's jurisdiction.	**As shown in the attached revised Permit, revise the cover page as follows:** "The San Diego County Copermittees in Table 1a are subject to waste discharge requirements <u>within their respective jurisdictions</u> set forth in this Order" This change is also requested for other sections of the Permit, including Provision A. Add the same language for Orange and Riverside County Copermittees. **Also make this change to the cover page:** This Order provides permit coverage for the Copermittee discharges described in Table 2. <u>"Copermittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.26(a)(3)(vi).</u>
General Comment	Multiple	Multiple	The term "prohibit" is broader than Clean Water Act requirements, and should be changed to "effectively prohibit." CWA section 402(p) (3) (B) (ii) reads as follows: (B) Municipal Discharge – Permits for discharges from municipal storm sewers – (ii) shall include a requirement to	**Revise language throughout the Permit to read as follows:** Change "prohibit" to "effectively prohibit."

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			effectively prohibit non-stormwater discharges into the storm sewer; (Emphasis added) The provision does not provide any reference to exemptions. Rather the section may be read that a permit shall "effectively prohibit non-stormwater discharges" but may exempt certain discharges that are not significant sources of pollutants from the prohibition. The section does not require a full prohibition but rather an effective prohibition. The operative word is "effective". The more precise and correct finding/provision should note that non-stormwater discharges are effectively prohibited (per 402 (p) (3) (B) (ii)). However discharges that are not significant sources of pollutants are exempted from the prohibition. In a practical sense the use of word "effective" provides flexibility to assess the impacts of relatively benign discharges such as landscape irrigation, air condition condensate, individual car washing, and non-emergency fire fighting flows or non-anthropogenic sources before instituting a prohibition.	
General Comment	Multiple	Multiple	Jurisdictional boundaries only partially define the geographic extent of areas where Copermittees can control, reduce, or prohibit stormwater pollutants. The other component that must be incorporated into the Permit language is	**Clarify/Make distinction between different MS4 classifications:** Throughout the Permit replace "MS4s" with "MS4s owned and operated by the Copermittee".

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			ownership/operation. There can be multiple MS4s within a municipal boundary (e.g., Phase 2 MS4s), and some MS4 areas are neither owned nor operated by Copermittees, preventing them from controlling pollutants or flows. The Permit should clarify that Permit requirements apply to MS4s owned and operated by the Copermittees. Other MS4 permits in California, including the Los Angeles County MS4 permit, include the "owned and operated" distinction.	
I. FINDINGS				
8	2	Jurisdiction	40 CFR 131.10(a) is applicable to waters of the U.S. for beneficial use designations. Application to waters of the state, which the Regional Board has asserted includes the MS4, beyond beneficial use designations is too broad of an interpretation. It could mean that, for example, storm drain inlet drainage inserts are no longer allowed as they would be a TCBMP in a waters of the state. This finding also conflicts with other Provisions requiring TCBMPs.	**As shown in the attached revised Permit, revise the sentence as follows**: Treatment control best management practices (BMPs) must not be constructed in waters of the U.S.
9	2	Discharge Characteristics and Runoff Management	Discharges may contain waste or pollutants, but it should not be presumed that they necessarily always contain waste or pollutants.	**As shown in the attached revised Permit, revise the section to:** "Discharges from the MS4s <u>may</u> contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the state. A discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. Storm water and non-storm water discharges from the MS4s <u>may</u> contain pollutants that cause or threaten to cause a

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				violation of surface water quality standards, as outlined in the Basin Plan."
11	3	Discharge Characteristics and Runoff Management	This finding does not apply to developed area that is subject to SUSMP or HMP requirements. These requirements are specifically designed to reduce loads.	**As shown in the attached revised Permit, revise the section to:** "Therefore, runoff leaving a developed area not subject to SUSMP or HMP requirements contains greater pollutant loads and is significantly greater in runoff volume velocity, and peak flow rate than pre-development runoff from the same area."
II. PROVISIONS				
A. Prohibitions and Limitations				
A	9	Prohibitions and Limitations	The goals of Provision A are multiple, and the Copermittees appreciate the Regional Board's mission to "protect, preserve, enhance, and restore" water quality. For NPDES compliance purposes, however, a concise goal statement that is more central to MS4 permitting is requested. This goal statement provides context to several requested revisions to subsequent provisions. This goal statement is consistent with the intent of the permit program established by Section 402(p)(3)(B) of the Clean Water Act.	**As shown in the attached revised Permit, revise the second sentence of the introductory paragraph of Provision A to:** "The goal of this provision is to ~~protect, preserve, enhance, and restore the~~ address the impacts of MS4 discharges so that such discharges do not impair water quality and designated beneficial uses of waters of the state."
A	9	Prohibitions and Limitations	The proposed Prohibitions and Limitation provisions may be construed as stand-alone provisions that could expose the Copermittees to state and federal enforcement actions, as well as to third party actions under the federal Clean Water Act's citizen suit provisions.	**As shown in the attached revised Permit, insert the following sentence at the end of the introductory paragraph of Provision A:** "The process for determination of compliance with the Discharge Prohibitions (A.1), Receiving Water Limitations (A.2), and Effluent Limitations (A.3) is defined in Provision A.4."

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			Consistent with the recent 9th Circuit Court of Appeal decision, each provision of the permit could be read separately so if provision A.2.a states that "the MS4 must not cause or contribute to a violations of a water quality standard" then that is the stand-alone provision, and the accompanying language found in A.4 (Compliance with Discharge Prohibitions) regarding compliance may be considered irrelevant. As such, a clear linkage between the compliance provisions and the prohibitions, receiving water limitations, and effluent limitations must be established.	In this manner, Provisions A.1, A.2, and A.3 are clearly linked to A.4, as opposed to being standalone provisions.
A.1.a	9	Prohibitions and Limitations	Provision A.1.a prohibits certain discharges into waters of the state. NPDES permits under the authority of the Clean Water Act regulate discharges into navigable (surface) waters. Expanding the scope of the Discharge Prohibitions to waters of the state would expand the scope of the Permit to protect groundwater. While the Board has legal authority to protect groundwater under Porter-Cologne, this exceeds federal requirements and would represent an unfunded mandate. Other MS4 permits in California, including the Los Angeles County MS4 permit, protect "waters of the United States."	Throughout the Permit, change "waters of the state" to "waters of the United States", where applicable. The change for Provision A.1.a is as follows: "…in receiving waters of the United States ~~state~~ are effectively prohibited."
A.1.a	9	Prohibitions and Limitations	The Discharge Prohibitions do not establish a sufficient linkage with	**As shown in the attached revised Permit:**

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			approved compliance schedules for TMDLs that have been incorporated into the Basin Plan. TMDLs adopted within the region include a schedule to provide MS4 Permittees the time necessary to develop and implement a plan to achieve water quality standards in impaired waters. The compliance schedules for effective TMDLs have been incorporated into Attachment E and language is included in the RWLs provisions (A.2.c.) and the Effluent Limitations provisions (A.3.b.) pointing to the TMDL compliance schedules. However, by not including similar language within Discharge Prohibitions, these provisions could result in violations of the permit even though the implementation compliance dates have not yet passed. Without modification, the Discharge Prohibitions *conflict* with TMDL compliance schedules. Language should be included to clarify that in instances where a TMDL is in place, or a TMDL is being developed, the permittees shall achieve compliance with these provisions as outlined in Attachment E (Specific Provisions for Total Maximum Daily Loads).	**Revise A.1.a and A.1.c by adding the following onto the end of the provision:** "…, unless the Copermittee is addressing the discharges through Provision A.1.e or A.4 through the process set forth in Provision A.4." **Add new part 1.e as follows:** "For discharges associated with water body pollutant combinations addressed in a TMDL in Attachment E of this Order, the affected Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions).
A.1.d	9	Discharge Prohibitions	The first sentence seems to conflict with the remainder of the paragraph and may create a conflict with the State Water Board's policy if not clarified. The revised language clarifies authorized and	**As shown in the attached revised Permit, revise A.1.d as follows:** "~~Discharges from MS4s to ASBS are prohibited unless specifically authorized.~~ Stormwater discharges from the City of

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			unauthorized discharges to the ASBS and limits the jurisdiction. Furthermore, this Discharge Prohibition covers MS4 impacts on ASBS, and thus the Receiving Water Limitation is unnecessary and conflicting.	San Diego's MS4 to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's MS4 to the Heisler Park ASBS are authorized under this Order subject to the Special Protections contained in Attachment B to State Water Board Resolution No. 2012-0012 applicable to these discharges, included in Attachment A to this Order. All other discharges from MS4s to ASBS are prohibited, unless authorized by a subsequent order." In addition, A.2.c should be deleted.
A.2.a, A.2.c	9-10	Receiving Water Limitations	Without modification to the RWLs, they conflict with TMDL compliance schedules. Language should be included to clarify that in instances where a TMDL is in place, or a TMDL is being developed, the permittees shall achieve compliance with these provisions as outlined in Attachment E (Specific Provisions for Total Maximum Daily Loads). Without the requested change, the RWLs put the municipalities in immediate and ongoing non-compliance with the permit, as opposed to incorporating TMDL implementation schedules.	**To provide a more direct tie in between Provision A.2.a, TMDL compliance schedules and A.4.a. the following language is proposed, as shown in the attached revised Permit**. **As shown in the attached revised Permit, replace 2.c with**: "For receiving water limitations associated with a water body pollutant combination addressed in a TMDL in Attachment E of this Order, the Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions)." Provision A.2.a should also be revised to make clear that compliance with the Receiving Water Limitations is determined by compliance with the iterative process. However, the Copermittees have not proposed redline language at this time in anticipation of the State Board's forthcoming November workshop on this important issue, which will presumably inform the development of state-wide language. The proposed language in Provision A.1.a provides an example of an approach for addressing this issue in Provision A.2.a. We request that Regional Board staff coordinate with the Copermittees to develop updated RWL language.

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A.2.a.3.b	10	Receiving Water Limitations	The Sediment Quality Control Plan applies specifically to bays and estuaries and only and subtidal surficial sediments that have been deposited or emplaced seaward of the intertidal zone. Many Copermittees do not discharge to the intertidal zone. Text must be revised to clarify that this does not apply to inland MS4 discharges.	**As shown in the attached revised Permit, revise A.2.a.3.b as follows**: "Sediment Quality Control Plan which includes the following narrative objectives <u>for bays and estuaries:"</u>
A.2.a.4.b.	10	Receiving Water Limitations	Footnote to A.2.a.4.b requires Copermittees to not cause or contribute to the more stringent of a water quality objective or a CTR criterion. Instances may exist where it has been determined that one or the other is more appropriate given site specific conditions or analysis (i.e., a TMDL has been established).	**As shown in the attached revised Permit, attach the following to the end of footnote 3**: "<u>unless a previous regulatory action (i.e., TMDL) has specified otherwise</u>."
A.3	11	Effluent Limitations	Two types of effluent limitations, technology-based and water-quality based, are described in A.3, which should be reflected in the Permit.	**As shown in the attached revised Permit, add subsections (a) and (b) for Technology-based and Water Quality-based Effluent Limitations, respectively.**
A.3	11	Effluent Limitations	The effluent limitations and compliance with limitations should be more accurately linked to Attachment E; currently the language reads in a manner that is stand-alone from Attachment E. Instead, the language should reference Attachment E and the compliance determination language the Copermittees propose for inclusion therein. The language should say "as described in" Attachment E rather than "in." In	**As shown in the attached revised Permit, revised the WQBEL language in A.3 as follows to better reflect the role of Attachment E:** "<u>For a water body-pollutant combination addressed in a TMDL in Attachment E of this Order</u>, ~~Pollutants~~ pollutants in discharges from MS4s must be reduced to comply with ~~any~~ effluent limitations expressed as WQBELs required to meet the WLAs established for ~~the~~ <u>those</u> TMDLs <u>as described</u> in <u>Provision A.4</u> and Attachment E to this Order, pursuant to the applicable TMDL compliance schedules."

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			addition, compliance with effluent limitations should be linked to Provision A.4 as described in the next comment.	
A.3	11	Effluent Limitations	Similar to the WQBELs, the technology-based effluent limits should be linked to Provision A.4 as described in the comment below.	**As shown in the attached revised Permit, please add the following language to the end of the sentence that ends with "must be reduced to the MEP" in A.3.a:** "through timely implementation of control measures and other actions as specified in Provisions B and E as described in Provision A.4."
A.4.a.1	11	Compliance with Discharge Prohibition and Receiving Water Limitations Compliance with Discharge Prohibitions, Receiving Water Limitations, <u>and Effluent Limitations</u> (Title Revision)	Provision A.4 describes the iterative process for MS4s to respond to exceedances of water quality standards that persist. However, the language in A.4 appears too broad and suggests the Copermittees should revise their WQIPs even in cases when (1) TMDL pollutant WLAs are exceeded but the TMDL compliance date has not yet occurred and (2) non-TMDL pollutant RWLs are exceeded and the pollutant is a WQIP priority but the BMP implementation schedule described in the WQIP has not yet been exhausted. In these two cases, the water quality standards exceedances are "expected" and no WQIP update is needed; instead the Copermittees should simply complete the implementation of actions identified in the WQIP.	**As shown in the attached revised Permit, insert the following language at the beginning of A.4.a.(1): "**<u>For pollutants that are not in process of being addressed via specific, scheduled actions in the Water Quality Improvement Plan,</u> .." **Insert a new A.4.a.(2) as follows:** "For pollutants in the process of being addressed via a specific, scheduled program in a Water Quality Improvement Plan, the Copermittee(s) shall continue to implement that program as described in the Water Quality Improvement Plan approved by the Regional Board."
A.4.a.1	11	Compliance with Discharge	Provision A.4.a.1 states that in the case of	**As shown in the attached revised Permit, add an exception to Provision A.4.a.(1) to acknowledge forthcoming TMDLs, as follows:**

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		Prohibition and Receiving Water Limitations	persistent water quality standard exceedances, Copermittees shall update their WQIPs in their Annual Reports, "unless the San Diego Water Board directs an earlier submittal." This provision should also consider the scenario where a TMDL is in the process of being developed. In this case, the Copermittees should update their numeric targets/goals to reflect the TMDL WLAs. However, until the TMDL is adopted, the Copermittees have no TMDL WLAs on which to base their numeric goals.	"Copermittees must submit the following updates to the Water Quality Improvement Plan required under Provision B as part of the Annual Report required under Provision F.3.b or Water Quality Improvement Plan update Provision B.5.a, unless the San Diego Water Board either 1) directs an earlier submittal or 2) allows for the adoption of a forthcoming TMDL to establish wasteload allocations that will form the basis of revisions to the Water Quality Improvement Plan:"
A.4.a.1.b	11	Compliance with Discharge Prohibition and Receiving Water Limitations	Language clarification.	**As shown in the attached revised Permit, revise wording, as follows:** "~~Additional w~~ Water quality improvement strategies (e.g., BMPs, retrofitting projects, stream and/or habitat rehabilitation, restoration projects, etc.)"
A.4.a.2	12	Compliance with Discharge Prohibition and Receiving Water Limitations	Copermittees need more than 30 days to update and implement their plans. The San Diego Water Board should also provide a timeline for providing comments and requesting modifications. The timeline should be reasonable and consistent with the Copermittee implementation timeline. Most importantly, the revision process should be identical to the modification and submission process described in Provision B.	**As shown in the attached revised Permit, revise section A.4.a.2., as follows:** Replace the language in sub-bullets (e) and (f) with language that is identical to the language in Provision B, as follows: "As described in Provision B.6, Copermittees must submit requested modifications to the [insert either "Water Quality Improvement Plan" or "jurisdiction runoff management program"] either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b"
A.4.b	12	Compliance with		**To match the language in Order 99-05, as shown in the**

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		Discharge Prohibition and Receiving Water Limitations Compliance with Discharge Prohibitions, Receiving Water Limitations, and Effluent Limitations (Title Revision)	Provision A.4.b notes that should water quality exceedances continue to occur even after the MS4 has engaged in the "iterative" process and is implementing enhanced water quality improvement strategies, the MS4 must still redo the "iterative" process unless the Regional Board decides otherwise. This approach is not consistent with other stormwater permits (e.g., the recent Caltrans permit) in which the Copermittee does not have to reinstitute the iterative process unless directed to do so by the Regional Board. This distinction is important, as the WQIP process will be underway throughout the course of the Permit, and being required to "re-iterate" when a process is already underway to address exceedances is unreasonable.	**attached Revised, replace A.4.b with the following language:** "So long as the Copermittees have complied with the procedures set forth above and are implementing the revised Water Quality Improvement Plans, the Copermittees do not have to repeat the same procedure for continuing or recurring exceedances of the same discharge prohibitions, effluent limitations, and receiving water limitations unless directed to by the San Diego Water Board."
A.4.c	12	Compliance with Discharge Prohibition and Receiving Water Limitations Compliance with Discharge Prohibitions, Receiving Water Limitations, and Effluent Limitations (Title Revision)	The Copermittees envision WQIPs as the foundation for a BMP-based compliance approach for the Discharge Prohibitions and RWLs. However, the language in the Provision A does not clearly link compliance with the iterative process set forth in the WQIPs. In essence, the language suggests that even if Copermittees expend significant resources to develop and fully implement WQIPs that are progressing towards attainment of water quality standards, they may still be found to be out of compliance for single exceedances.	**As shown in the attached revised Permit, modify the opening paragraph to A.4 to reflect the 99-05 order, using the WQIP in place of the SWMP, as follows:** 1. Change the title of the section and first sentence in A.4 to also include effluent limitations (A.3) 2. Add the following language to the end of the paragraph: "The Water Quality Improvement Plans described in Provision B shall be designed to achieve compliance with the discharge prohibitions, receiving water limitations, and effluent limitations. Copermittees shall be considered in compliance with A.1, A.2 and A.3 unless the Regional Board has denied approval of a Water Quality Improvement Plan or subsequent update as described in

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			The iterative process is a fundamental aspect of MS4 programs, as envisioned by State Water Board Order 99-05 and later reconfirmed in Order WQ 2001-15 (BIA Order), and is the mechanism by which MS4 Permittees should demonstrate compliance (i.e., implementation of the iterative process equals compliance). The WQIPs now provide a mechanism to "raise the bar" with regards to the detail and quantitative analyses used to identify pollutant sources, implement BMPs to address those sources, and increase the number or size of BMPs until water quality standards are attained. However, as Provision A.4 is written, the envisioned strategic compliance process falls short, and the WQIPs are simply documents that do not appear to have a meaningful linkage to MS4 compliance. An unintended but potentially significant consequence of this compliance uncertainty is that Copermittees will be faced with increased difficulty successfully securing program funding because even substantial increases in funding would not eliminate the potential for non-compliance.	Provision B and F.1. In addition to the above suggested changes, these changes must be coupled with changes to the Permit which define a Regional Board approval review and process for initial plan submittals and updates. These Regional Board approvals, when provided, will define a clear mechanism for compliance with Provision A.1 and A.3. Note that compliance with Provision A.2 could also follow the same determination process. We request that Regional Board staff coordinate with the Copermittees to develop updated RWL language. However, the Copermittees have not proposed redline language at this time in anticipation of the State Board's forthcoming November workshop on this important issue, which will presumably inform the development of state-wide language. The proposed language in Provision A.4 could easily be expanded to also reference Provision A.2 (RWLs). We request that Regional Board staff coordinate with the Copermittees to develop updated RWL language.
B. Water Quality Improvement Plans				
B	13	Water Quality	Similar to comments regarding the goal	**As shown in the attached revised Permit, revise the second**

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		Improvement Plans	statement in Provision A, the Copermittees request a revision to the WQIP goal statement. A concise goal statement that is more central to MS4 permitting is requested. This goal statement provides context to several requested revisions to subsequent provisions.	**sentence of the first paragraph of Provision B as follows:** "The goal of the Water Quality Improvement Plan is to 1) effectively prohibit non-storm water discharges into the MS4s, 2) reduce pollutants in storm water discharges from the MS4s to the MEP, and 3) support the attainment and reasonable protection, preservation, and enhancement ~~and restoration~~ of water quality and designated beneficial uses of waters of the state."
B	13	Water Quality Improvement Plans	Similarly, the Copermittees request revisions to the required/critical elements of the WQIPs. These elements reflect several requested revisions to the WQIP process (e.g., B.2), described below.	**As shown in the attached revised Permit, revise the second paragraph of Provision B as follows:** The Copermittees must develop Water Quality Improvement Plans for each Watershed Management Area that 1) prioritize water quality ~~issues~~conditions resulting from the Copermittee's MS4 discharges to and from the MS4s within each Watershed Management Area, 2) identify MS4 pollutant sources and other stressors associated with ~~those~~the water quality priorities, 3) define numeric ~~targets~~goals and schedules to ~~achieve improvement of~~address water quality priorities, 4) describe water quality improvement strategies to achieve numeric ~~targets~~goals, and 5) develop and execute a coordinated monitoring and assessment program to facilitate adaptive management of the Water Quality Improvement Plans and ~~determine progress towards achieving improved water quality~~those goals.
B	13	Water Quality Improvement Plans	The Copermittees envision the WQIPs as the foundation for a BMP-based compliance approach for the Discharge Prohibitions and RWLs. However, language needs to be added to Provision B to provide a clear linkage between Provision A and B.	**As shown in the attached revised Permit, insert the following into the first paragraph of Provision B:** Therefore, implementation of the WQIPs also provides the basis for complying with Provisions A.1 and A.3, as described in Provision A.4.

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			Note that Provision A.2 is excluded to acknowledge the State's November workshop regarding Receiving Water Limitations. However, it seems logical that RWLs would be included, and we request that Regional Board staff coordinate with the Copermittees to develop updated RWL language.	
B	13	Water Quality Improvement Plans	It is unclear whether the 12-month timeline identified in the third paragraph of Provision B applies to the development of the WQIP or the implementation of the BMPs identified in the WQIP. It would appear that the provision requires that the MS4s must *implement* all the requirements (including BMPs) of Provision B within 12 months of permit adoption.	**As shown in the attached revised Permit, revise the last introductory paragraph of Provision B, as follows:** The Copermittees must submit Water Quality Improvement Plans for public review and Regional Board Executive Officer review and approval per the schedule outline in Provision B.
B	13	Water Quality Improvement Plans	The development of a WQIP will require at a minimum of 18 months and BMP implementation will likely be staggered over a certain time frame. Once the permit is adopted, Copermittees will begin the planning process. However, Copermittees must have at least one full fiscal year budgeting cycle within which to seek additional funding to implement the WQIP from our governing bodies (i.e., City councils and County supervisors). Thus the more reasonable time schedule is to require the	**See the proposed changes to the last paragraph of the opening section of Provision B in the attached revised Permit.** Also see the new Section B.6, which combines the submittal, modification, and implementation requirements. 1. The complete WQIPs and corresponding jurisdiction measures are submitted within 18 months. (B.6.a) 2. WQIP implementation is initiated at the beginning of the next fiscal year. (B.6.a) 3. JRMPs are modified in accordance with WQIP modifications (B.6.b)

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			development of the WQIP within 18 months and the implementations of the BMPs to occur consistent with the final approved WQIP.	
B.1	13-14	Watershed Management Areas	Several changes to Table B-1 are requested. The Copermittees request addition of a tenth WMA, for Mission Bay which is entirely in the jurisdiction of the City of San Diego. Furthermore, the City of Poway is not a responsible Copermittee for San Diego River. City of Escondido is not a responsible Copermittee for San Luis Rey River. Finally, the waterbody Loma Alta Slough should be listed under the Carlsbad WMA. Penasquitos WMA includes Miramar Reservoir HA and Poway HA.	**Make the following changes to Table B-1, per the attached revised Permit:** 1. Add a WMA for Mission Bay which includes Scripps HA, Miramar HA, and Tecolote HA. 2. Remove Penasquitos HA and Mission Bay HA from Penasquitos WMA and insert Miramar Reservoir HA and Poway HA. 3. Remove City of Poway from San Diego River 4. Remove City of Escondido from San Luis Rey River. 5. Add the waterbody “Loma Alta Slough” to the Carlsbad WMA.
B.2	15-18	Identification of Water Quality Priorities	The Copermittees have fully embraced the concept of WQIPs and appreciate the Regional Board’s approach to identifying priorities, setting goals, and developing a strategy and schedule to meet those goals. The Copermittees have identified an alternative to Provision B.2, which follows the general approach proposed by the Regional Board but increases focus on addressing MS4 impacts.	The following changes are requested, as detailed in the attached revised Permit section B and further described in subsequent comments: 1. Revisions are proposed to section B.2.a to refine the purpose and add considerations for assessing receiving water conditions. 2. A new section B.2.b is proposed to provide a linkage between receiving water conditions and corresponding impacts from the MS4s (versus other sources). 3. Section B.2.c is expanded to describe the considerations when identifying priority receiving water conditions. 4. Section B.2.d is refined to focus on MS4 impacts and pollutant generating activities. 5. Section B.2.e is refined to elucidate the meaning of numeric goals and their implication for MS4 compliance.

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				6. The schedule component of B.2.e is moved to a new section B.6 to improve organization of WQIP concepts.
B.2.a	15-16	Assessment of Receiving Water Conditions	The assessment of receiving water conditions is a critical first step to WQIP development. Changes to purpose of this step are proposed, to focus on water quality issues related to MS4s. Further, data quality and relevance are critical to this assessment, and requirement to consider "all available data" should be refined to address accessibility and quality control issues. Finally, whether a receiving water condition can be achieved and maintained should be assessed.	**As shown in the attached revised Permit, the following changes/revisions were made in Permit section B.2.a:** **Revise the opening paragraph**: "The Copermittees must consider the following, at a minimum, to support the identification of water quality priorities based on the impacts of MS4 discharges on receiving water beneficial uses:" **Under part (7):** replace "All available data" with "Available, relevant, and appropriately collected…data meeting appropriate QA/QC standards" **Insert a new part (10):** "The potential for long-term achievement and maintenance of beneficial use attainment in the Watershed Management Area."
Language Addition B.2.b	16	Assessment of MS4 Discharge Quality and Impacts	For WQIP development, it is critical to differentiate between receiving water conditions and MS4 discharges and impacts. Many receiving water conditions are not driven by MS4 impacts, and Copermittees can have the greatest effect on receiving water quality by focusing on reduction of pollutants discharged by their MS4s.	**As shown in the attached revised Permit, add a new section B.2.b titled "Assessment of MS4 Discharge Quality and Impacts", as follows:** "To support the identification of priorities based on the impacts of MS4 discharges on receiving water beneficial uses, the Copermittees must review appropriately collected MS4 discharge quality data and consider the extent to which MS4s cause or contribute to the adverse impacts to receiving water beneficial uses identified in B.2.a. Considerations include: (1) Locations of the Copermittees' MS4 discharges with respect to receiving waters; (2) MS4 discharge quality results relevant to impacts in receiving waters and action levels, including the temporal and geographic variation of the results:

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				(3) The requirements of Provisions A.1 and A.3.; and (4) Whether MS4 discharge quality is sufficiently well known or other information is available to assess whether MS4 discharges are causing or contributing to specific receiving water conditions, or whether additional data need to be collected through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan.”
B.2.b	16-17	Identify Priority Pollutants and Receiving Water Conditions	We appreciate the Regional Board’s approach to identifying priorities for receiving water conditions. Our proposed revisions to the Permit add several elements that should be included by Copermittees when identifying priority receiving water conditions. Following the Regional Board’s approach, “priorities” are also differentiated from “highest priorities.” Note the proposed revision to the title of the section, which better reflects the envisioned effort/outcome.	Move Provision B.2.b down to B.2.c. **As shown in the attached revised Permit, make two changes:** **#1: Revise the last paragraph of B.2.c as follows:** The Copermittees must identify the highest water quality priorities to be addressed by the Water Quality Improvement Plan, <u>and describe the reasoning for selecting a subset of receiving water conditions as the highest priority(ies).</u> **#2: Rename section to “Identification of Priority Receiving Water Conditions” and add the following to the end of the Section B.2., as follows:** The Water Quality Improvement Plans shall describe the following for the highest priority receiving water condition(s): (1) The beneficial use(s) and pollutant(s) associated with the priority receiving water condition(s); (2) The geographic extent of the priority receiving water condition(s)within the WMA, if known; (3) The Copermittees with MS4s that contribute discharges to the priority water receiving condition(s); (4) The temporal extent of the priority receiving condition(s) (i.e., dry weather and/or wet weather); and

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				(5) Whether receiving waters have been monitored sufficiently to adequately characterize the priority receiving condition(s), including a consideration of spatial and temporal variation”
B.2.c	16-17	Pollutant Source and/or Stressor Identification	The success of WQIPs will hinge on the ability of MS4s to identify and abate sources of pollutants within the MS4s. The pollutant source identification process proposed by the Regional Board is too broad and inhibits the Copermittees from focusing on the sources they are most able to control. In addition, some pollutants are poorly understood and need to be further investigated to allow for design of pollutant control strategies [new sub-bullet d.(4).(5)]. The proposed revisions to the Source ID section are intended to effectively focus the WQIP prioritization process.	**As shown in the attached revised Permit, rename section to “MS4 Pollutant Source Identification” and revise the section, as follows:** See the changes proposed in the attached revised Permit, which focuses the Source ID section on MS4 sources and impacts. **The new section B.2.d follows:** “The Copermittees must identify <u>and prioritize </u>known and suspected storm water and non-storm water pollutant sources within the MS4 associated with the highest priority receiving water conditions identified under B.2.c. The identification of known and suspected sources of the highest water quality priorities as identified for Provision B.2.c shall consider the following : (1) Land uses and their potential contribution to the highest priority receiving water conditions; (2) Pollutant generating facilities, areas, and/or activities within the Watershed Management Area;: (3) Locations of the Copermittees’ MS4s outfalls. (4) Review of available data, including: (a) Findings from the Copermittees’ illicit discharge detection and elimination programs, (b) Findings from the Copermittees’ MS4 outfall monitoring, (c) Other available, relevant, and appropriately-collected data, information, or studies related to

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				pollutant sources and pollutant-generating activities that contribute to the highest priority receiving water conditions identified in Provision B.2. (5) Whether MS4 sources are sufficiently well known to design an effective, directed control strategy, or whether additional source/stressor identification needs to be conducted through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan to identify and prioritize sources/stressors within the watershed.”
B.2.d	17-18	Numeric Targets and Schedules	We appreciate the Board staff efforts to allow the MS4s to prioritize their water quality issues and to develop a plan to address these issues. However, the terminology in Provision B.2.d regarding interim and final targets are terms used in TMDL program and their use here confuses the issue. In fact, Provision 2.d (3)(e) clearly ties the numeric “targets” with a TMDL. The WQIP should identify interim and final numeric “goals” to keep the distinction clear between a TMDL and a WQIP. It is entirely possible that the interim goal may in fact be the same as an interim TMDL target but not necessarily.	**Replace “numeric target” with “numeric goal” throughout Provision B.**
B.2.d	17-18	Numeric Targets and Schedules	It will be critical to quantify the expected outcomes of WQIP implementation efforts, and numeric goals serve to elucidate those expected outcomes. Based on the proposed revisions to the	**As shown in attached revised Permit, revise section B.2.e.(1)-(2), as follows:** The Copermittees must develop and incorporate interim and final numeric goals into the Water Quality Improvement Plans. Numeric goals and schedules are intended to support Water

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			WQIP goals and elements, revisions to the description of the purpose of numeric goals are also proposed. Furthermore the notation of "target" implies a compliance effluent limit and thereby subject to enforcement action, versus goals set by the Copermittees that do not trigger any enforcement action by themselves.	Quality Improvement Plan development and to measure progress towards addressing the highest priority receiving water conditions identified under B.2.b. Numeric goals are not enforceable compliance standards, effluent limitations, or receiving water limitations. When establishing numeric goals and corresponding schedules, the Copermittees must consider the following: (1) Final numeric goals must be based on measureable criteria or indicators, to be achieved in the receiving waters and/or MS4 discharges for the highest priority receiving water conditions which will be capable of demonstrating progress toward the achievement of the restoration and/or protection of water quality standards in receiving waters; and (2) Interim numeric goals must be based on measureable criteria or indicators that can demonstrate incremental progress toward achieving the final numeric goals in the receiving waters and/or MS4 discharges. **Footnote 7:** "Interim and final numeric goals may take a variety of forms such as TMDL targets, TMDL wasteload allocations, TMDL based WQBELs incorporated in Attachment E of this Order, action levels, pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric goals are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators. To the extent that a goal is not based on an enforceable regulatory mechanism (i.e., TMDL, WLA), WQIP goals and schedules may be revised through the iterative process. Numeric goals are not subject to enforcement or non-compliance actions under this Order."

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B.3	18-19	Water Quality Improvement Strategies and Schedules	The current version of B.3 requires that the MS4s have <u>all</u> of the following water quality improvement strategies in their WQIP (sub-bullets B.3.a.1 through B.3.a.4): structural and non-structural BMPs, retrofit projects, stream and/or habitat rehabilitation, and other water quality improvements associated with eliminating non-stormwater discharges to the MS4s. This may be an appropriate menu of actions to choose from, but pending the water quality issues and the watershed, the WQIP strategies may include all or only one of the strategies listed.	**As shown in the revised Permit, revise section B.3, as follows:** See the changes proposed in the attached revised Permit section B.3. Sub-bullets B.3.a.1 through a.4 are revised and condensed into two sub-bullets, one for JRMP activities and one for other structural and non-structural BMPs. The two sub-bullets (1) and (2) compose the universe of BMPs that would be implemented by the Copermittees to meet the WQIP numeric goals. **a. WATER QUALITY IMPROVEMENT STRATEGIES** The water quality improvement strategies must prioritize, based on their likely effectiveness and efficiency, and implement measures, as appropriate, to effectively prohibit non-storm water discharges into its MS4, reduce pollutants in storm water discharges from its MS4 to the MEP, and achieve the interim and final numeric goals in accordance with the schedules in Provision B.2.e. Measures include: (1) Copermittee-selected activities identified in Provision E ,either as described in the jurisdictional runoff management programs or as modified with justification, that will address priority receiving water conditions; and (2) Additional structural and/or non-structural BMPs, as selected by the Copermittee, that are designed to achieve the interim and final numeric goals identified in Provision B.2.e.

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B.3.b	19	Implementation Schedules	The requirement that "Final dates for achieving final numeric targets must not extend more than 10 years..." may be broadly misinterpreted as currently written with major implications. Based on conversations with Regional Board staff, it is understood that goals can take a number of forms and the "10 year" requirement is not intended as a requirement to attain all Basin Plan water quality standards within 10 years. However, to ensure this requirement is not misinterpreted by third parties, language should be added to make this clarification.	**As shown in the attached revised Permit, add a footnote to sub-bullet (5), as follows:** "Achievement of final numeric goals within 10 years represents progress towards attainment of water quality standards, but is not a requirement to fully attain all applicable water quality standards or all priority receiving water conditions within 10 years."
B.4	19-20	Water Quality Improvement Monitoring and Assessment	Monitoring and assessment will be a critical component of the WQIP process. The vision for WQIP monitoring and assessment is reflected in the proposed revised language for Permit section B.4. A major aspect of this vision is that monitoring requirements in Provision D will be fully integrated into the WQIPs and modified as the WQIPs evolve. The proposed language clarifies the Copermittee's vision for purpose and components of WQIP monitoring and assessment. The requested linkage with Provision D is highlighted through the proposed revision.	As shown in the attached revised Permit revise section B.4, as follows: The Copermittees in each Watershed Management Area must develop an integrated Water Quality Improvement Plan Monitoring and Assessment Program that assesses: 1) progress toward achieving the numeric goals and schedules, 2) progress toward addressing the highest priority receiving water conditions for each Watershed Management Area, and 3) each Copermittee's overall efforts implementing the requirements of Provision B[10]. The water quality improvement monitoring and assessment program must include the monitoring and assessment requirements of Provision D, which may be modified for consistency with the priority receiving water conditions of each Watershed Management Area and associated Copermittees. For Watershed Management Areas with applicable TMDLs, the water quality monitoring and assessment program must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water

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				quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-0012 (see Attachment A).
B.5	20-21	Adaptive Management Process	The WQIPs provide an opportunity to synchronize water quality improvement strategies (e.g, TMDL implementation) and jurisdictional runoff management programs. The Adaptive Management section B.5 proposed by the Regional Board has two components: WQIP adaptive management and JRMP adaptive management. With the proposed expanded scope of the WQIPs proposed by the Copermittees, the two components of the adaptive management process are not WQIP and JRMP, instead the components are (1) Priority Receiving Water Conditions and Numeric Goals and (2) Water Quality Improvement Strategies and Schedules. The proposed revisions to section B.5 reflect the Copermittee's vision for WQIP implementation. Most of the components of the adaptive management process proposed by the Regional Board (sub-bullets B.5.a.1.a thru h and B.5.b.1.a thru e) are included. The proposed language adds clarification	**As shown in the attached revised Permit revise section B.5, as follows:** The Copermittees in each Watershed Management Area must implement the iterative process, adapting the Water Quality Improvement Plan, jurisdictional runoff management programs and monitoring and assessment programs, as necessary, to become more effective and meet the requirements of Provisions A, and shall consider the following: **a. PRIORITY RECEIVING WATER CONDITIONS AND NUMERIC GOALS** The priority receiving water conditions and numeric goals, developed pursuant to B.2.c. and B.2.e respectively, shall guide jurisdictional implementation efforts for the duration of this Order. Recommendations for changes to priority receiving water conditions and numeric goals shall be provided in the Report of Waste Discharge and shall consider the following: (1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan; (2) Progress toward achieving interim and final numeric goals in receiving waters and/or MS4 discharges for the highest water quality priorities

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			on the purpose of the adaptive management process and re-organizes into two alternative management categories: (1) Priority Receiving Water Conditions and Numeric Goals and (2) Water Quality Improvement Strategies and Schedules. Note that these two management categories are adapted on different timelines: • Priority Receiving Water Conditions and Numeric Goals would be adapted, at a minimum, on a frequency that corresponds to Permit cycles (every 5 years). In this manner the ROWD for future permits is supported by the WQIP process. It is <u>not</u> expected that priority receiving water conditions and numeric goals would vary on a shorter frequency, and thus resources for adaptive management should be focused on the strategies/BMPs used to *achieve* the numeric goals. • Water Quality Improvement Strategies and Schedules would be adapted annually, allowing modification to the JRMP elements, structural BMPs, and non-structural BMPs for achieving numeric goals.	in the Watershed Management Area (3) New scientific information or new or updated policies or regulations that affect identified numeric goals including revised water quality objectives or TMDLs; (4) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality problems and implementation measures to address the highest priority receiving water conditions; (5) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees; (6) The factors listed in Provision B.2.a.(1)-(10); (7) San Diego Water Board recommendations; and (8) Recommendations for modifications solicited through a public participation process. **b. WATER QUALITY IMPROVEMENT STRATEGIES AND SCHEDULES** The water quality improvement strategies and schedules required pursuant to B.3and B.4 shall be adapted as new information becomes available to inform more effective and efficient means of achieving the numeric goals established in B.2.e. Copermittees shall consider adaptation to jurisdictional programs and monitoring and assessment strategies and schedules at least

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			Finally, to improve organization, it is proposed that the requirements regarding WQIP and JRMP modification and submittals (sub-bullets B.5.a.2 thru 3 and B.5.b.2 thru 3) be moved to a new section B.6.	annually considering the following when applicable: (1) Changes to priority receiving water conditions and numeric goals based on recommendations from B.5.a.; (2) Measurable or demonstrable reductions of non-storm water discharges to each Copermittee's MS4; (3) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP; (4) Information on the MS4 sources and/or pollutant-generating activities determined to be most significantly contributing to priority receiving water conditions; (5) Efficiency in implementing the Water Quality Improvement Plan; (6) San Diego Water Board recommendations; and (7) Recommendations for modifications solicited through a public participation process.
B.6	21	Water Quality Improvement Plan Implementation	The development of a WQIP will require at a minimum of 18 months and BMP implementation will likely be staggered over a certain time frame. Once the permit is adopted, Copermittees will begin the planning process. However, Copermittees must have at least one full	**As shown in the attached revised Permit revise section B.6, as follows:** **6. Water Quality Improvement Plan Submittal, Implementation, and Modifications**

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			fiscal year budgeting cycle within which to seek additional funding to implement the WQIP from our governing bodies (i.e., City councils and County supervisors). Thus the more reasonable time schedule is to require the development of the WQIP within 18 months and the implementations of the BMPs to occur consistent with the final approved WQIP. Furthermore, adaptive management submittals (i.e., WQIP, JRMP and monitoring modifications) and modifications should be specified under Provision F. In this manner, submittal requirements will be organized and easier for Permittees to follow. As such, the submittal requirements that were previously described under section B.5.a.2 thru 3 and section B.5.b.2 thru 3 were modified and moved to Provision F.	Requirements for Water Quality Improvement Plan submittals and modifications are described in Provision F. Requirements for corresponding modifications to the jurisdictional runoff management programs and monitoring and assessment program are also described in Provision F. Copermittees must commence with implementation of the Water Quality Improvement Plan no later than the fiscal year (July 1) following San Diego Water Board approval of the Water Quality Improvement Plan.
C. Action Levels				
C. (Intro)	22	Action Levels	The Draft Order in Provision B states that the goal of the WQIP is to identify the highest water quality priorities within a watershed and implement strategies to achieve improvements in the quality of discharge and receiving waters. Furthermore in Provision B.2.d the Permittees are required to develop and	**As shown in the attached revised Permit, revise introductory paragraphs of section C, as follows:** "The purpose of this provision is for the Copermittees to incorporate numeric non-storm water and storm water action levels in the Water Quality Improvement Plans. The action levels shall be used to guide the following program planning efforts and measure progress towards attaining the reasonable protection,

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			use *interim and final numeric targets/goals* to measure progress towards the protection/enhancement of the receiving waters and beneficial uses. The choice of the target/goals of the watershed may be biological, chemical, or physical based and may include multiple criteria and/or indicators. The permit should provide a clear linkage between Provision B and Provision C and state that the WQIP should guide the customization of the NALs/SALs to meet the highest water quality priorities in a given watershed and that NALs/SALs will be used to assist Copermittees in reaching the goals specified in the WQIP. The introduction to Provision C indicates that the *action levels* (NALs and/or SALs) will be incorporated into the WQIPs (B.2.d) and used to: a) Measure progress towards the protection/ enhancement of the receiving waters and beneficial uses (B.4) ; b) Direct and focus the JRMP implementation efforts for addressing MS4 discharges (D.4.a); and c) Detect and eliminate non-stormwater and illicit discharges to the MS4 (E.2) Although action levels will be used for several different purposes, the action	preservation, and enhancement of water quality and designated beneficial uses of waters of the state: 1) Support development and prioritization of water quality improvement strategies through the Water Quality Improvement Plans. Discharge data above action levels can be evaluated using a statistical approach considering the frequency, magnitude, and loading of discharges to the receiving waters to support development of actions and prioritization of their implementation. 2) Assist in the effective prohibition of non-stormwater discharges from the MS4 pursuant to Provision E.2. 3) Support the detection and elimination of illicit discharges to the MS4 pursuant to Provision E.2. These goals will be accomplished through monitoring and assessing the quality of the MS4 discharges prior to and during the implementation of the Water Quality Improvement Plans. Exceedances of action levels are not subject to enforcement or non-compliance actions under this Order. ”

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			levels defined in Provision C.1 and C. 2 are chemically based and may be in conflict with the selected watershed metrics. As an example, if the watershed metric is improved IBI scores for a water body, then NALs and SALs associated with water chemistry are unlikely to be the best metric to evaluate progress towards improving IBI scores or for assessing our implementation efforts. Thus, the chemically based NALs/SALs may direct resources away from the watershed priorities. Since Provision C indicates that there are three different purposes for the action levels, the permit should recognize that the action levels for each permit provision (B.4, D.4.a, and/or E.2) may be based on different constituents, metrics, and/or may be different values. As a result, the permit should establish the purposes of the action levels and then allow the Copermittees to establish the numeric action levels. For our purpose we would submit that the action levels should be developed to support program planning and measure progress towards attaining the protection of the beneficial uses.	

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C. (Intro)	22	Action Levels	The development of action levels, including the timeline should be clearly linked to the Water Quality Improvement Plans. A timeline that is separate and different from the development of the Water Quality Improvement Plans is not necessary. Previously developed action levels should serve as interim action levels until the Water Quality Improvement Plans are completed.	**As shown in the attached revised Permit, revise concluding paragraph of section C, as follows:** Action levels will be developed and incorporated into the Water Quality Improvement Plans (Provision B) including the Illicit Discharge Detection and Elimination (IDDE) Program (Provision E.2). Depending upon the goals/objectives for the use of the action levels and the priority receiving water conditions, the constituents and values at which they are set may differ between watersheds. Copermittees may develop Watershed Management Area specific numeric action levels for non-storm water and storm water MS4 discharges using an approach approved by the Regional Board or use the default non-stormwater and stormwater action levels prescribed within C.1 and C.2 below, respectively. The Copermittees will submit action levels as part of their Water Quality Improvement Plan(s). The action levels established as part of R9-2007-0001 will serve as the interim action levels until the Water Quality Improvement Plans are completed and approved.
C.1	22-24	Non-Stormwater Action Levels	Referencing the CTR as a "source" is misleading. It is unclear why the Board is excluding the conversion factor from the CMC and CCC Metals Criteria equations from the CTR to generate total recoverable metals criteria. Table notes need to be updated to explain how NALs were derived. It should be made clear that the MDALs and AMALs were calculated using State Implementation Standard (SIP) procedures.	Add appropriate references to the State Implementation Standard procedures and provide a narrative explanation for reasoning and application in the fact sheet, when provided.
C.1	22-24	Non-Stormwater Action Levels	Provision C.1.b of the permit requires that additional NALs must be	The permit should provide a clear linkage between Provision B and Provision C and allow the WQIP to guide the customization

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			incorporated into the Permit for any constituents causing or contributing to conditions associated with the highest non-stormwater related water quality priorities. However the provision does not identify other options for the development of NALs. The Copermittees believe it necessary to have the flexibility to develop NALs that are relevant to their watershed issues.	of the NALs based on the watershed needs. Furthermore the permit should identify past and current dry weather monitoring as a basis for the development of NALs that are watershed specific.
C.2	25	Storm Water Action Levels	Provision C.2.b requires that additional SALs must be incorporated into the Permit for any constituents causing or contributing to conditions associated with the highest non-stormwater related water quality priorities. The development of SALs may be based on one of 3 options: 1) water quality standards; 2) site specific conditions; and 3) numeric WQBELs. As noted previously the Copermittees believe that it is critical that flexibility be provided in the development and implementation of the SALs to allow the Copermittees to address their highest water quality issue(s). Consequently the Copermittees support other options for developing SALs.	Other options that should be included for the development of the SALs in the Permit are the approaches identified in the California Storm Water Panel in its report, “The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities” (June 2006). As previously noted, if the Copermittees do not establish action levels to support the WQIP then the Copermittees must use the SALs identified in Provision C.
D. Monitoring and Assessment Requirements				
D	26-52	Monitoring and Assessment Requirements	Current provisions are overly prescriptive and constrain the efficient or best use of Copermittee resources or for adaptive management. Significant efforts have been invested by the State and Regional Boards as well as Copermittees to	Remove current Provision D and replace with the Provision D attached.

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			develop a structured, question-driven monitoring approach. These efforts provide for the development of an effective and appropriate alternative to address the monitoring needs of the permit, which include an evaluation of the effective prohibition of non-stormwater discharges, attainment of MEP, evaluation of impacts to and improvements in receiving waters, and collection of data to support management of stormwater programs.	
D.1.a	26	Jurisdictional Non-Stormwater Monitoring	The Copermittees' past monitoring results illustrate that chemical water quality monitoring data for dry weather inter-MS4 flows is not effective for eliminating dry weather discharges. The approach outlined in the Administrative Draft Tentative Order would generate a great deal of water quality data for dry weather flows and identify some IC/IDs. However, since the purpose of the program is to eliminate dry weather flows and IC/ID flows entirely, there is little value to collecting extensive dry weather water quality data for MS4 sites. Very little of the water quality data collected would support assessment of the stated program management objective to effectively prohibit non-storm water discharges to the MS4s. Consequently, this extremely resource intensive approach will be relatively inefficient in eliminating the MS4 flows and IC/IDs	*If Provision D is not replaced, modify language to allow greater flexibility in monitoring to eliminate IC/IDs based on Copermittees' experience and understanding of how to effectively address non-stormwater discharges.*

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			with any potential to adversely impact receiving waters. *See the Dry Weather Outfall Monitoring and Discussion of IDDE Program Efficiency and Effectiveness Sections of the Alternative Provision D Supporting Documentation for additional details.*	
D.1.a.2	32	Dry Weather Ambient Receiving Water Monitoring Program	TO Provision D does not take advantage of the current state of knowledge of receiving water conditions and does not integrate the many existing receiving water monitoring efforts. The proposed monitoring would result in a significant and unnecessary duplication of monitoring efforts by the Copermittees in receiving waters. Copermittees propose to integrate the numerous receiving waters programs at the WMA level. *See the Receiving Water Monitoring Section of the Alternative Provision D Supporting Documentation for additional details.*	*If Provision D is not replaced, modify language to allow greater flexibility and coordination of monitoring to achieve program objectives considering existing receiving water programs that may already meet the goals of Provision D.*
D.1.a.2	32	Dry Weather Jurisdictional Receiving Water Boundary Monitoring	Jurisdictional receiving water dry weather boundary monitoring proposed in the TO does not support the three key monitoring goals. Monitoring conducted by the Copermittees' and others have shown jurisdictional boundary monitoring of the type proposed in the TO to be ineffective in estimating water quality impacts and loading from MS4	*If Provision D is not replaced, remove the jurisdictional receiving water boundary monitoring.*

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			discharges (particularly from one jurisdiction to the next). This is due to a combination of factors, including high variability of the constituent concentrations in receiving waters and discharges, typically small percentages of MS4 discharge flows and pollutant loads in the receiving waters, and uncertainty of the source of flow changes within jurisdictional boundaries. The combination of high variability and relatively small impacts or differences requires high numbers of samples to detect significant and programmatically relevant differences and would be unlikely to support programmatic changes or guide improvements to water quality. *See the Discussion of Jurisdictional Boundary Monitoring of the Alternative Provision D Supporting Documentation for additional details.*	
D.1.a.2	32	Jurisdictional Monitoring Requirements	It would be useful to call for the monitoring program to adhere to the design recommendations in the SWAMP Assessment Framework, which calls for structured, question-driven monitoring.	If Provision D is not replaced, the following language should be revised: "…within and through its jurisdiction. <u>The design of the receiving water monitoring program should follow the guidance on structured question-driven monitoring outlined in the SWAMP Assessment Framework. In addition, the design should be comparable with, to the extent practicable, regional scale monitoring designs and approaches being developed for the San Diego River watershed and coastal estuaries in the San Diego Region.</u> Any available monitoring …"
D.1.a.2.a.	32	Jurisdictional	Add an emphasis on improving	If Provision D is not replaced, the following language should be

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		Monitoring Requirements	comparability of data and coordination of sampling.	revised: "…may be utilized as a dry weather ambient receiving water monitoring station, with an emphasis on improving coordination among sampling efforts and the comparability of monitoring data."
D.1.b	34-38	Jurisdictional Monitoring Requirements	Proposed monitoring of five MS4 outfalls in every jurisdiction is greatly in excess of the monitoring needed to characterize similar land uses and drainages. Monitoring of representative sites for homogeneous land uses or mixed-use land uses can be coordinated and the results shared among jurisdictions. *See the Wet Weather Outfall Monitoring section of the Alternative Provision D Supporting Documentation for additional details.*	*If Provision D is not replaced, modify language to allow greater flexibility and coordination of monitoring (i.e., site selection, frequency, and parameters) to achieve program objectives while focusing resources on receiving water priorities and supporting development and implementation of management actions.*
D.2	38-42	Watershed Monitoring Requirements	Section D.2 of the Tentative Order requires more reference watershed monitoring stations (one for each WMA) than are needed to assess receiving water conditions and establish reference conditions for the region. The Copermittees propose to use the results of the San Diego Region Stream Reference Study in lieu of this requirement. Regional reference sites that are based on similar geology and watershed size will provide an appropriate measure of the expected receiving water conditions achievable in Copermittees' jurisdictions as a result of the future implementation of	*If Provision D is not replaced, modify language to allow for the use of the San Diego Region Stream Reference Study results to meet the reference watershed requirements.*

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			their WQIPs. *See the Receiving Water Monitoring Section of the Alternative Provision D Supporting Documentation for additional details.*	
D.2	38-42	Watershed Monitoring Requirements	Monitoring proposed for MLS sites is more frequent than required to answer relevant management questions about trends in receiving water conditions. ~~Wet weather m~~Monitoring at MLS sites can be reduced to once every five years, based on the statistical simulations conducted for development of the ROWD (2011 and included in Attachment 2-1). *See the Receiving Water Monitoring Section of the Alternative Provision D Supporting Documentation for additional details.*	*If Provision D is not replaced, reduce wet weather monitoring frequency at MLS sites to once every five years.*
D.2.a	38	Watershed Monitoring Requirements	There is no additional value to continuing the TWAS monitoring in its current form because the constituent concentrations and patterns are generally similar at the TWAS and MLS (and especially within a watershed), (See Attachment 2-1 from the ROWD (2011)). Additional focused receiving water monitoring to address information needs should be evaluated and addressed by Copermittee Program Managers in the WQIP Monitoring and Assessment Plans. *See the Receiving Water Monitoring Section of the Alternative Provision D*	*If Provision D is not replaced, modify language to allow greater flexibility and coordination of monitoring to achieve program objectives consistent with the determination of receiving water priorities through the WQIP development process.*

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			Supporting Documentation for additional details.	
D.2.a	38	Watershed Monitoring Requirements	The distinction between these stations and those called for in D.1.a.2 is not clear, partly because the channel types have not been more completely defined but also because no monitoring questions have been stated. There could be overlap between these two types of stations, especially because the receiving water stations are to be located in natural or undisturbed areas.	If Provision D is not replaced, Clarify the distinction between receiving water and watershed stations. Define management / monitoring questions that follow the SWAMP Assessment Framework guidance.
D.2.a.1	38	Watershed Monitoring Requirements	It is not clear how the data from the mass loading stations will be used; as there is no monitoring question or link to a management issue or decision.	If Provision D is not replaced, Define management / monitoring questions that follow the SWAMP Assessment Framework guidance. Show how the mass loading data will be used. Delete these stations if the value of the data cannot be demonstrated.
D.2.a.4	38	Watershed Monitoring Requirements	A single reference station is not very useful and has all sorts of statistical problems if used in isolation. It would be better to use regional reference data where available.	If Provision D is not replaced, use the San Diego Stream Reference Study for reference stations.
D.2.a.5	38	Watershed Monitoring Requirements	The rationale for this station is not clear. There is no management / monitoring question or link to a management issue or decisions. In addition, there is no readily obvious scientific reason why a midpoint station would be useful.	If Provision D is not replaced, Delete this requirement.
D.2.e and D.3	45-46	WMA Special Studies and Regional Special Studies	Reduce the number of Special Studies from 3 to 2 per WMA in consideration of the planning period required to develop the Monitoring and Assessment Plan	Reduce the number of Special Studies from 3 to 2 per WMA.

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			required as part of the WQIP. *See the Source/Stressor ID and Special Studies section of the Alternative Provision D Supporting Documentation for additional details.*	
D.4.b and D.4.c	51-52	Assessment Requirements	See comment A.4. Language should be added to limit Copermittees responsibilities to within their jurisdiction.	*If Provision D is not replaced, the following language should be revised:* "The Copermittees, within <u>their respective jurisdictions of</u> ~~in~~ each Watershed Management Area, must…"
E. Jurisdictional Runoff Management Programs				
E	53-89	Jurisdictional Runoff Management Programs	Minor grammatical correction in the first sentence.	"The purpose of this provision is for each Copermittee to implement a program to control the contribution of pollutants to and the discharges from the MS4 with<u>in</u> its jurisdiction.**"**
E	53-89	Jurisdictional Runoff Management Programs	As stated in the second introductory paragraph in Provision E "The jurisdictional runoff management programs implemented by each Copermittee must be consistent with the Water Quality Improvement Plan for the applicable Watershed Management Area required by Provision B." Additionally, as stated in the introduction to the WQIP (Provision B) "The purpose of this provision is to develop Water Quality Improvement Plans that guide the Copermittees' jurisdictional runoff management program implementation efforts…" However, the provisions do not clearly allow for the appropriate modification of the JRMP requirements contained in the permit.	Include language into the introductory paragraph that clearly indicates that the JRMP requirements contained in Provision E may be modified to allow for implementation of the JRMP consistent with the WQIP if appropriate justification is provided. Suggested language is provided in the attached strikeout version of Provision E.

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E and Attachment C	Throughout	Jurisdictional Runoff Management Programs	Clarification.	Refer to Permanent BMPs as Structural BMPs and add a definition for structural BMPs into Attachment C.
E	Throughout	Jurisdictional Runoff Management Programs	Clarification for consistency.	Change "~~Permanent BMP Sizing Criteria Design Manual"~~ to "BMP Design Manual" and make reference to the current design requirements under R9-2007-0001.
E.1.a.2	53	Legal Authority Establishment and Enforcement	Sites regulated under the Construction and Industrial General Permits are regulated elsewhere and through alternative means. Clarification is necessary for sites that are not regulated under the respective General Permits.	"Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites that do not~~, including industrial and construction sites which~~ have coverage under the statewide General Permit for Discharges of Storm Water Associated with Industrial Activities (Industrial General Permit) or General Permit for Discharges of Storm Water Associated with Construction Activities (Construction General Permit)~~, as well as to those sites which do not~~; "
E.1.a.4 and E.1.a.5	53-54	Legal Authority Establishment and Enforcement	The Copermittees do not have jurisdiction to control MS4 discharges outside of their respective MS4s and the Regional Board does not have the authority to require interagency agreements to grant such jurisdiction, particularly for those agencies not subject to the Order (Caltrans, Native American Tribes, Military installations, etc.)	Remove, reword, and/or combine the two subsections as follows : ~~"Control through interagency agreements among Copermittees the contribution of pollutants from one portion MS4 to another portion of the MS4;"~~ and ~~"Control through interagency agreements with other owners of the MS4 such as Caltrans, the U.S. federal government, or sovereign Native American Tribes, where possible, the contribution of pollutants from one portion of the MS4 to another portion of the MS4;"~~ "Coordinate, as possible, with other agencies to minimize the contribution of pollutant discharges from the Copermittee's portion of the MS4 to portions of the MS4 under another agency's jurisdiction and from other agency's portions of the MS4 to the portion of the MS4 under the Copermittee's jurisdiction"
E.2.a	54-57	Illicit Discharge Detection and	The addition of "to the extent allowable by law", as referenced from the Phase II	"To the extent allowable by law, ~~E~~each Copermittee must address all non-storm water discharges as illicit discharges, where the

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		Elimination	Regulations, limits Copermittees responsibility to those that they have the legal authority to implement. Copermittees cannot implement programs outside of what they have legal authority to do. In addition, some non-storm water discharges are authorized under the permit unless the Copermittee or San Diego Water Board determines they are a source of pollutants in receiving waters. Language should be provided to account for subsection E.2.a.(3).	likelihood exists that they are a source of pollutants to waters of the U.S."
E.2.a.1	55	Illicit Discharge Detection and Elimination	Uncontaminated pumped groundwater is the only category under this section that is required to be permitted under an NPDES Permit. It should be added to the initial paragraph and the remainder of the bullets should be added to E.2.a.(3), as they are impractical to be permitted and are currently not required to be permitted.	"Discharges of non-storm water to the MS4 from uncontaminated pumped groundwater ~~the following categories~~ must be addressed as illicit discharges where there is evidence that suggests that they are the source of pollutants to waters of the U.S., unless the discharge has coverage under NPDES Permit No. CAG919001 (Order No. R9-2007-0034, or subsequent order) for discharges to San Diego Bay, or NPDES Permit No. CAG919002 (Order No. R9-2008-0002, or subsequent order) for discharges to surface waters other than San Diego Bay: ~~(a) Uncontaminated pumped ground water;~~ ~~(b) Discharges from foundation drains;~~ ~~(c) Water from crawl space pumps; and~~ ~~(d) Water from footing drains."~~
E.2.a.2	55	Illicit Discharge Detection and Elimination	Limit to within the Copermittee's jurisdiction per prior comments and reword the applicable permitting portion to allow flexibility for any subsequent	Discharges of non-storm water from water line flushing and water main breaks to the MS4 must be addressed as illicit discharges unless the discharge has coverage under a valid NPDES Permit, ~~No. CAG 679001 (~~Order No. R9-2010-0003, or a subsequent

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			NPDES permits that may be issued.	order~~)~~. This includes water line flushing and water main break discharges from water purveyors under the Copermittee's jurisdiction that has been issued a water supply permit by the California Department of Public Health or federal military installations.
E.2.a.3	55	Illicit Discharge Detection and Elimination	Non-storm water sources should be limited to anthropogenic sources within the Copermittees jurisdiction to enable to Copermittees to address those sources in which they have control over. Also, see comment E.2.a.1.	Limit the source of pollutants in receiving waters to anthropogenic sources identified as an illicit discharge within the Copermittees jurisdiction and add discharges from foundation drains, water from crawl space pumps, and water from footing drains.
E.2.a.4	56	Illicit Discharge Detection and Elimination	See comment E.2.a.	Add "or similar means where there is evidence that those discharges are a source of pollutants to waters of the U.S."
E.2.a.4.a	56	Illicit Discharge Detection and Elimination	Individual buildings may require substantial structural modifications to redirect air conditioning condensation to landscaped areas. Redirection should be encouraged instead of required.	"The discharge of air conditioning condensation ~~must~~ should be directed to landscaped areas or other pervious surfaces where feasible;"
E.2.a.4.b	56	Illicit Discharge Detection and Elimination	Complete removal of residential car washing activities is unrealistic and resources would be better used to educate the public. Public outreach has proven to be also effective in minimizing water and detergent use and encouraging the use of commercial facilities.	"~~(i)~~ The discharge of wash water must be encouraged through public outreach and education (i) to be directed to landscaped areas or other pervious surfaces where feasible, and (ii) to m~~M~~inimize the use of water for vehicle washing, use as little washing detergent and other vehicle wash products as possible, wash vehicles at commercial wash facilities, and implement other practices or behaviors that will prevent the discharge of pollutants associated with individual residential vehicle washing from entering the MS4; and"
E.2.a.4.c.ii	56	Illicit Discharge Detection and Elimination	Clarify. Discharges of saline water to the MS4 cannot be directed out of the MS4 once the discharge has occurred. Allow saline discharges to salt water receiving waters.	"The discharge of saline swimming pool water ~~to the MS4~~ must be directed to the sanitary sewer, landscaped areas, or other pervious surfaces that can accommodate the volume of water or to the MS4 if the MS4 discharges to a saltwater receiving water."

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E.2.a.5.a.1	56	Illicit Discharge Detection and Elimination	Building fire suppression system maintenance discharges should not be considered an illicit discharge if BMPs are implemented to prevent discharge of pollutants to the MS4.	Add "where BMPs are implemented."
E.2.a.5.b	57	Illicit Discharge Detection and Elimination	Emergency firefighting discharges are exempted in the Clean Water Act. BMPs should be encouraged, not required to be implemented, particularly in emergency situations that may result in the destruction of life and property.	"Each Copermittee ~~must~~ should develop"
E.2.b.1.d	57	Illicit Discharge Detection and Elimination	MS4 and Private Outfalls should be clearly defined. The Clean Water Act definition of MS4 Outfalls limits outfalls to "major outfalls", limiting the responsibility of Copermittees' mapping of outfalls to "major outfalls" and clarifying the definition of what constitutes a "private outfall".	"All known locations of MS4 outfalls as defined by 40 CFR §122.26(b)(5-6) and private outfalls, as defined by 40 CFR 122.26(b)(9), that discharge runoff collected from areas within the Copermittee's jurisdiction,"
E.2.b.1.e	58	Illicit Discharge Detection and Elimination	Clause is redundant and confusing.	~~(i.e., receiving water segments that are both a receiving water and part of the MS4),~~
E.2.b.2	58	Illicit Discharge Detection and Elimination	Clarification is necessary to limit employee responsibilities to within the terms of their employment.	"Each Copermittee must use Copermittee personnel and contractors to assist in identifying and reporting illicit discharges and connections, if observed during the course of their daily employment activities;"
E.2.b.4	58	Illicit Discharge Detection and Elimination	The addition of language is necessary to limit Copermittees responsibility to standards that may reasonably be met.	"Each Copermittee must implement practices and procedures (including a notification mechanism) to prevent, respond to, contain, and clean up any spills that may discharge into the MS4 within their jurisdiction from any source. The Copermittee must coordinate with spill response teams to prevent to the extent possible entry of spills into the MS4, and prevent contamination of waters of the U.S. ~~surface water, ground water, and soil~~."

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E.2.b.5	58	Illicit Discharge Detection and Elimination: Prevent and Detect	Clarification is needed for circumstances where the source of an illicit connection and/or discharge is from another MS4. Add language to E.2.b(5) and move current E.2.b(5) to E.2.b(6).	Add language to clarify responsibility: (5) Copermittees are responsible for control of discharges to their MS4. In the event that the source of an illicit discharge or connection is from another MS4, the Copermittee shall notify and, if necessary coordinate, with the upstream MS4 to implement and/or enforce corrective actions. Move current E.2.b(5) to E.2.b(6).
E.2.c	58	Illicit Discharge Detection and Elimination: Field Screening and Monitoring	Visual observations should be acknowledged as a way to detect non-storm water and illicit discharges and connections.	Add "Visual Observations" to the provision header and acknowledge within the text.
E.2.d	58-61	Investigate and Eliminate Illicit Discharges and Connections	See the comments above for C.1. NALs should guide JRMP implementation and management actions through the iterative process set forth in the WQIP and may trigger follow up investigations, but may trigger other alternative actions. Actions taken based on NAL exceedances should be defined in the WQIP and/or JRMP based on the most effective actions to reach their watershed-based goals.	Clarify language to state that NAL exceedances during IDDE monitoring/investigations may trigger action levels, including but not limited to follow-up investigations based on the highest watershed priorities set forth and the iterative process provided in the WQIP. In addition, limit E.2.d.1.d to exclude identified natural sources.
E.2.d.2 and E.2.d.3	59 – 61	Illicit Discharge Detection and Elimination: Investigate and Eliminate	Sections 2 and 3 outline the procedures that Copermittees must have in place. Not all language under these headers speak to procedures. Additionally, some overlap exists between these two sections.	Edits were made to ensure that requirements addressed the development of procedures. Additional edits made for clarity and to reduce overlap between sections. See the strikeout document of the admin draft for specifics.
E.2.d.2	59	Illicit Discharge Detection and Elimination	TCBMPs may be part of the MS4 and specifically designed to receive and contain pollutants. The language, as written, is inconsistent with the TCBMP requirements prescribed in Provision E.3.a of the proposed permit. Limiting language should also be added for	"Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on reports or notifications, field screening and monitoring, or other appropriate information, indicate a reasonable potential of ~~receiving, containing, or~~ discharging pollutants to receiving waters within the Copermittees jurisdiction due to illicit discharges, illicit connections, or other sources of non-storm water."

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			discharges to receiving waters within the jurisdiction of the Copermittee.	
E.2.d.4	61	Illicit Discharge Detection and Elimination	Language used in the current Orange County Permit (Provision R9-2009-0002) provides clearer language regarding follow through.	Use Orange County permit language instead: If the Copermittee suspects the source of the non-storm water discharge as natural in origin (i.e. non-anthropogenically influenced) and in conveyance into the MS4, then the Copermittee must ~~collect the data and evidence necessary to demonstrate to the San Diego Water Board that it is natural in origin; and~~ document the rationale for why the discharge does not need further investigation. This documentation shall be included in the Annual Report.
E.3	61	Permanent BMP Requirements for All Development Projects	No jurisdictional limitations are provided in this section. As a result, language in the subsections may be interpreted as expanding Copermittee requirements outside their MS4 jurisdiction. In addition how the Copermittees implement their program should be a decision left to each Copermittee.	Reword to "Each Copermittee, within their respective jurisdictions, must ~~use their land use/planning authorities to~~ implement a development planning program…"
E.3.a	61	Permanent BMP Requirements for All Development Projects	Added language to clarify that not all the prescribed BMPs in Section E.3.a.are applied to every project. These BMPs are applied as practical and feasible and as applicable based on the sites condition and nature of development.	"Each Copermittee, as practical and feasible, must prescribe the following BMP requirements during the planning process (i.e. prior to project approval and issuance of grading or building permits) for all development projects ~~(regardless of project type or size)~~ where local permits are issued, including unpaved roads and flood management projects, except emergency projects implemented for the protection of persons and property:
E.3.a.2	62	Permanent BMP Requirements for All Development Projects	Source control BMP requirements apply to all projects and should be located in one place in the Provision. Language regarding source control BMPs from E.3.c should be moved here. A definition of "properly designed" should also be provided in Attachment C.	Add "Each Copermittee must require each Priority Development Project to implement applicable source control BMPs." A definition of properly designed has been added to Attachment C.

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E.3.a.4 and E.3.a.5	63-64	Long-Term Permanent BMP Maintenance and Infiltration and Groundwater Protection	Structural BMP maintenance is required under PDPs and infiltration and groundwater protection are again only necessary under PDP requirements.	Both sections were moved under PDP requirements, after section Hydromodification Management BMP Requirements and before Alternative Compliance for Technical Infeasibility.
E.3.a.5.a.vi	64	Permanent BMP Requirements for All Development Projects	Treatment with infiltration BMPs should be allowed if no significant pollutant levels are present (e.g. light industrial building with all activities inside).	(moved under PDP) "Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities as designated by each Copermittee, unless <u>runoff does not exceed Basin Plan water quality standards or runoff is</u> first treated or filtered to remove pollutants prior to infiltration; and"
E.3.b.1.b	64-65	Definition of Priority Development Project	Limit requirements to projects that were not previously subject to prior PDP requirements.	Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development<u> and was not subject to previous Priority Project Development requirements</u>, the performance and sizing requirements apply to the entire development.
E.3.b.1.c	65	Definition of Priority Development Project	Clarify that regardless of the 50% threshold, portions of the site that were subject to and met previous Priority Development Project requirements and will remain undisturbed are not subject to the new requirements. Proposed language has been modified from Ventura County NPDES MS4 Permit (Order No. 00-108).	Add the following: <u>(c) Projects where redevelopment results in an increase of more than fifty percent of impervious surfaces of a previously existing development, and the existing development *was* subject to previous Priority Project Development Requirements, only the altered portion of development is subject to the new Priority Development Project requirements.</u>
E.3.b.2	65-66	Priority Development Project Categories	This provision establishes the scope of development projects subject to the post-construction controls. Sometimes the criterion is based on impervious area and other times it is based on surface area. Revision for consistency is proposed. Also, this is an increase in requirements from the prior permit, which was limited to much larger development projects.	In the interest of consistency, revise the criterion so that impervious area is the mechanism for determining applicability ~~as it is an accurate surrogate for establishing project eligibility~~. Also, add language to E.3.b.2.e to clarify that applicable discharges to an ESA are "<u>not commingled with flows"</u>

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E.3.b.2.g	66	Priority Development Project	This requires streets, roads, highways, freeways, and residential driveways over 5,000 square feet be considered priority development projects. The residential driveways category was added under the proposed permit and will require additional Copermittee effort for Storm Water Management Plan review, TCBMP inventory, inspections, and maintenance verification without proportional water quality benefit. Residential driveways should be removed from this Provision as they carry much lower traffic volumes and therefore do not have the potential to generate the high levels of pollutants that streets and highways generate. Residential driveways would be subject to the requirements of residential development.	"Streets, roads, highways, <u>and</u> freeways, ~~and residential driveways~~. This category is defined as any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles."
E.3.b.3.c and E.3.b.3.d	66	Priority Development Project	An exemption for Priority Development Projects should be provided for driveways constructed with permeable surfaces.	Add driveways to (c) and (d). Add parking lots to (d).
E.3.b.3.e	66	Priority Development Project Categories	This exemption allows small individual residential projects to apply minimum BMPs that meet a minimum performance standards without the burden of preparing a full Storm Water Management Plan, , review cycles, and other burdensome administrative tasks that don't benefit water quality. Under the current proposed language, single family residence as small as 5,000sf may be subject to PDP requirements, and is	Add language as follows: <u>(e) Single-family residential projects that are not part of a larger development or proposed subdivision and implement BMPs that meet minimum performance standards, as outlined in the BMP Design Manual.</u>

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			lumped in with industrial and commercial development. The potential pollutants generated by small residential is not as significant as industrial or commercial and can be effectively reduced by effective source control and minimum permanent BMPs rather than going thru an extensive PDP and HMP analysis and BMP sizing.	
E.3.b.3.f	66	Priority Development Project Exemption	This exemption provides an alternative design standard for smaller roadway projects. Existing roads may provide a great retrofit opportunity, but have many challenges due to physical constraints. Existing roads are considered utility corridors, in addition to being adjacent to buildings and structures which makes it physically impossible to fit BMPs that meet PDP sizing criteria. Therefore, Green Street concepts is a great approach.	Add language as follows: (f) Any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles~~.~~ that follows the USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets[1] to the MEP. 1:http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm
E.3.c	66-71	PDP	Permanent BMPs which include source control (stenciling, trash lids, efficient irrigation) were being confused with structural BMPs (bioretention, basins, etc) that require inventory tracking and perpetual maintenance. Therefore two different terms are used in the different scenarios. A definition of Structural BMPs was added.	In places where it applied, Permanent was replaced with Structural
E.3.c.1	66	Source Control BMP Requirements	Source Control requirements apply to all projects and should be moved up. See comment E.3.a.(2)	Move Section language to Provision E.3.a.(2).
E.3.c.2.b	67	Priority Development	Retention should be limited to that which is found during undeveloped conditions	(Now E.3.c.(1)(b)) "Each Priority Development Project must be required to implement LID BMPs that are sized and designed to

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		Project BMP Implementation and Oversight	Requiring strict retention of the 85th percentile storm volume without consideration of the natural condition will result in lesser flows necessary for downstream habitats and may result in impacts to habitat and beneficial uses. The recommended language requires mimicking of natural hydrology while still providing improved pollution reduction.	retain the difference in volume ~~equivalent to~~ between the runoff volume produced in the post-project condition as compared to the pre-project condition resulting from a 24-hour 85th percentile storm event ("design capture volume"). A footnote should also be provided clarifying that the "Design capture volume is a single event based volume available after an extended dry period".
E.3.c.2.c	67	Retention Standard	A second tier standard is proposed for sites where on site retention is not feasible due to adverse soils or other conditions. The proposed language allows projects to provide pollutant removal equal to the retention standard by capturing and treating a larger volume. Since equal pollutant removal is to be achieved, offsite mitigation should not be required if the second tier standard is met.	(Now E.3.c.(1)(c)) If onsite retention of the design capture volume using LID BMPs is technically infeasible per Provision E.3.c.(4), flow-thru LID and/or conventional treatment control BMPs must be implemented to provide equal pollutant removal for the portion of the design capture volume that is not retained onsite. Flow-thru LID treatment control BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP; or
E.3.c.2.d	67	Retention and Treatment Mitigation	The requirement for offsite mitigation should only apply to projects that do not meet predevelopment retention or equal pollutant load removal standards.	(Now E.3.c.(1)(d)) If retention and/or equivalent pollutant removal of the design capture volume to meet E.3.c.(2)(a) or E.3.c.(2)(b) are infeasible onsite, project applicants must perform mitigation for the portion of the pollutant load in the design capture volume that is not retained or equally treated onsite, as described in Provision E.3.c.(6)
E.3.c.3	68	Hydromodification Management BMP Requirements	The Regional Board adopted the San Diego Hydromodification Management Plan (HMP) in July 2010. Significant work, technical analysis and input have gone into the development of the HMP and these requirements have been in effect for only 16 months. Rather than	(Now E.3.c.(2) Each Copermittee must require each Priority Development Project disturbing greater than one acre to implement hydromodification management BMPs, as described in the Copermittees current HMP, as applicable.

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			providing separate criteria, the permit should acknowledge implementation of the Regional Board approved HMP as a sufficient mechanism for meeting hydromodification requirements. The one acre threshold is consistent with the threshold recently established by the State Board for Phase II permits and discussed during the HMP workshop.	
E.3.c.3.a	68	HMP Requirements	The requirement to match naturally occurring pre-development runoff conditions holds redevelopment to a higher standard than new development. Redevelopment is widely accepted as benefiting water quality, Redevelopment should be incentivized to ensure an overall improvement of water quality. The main obstacle for removing concrete lining in existing channels is lack of space available to contain the peak flow (Q100). The HMP requirements target much smaller flow rates (Q2 to Q10); therefore, requiring this standard for redevelopment projects is unlikely to increase the ability for channels to be rehabilitated.	(Now E.3.c.(2)(a) Post-project runoff flow rates and durations do not exceed pre-development ~~(naturally occurring)~~ runoff flow rates and durations by more than 10 percent (for the range of flows that result in increased potential for erosion or degraded channel conditions downstream of Priority Development Projects). Added the EPA (64 Federal Register 68722, 68761) definition of Pre-development to the permit definitions.
E.3.c.3.b	68	HMP Requirements	Flexibility is to allow assessment, preservation and compensation for sediment supply losses due to development on a regional basis.	(Now E.3.c(2)(b) Projects shall preserve (where feasible) or provide compensation for significant losses of sediment supply anticipated as a result of development.
E.3.a.4 and E.3.a.5 (moved	63-64	Long-Term Permanent BMP	Structural BMP maintenance is required under PDPs and infiltration and	(Now E.3.**c**.(4) and (5)

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here)		Maintenance and Infiltration and Groundwater Protection	groundwater protection are again only necessary under PDP requirements.	Both sections Long-Term Structural BMP Maintenance and Infiltration and Groundwater Protection were moved here under PDP requirements.
E.3.c.4	69	Alternative Compliance for Technical Infeasibility: Mitigation	Allowing alternative compliance encourages innovative solutions that are not specifically called out in the permit. Alternatives are only valid if it is demonstrated that they can provide equal or better progress towards permit goals.	(Now E.3.c.(6)) Add "Alternative compliance is an optional program for the Copermittees to utilize if it is determined to provide an equal or greater benefit than onsite compliance. Where alternative compliance is allowed, it is the sole responsibility of the project applicant to execute the alternative compliance and comply with the following requirements: ~~subject to the following requirements:~~"
E.3.c.4.b	69-70	Criteria for Technical Infeasibility	On some very small projects, required orifice sizes are so small that effective maintenance is not possible.	(Now E.3.c.(6)(b) HMP flow rate requirements that result in BMP orifice sizes too small for efficient maintenance; and
E.3.c.4.c	70	Alternative Compliance for Technical Infeasibility: Mitigation	The permit should clearly provide Copermittees' with the flexibility to identify and craft an alternative compliance program that meets their specific program needs.. For example, a retrofit project is likely to capture, retain, and treat a mix of land uses. As a result, an offsite project's (i.e., regional retrofit) land uses (and associated EMCs) may not exactly line up with the land use of the new development.	(Now E.3.c.(6)(c)(i)) Modify language as follows: and/or ~~increased pollutant loads~~ water quality equivalence expected to be discharged from the site. The Project applicant must perform offsite mitigation for: [a] The portion of the pollutant load in the design capture volume that is not retained or equally treated onsite, and/or [b] The portion of the increased potential erosion of downstream receiving waters not fully controlled with hydromodification management BMPs onsite. ~~For the pollutant load in the volume of storm water not retained onsite with retention LID BMPs, or increased potential erosion of downstream receiving waters not fully controlled onsite with hydromodification management~~

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				~~BMPs, the Copermittee must require the project applicant to either 1) implement an offsite mitigation project, and/or 2) provide sufficient funding for a public or private offsite mitigation project via a mitigation fund.~~
E.3.c.4.c.i	70-71	Mitigation Project Locations	Aligning project locations with the watershed management areas as detailed in the WQIPs.	(Now E.3.c.(6).(c).(ii)) Replace hydrologic unit with Watershed Management Area
E.3.c.4.c.ii	71	Mitigation Project Types	Groundwater recharge and downstream flows are necessary for healthy receiving waters. Allowing offsite groundwater replenishment encourages more regional facilities. Added groundwater recharge projects, and further defined that in stream impervious surfaces are not applicable for credit.	(Now E.3.c.(6).(c).(iii)) Offsite mitigation projects may include, where applicable and feasible, retrofitting opportunities and stream and/or habitat rehabilitation or restoration opportunities identified in the Water Quality Improvement Plans, identified pursuant to Provision B.3.. Other offsite mitigation projects may include green streets or infrastructure projects, *groundwater recharge projects*, or regional BMPs upstream of receiving waters. Mitigation credit will not be given to portions of in stream mitigation projects using impervious hardscape materials such as concrete. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of Provision E.3.c.(4).
E.3.c.4.c.iii	71	Mitigation Project Timing	The requirement that offsite mitigation projects "be completed upon the granting of occupancy for the first project that contributes funds towards the offsite mitigation project…" is not feasible. Due to the length of time it takes to acquire all of the necessary permits, this timeline is not realistic for regional facilities and will serve as a deterrent to	(Now E.3.c.(6).(c).(iv)) Modify as follows: Offsite mitigation <u>funding</u> ~~projects~~ must be <u>secured by the applicant and verified by the Copermittee prior to granting construction permits or recording of maps,whichever comes first, for each</u> ~~completed upon the granting of occupancy for the first project that contributed funds toward the offsite mitigation project, unless a longer period is authorized by the San Diego~~

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			their construction as an alternative compliance mechanism. Additionally, it may take several years for a Copermittee to accumulate the funds necessary for the design, construction and permitting of a regional facility.	~~Water Board.~~
E.3.d	71	BMP Design Manual	Rename "Permanent BMP Sizing Criteria Design Manual" to simply the "BMP Design Manual". Simplicity is best for project applicants.	Update BMP Design Manual
E.3.e.2.a	73	Priority Development Project BMP Implementation and Oversight	Removal of the term "continuously" is suggested so ensure Copermittees do not have to allocate resources for incessant updates to the database. Language should also be added to clarify that, although the database will be watershed-based, each Copermittee is responsible only for inventory under their jurisdiction.	"Each Copermittee must develop and ~~continuously~~ regularly maintain a watershed-based database to track and inventory all Priority Development Projects and associated structural ~~permanent~~ BMPs within their jurisdiction. Inventories must be accurate and complete beginning from January 2002 for the San Diego County Copermittees, February 2003 for the Orange County Copermittees, and July 2005 for the Riverside County Copermittees. The database must include, at a minimum, the following information:"
E.4	75	Construction Management	Storm Water Pollution Prevention Plan (SWPPP) is a State General Construction Permit term, and should not be used within the MS4 permit so that there is no confusion. Replace with Pollution Control Plan.	Replaced SWPPP with Pollution Control Plan.
E.4.	75	Construction Management	The language has been updated so that the Copermittee can define which construction projects will be inventoried within its jurisdictional program. Not all jurisdictions apply permits the same way, therefore each needs the ability to address their processes in regards to construction projects. This will eliminate projects in	a. Construction Program Management Each copermittee must define in the Jurisdictional Runoff Management Plan the following: (1) Define construction sites to be inventoried, such as sites that involve ground disturbance or soil disturbing activities. (2) Define a process for ensuring adequate construction BMP implementation for non-

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			the inventory that are issued local building or construction permits but have no ground disturbance, e.g. plumbing, electrical, mechanical, decks, patios, etc.	inventoried sites. Non-inventoried sites involve minor construction activities that are not anticipated to create storm water pollution such as interior improvements, small miscellaneous residential improvements such as patio covers, plumbing, electrical and mechanical work.
E.5	79-85	Existing Development Management	After years of implementation of existing development programs, the Copermittees have the knowledge and experience to implement programs consistent with the goals of the Order and the adaptive management process required under the Order. In order to accomplish this goal, the Copermittees have reorganized and provided a concise existing development section as an alternative to the current provision E.	Replace the current provision E.5 with the proposed Provision E.5 located in the strikeout version provided.
E.5.a	79	Existing Development Management	Adding the term "reasonable potential to discharge" allows flexibility for the Copermittees to determine priorities. Practically all existing properties have the potential to generate pollutant loads and the inspection program will be ineffective and impractical to implement as written. The focus needs to be on significant pollutant load discharges so inspections and enforcement can actually succeed in receiving water pollutant load reductions versus spending an exhaustive amount of time and money inspecting sites that discharge no pollutant loads, but have the potential to generate minimal loads.	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must maintain an updated watershed-based inventory of all its existing development that <u>has the reasonable potential to</u> ~~may potentially~~ ~~generate~~ <u>discharge</u> a pollutant load to and from the MS4".
E.5.a.1.c	79	Existing Development	The SIC Code system was replaced by the NAICS Code system in 1997. As a	*If the current Provision E.5 is not replaced, modify as follows:*

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		Management	result, the use of the SIC Code system is being phased out.	c) SIC Code or NAICS Code, if applicable;
E.5.a.4, E.5.a.7	79	Existing Development Management	Mobile home parks are outside the jurisdiction of Copermittees. Also, minor grammatical corrections.	*If the current Provision E.5 is not replaced, modify as follows:* “(4) Identification ~~if a business is a~~ of mobile businesses; “ “(7) ~~Identification if an area is a~~ Common Interest Areas (CIAs) / Home Owner Associations (HOAs)~~, or and mobile home parks~~; “
E.5.a.13	80	Existing Development Management	The continual requirement for map updating is excessive. Regularly updated maps should be sufficient for up-to-date information without requiring Copermittees to expend excessive resources.	*If the current Provision E.5 is not replaced, modify as follows:* “A ~~continually~~ regularly updated map showing the location of inventoried existing development, watershed boundaries, water bodies, and pollutants generated at the inventoried existing development.”
E.5.b	80	Retrofitting and Channel Rehabilitation in Areas of Existing Development	This is a new requirement, as compared to the prior permit, which only requires an evaluation of channels that may be retrofitted. In many instances, channel rehabilitation may not be feasible and other options for improving discharge water quality would need to be considered. Language should be clarified to indicate retrofit and channel rehabilitation are options the Copermittees have at their disposal, but are not necessarily obligatory.	*If the current Provision E.5 is not replaced, modify as follows:* Remove this Provision entirely or include it as an option for compliance as stated below: “…and rehabilitate–channels and/or receiving waters to restore impaired beneficial uses of streams within its jurisdiction, as feasible.”
E.5.b.3	80	Existing Development Management	The proposed permit requires the Copermittees to “encourage” landowner retrofit to private property through the “Copermittee’s use of subsidies, penalties, or other incentives.” Copermittees will face serious enforcement (and possibly legal) issues if	*If the current Provision E.5 is not replaced, modify as follows:* Each Copermittee must implement retrofit and channel rehabilitation projects, as feasible, that address the highest water quality priorities identified in the Water Quality Improvement Plan pursuant to Provision B.3.a. Ranking may also take into account water quality, project feasibility cost effectiveness, and

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			they attempt to penalize private landowners for failing to expend their own time, effort, and money retrofitting properties that landowners had no intention of altering in the first place. In addition, water quality, feasibility, cost effectiveness, and community acceptance should be considered when a strategy is developed for retrofit and/or channel rehabilitation.	community acceptance. The Copermittee ~~must~~ should encourage private landowners to implement retrofit designs, at minimum, through the use of public education and outreach. ~~and channel rehabilitation projects whenever practical. Private landowners should be encouraged through the Copermittee's use of subsidies, penalties, or other incentives.~~
E.5.b.5	81	Existing Development Management	See comments for Provision E.5.b.	*If the current Provision E.5 is not replaced, modify as follows:* "Where retrofitting and channel rehabilitation within specific areas of existing development under the Copermittees jurisdiction are determined to be infeasible to restore and protect receiving waters from the highest water quality priorities identified in the Water Quality Improvement Plan, each Copermittee ~~must~~ may identify, develop, and implement regional retrofitting and channel rehabilitation projects..."
E.5.b.7	81	Existing Development Management	Resource re-allocation will assist in neutralizing costs for any channel rehabilitation/retrofit projects undertaken by the Copermittees and will have a more significant likelihood of improving water quality than monitoring. Add.	*If the current Provision E.5 is not replaced, modify as follows:* (7) Upon Regional Board approval and in lieu of monitoring during any given year, the Copermittees may reallocate resources originally authorized for water quality monitoring for retrofit and/or rehabilitation project(s), for a maximum of two nonconsecutive years during the permit term.
E.5.c.1	81	Existing Development Management	Required use of pollution prevention methods will be extremely difficult to enforce, particularly if residential land uses are included.	*If the current Provision E.5 is not replaced, modify as follows:* Each Copermittee must ~~require~~ promote the use of pollution prevention methods by the inventoried existing development through public outreach.
E.5.c.2	81	Existing Development	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:*

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		Management		"Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development with the reasonable potential to discharge pollutant loads to their MS4, including special event venues ~~that have the potential to generate pollutants~~."
E.5.c.3	81	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* Each Copermittee must implement, or require the implementation of, designated BMPs at inventoried existing development that have the reasonable potential to ~~generate~~ discharge pollutant~~s~~ loads from their MS4.
E.5.c.4	82	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* Each Copermittee must operate and maintain, or require the operation and maintenance of designated BMPs at all inventoried existing development that have been identified by the Copermittee as having the reasonable potential to discharge pollutant loads to their MS4.
E.5.c.4.b	82	Existing Development Management	Clarification is necessary that Copermittees are only responsible for the work conducted within their jurisdiction and under their authority.	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must implement procedures during the operation and maintenance of public streets, unpaved roads, paved roads, and paved highways and freeways, conducted under their authority and within their jurisdiction, that will reduce the contribution of storm water pollutants to the MEP and effectively prohibit the discharge of non-storm water pollutants from the MS4 to receiving water bodies. During maintenance of unpaved roads, each Copermittee must examine the feasibility of replacing existing culverts or designing new culverts/bridge crossings to maintain natural stream geomorphology.
E.5.c.5	82	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must implement procedures, or require the

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				implementation of procedures, to reduce the contribution of pollutants in storm water to the MEP and effectively prohibit non-storm water discharges associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from inventoried existing development ~~into and from the MS4s.~~ identified by the Copermittee as having the reasonable potential to discharge pollutant loads into or from their MS4."
E.5.d	83	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must conduct inspections of inventoried existing development that have been identified by the Copermittee as having the reasonable potential to discharge pollutant loads from their MS4 to ensure compliance with applicable local ordinances and permits, and the requirements of this Order."
E.5.d.1	83	Existing Development Management	See comment E.5.a.	*If the current Provision E.5 is not replaced, modify as follows:* "Each Copermittee must establish appropriate inspection frequencies for inventoried existing development based on the priorities set forth in the Water Quality Improvement Plan, and the potential for discharging pollutants via storm water and non-storm water runoff. At a minimum, inventoried existing development that has been identified by the Copermittee as having the reasonable potential to discharge pollutant loads to and from their MS4 must be inspected once ~~every five years~~ during the permit term. Inventoried existing development must also be inspected within six months of any change in property ownership or ~~change~~ increase in pollutant generating activity.."
E.5.d.2.d through E.5.d.2.f	83-84	Existing Development Management	The addition of "if present" is necessary for clarification.	*If the current Provision E.5 is not replaced, modify as follows:* "(d)Visual observations of actual non-storm water discharges, if present; (e)Visual observations of actual or potential discharge of pollutants, if present;

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				(f)Visual observations of actual or potential illicit connections, if present; and…”
E.5.e	85	Existing Development Management	Limiting language should be included for the Copermittee's jurisdiction. The existing development inventory and enforcement should be limited to development with the reasonable potential to discharge pollutants.	*If the current Provision E.5 is not replaced, modify as follows:* “Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried existing development identified by the Copermittee as having the reasonable potential to discharge pollutant loads from the MS4 within their jurisdiction, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.”
E.6	85	Enforcement Response Plans	Enforcement response plans are already codified in Copermittees' municipal codes. This section increases requirements for enforcement response and should be made more concise.	Recommend replacement of Enforcement Response Plan Provision with Copermittee streamlined provision, contained in the strikeout provided.
E.6.b.5	87	Enforcement Response Plans	Two weeks compliance is an extremely short time period for maintenance of TCBMPs and reasonable only if the next rain event is within that two week period. One month is much more reasonable and realistic for confirmation of TCBMP maintenance and is consistent with Copermittee implementation experience and existing ordinances.	*If the current Provision E.6 is not replaced, modify as follows:* “For violations of permanent BMP maintenance requirements, all violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than ~~10 business~~ 30 calendar days after the violations are discovered. If more than ~~10 business~~ 30 calendar days are required for compliance, a rationale must be recorded in the electronic database or equivalent tabular system used to track permanent BMP inspections. “
E.6.c.2	87-88	Enforcement Response Plans	Criminal penalties should be limited to intentional or criminally negligent acts.	*If the current Provision E.6 is not replaced, modify as follows:* The enforcement process must include, at a minimum, appropriate sanctions to compel compliance, such as: (a) Verbal and written notices of violation;

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				(b) Cleanup requirements; (c) Fines; (d) Bonding requirements; (e) Administrative and criminal <u>(if intentional or criminally negligent)</u> penalties; (f) Liens; (g) Stop work orders; and (h) Permit and occupancy denials.
E.6.c.4	88	Enforcement Response Plans	See comment E.6.b.5.	*If the current Provision E.6 is not replaced, modify as follows:* Change 10 business days to 30 calendar days.
E.6.d.1	88	Enforcement Response Plans	San Diego Water Board notice should be consistent with 40 CFR §122.41(l)(6) and the State of California Construction General Permit. Generally, the requirements should be 24 hour verbal notice and five day written notification. Also, email should suffice as written notice.	"Each Copermittee must notify the San Diego Water Board in writing within ~~48 hours~~ <u>5 calendar days</u> of issuing ~~high level~~ <u>escalated</u> enforcement (as defined in the Copermittee's Enforcement Response Plan) to a construction site that poses a significant threat to water quality as a result of violations or other non-compliance with its permits and applicable local ordinances, and the requirements of this Order. <u>Written notification may be provided electronically in email form.</u>"
E.7.b.	89	Public Education and Participation	Public participation activities are more closely related to education and outreach, and are inherently different from intergovernmental coordination. Therefore public participation should be included with outreach activities. Move from E.7.b. to E.7.a.	"Each Copermittee must implement a public education <u>and participation program</u>, as appropriate, to promote and encourage <u>the development of programs</u>, management practices, control techniques and systems, design and engineering methods, and behaviors that reduce the discharge of pollutants in storm water to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving waters. The public education program must include~~, at minimum,~~ the following:"
E.7.a.(1)	89	Public Education and Participation	There is specific emphasis on pesticides, herbicides and fertilizers. The rationale for the specificity of these topics is unclear. Given the emphasis on showing changes in water quality, education	Educational activities, public information activities, and other appropriate outreach activities intended to reduce pollutants ~~associated with the application of pesticides, herbicides and fertilizer in storm water discharges~~ <u>of concern</u> from the MS4 to the MEP<u>. Activities shall be determined and prioritized by</u>

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			efforts should be focused on activities that address the pollutants of concern and behaviors that are tied to water quality issues. Therefore, each Copermittee, by jurisdiction and watershed, should identify, determine and prioritize the activities that address priorities consistent with Provision B.	Copermittees by jurisdiction and/or watershed (Section 5.c.(5) to address the highest threats to water quality, such as pesticides, herbicides and fertilizers, used oil, toxic waste, etc.;
E.7.a (2)	89	Public Education and Participation	There is specific emphasis on used oil and toxic material disposal. The rationale for the specificity in education topics is unclear. As stated above, Copermittees should be able to target education efforts on the pollutants and behaviors most commonly linked to the water quality issues within their respective jurisdictions and watersheds. Thus, this section is incorporated in the changes proposed above and would become part of E.7.a.1.	Move section E.7.a(2) into E.7.a(1).
E.7.a(3)	89	Public Education and Participation	There is specific emphasis on construction site operators as a target audience, with "other target audiences as determined by the Copermittee(s)". The rationale for this is unclear. Per the justification above, each Copermittee should be able to determine target audiences in accordance with high risk activities and high priority pollutants within their jurisdiction and watershed(s). Once re-worded, this paragraph then becomes E.7.a (2), because the first two paragraphs have been combined per the comments above. .	"Appropriate education and training measures ~~for construction site operators and other~~ specific target audiences, as determined and prioritized by the Copermittees by jurisdiction and watershed, based on high risk behaviors and pollutants of concern, such as construction site operators, residents, underserved target audiences and school-aged children."
E.7.b	89	Public Education	Inclusion of evaluation and assessment	Include the following language as E.7.a(3):

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		and Participation	for education and outreach activities is a critical tool for adaptive management and should be addressed. Use of assessment is heavily cited in the development of the overall Water Quality Improvement Plan strategy. In addition, the purpose of intergovernmental coordination on respective JRMPs is unclear. Append to allow for watershed and regional collaboration of education and outreach activities based on effectiveness as determined by the Copermittees. Remove requirement for intergovernmental collaboration on jurisdictional runoff management programs. Add E.7.b as evaluation and assessment and move the current E.7.b to E.7.c.	b. "Each Copermittee shall incorporate a mechanism for evaluation and assessment of educational and other outreach activities, as needed, to identify progress and incorporate modifications necessary to increase the effectiveness of the public education program." c. "Each Copermittee may determine, where appropriate and effective, mechanisms for intergovernmental coordination on education and outreach activities. ~~must incorporate a mechanism for public participation and where necessary intergovernmental coordination in updating, developing, and implementing its jurisdictional runoff management program.~~
F. Reporting				
F.1 and F.2	90	Reporting	Changes for consistency with Provision B.6.	Change timeframe from 12 to 18 months.
F.1	90	Reporting	Minor changes incorporated for consistency with Provision B.	Incorporate timeline consistent with Provision B.
F.2.a	90	Reporting	Additional language is necessary to clarify that modification of program elements of the jurisdictional runoff management program will include rationale for any changes to program elements prescribed in Provision E.	Add "Jurisdictional Runoff Management Program document updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents." Add similar language for the BMP design manual and the Water Quality Improvement updates.
F.2.b	90	Reporting	See F.2.a.	See F.2.a.
F.2.c	91	Reporting	See F.2.a.	See F.2.a.
F.3.b	91	Reporting	Clarification.	"…The first Annual Report must be prepared for the reporting period beginning July 1 after adoption of the permit, and upon

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				San Diego Water Board determination that ~~the date the San Diego Water Board determines that~~…”
F.3.b.	91-92	Reporting	The San Diego Water Board should provide flexibility to allow updates to the Jurisdictional Runoff Management Program Annual Report Form (Attachment D).	Clarify “(Attachment D or approved revision” throughout the Provision.
F.3.b.1 (a through c)	91	Reporting	Monitoring data should be discussed under proposed modifications of the WQIP.	Move a through c under (iii) in original document (now iv).
F.3.b.1.d	92	Reporting	See F.2.a.	Add: (iii) “Proposed modifications to water quality improvement or jurisdictional strategies with associated rationale for such modifications,”
F.3.b.2	92	Reporting	Each Copermittee must submit the report form for each WMA in which they have jurisdiction. Language has been clarified.	Add: “Each Copermittee’s Annual Report form must summarize the jurisdictional activities in the WMAs in which the Copermittee has jurisdiction.”
F.4	93	Reporting	The Copermittees require language clarification that the regional clearinghouse may be maintained by another agency.	Add a footnote: “The Copermittee may elect to develop and maintain the clearinghouse(s) provided by other Copermittees or agencies.”
F.5	93	Reporting	See F.4.	Add similar language from F.4.
G. Principal Watershed Copermittee Responsibilities				
G	96	Principal Watershed Copermittee Responsibilities	Coordinating and developing, with the other Copermittees, the requirements of Provisions F.3.c, F.4, and F.5.b of this Order.	Remove requirement that Principal Copermittee can only be Principal Copermittee for 2 watersheds. Clarify that all Copermittees have some level of commitment, not just the Principal Watershed Copermittee.
H. Modification of Programs				
H	97	Modification of Programs	Modifications of programs are allowed under the WQIP as part of the iterative process and adaptive management. Language should be added to that effect or there may be annual amendments to	“Proposed modifications outside of the WQIP process that are not minor require amendment of this Order in accordance with this Order’s rules, policies, and procedures.”

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			the Order.	
I. Standard Permit Provisions and General Provisions				
			N/A	None.
Attachment A. Discharge Prohibitions				
Attachment A, 2	A-1	Attachment B to State Water Board Resolution 2012-001X	The Resolution has been adopted as 2012-0012 and should be updated accordingly throughout the document. Order should be incorporated by reference instead duplication.	Reference adopted SWRCB Resolution 2012-0012.
Attachment B. Standard Permit Provisions and General Provisions				
Attachment B	B1-B5	Standard Permit Provisions and General Provisions	This attachment incorporates the standard NPDES permit provisions as identified in 40 CFR 122.41. Although correctly transposed from the regulations the provisions are obviously developed for a traditional point source permit (i.e. wastewater permit). As such there are a number of standard provision that pose challenges to the Copermittees to comply with. Clarification is requested on a number of the provisions.	See specific changes noted below.
Attachment B, 1.m	B-7	Bypass	This provision requires the Copermittees to notify the Regional Board whenever an anticipated or unanticipated bypass will occur. Given the nature of storm events and the fact that stormwater treatment BMPs include bypass provisions to protect the BMP integrity it would appear that the Copermittees should notify the Regional Board anytime a storm is predicted to ensure compliance with the provision (whether anticipated or unanticipated). This provision was crafted for typical wastewater discharges	Delete this provision.

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			and has little relevance to stormwater.	
Attachment C. Acronyms, Abbreviations and Definitions				
Attachment C	C1-C10	Definitions	Definitions need to be added for: properly designed, BMP Design Manual, Public Education, Outreach, and Participation channel rehabilitation and improvement, and retrofit. As currently written, the permit authorizes subjective broad authority and deference to the Regional Board in interpretation of the definitions, if not included. Minor clarifications and grammatical corrections are also included.	Suggested definitions are provided in the strikeout.
Attachment C	C-6	Definitions – MS4	The addition of CWA language to the definition of MS4 limits Copermittees' responsibilities to within their jurisdiction and strengthens support that Copermittees are not responsible for discharges in MS4s that they do not operate.	Add <u>"Copermittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.21(a)(vi).</u>
Attachment C	C-7	Definitions – Pre-Development Runoff Conditions	The definition for Pre-Development Runoff Conditions should be the exact language codified in the Federal Register at 64 FR §68761.	**Replace the definition as follows:** **<u>Pre-Development Runoff Conditions</u>** <u>– "Runoff conditions that exist onsite immediately before the planned development activities occur. Pre-development is not intended to be interpreted as that period before any human-induced land disturbance activity has occurred." 64 FR §68761.</u>
Attachment C	C-7	Definitions – Public Education, Outreach, and Participation	Neither Public Education and Outreach, nor Public Participation are mentioned in the definitions section of Attachment C. Please add definitions for these non-structural BMPs.	**Add "<u>Public Education, Outreach and Participation</u>** <u>– Programs to educate residents, businesses and visitors about the importance of water quality and water quality programs so that they will support local efforts and understand their role in protecting receiving waters. The Education and Outreach Program will increase knowledge and awareness, improve attitudes toward</u>

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				storm pollution prevention, and provide a foundation for changing behaviors that contribute to storm water pollution."
Attachment C	C-10	Definitions – Waters of the state	Current permit language, citing the California Water Code, presupposes that all portions of the MS4 are considered waters covered by the definition of waters of the state, "Any water, surface or underground, including saline waters within the boundaries of the State [CWC Provision 13050 (e)]." This language should be limited based on the intent of the definition (natural water sources) and should not include dry man-made structures that collect runoff for the sole purpose of flow volume/velocity and/or pollutant reduction.	**"Waters of the State** - Any water, surface or underground, including saline waters within the boundaries of the State [CWC Provision 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State ~~regardless of circumstance or condition~~. Under this definition, portions of a MS4 may be ~~is always~~ considered to be a Waters of the State. However, man-made portions of the MS4 constructed for the sole purpose of flow and/or pollutant reduction will not be considered Waters of the State."
Attachment D. Jurisdictional Runoff Management Program Annual Report Form				
			N/A	None.
Attachment E. Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011				
Attachment E	E-1 to E-30	Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	Most requirements are outlined already in the TMDLs and the redundancy of this Attachment is unnecessary. In fact, Attachment E *adds* many TMDL requirements not provided in the TMDL Resolutions, circumventing the TMDL public process. Implementation will be inconsistent with previously adopted resolutions and CLRPs and MPs already drafted, submitted, approved, and/or implemented. A summary of inconsistencies between the TMDLs and Attachment E, where the City of San	On page E-1, reword to clarify that TMDL implementation must be incorporated into the WQIP and Monitoring sections by the Copermittees and reference the Resolution Numbers in the TMDL list and add recommended compliance language per comments below. Address all inconsistencies with the TMDL Resolutions (provided as attachment).

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			Diego is listed as a responsible party, are provided as an attachment to this table.	
Attachment E	E-1	Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	The Rainbow Creek TMDL for Total Nitrogen and Phosphorous does not include Wasteload Allocations for the County of San Diego Copermittees. The TMDL only contains Load Allocations. Load allocations should not be implemented through an NPDES permit. It is inappropriate to simply "re-name" the Load Allocations as Wasteload Allocations.	Strike the following TMDL from Attachment E in its entirety: Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed
Attachment E	E-1 to E-30	Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	State and federal law do not require the use of numeric effluent limitations for MS4 permittees, but rather encourage flexible implementation of best management practices through an iterative process. Specifically, the choice to include either management practices or numeric limitations in MS4 permits is within the regulatory agency's discretion, and on the question of whether MS4 permits must contain numeric effluent limitations, the court upheld EPA's use of iterative BMPs in place of numeric effluent limitations for storm water discharges. (See *Defenders of Wildlife v. Browner*, 191 F.3d 1159, 1166-1167 (9th Cir. 1999)[1]	See recommended changes in the attached revised Permit to the following: • Provision A.4.c • Provision A.4.d • Provision B (first paragraph) • Provision B.3 Additionally, within the requirements for each individual TMDL in Attachment E, include language similar to the following,: Compliance may be demonstrated via any one of the following methods: 1. There is no discharge from the MS4, or 2. Applicable effluent limitations are met, or 3. Receiving waters meet the applicable receiving water limitations or water quality objective, or 4. Loading from the MS4 is such that it does not cause water

[1] See also California Regional Water Quality Control Board San Diego Region - Fact Sheet / Technical Report For Order No. R9-2010-0016 / NPDES NO. CAS0108766.

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			Given the challenges with meeting the numeric WQBELs (even with the implementation of a comprehensive suite of BMPs) and the flexibility allowed by State and federal regulations and guidance, a BMP-based WQBEL approach should be allowed for complying with TMDLs. Removing the numeric WQBELs is not proposed. Rather, inclusion of a WQIP-based "compliance path" is recommended. The WQIPs can and should be used as the basis for establishing WQBELs expressed as BMPs. The WQIPs can satisfy the necessary elements of BMP-based WQBELs. For example, the WQIPs would meet the requirements described in the 2010 EPA memo (which updated key aspects of the 2002 memorandum) regarding federal expectations for incorporation of TMDLs WLAs into NPDES stormwater permits as BMP-based WQBELs.	quality objective exceedances, or 5. For Copermittee(s) that are implementing a Regional Board-approved WQIP, WQBELs will be implemented as BMPs and compliance will be based upon implementing all provisions of the WQIP in accordance with the approved milestones and schedule.
Attachment E	E-1 to E-30	Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2012-0011	The findings of California's Stormwater Blue Ribbon Panel, which was convened specifically to examine the feasibility of incorporating numeric effluent limits in stormwater permits, ultimately concluded that numeric limits were generally infeasible across all three stormwater activities (municipal, industrial, and construction), with a few exceptions (*The*	See recommended changes in the attached revised Permit to the following: • Provision A.4.c • Provision A.4.d • Provision B (first paragraph) • Provision B.3 Additionally, within the requirements for each individual TMDL in Attachment E, include language similar to the following,:

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			Feasibility of Numeric Effluent Limits Applicable to Discharges of Stormwater Associated with Municipal, Industrial and Construction Activities, June 19, 2006). Additionally, state law and policy does not require the use of numeric effluent limitations in MS4 permits. In 2009, the State Water Board affirmed this approach in a precedential order, stating: [i]t is our intent that federally mandated TMDLs be given substantive effect. Doing so can improve the efficacy of California's NPDES storm water permits. This is not to say that a wasteload allocation will result in numeric effluent limitations for municipal storm water dischargers. Whether a future municipal storm water permit requirement appropriately implements a storm water wasteload allocation will need to be decided on the regional water quality control board's findings *supporting either the numeric or non-numeric* effluent limitations contained in the permit. (Order WQ 2009-0008, In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District, at p. 10	Compliance may be demonstrated via any one of the following methods: 1. There is no discharge from the MS4, or 2. Applicable effluent limitations are met, or 3. Receiving waters meet the applicable receiving water limitations or water quality objective, or 4. Loading from the MS4 is such that it does not cause water quality objective exceedances, or 5. For Copermittee(s) that are implementing a Regional Board-approved WQIP, WQBELs will be implemented as BMPs and compliance will be based upon implementing all provisions of the WQIP in accordance with the approved milestones and schedule.

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			(emphasis added).)	
Attachment E. Part 1.b, 2.b, 3.b, 4.b, 5.b, and 6.b	E-2, E-4, E-6, E-9, E-13, and E-19	Water Quality Based Effluent Limitations	Federal regulations (40 CFR 122.44(d)(1)(vii)(B)) require inclusion of effluent limits that are "consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA." Attachment E outlines the requirements of effective TMDLs and appears to incorporate numeric receiving water limitations (RWL) <u>and</u> effluent limitations, where the effluent limitations are set equal to the TMDL Waste Load Allocations (WLAs) and the RWLs are set equal to the TMDL numeric targets. This approach results in a situation where the Copermittees are in double jeopardy. Copermittees should not be put in double jeopardy by being required to meet both RWLs and effluent limitations. Rather, attainment of either RWLs <u>**or**</u> effluent limitations should represent compliance with the permit and the requirements of the TMDL.	See recommended changes in the attached revised Permit. Additional language should be added to the WQBELs sections for all TMDLs in Attachment E to clearly define compliance with WQBELs via any of the following methods: - There is no discharge from the MS4, **OR** - Applicable effluent limitations are met, **OR** - Receiving waters meet the applicable receiving water limitations or water quality objective, **OR** - Loading from the MS4 is such that it does not cause water quality objective exceedances, **OR** - For Copermittee(s) that are implementing a Regional Board-approved WQIP, WQBELs will be implemented as BMPs and compliance will be based upon implementing all provisions of the WQIP in accordance with the approved milestones and schedule.
Attachment E	E-1 to E-30	Multiple	Attachment E specifies outfall monitoring requirements for several TMDLs, "in accordance with the requirements of Provisions D.1,	Modify the Specific Monitoring and Assessment Requirements for the following TMDLs: 1. Total Maximum Daily Load for Diazinon in Chollas

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			D.4.a.(1)(b), and D.4.a.(3)(b) of this Order." Adding outfall monitoring to the TMDL provisions is inappropriate and unnecessary. Attachment E should focus on integrating the monitoring requirements *specified in the TMDL Basin Plan Amendments*. The monitoring requirements for TMDLs were developed through a public comment process and adopted by the Regional Board, and are the only monitoring requirements that should be specified in Attachment E. Furthermore, there is no reason to re-state the requirements from Provision D, which makes it likely that Attachment E and Provision D will have inconsistencies. Provision D requirements should only be listed in Provision D.	Creek Watershed 2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin 3. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek 4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Specifically, for each of these TMDLs, the sub-bullet under section (d) regarding effluent monitoring should be stricken and replaced with the following: "The Responsible Copermittees must implement the monitoring and assessment requirements issued under Order No. XXXX. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.", where "XXXX" reflects the order numbers for each TMDL, shown in the attached revised Permit on Page E-1. For the Chollas Creek Metals and Diazinon TMDLs, the XXX refers to the order number for the issued Investigation Orders. For the Project I Bacteria TMDL, specific changes to the monitoring requirements are requested to reflect those specified in the TMDL Basin Plan Amendment, as described below.
Attachment E. Part 4.b.	E-10	Water Quality Based Effluent Limitations	The TMDL for Dissolved Copper, Lead, and Zinc in Chollas Creek states that "If all copper, lead, and zinc concentrations in urban runoff to Chollas Creek meet their respective TMDL concentrations, the loading capacity of the creek should	If WQBELs are to be expressed as numeric effluent limits consistent with the WLAs, then mass-based WQBELs should be included as a mechanism for demonstrating compliance to allow for options to demonstrate load-based pollutant reductions. As described above, the mass-based WQBELs should only be included with an "or" statement (not an "and" statement).

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			not be exceeded" (Section 8). The TMDL further states that "because this WLA is concentration-based it will apply to each land use and each sub-watershed at all times and will not be specific to any land use or sub-watershed (Section 8.1)." Requiring all land uses and sub-watersheds to meet effluent limits consistent with RWLs is not a cost-effective or practicable approach to BMP strategy development. Volume reduction strategies such as Low Impact Development and Green Infrastructure should be a viable compliance path for the San Diego region. The WQBELs should include the mass-load based WLAs to consider the pollutant loads reduced, which will be impacted by both pollutant concentration reductions *and* stormwater volume reductions. Alternatives for load-based approaches should be included as effluent limitations, which will correspond to targets for meaningful CLRP and WQIP development.	The recommended Compliance Determination language in the attached revised Permit addresses this issue.
Attachment E. Part 6.a	E-16 to E-19	Applicability	Since adoption of the Project I Bacteria TMDL, the Copermittees have submitted data analysis to the Regional Board to demonstrate that 303(d) listings for San Marcos HA, San Dieguito River HA, and Los Penasquitos HA were incorrectly applied to REC beneficial uses. The	In Table 6.0, the San Dieguito River WMA and Carlsbad WMAs should be deleted. The Los Penasquitos WMA should be re-named to the Mission Bay WMA and Torrey Pines State Beach at Del Mar should be removed. The recommended language in the attached revised Permit addresses this issue by also adding the following to Specific Provision 6.a.(5):

<table>
<tr><th colspan="5">SAN DIEGO COPERMITTEE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011</th></tr>
<tr><th>Permit Section</th><th>Permit Page (Original)</th><th>Section Title</th><th>Reason for Proposed Changes/Comments</th><th>Proposed Changes</th></tr>
<tr><td></td><td></td><td></td><td>Regional Board has concurred with the findings for each HA and stated that these HAs are “not subject to further action under Resolution No. R9-2010-0001.” Similar responses are expected for the other HAs.</td><td>“Subsequent to TMDL adoption, it has been established by the Regional Board that the following water bodies are not subject to further action under Resolution No. R9-2010-001, and therefore are not subject to Bacteria TMDL requirements described herein and are not included in Table 6.0:
<table>
<tr><th>Watershed Management Area</th><th>Water Body</th><th>Segment or Area</th></tr>
<tr><td>Carlsbad</td><td>Pacific Ocean Shoreline</td><td>at Moonlight State Beach</td></tr>
<tr><td>San Dieguito River</td><td>Pacific Ocean Shoreline</td><td>at San Dieguito Lagoon mouth</td></tr>
<tr><td>Penasquitos</td><td>Pacific Ocean Shoreline</td><td>Torrey Pines State Beach at Del Mar (Anderson Canyon)</td></tr>
</table></td></tr>
<tr><td>Attachment E. Part 6.b</td><td>E-19</td><td>Receiving Water Limitations</td><td>The Basin Plan Amendment for the Project I Bacteria TMDL contains Receiving Water Limitations. These Receiving Water Limitations should be incorporated directly into the Permit. However, Attachment E contains Receiving Water Limitations that do <u>not</u> match those from the TMDL. The Regional Board should not revise or translate the RWLs from the TMDL, they should be incorporated directly. The RWLs incorporated into Attachment E have several discrepancies with the</td><td>Replace entirely the RWLs in the Permit with those from the TMDL.

The attached revised Permit incorporates RWLs for beaches (Table 6.1) and RWLs for Creeks (Table 6.2). Note these RWLs were pasted directly from the Basin Plan Amendment (Attachment A, page 52).</td></tr>
</table>

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			RWLs in the TMDL, including application of single sample targets to the dry weather RWLs and application of total coliform RWLs for inland waters.	
Attachment E. Part 6.b	E-19 and E-20	Water Quality Based Effluent Limitations	Attachment E specifies WQBELs for dry weather flows as both receiving water and effluent limitations for the Project I Bacteria TMDL, in terms of zero allowable exceedances of the single sample maximum and the 30-day geometric mean. However, the dry weather component of the TMDL only considered the 30-day geometric mean, and did not consider the single sample maximum within its calculation. Incorporating single sample effluent limitations into the Permit goes beyond the TMDL requirements. In addition, if the TMDL had included single sample limits, there would have been a corresponding allowable exceedance frequency, just as for wet weather. The 22% allowable exceedance rate for wet weather was based on a reference beach within the Los Angeles Region, and although not used in the technical approach for the San Diego Beaches and Creeks TMDL, the reference beach also exhibits exceedances during dry weather, which is incorporated into beach TMDLs in the Los Angeles region.	It is recommended that the single sample maximum not be used for dry weather WQBELs. At a minimum, an acceptable dry weather exceedance frequency should be assumed and applied. Specific Provision 6.b.(2) of the attached revised Permit addresses this issue by (1) incorporating the RWLs directly from the TMDL, and (2) linking the receiving water limitations and effluent limitations.
Attachment E.	E-20	Water Quality		If WQBELs are to be expressed as numeric effluent limits

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Part 6.b		Based Effluent Limitations	The Project I Bacteria TMDL applies mass-load based TMDLs to point sources. Many of the BMPs used for achieving pollutant reductions, such as structural BMPs and green infrastructure, emphasize infiltration and associated volume reduction as the primary mechanism for reducing urban runoff. A significant investment could be made to implement structural BMPs to reduce urban runoff to meet the mass-load based WLAs assigned in the TMDL. These reductions could result in meeting the mass-based WLA and have a positive impact on receiving waters by significantly reducing urban loads to receiving waters. However, even the small amount of flows remaining could exceed the numeric effluent limitations currently in the Permit, but <u>not</u> cause or contribute to WQO exceedances. In this manner, a violation of the numeric WQBELs would result in zero credit for the millions invested and penalty for discharges that did <u>not</u> negatively impact attainment of WQ standards. Volume reduction strategies such as Low Impact Development and Green Infrastructure should be a viable compliance path for the San Diego region. The WQBELs should include the mass-load based WLAs to consider the pollutant loads reduced, which will be	consistent with the WLAs, the mass based WLAs for both dry and wet weather presented in the TMDL should be included as a mechanism for demonstrating compliance to 1) be consistent with the assumptions of the WLAs and 2) allow for options to demonstrate load based pollutant reductions. The attached revised Permit addresses this issue by incorporating the mass-based wasteload allocations into Section 6.b.(2).

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			impacted by both pollutant concentration reductions *and* stormwater volume reductions.	
Attachment E. Part 6.b	E-19-E-20	Water Quality Based Effluent Limitations	The reference conditions and associated allowable exceedance frequencies for WQBELs addressing Project I Bacteria TMDL were based on a marine reference beach within Los Angeles, and are not necessarily applicable to fresh water flows in the San Diego Region. The Los Angeles reference beach was influenced by salt water (increasing bacterial die-off) and mixing/dilution from wave action that likely resulted in lower exceedances of REC-1 objectives than would be found in a freshwater stream. Freshwater TMDLs in the Los Angeles region now incorporate freshwater reference systems (instead of a marine reference system), and the marine beach exceedance rates have been updated through a recent TMDL reopener for Santa Monica Bay. In addition, a reference study is currently underway for the San Diego Region.	The permit should include language that allows for update of the allowable exceedance frequencies as these results become available. The attached revised Permit addresses this issue by added the following paragraph to Specific Provision 6.b.(1).(a): "The allowable exceedance frequencies in Table 6.1 and Table 6.2 can be updated by the Regional Board Executive Officer if sufficient data is provided regarding reference systems in the San Diego Region."
Attachment E. Part 6.c	E-21	Compliance Schedule	Total coliform WQOs do not apply to inland waters.	As shown in the attached revised Permit, add a footnote to Table 6.3 as follows: "Total coliform receiving water limitations apply only to segments of areas of Pacific Ocean Shoreline listed in Table 6.0."
Attachment E. Part 6.c	E-21 to E-27	Compliance Schedule	The CLRPs to be submitted by Copermitees will propose interim compliance dates, as allowed by the	The interim compliance dates should not be specified in the Permit. Instead, the Permit should reference the submitted and

SAN DIEGO COPERMITTEE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Permit Section	**Permit Page (Original)**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
			Project I Bacteria TMDL, generally 7 and 10 years, respectively, to meet the 50% reduction milestone for dry and wet weather. The CLRPs submitted by Copermittees may not all propose the same interim compliance dates and the Permit should acknowledge the flexibility allowed by the TMDL (see page 68 of Attachment A of the Basin Plan Amendment). In fact, this scheduling flexibility was a primary "incentive" for Copermitees to develop CLRPs instead of BLRPs.	Regional Board-approved CLRPs. This approach will avoid conflict between the TMDL, Permit, and CLRPs. The attached revised Permit addresses this issue by revising the opening of Section 6.c.(2): "The Responsible Copermittees must comply with the following interim WQBELs by the interim compliance dates <u>submitted in the Regional Board-approved CLRPs and supported by Order No. R9-2010-0001</u>:" Table 6.5 should be deleted from Attachment E to allow the CLRPs the scheduling flexibility provided in the TMDL adopted by the Regional Board.
Attachment E. Part 6.c	E-21 thru E-27	Compliance Schedule	Similar to the flexibility allowed for scheduling, the TMDL allows CLRPs flexibility in expressing and achieving TMDL milestones/interim requirements. Furthermore, the wet weather interim compliance dates are well-beyond the term of this Permit, and should be not included in Attachment E.	Delete Table 6.4 because (1) the CLRPs have flexibility to express interim milestones and (2) the wet weather interim requirements do not apply until 2022, well beyond the term of this Permit.
Attachment E. Part 6.c	E-27	Compliance Schedule	The Copermittees request an acknowledgement of the TMDL reopener scheduled for April 2016 which falls within the term of this Permit.	Add a part (3) to Specific Provision 6.c: "(3) <u>Submittals to Support TMDL Basin Plan Amendment</u> The Responsible Copermittees are encouraged to submit data to support the TMDL reopener scheduled for April 2016 including but not limited to data related to reference watershed monitoring and beneficial use usage frequency."
Attachment E. Part 6.d	E-27	Compliance Determination	The BPA for the Project I Bacteria TMDL contains specific language regarding MS4 compliance determination	As shown in the attached revised Permit, add the following language to Section 6 of Attachment E, which is *pasted directly* from the BPA:

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Permit Section	**Permit Page (Original)**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
(new section added to revised)			in the case that receiving water limitations are not attained. This language should be added directly to the Permit.	"The municipal MS4s may demonstrate that their discharges are not causing the exceedances in the receiving waters by providing data from their discharge points to the receiving waters, by providing data collected at jurisdictional boundaries, and/or by using other methods accepted by the San Diego Water Board. Otherwise, at the end of the wet weather TMDL compliance schedule, the municipal Phase I MS4s will be held responsible and considered out of compliance unless other information or evidence indicates another controllable or uncontrollable source is responsible for the exceedances in the receiving waters. If controllable sources other than discharges from the municipal Phase I MS4s are identified before or after the end of the wet weather TMDL Compliance Schedules as causing the exceedances, those controllable sources will be responsible for reducing their bacteria loads and/or demonstrating that discharges from those sources are not causing the exceedances. If controllable sources other than the Phase I MS4s are identified as causing the exceedances, and the Phase I MS4s have demonstrated they are not causing or contributing to the exceedances, the Phase I MS4s will not be considered out of compliance. The San Diego Water Board shall implement additional actions (e.g., issue enforcement actions, amend existing NPDES requirements or conditional waivers), as needed, to bring all those controllable sources into compliance with the wet weather TMDLs."
Attachment E. Part 6.d	E-27	Specific Monitoring and Assessment Requirements	As described above, the CLRPs envisioned in the Project I Bacteria TMDL include flexibility to develop certain components based on watershed-specific issues and conditions. Each CLRP submitted by the Copermittees will include a monitoring and assessment component. It is important to allow the	As shown in the attached revised Permit, include the following at the beginning of the Monitoring and Assessment section: "The BLRPs and CLRPs to be submitted by the Copermittees and approved by the Regional Board Executive Officer contain monitoring programs. Implementation of those Regional Board-approved monitoring programs constitutes compliance with the

SAN DIEGO COPERMITTEE COMMENTS ON TENTATIVE ORDER NO. R9-2012-0011				
Permit Section	**Permit Page (Original)**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
			CLRP process to drive the monitoring programs.	Monitoring Station and Monitoring Procedure requirements, described below."
Attachment E. Part 6.d	E-27	Specific Monitoring and Assessment Requirements	The Project I Bacteria TMDL included specific beach monitoring requirements, which were subject to a public comment process and adopted by the Regional Board. Attachment E adds many additional components to these requirements, which undermines the TMDL adoption and public commenting process. Instead of re-interpreting and adding onto the TMDL monitoring requirements in the Basin Plan Amendment, the Permit should adopt those requirements directly (BPA Attachment A, page 50-51).	As shown in the attached revised Permit, the beach monitoring requirement should be incorporated directly from the TMDL. The following language/requirement for beaches is *pasted directly* from the TMDL: "(1) Monitoring and Assessment Requirements for Beaches (a) Monitoring Stations For beaches addressed by these TMDLs, monitoring locations should consist of, at a minimum, the same locations used to collect data required under MS4 NPDES monitoring requirements and beach monitoring for Health and Safety Code section 115880.75 If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters. (b) Monitoring Procedures (i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly. (ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations at least once within the first 24 hours of the end of a storm event that occurs during the rainy season (i.e., October 1 through April 30).

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Permit Section	**Permit Page (Original)**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
				(iii) Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria."
Attachment E. Part 6.d	E-27	Specific Monitoring and Assessment Requirements	Similarly, the creek monitoring requirements should reflect the TMDL that was approved and subject to public comment (BPA Attachment A, page 50-51). Note that total coliform should not be a requirement for creek monitoring, as creeks are not subject to total coliform WQOs, RWLs, or WLAs.	As shown in the attached revised Permit, the creek monitoring requirement should be incorporated directly from the TMDL. The following language/requirement for creeks is *pasted directly* from the TMDL: "Monitoring and Assessment Requirements for Creeks and Creek Mouths (a) Monitoring Stations For creeks addressed by these TMDLs, monitoring locations should consist of, at a minimum, a location at or near the mouth of the creek (e.g., Mass Loading Station or Mass Emission Station) and one or more locations upstream of the mouth (e.g., Watershed Assessment Stations). If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters. (b) Monitoring Procedures (i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly. (ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations within the first 24 hours of the end of a storm event that occurs

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Permit Section	**Permit Page (Original)**	**Section Title**	**Reason for Proposed Changes/Comments**	**Proposed Changes**
				during the rainy season (i.e., October 1 through April 30) (iii) Samples collected from receiving water monitoring stations must be analyzed for fecal coliform and *Enterococcus* indicator bacteria.”

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE
ORDER NO. R9-2012-0011
NPDES NO. CAS0109266

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHEDS WITHIN THE SAN DIEGO REGION

The San Diego County Copermittees in Table 1a are subject to waste discharge requirements within their respective jurisdictions set forth in this Order.

Table 1a. San Diego County Copermittees

City of Carlsbad	City of Oceanside
City of Chula Vista	City of Poway
City of Coronado	City of San Diego
City of Del Mar	City of San Marcos
City of El Cajon	City of Santee
City of Encinitas	City of Solana Beach
City of Escondido	City of Vista
City of Imperial Beach	County of San Diego
City of La Mesa	San Diego County Regional Airport Authority
City of Lemon Grove	Unified Port District of San Diego
City of National City	

The Orange County Copermittees in Table 1b are subject to waste discharge requirements within their respective jurisdictions set forth in this Order upon expiration of Order No. R9-2009-0002, NPDES No. CAS0108740 on December 16, 2014.

Table 1b. Orange County Copermittees

City of Aliso Viejo	City of Ranch Santa Margarita
City of Dana Point	City of San Clemente
City of Laguna Beach	City of San Juan Capistrano
City of Laguna Hills	City of Laguna Woods
City of Laguna Niguel	County of Orange
City of Lake Forest	Orange County Flood Control District
City of Mission Viejo	

The Riverside County Copermittees in Table 1c are subject to waste discharge requirements within their respective jurisdictions set forth in this Order upon expiration of Order No. R9-2010-0016, NPDES No. CAS0108766 on November 10, 2015.

Table 1c. Riverside County Copermittees

City of Murrieta	County of Riverside
City of Temecula	Riverside County Flood Control and Water Conservation District
City of Wildomar	

The Orange County Copermittees and Riverside County Copermittees may enroll under this Order at a date earlier than the expiration date of their current Orders subject to the conditions described in Provision F.6 of this Order and the Copermittees in the respective county receive a Notice of Enrollment (NOE) from the San Diego Water Board.

The term Copermittee in this Order refers to any San Diego County, Orange County, or Riverside County Copermittee enrolled under this Order, unless specified otherwise.

This Order provides permit coverage for the Copermittee discharges described in Table 2. "Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.26(a)(3)(vi).

Table 2. Discharge Locations and Receiving Waters

Discharge Points	Locations throughout San Diego Region
Discharge Description	Municipal Separate Storm Sewer System (MS4) Discharges
Receiving Waters	Waters of the U.S.: Inland Surface Waters, Enclosed Bays and Estuaries, and Coastal Ocean Waters of the San Diego Region

Table 3. Administrative Information

This Order was adopted by the San Diego Water Board on:	**Month Day, 2012**
This Order will become effective on:	**Month Day, 2012**
This Order will expire on:	**Month Day, 2017**
The Copermittees must file a Report of Waste Discharge (ROWD) in accordance with Title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than 180 days in advance of the Order expiration date.	

I, David W. Gibson, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on Month Day, 2012.

TENTATIVE

David W. Gibson
Executive Officer

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I. FINDINGS

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board), finds that:

JURISDICTION

1. **MS4 Ownership or Operation.** Each of the Copermittees owns or operates an MS4, through which it discharges storm water and non-storm water into waters of the U.S. within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

2. **Legal and Regulatory Authority.** This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations (Code of Federal Regulations [CFR] Title 40, Part 122 [40 CFR 122]) adopted by the United States Environmental Protection Agency (USEPA), and chapter 5.5, division 7 of the California Water Code (CWC) (commencing with section 13370). This Order serves as an NPDES permit for discharges from MS4s to surface waters. This Order also serves as waste discharge requirements (WDRs) pursuant to article 4, chapter 4, division 7 of the CWC (commencing with section 13260).

3. **CWA Technology Based Standards and Prohibitions.** Pursuant to CWA section 402(p)(3)(B), NPDES permits for storm water discharges from MS4s must include requirements to effectively prohibit non-storm water discharges into MS4s, and require controls to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP).

4. **CWA NPDES Permit Conditions.** Pursuant to CWA section 402(a)(2), NPDES permits must prescribe conditions to assure compliance with CWA section 402(p)(3)(B) and 40 CFR 122.26(d)(2)(iv)(B). This Order prescribes conditions to assure compliance with the CWA requirements for owners and operators of MS4s to effectively prohibit non-storm water discharges in to the MS4s, and require controls to reduce the discharge of pollutants in storm water from the MS4s to the MEP.

5. **CWA and CWC Monitoring Requirements.** Pursuant to 40 CFR 122.48, NPDES permits must specify requirements for recording and reporting monitoring results. In addition, CWC sections 13267 and 13383 authorize the San Diego Water Board to require technical and monitoring reports. This Order establishes monitoring and reporting requirements to implement federal and State requirements.

6. **Total Maximum Daily Loads.** CWA section 303(d)(1)(A) requires that "[e]ach state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Clean Water Act Section 303(d) List of Water Quality Limited Segments, commonly referred to as the 303(d) List. The CWA requires the 303(d) List to be updated every two years. Requirements of this Order implement the TMDLs adopted by the San Diego Water Board and approved by USEPA.

7. **Non-Storm Water Discharges.** Pursuant to CWA section 402(p)(3)(B)(ii), this Order requires each Copermittee to effectively prohibit discharges of non-storm water into its MS4. Nevertheless, non-storm water discharges into and from the MS4s continue to be reported to the San Diego Water Board by the Copermittees and other persons. Monitoring conducted by the Copermittees, as well as the 303(d) List, have identified dry weather, non-storm water discharges from the MS4s as a source of pollutants causing or contributing to receiving water quality impairments in the San Diego Region. The federal regulations [40 CFR 122.26(d)(2)(iv)(B)] require the Copermittees to have a program to prevent all types of non-storm water discharges, or illicit discharges, from entering the MS4. The federal regulations, however, allow for specific categories of non-storm water discharges or flows to be addressed as illicit discharges only where such discharges are identified as sources of pollutants to waters of the U.S.

8. **In-Stream Treatment Systems.** Pursuant to federal regulations [40 CFR 131.10(a)], in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of a runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Runoff treatment must occur prior to the discharge of runoff into receiving waters. Treatment control best management practices (BMPs) must not be constructed in waters of the U.S. ~~or state.~~ Construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body.

DISCHARGE CHARACTERISTICS AND RUNOFF MANAGEMENT

9. **Point Source Discharges of Pollutants.** Discharges from the MS4s may contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the state. A discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. Storm water and non-storm water discharges from the MS4s may contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4s are subject to the

conditions and requirements established in the Basin Plan for point source discharges.

10. **Potential Beneficial Use Impairment.** The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution, contamination, or nuisance.

11. **Pollutants Generated by Land Development.** Land development has created and continues to create new sources of non-storm water discharges and pollutants in storm water discharges as human population density increases. This brings higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, and trash. Pollutants from these sources are dumped or washed off the surface by non-storm water or storm water flows into and from the MS4s. When development converts natural vegetated pervious ground cover to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area not subject to SUSMP or HMP requirements contains greater pollutant loads and is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area.

12. **Runoff Discharges to Receiving Waters.** The MS4s discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within the eleven hydrologic units comprising the San Diego Region. Numerous receiving water bodies and water body segments have been designated as impaired by the San Diego Water Board pursuant to CWA section 303(d).

13. **Pollutants in Runoff.** The most common pollutants in runoff discharged from the MS4s include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., cadmium, copper, lead, and zinc), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

14. **Human Health and Aquatic Life Impairment.** Pollutants in runoff discharges from the MS4s can threaten and adversely affect human health and aquatic organisms. Adverse responses of organisms to chemicals or physical agents in runoff range from physiological responses such as impaired reproduction or growth anomalies to mortality. Increased volume, velocity, rate, and duration of storm water runoff greatly accelerate the erosion of downstream natural channels. This alters stream channels and habitats and can adversely affect aquatic and terrestrial organisms.

15. **Water Quality Effects.** The Copermittees' water quality monitoring data submitted to date documents persistent exceedances of Basin Plan water quality objectives for runoff-related pollutants at various watershed monitoring stations. Persistent toxicity

ADMINISTRATIVE DRAFT

has also been observed at several watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity (IBI) ratings. These findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in the San Diego Region. Non-storm water discharges from the MS4s have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds, and contribute significantly to exceedances of applicable receiving water quality objectives.

16. **Non-Storm Water Discharges.** ~~Non-storm water discharges from the MS4s are not considered storm water discharges and therefore are not subject to the MEP standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4s.~~ Pursuant to CWA 402(p)(3)(B)(ii), non-storm water discharges into the MS4s must be effectively prohibited.

17. **Best Management Practices.** Pollutants can be effectively reduced in runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and runoff, therefore keeping pollutants onsite and out of receiving waters. Treatment control BMPs remove pollutants that have been mobilized by storm water or non-storm water flows.

18. **BMP Implementation.** Runoff needs to be addressed during the three major phases of development (planning, construction, and use) in order to reduce the discharge of storm water pollutants to the MEP, effectively prohibit non-storm water discharges, and protect receiving waters. Development which is not guided by water quality planning policies and principles can result in increased pollutant load discharges, flow rates, and flow durations which can negatively affect receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development can generate substantial pollutant loads which are discharged in runoff to receiving waters.

19. **Long Term Planning and Implementation.** Federal regulations require municipal storm water permits to expire 5 years from adoption, after which the permit must be renewed and reissued. The San Diego Water Board recognizes that the degradation of water quality and impacts to beneficial uses of the waters in the San Diego Region occurred over several decades. The San Diego Water Board further recognizes that a decade or more may be necessary to realize demonstrable improvement to the quality of waters in the Region. This Order includes a long term planning and implementation approach that will require more than a single permit term to complete.

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FINDINGS

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WATER QUALITY STANDARDS

20. **Basin Plan.** The San Diego Water Board adopted a Water Quality Control Plan for the San Diego Basin (Basin Plan) on September 8, 1994 that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for receiving waters addressed through the plan. The Basin Plan was subsequently approved by the State Water Resources Control Board (State Water Board) on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and approved by the State Water Board. Requirements of this Order implement the Basin Plan.

    The Basin Plan identifies the following existing and potential beneficial uses for inland surface waters in the San Diego Region: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Freshwater Replenishment (FRSH), Hydropower Generation (POW), and Preservation of Biological Habitats of Special Significance (BIOL). The following additional existing and potential beneficial uses are identified for coastal waters of the San Diego Region: Navigation (NAV), Commercial and Sport Fishing (COMM), Estuarine Habitat (EST), Marine Habitat (MAR), Aquaculture (AQUA), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction, and/or Early Development (SPWN), and Shellfish Harvesting (SHELL).

21. **Ocean Plan.** The State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, and 2005. The State Water Board adopted the latest amendment on April 21, 2005 and it became effective on February 14, 2006. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean. Requirements of this Order implement the Ocean Plan.

    The Ocean Plan identifies the following beneficial uses of ocean waters of the state to be protected: Industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture; preservation and enhancement of designated Areas of Special Biological Significance; rare and endangered species; marine habitat; fish spawning and shellfish harvesting

22. **Sediment Quality Control Plan**. On September 16, 2008, the State Water Board adopted the Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality (Sediment Quality Control Plan). The Sediment Quality Control Plan became effective on August 25, 2009. The Sediment Quality Control Plan establishes 1) narrative sediment quality objectives for benthic community protection from exposure to contaminants in sediment and to protect human health, and 2) a program of implementation using a multiple lines of evidence approach to interpret

the narrative sediment quality objectives. Requirements of this Order implement the Sediment Quality Control Plan.

23. **National Toxics Rule and California Toxics Rule.** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the National toxics Rule (NTR) applied in California. On May 18, 2000, USEPA adopted the California Toxics Rule (CTR). The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants

24. **Antidegradation Policy.** This Order is in conformance with the federal Antidegradation Policy described in 40 CFR 131.12, and State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*. Federal regulations at 40 CFR 131.12 require that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The San Diego Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies.

CONSIDERATIONS UNDER FEDERAL LAW

25. **Coastal Zone Act Reauthorization Amendments.** Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This Order addresses the management measures required for the urban category, with the exception of septic systems. The runoff management programs developed pursuant to this Order fulfill the need for coastal cities to develop a runoff non-point source plan identified in the Non-Point Source Program Strategy and Implementation Plan. The San Diego Water Board addresses septic systems through the administration of other programs.

26. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 USCA sections 1531 to 1544). This Order requires compliance with receiving water limits, and other requirements to protect the beneficial uses of waters of the State. The Copermittees are responsible for meeting all requirements of the applicable Endangered Species Act.

CONSIDERATIONS UNDER STATE LAW

27. Unfunded Mandates. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following:

a. This Order implements federally mandated requirements under CWA section 402. (33 USC 1342(p)(3)(B).)

b. The local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges.

c. The local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order.

d. The Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301(a) (33 USC 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations).

e. The local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

f. The provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 USC 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions and requirements of any applicable wasteload allocation. (40 CFR 122.44(d)(1)(vii)(B).)

28. California Environmental Quality Act. The issuance of WDRs and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with CWC section 13389.

STATE WATER BOARD DECISIONS

29. Compliance with Prohibitions and Limitations. The receiving water limitation language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The receiving water limitation language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the

implementation of improved and better-tailored BMPs over time. Implementation of the iterative approach to comply with receiving water limitations based on applicable water quality standards is necessary to ensure that storm water discharges from the MS4 ultimately will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

30. **Special Conditions for Areas of Special Biological Significance.** On March 20, 2012, the State Water Board approved Resolution No. 2012-0012~~X~~ approving an exception to the Ocean Plan prohibition against discharges to Areas of Special Biological Significance (ASBS) for certain nonpoint source discharges and NPDES permitted municipal storm water discharges. The Resolution requires monitoring and testing of marine aquatic life and water quality in several ASBS to protect California's coastline during storms when rain water overflows into coastal waters. Specific terms, prohibitions, and special conditions were adopted to provide special protections for marine aquatic life and natural water quality in ASBSs. The City of San Diego's municipal storm water discharges to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's municipal storm water discharges to the Heisler Park ASBS are subject terms and conditions of the Resolution. The Special Protections contained in Attachment B to the Resolution applicable to these discharges are hereby incorporated in this Order as if fully set forth herein.

ADMINISTRATIVE FINDINGS

31. **Executive Officer Delegation of Authority.** The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC section 13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC section 13223 or this Order explicitly states otherwise.

32. **Standard Provisions.** Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment B to this Order.

33. **Fact Sheet.** The Fact Sheet for this Order contains background information, regulatory and legal citations, references and additional explanatory information and data in support of the requirements of this Order. The Fact Sheet is hereby incorporated into this Order and constitutes part of the Findings of this Order.

34. **Public Notice.** The San Diego Water Board notified the Copermittees, and interested agencies and persons of its intent to prescribe WDRs for MS4 discharges of pollutants to waters of the U.S. and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet.

35. **Public Hearing.** The San Diego Water Board held a public hearing on Month Day, 2012 and heard and considered all comments pertaining to the terms and conditions of this Order. Details of the public hearing are provided in the Fact Sheet.

II. PROVISIONS

THEREFORE, IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND LIMITATIONS

[NOTE: The receiving water limitations language contained in provision A raises significant legal and policy issues that require further discussion and revision. The receiving water limitations language in Provision A generally follows the language required by the State Board's precedential Order WQ 99-05. In the State Board's precedential order WQ 2001-15, the State Board determined that the mandatory receiving water limitations language found in Order 99-05 "does not require strict compliance with water quality standards." Instead, the State Board concluded that compliance with water quality standards is "to be achieved over time, through an iterative approach requiring improved BMPs." Despite this policy statement from the State Board, in 2011, the 9th Circuit interpreted the State Board's mandatory language in a manner that requires strict and immediate compliance with water quality standards. The State Board has recently scheduled a workshop for November 20 to address the receiving water limitations language. The San Diego Copermittees support revisions to the receiving water limitations language that align the language with the State Board's policy that compliance with water quality standards is "to be achieved over time, through an iterative approach requiring improved BMPs." Storm water organizations such as CASQA have already submitted language to the State Board designed to address this conflict between the State Board's policy and the 9th Circuit decision. The redlines submitted below are not designed to address all the issues raised by this conflict. Instead, the redlines address, for this draft permit, how compliance with water quality standards will be achieved for water bodies covered by an adopted TMDL or covered in the WQIPs. The San Diego Copermittees will participate in the State Board process regarding the larger issues involving the receiving water limitations language, and encourage the Regional Board to do so as well. The San Diego Copermittees reserve the right to submit additional language intended to align all of the receiving water limitations language in this draft permit with State Board policy as the State Board workshop process evolves. At this time, however, the San Diego Copermittees believe it is premature to submit such language given the pending State Board process and the proposed CASQA language.]

The purpose of this provision is to describe the conditions under which storm water and non-storm water discharges into and from MS4s are prohibited or limited. The goal of this provision is to ~~protect, preserve, enhance, and restore~~ address the impacts of MS4 discharges so that such discharges do not impair water quality and designated beneficial uses of waters of the U.S. This goal will be accomplished through implementation of control measures that effectively prohibit non-storm water discharges into and from the Copermittees' MS4s, and reduce pollutants in storm water discharges from the Copermittees' MS4s to the MEP. The process for determination of compliance with the Discharge Prohibitions (A.1), Receiving Water Limitations (A.2), and Effluent Limitations (A.3) is defined in Provision A.4.

1. Discharge Prohibitions

a. Discharges ~~into and~~ from MS4s owned and operated by a Copermittee in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance in receiving waters of the ~~state~~ U.S. are effectively prohibited, unless the Copermittee is addressing the discharges through Provision A.1.e or A.4 through the process set forth in Provision A.4.

b. Non-storm water discharges into ~~and from~~ MS4s are effectively prohibited, unless such discharges are either authorized by a separate NPDES permit, or the discharge is a category of non-storm water discharges or flows that must be addressed pursuant to Provisions E.2.a.(1)-(5) of this Order.

c. Discharges from MS4s are subject to all waste discharge prohibitions in the Basin Plan, included in Attachment A to this Order, unless the Copermittee is addressing the discharges through Provision A.1.e or A.4 through the process set forth in Provision A.4.

d. ~~Discharges from MS4s to ASBS are prohibited.~~ Storm water discharges from the City of San Diego's MS4 to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's MS4 to the Heisler Park ASBS are authorized under this Order subject to the Special Protections contained in Attachment B to State Water Board Resolution No. 2012-001**2**~~X~~ applicable to these discharges, included in Attachment A to this Order. All other discharges from MS4s to ASBS are prohibited, unless authorized by a subsequent order.

e. For discharges associated with water body pollutant combinations addressed in a TMDL in Attachment E of this Order, the affected Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions).

2. Receiving Water Limitations

a. Discharges from MS4s owned and operated by a Copermittee must not cause or contribute to the violation of water quality standards in any receiving waters, including ~~but not limited to~~ all applicable provisions contained in the list below including any modifications unless the Copermittee is addressing the discharges through Provision A.2.b or A.4 through the process set forth in Provision A.4:

(1) The San Diego Water Board's Basin Plan, including beneficial uses, water quality objectives, and implementation plans;

(2) State Water Board plans for water quality control including the following:

(a) Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries (Thermal Plan), and

(b) The Ocean Plan, including beneficial uses, water quality objectives, and implementation plans;

(3) State Water Board policies for water and sediment quality control including the following:

(a) Water Quality Control Policy for the Enclosed Bays and Estuaries of California,

(b) Sediment Quality Control Plan which includes the following narrative objectives for bays and estuaries:

(i) Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities, and

(ii) Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health,

(c) The Statement of Policy with Respect to Maintaining High Quality of Waters in California (State Water Board Resolution No. 68-16).

(4) Priority pollutant criteria promulgated by the USEPA through the following:

(a) National Toxics Rule (NTR)[1] (promulgated on December 22, 1992 and amended on May 4, 1995), and

(b) California Toxics Rule (CTR)[2,3]

~~**a.** Discharges from MS4s composed of storm water runoff must not alter natural ocean water quality in an ASBS.~~

~~**b.** Discharges from MS4s must not cause or contribute to the violation of any receiving water limitations expressed as water quality based effluent limitations (WQBELs) required to meet the WLAs established for the TMDLs in to this Order, pursuant to the applicable TMDL compliance schedules.~~

b. For receiving water limitations associated with a water body pollutant combination addressed in a TMDL in Attachment E of this Order, the Copermittees shall achieve compliance as outlined in Attachment E (Total

[1] 40 CFR 131.36
[2] 65 Federal Register 31682-31719 (May 18, 2000), adding Section 131.38 to 40 CFR
[3] If a water quality objective and a CTR criterion are in effect for the same priority pollutant, the more stringent of the two applies, unless a previous regulatory action (i.e., TMDL) has specified otherwise.

Maximum Daily Load Provisions).

3. Effluent Limitations

a. Technology Based Effluent Limits

Pollutants in storm water discharges from MS4s must be reduced to the MEP~~.~~[4], through timely implementation of control measures and other actions as specified in Provisions B and E as described in Provision A.4.

b. Water Quality Based Effluent Limits

For a water body-pollutant combination addressed in a TMDL in Attachment E of this Order, ~~P~~pollutants in discharges from MS4s must be reduced to comply with ~~any~~ effluent limitations expressed as WQBELs required to meet the WLAs established for those TMDLs as described in Provision A.4 and Attachment E to this Order, pursuant to the applicable TMDL compliance schedules.

4. Compliance with Discharge Prohibitions, ~~and~~ Receiving Water Limitations, and Effluent Limitations

Each Copermittee must comply with the discharge prohibitions (A.1), ~~and~~ receiving water limitations (A.2), and effluent limitations (A.3) of this Order through timely implementation of strategies, control measures, and other actions as specified in Provisions B and E of this Order, including any modifications. The Water Quality Improvement Plans described in Provision B shall be designed to achieve compliance with the discharge prohibitions, receiving water limitations, and effluent limitations. Copermittees shall be considered in compliance with A.1, A.2, and A.3 unless the Regional Board has denied approval of a Water Quality Improvement Plan or subsequent update as described in Provisions B and F.1.

a. If exceedance(s) of water quality standards persist in receiving waters notwithstanding implementation of this Order, the Copermittees must comply with the following procedures:

(1) For pollutants that are not in the process of being addressed via specific scheduled actions in a Water Quality Improvement Plan, ~~U~~upon a determination by either the Copermittees or the San Diego Water Board that discharges from the MS4 are causing or contributing to an exceedance of an applicable water quality standard, the Copermittees must submit the following updates to the Water Quality Improvement Plan required under Provision B as part of the Annual Report required under Provision F.3.b~~,~~ or Water Quality Improvement Plan update Provision B.5.a, unless the San Diego Water Board

[4] This does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment must occur prior to the discharge of runoff into receiving waters per Finding 8.

either: 1) directs an earlier submittal; or 2) allows for the adoption of a forthcoming TMDL to establish wasteload allocations that will form the basis of revisions to the Water Quality Improvement Plan:

(a) The water quality improvement strategies being implemented that are effective and will continue to be implemented;

(b) ~~Additional w~~Water quality improvement strategies (~~i.~~e.g. BMPs, retrofitting projects, stream and/or habitat rehabilitation, ~~or~~ restoration projects, etc.) that will be implemented to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards;

(c) Updates to the schedule for implementation of the existing and additional water quality improvement strategies; and

(d) Updates, when necessary, to the schedule for achieving compliance with the discharge prohibitions and receiving water limitations of this Order;

(e) As described in Provision B.6, Copermittees must submit requested modifications to the Water Quality Improvement Plan either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b. ;~~The San Diego Water Board may require the incorporation of additional modifications to the Water Quality Improvement Plan required under Provision B. The applicable Copermittees must submit any modifications to the update to the Water Quality Improvement Plan within 30 days of notification that additional modifications are required by the San Diego Water Board, or as otherwise directed~~;

(f) As described in Provision B.6, upon ~~Within 30 days of the~~ San Diego Water Board determination that the update to the Water Quality Improvement Plan meets the requirements of this Order, the Copermittees must submit requested modifications to the jurisdictional runoff management programs either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b.~~revise the jurisdictional runoff management program documents to incorporate the updated water quality improvement strategies that have been and will be implemented, the implementation schedule, and any additional monitoring required~~; and

(g) The Copermittees must implement the revised jurisdictional runoff management programs and updated jurisdictional monitoring and assessment component of the Water Quality Improvement Plan.

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(2) For pollutants in the process of being addressed via a specific, scheduled program in a Water Quality Improvement Plan, the Copermittee(s) shall continue to implement that program as described in the Water Quality Improvement Plan approved by the Regional Board;

b. So long as the Copermittees have complied with the procedures set forth above and are implementing the Water Quality Improvement Plan(s) approved by the Regional Board, the Copermittees ~~must~~ do not have to repeat the same procedure ~~set forth above to comply with~~ for continuing or recurring exceedances of the same discharge prohibitions, effluent limitations, and receiving water limitations ~~of this Order for continuing or recurring exceedances of the same water quality standard(s) following implementation of scheduled actions~~ unless directed to ~~do otherwise~~ by the San Diego Water Board.

~~**a.** Nothing in Provisions A.4. and A.4. prevents the San Diego Water Board from enforcing any provision of this Order while the applicable Copermittees prepare and implement the above update to the Water Quality Improvement Plan and jurisdictional runoff management programs.~~

B. WATER QUALITY IMPROVEMENT PLANS

The purpose of this provision is to develop Water Quality Improvement Plans that guide the Copermittees' jurisdictional runoff management program implementation efforts towards achieving the outcome of improved water quality in MS4 discharges and receiving waters. The goal of the Water Quality Improvement Plan is to 1) effectively prohibit non-storm water discharges into the MS4s, 2) reduce pollutants in storm water discharges from the MS4s to the MEP, and 3) support attainment and ~~the~~ reasonable protection, preservation~~,~~ and enhancement~~, and restoration~~ of water quality and designated beneficial uses of waters of the state. Therefore, implementation of the WQIPs also provides the basis for complying with Provisions A.1 and A.3, as described in Provision A.4. This goal will be accomplished through an adaptive planning and management process that identifies the highest water quality priorities within a watershed and implements strategies, control measures, and BMPs to achieve improvements in the quality of discharges from the MS4s and receiving waters.

The Copermittees must develop Water Quality Improvement Plans for each Watershed Management Area that 1) prioritize water quality ~~issues~~conditions resulting from the Copermittee's MS4 discharges ~~to and from the MS4s with~~in each Watershed Management Area, 2) identify MS4 pollutant sources ~~and other stressors~~ associated with ~~those~~the water quality priorities, 3) define numeric ~~targets~~goals and schedules to ~~achieve improvement of~~address water quality priorities, 4) describe water quality improvement strategies to achieve numeric ~~targets~~goals, and 5) develop and execute a coordinated monitoring and assessment program to facilitate adaptive management of the Water Quality Improvement Plans and determine progress towards achieving improved water quality in MS4 discharges and receiving waters ~~improved water quality.~~

The Copermittees must ~~implement all~~submit Water Quality Improvement Plans for public review and Regional Board Executive Officer review and approval per the ~~requirements of~~ schedule outline in Provision ~~no later than 12 months after the adoption of this Order, or in accordance with Provision F.5~~B~~.6 of this Order.~~

~~1.~~

~~2.~~1. Watershed Management Areas

The Copermittees must develop Water Quality Improvement Plans for each of the Watershed Management Areas in Table B-1. A total of ~~nine~~ten Water Quality Improvement Plans must be developed for the San Diego Region.

Table B-1. Watershed Management Areas

Watershed Management Area	Hydrologic Unit(s)	Major Surface Water Bodies	Responsible Copermittees
South Orange County	San Juan (901.00)	Aliso Creek San Juan Creek San Mateo Creek Pacific Ocean	- City of Aliso Viejo[1] - City of Dana Point[1] - City of Laguna Beach[1] - City of Laguna Hills[1] - City of Laguna Niguel[1] - City of Laguna Woods[1] - City of Lake Forest[1] - City of Mission Viejo[1] - City of Rancho Santa Margarita[1] - City of San Clemente[1] - City of San Juan Capistrano[1] - County of Orange[1] - Orange County Flood Control District[1]
Santa Margarita River	Santa Margarita (902.00)	Murrieta Creek Temecula Creek Santa Margarita River Santa Margarita Lagoon Pacific Ocean	- City of Murrieta[2] - City of Temecula[2] - City of Wildomar[2] - County of Riverside[2] - County of San Diego[3] - Riverside County Flood Control and Water Conservation District[2]
San Luis Rey River	San Luis Rey (903.00)	San Luis Rey River San Luis Rey Estuary Pacific Ocean	~~- City of Escondido~~ - City of Oceanside - City of Vista - County of San Diego
Carlsbad	Carlsbad (904.00)	Loma Alta Slough Buena Vista Lagoon Agua Hedionda Lagoon Batiquitos Lagoon San Elijo Lagoon Pacific Ocean	- City of Carlsbad - City of Encinitas - City of Escondido - City of Oceanside - City of San Marcos - City of Solana Beach - City of Vista - County of San Diego
San Dieguito River	San Dieguito (905.00)	San Dieguito River San Dieguito Lagoon Pacific Ocean	- City of Del Mar - City of Escondido - City of Poway - City of San Diego - City of Solana Beach - County of San Diego
Penasquitos	~~Penasquitos~~ Reservoir HA (906.~~00~~10) Poway HA (906.20) Miramar HA (906.40)	Los Penasquitos Lagoon ~~Mission Bay~~ Pacific Ocean	- City of Del Mar - City of Poway - City of San Diego - County of San Diego
Mission Bay	Scripps HA (906.30) Miramar HA (906.40) Tecolote HA (906.50)	Mission Bay Pacific Ocean	-City of San Diego
San Diego River	San Diego (907.00)	San Diego River Pacific Ocean	- City of El Cajon - City of La Mesa ~~- City of Poway~~ - City of San Diego - City of Santee - County of San Diego

Table B-1. Watershed Management Areas

Watershed Management Area	Hydrologic Unit(s)	Major Surface Water Bodies	Responsible Copermittees
San Diego Bay	Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)	Sweetwater River Otay River San Diego Bay Pacific Ocean	- City of Chula Vista - City of Coronado - City of Imperial Beach - City of La Mesa - City of Lemon Grove - City of National City - City of San Diego - County of San Diego - San Diego County Regional Airport Authority - Unified Port of San Diego
Tijuana River	Tijuana (911.00)	Tijuana River Tijuana Estuary Pacific Ocean	- City of Imperial Beach - City of San Diego - County of San Diego

Notes:
1. The Orange County Copermittees will be enrolled under this Order upon expiration of Order No. R9-2009-0002, or earlier if the Orange County Copermittees meet the conditions in Provision F.6.
2. The Riverside County Copermittees will be enrolled under this Order upon expiration of Order No. R9-2010-0016, or earlier if the Riverside County Copermittees meet the conditions in Provision F.6.
3. The County of San Diego will not be required to implement the requirements of Provision B for the Santa Margarita River Watershed Management Area until the Riverside County Copermittees are enrolled under this Order. Until then, the County of San Diego is responsible for implementing and complying with the requirements of Provisions D.1, D.4.a.(1)&(3), E, F.2.a-b, F.3.b, and F.4 for the areas of the Santa Margarita River Watershed Management Area within its jurisdiction.

~~3.~~2. Identification of Water Quality Priorities

The Copermittees must identify the water quality priorities within each Watershed Management Area that will be addressed by the Water Quality Improvement Plan. Where appropriate, Watershed Management Areas may be separated into subwatersheds to focus water quality prioritization and jurisdictional ~~runoff management program~~ implementation efforts by receiving water.

a. ASSESSMENT OF RECEIVING WATER CONDITIONS

The Copermittees must ~~review pollutant sources, discharges, and receiving water conditions and assess~~consider the following, at a minimum, to ~~determine~~support the ~~degree~~identification of ~~adverse~~water quality priorities based on the impacts ~~to~~of MS4 discharges on receiving water beneficial uses:

(1) Receiving waters listed as impaired on the CWA Section 303(d) List of Water Quality Limited Segments (303(d) List);

(2) TMDLs adopted and under development by the San Diego Water Board;

(3) The requirements of Provision A.2;

~~(3)~~(4) Receiving waters recognized as sensitive or highly valued by the Copermittees, including estuaries designated under the National Estuary Program under CWA section 320, wetlands defined by the State or U.S. Fish and Wildlife Service's National Wetlands Inventory as wetlands, and receiving waters identified as ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-0012~~X~~ (Attachment A);

~~(4)~~(5) Water quality standards established in the Basin Plan;

~~(5)~~(6) Known historical versus current physical, chemical, and biological water quality conditions;

~~(6)~~(7) ~~All available~~ Available, relevant, and appropriately collected physical, chemical, and biological receiving water monitoring data meeting appropriate QA/QC standards, including~~, but not limited to,~~ data describing:

(a) Chemical constituents;

(b) Water quality parameters (i.e. pH, temperature, conductivity, etc.);

(c) Toxicity Identification Evaluations for both receiving water column and sediment;

(d) Trash impacts;

(e) Bioassessments; and

(f) Physical habitat.

~~(7)~~(8) Available evidence of erosional impacts in receiving waters due to accelerated flows (i.e. hydromodification); ~~and~~

~~(8)~~(9) Available evidence of adverse impacts to the chemical, physical, and biological integrity of receiving waters~~.~~; and

(10) The potential for long-term achievement and maintenance of beneficial use attainment in the Watershed Management Area.

b. Assessment of MS4 Discharge Quality and Impacts

To support the identification of priorities based on the impacts of MS4 discharges on receiving water beneficial uses, the Copermittees must review appropriately collected MS4 discharge quality data and consider the extent to which MS4s cause or contribute to the adverse impacts to receiving water beneficial uses identified in B.2.a. Considerations include:

(1) Locations of the Copermittees' MS4 discharges with respect to receiving waters;

(2) MS4 discharge quality results relevant to impacts in receiving waters and action levels, including the temporal and geographic variation of the results;

(3) The requirements of Provisions A.1 and A.3.; and

(4) Whether MS4 discharge quality is sufficiently well known or other information is available to assess whether MS4 discharges are causing or contributing to specific receiving water conditions, or whether additional data need to be collected through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan.

~~b.~~c. IDENTIFICATION OF ~~IDENTIFY~~PRIORITY ~~POLLUTANTS AND~~ RECEIVING WATER CONDITIONS

The Copermittees must use the information gathered in Provision B.2.a~~.~~ and B.2.b. to develop a list of water quality priorities as pollutants and/or receiving water conditions that are the highest threat to receiving water quality or that most adversely affect the physical, chemical, and biological integrity of receiving waters. The Copermittees must identify the highest water quality priorities to be addressed by the Water Quality Improvement Plan, and describe the reasoning for selecting a subset of receiving water conditions as the highest priority(ies)~~.~~ The Water Quality Improvement Plans shall describe the following for the highest priority receiving water condition:

(1) The beneficial use(s) and pollutant(s) associated with the priority receiving water condition(s);

(2) The geographic extent of the priority receiving water condition(s)within the WMA, if known;

(3) The Copermittees with MS4s that contribute discharges to the priority water receiving condition(s);

(4) The temporal extent of the priority receiving condition(s) (i.e., dry weather and/or wet weather); and

(5) Whether receiving waters have been monitored sufficiently to adequately characterize the priority receiving condition(s), including a consideration of spatial and temporal variation.

~~c.~~d. MS4 POLLUTANT SOURCE ~~AND/OR STRESSOR~~ IDENTIFICATION

The Copermittees must identify and prioritize known and suspected storm water and non-storm water pollutant sources ~~and any other stressors causing or contributing to~~within the MS4 associated with the highest priority receiving water conditions identified under B.2.c~~quality priorities.~~ . The identification of known and suspected sources of the highest water quality priorities as identified for Provision B.2.c ~~must~~ shall consider the following :

(1) Land uses and their potential contribution to the highest priority receiving water conditions;

~~(9)~~(2) Pollutant generating facilities ~~or~~, areas, and/or activities within the Watershed Management Area~~, including:~~;

~~(10) Each Copermittee's inventory of construction, municipal, commercial, industrial, and residential facilities, areas, and/or activities,~~
~~(11)~~
~~(12) Publicly owned parks and/or recreational areas,~~
~~(13)~~
~~(14) Open space areas,~~
~~(15)~~
~~(16) All currently operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, and~~
~~(17)~~
~~(18) Areas not within the Copermittees' jurisdictions (e.g., tribal lands, state lands, federal lands) that may be pollutant sources related to the highest water quality priorities within the Watershed Management Area;~~
~~(19)~~
~~(20)~~ Locations of the Copermittees' MS4s~~, including the following:~~
~~(21)~~
~~(22)~~(3) ~~All MS4~~ outfalls ~~that discharge to receiving waters, and~~ .

~~(23) Locations of major structural controls for storm water and non-storm water (e.g., retention basins, detention basins, major infiltration devices, etc.);~~
~~(24)~~
~~(25) Other known and suspected sources of non-storm water or pollutants in storm water discharges to receiving waters within the Watershed Management Area, including the following:~~
~~(26)~~
~~(27) Other MS4 outfalls (e.g., Phase II Municipal and Caltrans),~~
~~(28)~~
~~(29) Other NPDES permitted discharges,~~
~~(30)~~
~~(31) Any other discharges that may be considered point sources (e.g., private outfalls), and~~
~~(32)~~
~~(33) Any other discharges that may be considered non-point sources (e.g., agriculture, wildlife or other natural sources);~~
~~(34)~~
~~(35)~~(4) Review of available data, including ~~but not limited to~~:

(a) Findings from the Copermittees' illicit discharge detection and elimination programs,

(b) Findings from the Copermittees' MS4 outfall monitoring,

~~(c) Findings from the Copermittees' receiving water monitoring,~~
~~(d)~~
~~(e) Findings from the Copermittees' MS4 discharges and receiving water assessments, and~~
~~(f)~~
~~(g)~~(c) ~~Any other~~Other available, relevant, and appropriately-collected data, information, or studies related to pollutant sources and ~~conditions~~ pollutant-generating activities that contribute to the highest priority receiving water ~~quality priorities as~~conditions identified ~~for~~ in Provision B.2.c~~e~~.

(5) Whether MS4 sources are sufficiently well known to design an effective, efficient[5], directed control strategy, or whether additional source/stressor identification needs to be conducted through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan to identify and prioritize sources/stressors within the watershed.

~~d.~~e. NUMERIC ~~TARGETS AND SCHEDULES~~ GOALS

The Copermittees must develop and incorporate interim and final numeric ~~targets[6] and schedules~~ goals[7] into the Water Quality Improvement Plans. Numeric ~~targets~~goals and schedules ~~must be used~~are intended to support Water Quality Improvement Plan development and to measure progress towards addressing the highest priority receiving water conditions identified under B.2.c~~water quality priorities and an ultimate outcome of protections, preservation, enhancement, and restoration of~~. Numeric goals are not enforceable compliance standards, effluent limitations, or receiving water ~~beneficial uses.~~ limitations.

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[5] Copermittees are encouraged to use a sustainability analysis, or Triple Bottom Line analysis, that considers environmental, social and economic factors when estimating the potential efficiency of control strategies.

~~[6] Interim and final numeric targets may take a variety of forms such as pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric targets are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators.~~

[7] Interim and final numeric goals may take a variety of forms such as TMDL targets, TMDL wasteload allocations, TMDL based WQBELs incorporated in Attachment E of this Order, action levels, pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric goals are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators. To the extent that a goal is not based on an enforceable regulatory mechanism (i.e., TMDL, WLA), WQIP goals and schedules may be revised through the iterative process. Numeric goals are not subject to enforcement or non-compliance actions under this Order.

When ~~developing~~establishing numeric ~~targets~~goals and corresponding schedules, the Copermittees must consider the following:

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(1) Final numeric ~~targets~~goals must be based on measureable criteria or indicators, to be achieved in the receiving waters and/or MS4 discharges for the highest priority receiving water ~~quality priorities~~conditions which will ~~result in~~be capable of demonstrating progress toward the achievement of the restoration and/or protection of water quality standards in receiving waters; and

(2) Interim numeric ~~targets~~goals must be based on measureable criteria or indicators that can demonstrate incremental progress toward achieving the final numeric ~~targets~~goals in the receiving waters and/or MS4 discharges~~;~~. ~~and~~

(3) Schedules must be adequate for measuring progress toward achieving the interim and final numeric ~~targets~~ goals required for Provisions B.2.d. ~~and B.2.d..~~ Schedules must incorporate the following:

(a) Interim dates for achieving the interim numeric goals~~targets~~,

(b) Compliance schedules for any applicable TMDLs in Attachment E to this Order,

(c) Compliance schedules for any ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-0012~~X~~ (see Attachment A),

(d) Achievement of the final numeric goals ~~targets~~ in the receiving waters and/or MS4 discharges for the highest water quality priorities must be as soon as possible, and

~~(d)~~(e) Final dates for achieving the final numeric goals ~~targets~~ must not extend more than 10 years beyond the date this Order is adopted, unless the schedule includes an applicable TMDL in Attachment E to this Order[8].

~~4.~~3. Water Quality Improvement Strategies and Schedules

The Copermittees must develop specific water quality improvement strategies to address the highest ~~water quality~~ priorit~~ies~~y receiving water conditions identified within a Watershed Management Area. The water quality improvement strategies must address the highest water quality priorities by preventing or eliminating non-storm water discharges to and from the MS4, reducing pollutants in storm water discharges from the MS4 to the MEP, and restoring and/or protecting the water quality standards of receiving waters.

[8] Achievement of final numeric goals within 10 years represents progress towards attainment of water quality standards, but is not a requirement to fully attain all applicable water quality standards or all priority receiving water conditions within 10 years.

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a. WATER QUALITY IMPROVEMENT STRATEGIES

The Copermittees must prioritize water quality improvement strategies, ~~must prioritize~~based on their likely effectiveness and efficiency, and implement ~~the following~~ measures, as appropriate, to effectively prohibit non-storm water discharges into its MS4, reduce pollutants in storm water discharges from its MS4 to the MEP, and achieve the interim and final numeric ~~targets~~goals in accordance with the schedules ~~required for~~in Provision B.2~~.:~~.e. Measures include:

(1) Copermittee-selected activities identified in Provision E ,either as described in the jurisdictional runoff management programs or as modified with justification, that will address priority receiving water conditions; and

~~(1)~~ Additional ~~S~~structural and/or non-structural BMPs (to include public outreach and participation programs), as selected by the Copermittee, that are designed to achieve the interim and final numeric goals identified in Provision B.2.e.~~targets in the receiving waters and/or MS4 discharges;~~

~~(2)~~

~~(3) Retrofitting projects for areas of existing development known or suspected to contribute to the highest water quality priorities, and where retrofitting will contribute to reducing or eliminating non-storm water discharges to the MS4 and/or reducing pollutants in storm water discharges from the MS4 to the MEP;~~

~~(4)~~

~~(5)~~(2) ~~Stream and/or habitat rehabilitation or restoration projects where stream and/or habitat rehabilitation or restoration are necessary for, or will contribute to demonstrable improvements in the physical, chemical, and biological receiving water conditions and restoration and/or protection of water quality standards in receiving waters; and~~

~~Other water quality improvement strategies that will result in preventing or eliminating non-storm water discharges to and from the MS4, reducing pollutants in storm water discharges from the MS4 to the MEP, and restoring and/or protecting the water quality standards of receiving waters.~~

b. IMPLEMENTATION SCHEDULES

~~(6)~~ The Copermittees must develop schedules for implementing the water quality improvement strategies identified under Provision B.3.a to achieve the interim and final numeric ~~targets~~goals identified in ~~the receiving waters and/or MS4 discharges for the highest water quality priorities~~B.2.e in the Watershed Management Area. Schedules must be developed for both the water quality improvement strategies implemented by each Copermittee within its jurisdiction and for strategies that ~~will be implemented by multiple Copermittees~~ Copermittees' choose to implement on a collaborative basis~~.~~

(1) .

~~(2)~~

~~(3) Interim dates for achieving the interim numeric targets;~~

~~(4)~~

~~(5) Compliance schedules for any applicable TMDLs in Attachment E to this Order;~~

~~(6)~~

~~(7) Compliance schedules for any ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-001X (see Attachment A);~~

~~(8)~~

~~(9) Achievement of the final numeric targets in the receiving waters and/or MS4 discharges for the highest water quality priorities must be as soon as possible, and~~

~~(10)~~(2) ~~Final dates for achieving the final numeric targets must not extend more than 10 years beyond the date this Order is adopted, unless the schedule includes an applicable TMDL in Attachment E to this Order~~The Copermittees must incorporate the implementation compliance schedules for any ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-001~~X~~2 (see Attachment A).

~~5.~~4. Water Quality Improvement Monitoring and Assessment

The Copermittees in each Watershed Management Area must develop an integrated ~~program to assess the~~Water Quality Improvement Plan Monitoring and Assessment Program that assesses: 1) progress toward achieving the numeric ~~targets~~goals and schedules, ~~and~~2) ~~the~~ progress toward addressing the highest priority receiving water ~~quality priorities~~conditions for each Watershed Management Area, and 3) each Copermittee's overall efforts implementing the requirements of Provision B. The water quality improvement monitoring and assessment program must include the monitoring and assessment requirements of Provision D~~.~~, which may be modified for consistency with the priority receiving water conditions of each Watershed Management Area and associated Copermittees. For Watershed Management Areas with applicable TMDLs, the water quality monitoring and assessment program must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-001**2**~~**X**~~ (see Attachment A).

~~6.~~5. Iterative and Adaptive Management Process

~~a. Water Quality Improvement Plan Adaptive Management Process~~

The Copermittees in each Watershed Management Area must implement the iterative process, ~~at least once every 3 years,~~ adapting the Water Quality Improvement Plan, jurisdictional runoff management programs and monitoring and assessment programs, as necessary, to become more effective~~, based on, but not limited to~~ and meet the requirements of Provisions A, and shall consider the following ~~considerations~~:

a. PRIORITY RECEIVING WATER CONDITIONS AND NUMERIC GOALS
The priority receiving water conditions and numeric goals, developed pursuant to B.2.c. and B.2.e respectively, shall guide jurisdictional implementation efforts for the duration of this Order. Recommendations for changes to priority receiving water conditions and numeric goals shall be provided in the Report of Waste Discharge and shall consider the following:

(1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan;

(2) Progress toward achieving interim and final numeric ~~targets~~goals in receiving waters and/or MS4 discharges for the highest water quality priorities in the Watershed Management Area~~,~~

~~(3) Appropriateness of the highest water quality priorities identified for the Watershed Management Area;~~
~~(4)~~
~~(5) Progress toward achieving outcomes according to established schedules;~~
~~(6)~~
(3) New scientific information or new or updated policies or regulations that affect identified numeric goals including revised water quality objectives or TMDLs;

~~(7)~~(4) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality problems and implementation measures to address the highest priority receiving water ~~quality problems~~conditions;

~~(8)~~(5) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees;

(6) The factors listed in Provision B.2.a.(1)-(10);

~~(9)~~(7) San Diego Water Board recommendations; and

~~(10)~~(8) Recommendations for modifications ~~to the Water Quality Improvement Plan~~ solicited through a public participation process.

b. ~~BASED ON THE RESULTS OF THE ITERATIVE PROCESS~~ WATER QUALITY IMPROVEMENT STRATEGIES AND SCHEDULES

~~(1)~~ The water quality improvement strategies and schedules required pursuant to ~~Provision B.5.a., the~~Provisions B.3 and B.4 shall be adapted as new information becomes available to inform more effective and efficient means of achieving the numeric goals established in Provision B.2.e. Copermittees ~~must report any modifications necessary~~shall consider adaptation to ~~improve the effectiveness of the Water Quality Improvement Plan in the Annual Report required pursuant to Provision , or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5..~~

~~(2) The Copermittees must implement any modifications to the Water Quality Improvement Plan in accordance with the schedules developed pursuant to Provisions B.2. and B.3., unless directed otherwise by the San Diego Water Board.~~

~~b. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ADAPTIVE MANAGEMENT PROCESS~~

~~Each Copermittee in the Watershed Management Area must implement the iterative process,~~jurisdictional runoff management programs and monitoring and assessment strategies and schedules at least annually~~, adapting its jurisdictional runoff management program to become more effective, based on, but not limited to~~ considering the following:

(1) Changes to priority receiving water conditions and numeric goals based on recommendations from B.5.a.;

~~(11)~~(2) Measurable or demonstrable reductions of non-storm water discharges to ~~and from~~ each Copermittee's MS4;

~~(12)~~(3) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;

(4) Information on the MS4 sources and/or pollutant-generating activities determined to be most significantly contributing to priority receiving water conditions;

~~(13)~~(5) Efficiency in implementing the Water Quality Improvement Plan;

~~(14)~~(6) San Diego Water Board recommendations; and

~~(15)~~(7) Recommendations for modifications ~~to each Copermittee's jurisdictional runoff management program~~ solicited through a public participation process~~.~~.

6. Water Quality Improvement Plan Submittal, Implementation, and Modifications

Requirements for Water Quality Improvement Plan submittals and modifications are described in Provision F. Requirements for corresponding modifications to the jurisdictional runoff management programs and monitoring and assessment program are also described in Provision F.

~~The~~ Copermittees must commence with implementation of the Water Quality Improvement Plan no later than ~~180 days after submission, unless otherwise directed in writing by the San Diego Water Board.~~ the fiscal year (July 1) following San Diego Water Board approval of the Water Quality Improvement Plan.

~~(1) modifications necessary to improve the effectiveness its jurisdictional runoff management program document in the Annual Report required pursuant to Provision , or as part of the ROWD required pursuant to Provision F.5..~~

~~Each Copermittee must implement any modifications to its jurisdictional runoff management program in accordance with the schedules developed pursuant to Provisions B.2. and B.3., unless directed otherwise by the San Diego Water Board.~~

~~**7. Water Quality Improvement Plan Implementation**~~

~~Copermittees must commence with implementation of the Water Quality Improvement Plan no later than 180 days after submission, unless otherwise directed in writing by the San Diego Water Board.~~

C. ACTION LEVELS

The purpose of this provision is for the Copermittees to incorporate numeric non-storm water and storm water action levels in the Water Quality Improvement Plans. The action levels ~~will~~shall be used to guide the following program planning efforts and measure progress towards attaining the reasonable protection, preservation, and enhancement~~, and restoration~~ of water quality and designated beneficial uses of waters of the state~~. This goal will be accomplished through monitoring and assessing the quality of the MS4 discharges during the implementation of the Water Quality Improvement Plans.~~:

1. ~~The Copermittees must incorporate numeric action levels in the~~ Support development and prioritization of water quality improvement strategies through the Water Quality Improvement Plans ~~to direct and focus~~. Discharge data above action levels can be evaluated using a statistical approach considering the ~~Copermittees' jurisdictional runoff management program implementation efforts for addressing MS4~~ frequency, magnitude, and loading of discharges to the receiving waters~~. The numeric action levels will be used as part of the MS4~~ to support development of actions and prioritization of their implementation.
2. Assist in the effective prohibition of non-stormwater discharges ~~assessments required under~~ from the MS4 pursuant to Provision ~~, and each Copermittee's program to detect and eliminate non-storm water~~ E.2.
3. Support the detection and elimination of illicit discharges to the MS4 ~~required under~~pursuant to Provision ~~. Numeric~~E.2.

These goals will be accomplished through monitoring and assessing the quality of the MS4 discharges prior to and during the implementation of the Water Quality Improvement Plans. Exceedances of action levels are not subject to enforcement or non-compliance actions under this Order.

Action levels will be developed and incorporated into the Water Quality Improvement Plans (Provision B) including the Illicit Discharge Detection and Elimination (IDDE) Program (Provision E.2). Depending upon the goals/objectives for the use of the action levels ~~must be developed~~ and the priority receiving water conditions, the constituents and values at which they are set may differ between watersheds. Copermittees may develop Watershed Management Area specific numeric action levels for non-storm water and storm water MS4 discharges~~,~~ using an approach approved by the Regional Board or use the default non-stormwater and stormwater action levels prescribed within C.1 and C.2 below, respectively. The Copermittees will submit action levels as part of their Water Quality Improvement Plan(s). The action levels established as ~~follows:~~part of R9-2007-0001 will serve as the interim action levels until the Water Quality Improvement Plans are completed and approved.

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~~8.~~1. Non-Storm Water Action Levels

a. The following non-storm water action levels (NALs) must be incorporated ~~in the Water Quality Improvement Plan~~:

(1) Non-Storm Water Discharges from MS4s to Ocean Surf Zone

Table C-1. Non-Storm Water Action Levels for Discharges from MS4s to Ocean Surf Zone

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Total Coliform	MPN/100 ml	1,000	-	10,000/1,000[1]	OP
Fecal Coliform	MPN/100 ml	200[2]	-	400	OP
Enterococci	MPN/100 ml	35	-	104[3]	OP

Abbreviations/Acronyms
AMAL – average monthly action level
MDAL – maximum daily action level
OP – Ocean Plan water quality objective
MPN/100 ml – most probable number per 100 milliliters

Notes:
1. Total coliform density ~~shall not exceed~~NAL is 1,000 MPN/100 ml when the fecal/total coliform ratio exceeds 0.1
2. Fecal coliform density ~~may not exceed~~ NAL is 200 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas"

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~~(3)~~

~~(4)~~(2) Non-Storm Water Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Table C-2. Non-Storm Water Action Levels for Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Turbidity	NTU	75	-	225	OP
pH	Units	Within limit of 6.0 to 9.0 at all times			OP
Fecal Coliform	MPN/100 ml	200[1]	-	400[2]	BP
Enterococci	MPN/100 ml	35	-	104[3]	BP
Priority Pollutants	ug/L	See Table C-3			

Abbreviations/Acronyms:

AMAL – average monthly action level
OP – Ocean Plan water quality objective
NTU – Nephelometric Turbidity Units
ug/L – micrograms per liter
MDAL – maximum daily action level
BP – Basin Plan water quality objective
MPN/100 ml – most probable number per 100 milliliters

Notes:

1. Based on a minimum of not less than five samples for any 30-day period
2. ~~No~~NAL is reached if more than 10 percent of total samples ~~may~~ exceed 400 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for saltwater “designated beach areas” and is not applicable to waterbodies that are not designated REC-1.

Table C-3. Non-Storm Water Action Levels for Priority Pollutants

Parameter	Units	Freshwater (CTR) MDAL	Freshwater (CTR) AMAL	Saltwater (CTR) MDAL	Saltwater (CTR) AMAL
Cadmium	ug/L	**	**	16	8
Copper	ug/L	*	*	5.8	2.9
Chromium III	ug/L	**	**	-	-
Chromium VI	ug/L	16	8.1	83	41
Lead	ug/L	*	*	14	2.9
Nickel	ug/L	**	**	14	6.8
Silver	ug/L	*	*	2.2	1.1
Zinc	ug/L	*	*	95	47

Abbreviations/Acronyms:

CTR – California Toxic Rule
ug/L – micrograms per liter
AMAL – average monthly action level
MDAL – maximum daily action level

Notes:

* Action levels developed on a case-by-case basis (see below)

** Action levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels (MCLs) under the California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431

The Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc NALs for MS4 discharges to freshwater receiving waters will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

~~(5)~~(3) Non-Storm Water Discharges from MS4s to Inland Surface Waters

Table C-4. Non-Storm Water Action Levels for Discharges from MS4s to Inland Surface Waters

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BP
Turbidity	NTU	-	20	See MDAL	BP
pH	Units	Within limit of 6.5 to 8.5 at all times			BP
Fecal Coliform	MPN/100 ml	200[1]	-	400[2]	BP
Enterococci	MPN/100 ml	33	-	61[3]	BP
Total Nitrogen	mg/L	-	1.0	See MDAL	BP
Total Phosphorus	mg/L	-	0.1	See MDAL	BP
MBAS	mg/L	-	0.5	See MDAL	BP
Iron	mg/L	-	0.3	See MDAL	BP
Manganese	mg/L	-	0.05	See MDAL	BP
Priority Pollutants	ug/L	See Table C-3			

Abbreviations/Acronyms:
AMAL – average monthly action level
BP – Basin Plan water quality objective
COLD – cold freshwater habitat beneficial use
NTU – Nephelometric Turbidity Units
mg/L – milligrams per liter
MDAL – maximum daily action level
WARM – warm freshwater habitat beneficial use
MBAS – Methylene Blue Active Substances
MPN/100 ml – most probable number per 100 milliliters
ug/L – micrograms per liter

Notes:
1. Based on a minimum of not less than five samples for any 30-day period
2. ~~No~~NAL is reached if more than 10 percent of total samples ~~may~~ exceed 400 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for freshwater “designated beach areas” and is not applicable to waterbodies that are not designated REC-1.

b. If not identified in Provision C.1.a, NALs must be identified and incorporated in the Water Quality Improvement Plan for any pollutants or waste constituents causing or contributing, or threatening to cause or contribute to a condition of pollution or nuisance in waters of the ~~state~~ U.S. associated with the highest water quality priorities related to non-storm water discharges from the MS4s. NALs must be based on:

(1) Applicable water quality standards which may be dependent upon site-specific or receiving water-specific conditions or assumptions to be identified by the Copermittees; or

(2) Applicable numeric WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order.

c. Dry weather monitoring and assessment data from MS4 outfalls collected in accordance with Provision D.1 may be used to develop or revise NALs based upon watershed-specific data. Revision of NALs is subject to Regional Board EO approval.

~~10.~~ ~~11.~~2. Storm Water Action Levels

a. The following storm water action levels (SALs) for discharges of storm water from the MS4 must be incorporated ~~in the Water Quality Improvement Plan:~~:

Table C-5. Storm Water Action Levels for Discharges from MS4s to Receiving Waters

Parameter	Units	Action Level
Turbidity	NTU	126
Nitrate & Nitrite (Total)	mg/L	2.6
Phosphorus (Total P)	mg/L	1.46
Cadmium (Total Cd)*	µg/L	3.0
Copper (Total Cu)*	µg/L	127
Lead (Total Pb)*	µg/L	250
Zinc (Total Zn)*	µg/L	976

Abbreviations/Acronyms:
NTU – Nephelometric Turbidity Units
mg/L – milligrams per liter
ug/L – micrograms per liter

Notes:
* The sampling must include a measure of receiving water hardness at each MS4 outfall. If a total metal concentration exceeds the corresponding metals SAL in Table C-5, that concentration must be compared to the California Toxics Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific metal exceeds that SAL, but does not exceed the applicable USEPA 1-hour maximum concentration criterion for the measured level of hardness, then the sample result will not be considered ~~as an excursion~~ above the SAL for that measurement.

b. If not identified in Provision C.2.a, SALs must be identified and incorporated in the Water Quality Improvement Plan for pollutants or waste constituents causing or contributing, or threatening to cause or contribute to a condition of pollution or nuisance in waters of the state associated with the highest water quality priorities related to storm water discharges from the MS4s. SALs must be based on:

(1) Federal and State water quality guidance and/or water quality standards; ~~and~~or

(2) Site-specific or receiving water-specific conditions; or

(3) One of the approaches recommended by the California Water Board's Storm Water Panel in its report, "The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities" (June 2006).

~~(3)~~(4) Applicable numeric WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order.

c. Wet weather monitoring and assessment data from MS4 outfalls collected in accordance with Provision D.1.b may be used to develop or revise SALs based upon watershed-specific data. Revision of SALs is subject to San Diego Water

Board approval.

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~~C.~~D. MONITORING AND ASSESSMENT REQUIREMENTS

[NOTE: This section has been replaced with a proposed alternative version of provision D.]

Water quality monitoring and assessment shall be question-driven and designed to support adaptive storm water management and the iterative process outlined in Provision B. The monitoring and assessment activities shall be based on a logical hierarchy in which overall management goals help define clear management questions, which are addressed by specific monitoring activities designed to produce data targeted to defined assessment needs. The monitoring and assessment activities shall follow relevant and applicable guidance provided in the SWAMP Assessment Framework (Bernstein, 2010[9]), A Framework for Monitoring and Assessment in the San Diego Region (SDRWQCB, 2011[10]), and the Southern California Stormwater Monitoring Coalition's (SMC) Model Monitoring Program (SMC, 2004[11]).

The monitoring and assessment shall be designed in two phases. A transitional program shall be implemented beginning the first day of October in the year following permit adoption, and continue until the first day of October following commencement of Water Quality Improvement Plan implementation, pursuant to Provision B. The transitional ("pre-WQIP") program shall build on the experience gained implementing water quality monitoring programs under previous Orders and shall address the SMC questions as described below. The second ("post-WQIP") phase of the Monitoring and Assessment Program shall address the watershed priorities identified in the Water Quality Improvement Plans as developed for each watershed pursuant to Provision B. This phase of monitoring shall begin with implementation of the approved WQIPs.
The transitional (pre-WQIP) phase of monitoring and assessment applies only to the San Diego County Copermittees; the Orange County and Riverside County permittees affected by this regional permit are expected to participate during the post-WQIP phase, after officially enrolling under the regional permit.

As a starting point, the Monitoring and Assessment Program shall be designed to address the overarching management questions developed by the SMC:

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[9] Bernstein, Brock, 2010. "SWAMP Assessment Framework." Prepared for the Surface Water Ambient Monitoring Program (SWAMP). December, 2010). http://www.swrcb.ca.gov/water_issues/programs/swamp/docs/reports/app_c_assess_frmwrk.pdf.

[10] SDRWQCB, 2011. "A Framework for Monitoring and Assessment in the San Diego Region." California Regional Water Quality Control Board, San Diego Region, Staff Report, Working Draft. May 2012. Prepared by Lilian Busse and Bruce Posthumus. http://www.waterboards.ca.gov/sandiego/board_info/agendas/2012/Jun/item9/eosr0612MonitoringFramework.SD1.pdf

[11] SMC, 2004. "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California." A report from the Stormwater Monitoring Coalition's Model Monitoring Technical Committee. August 2004. Technical Report #419. http://www.lmtf.org/FoLM/Poliact/EColi/419_smc_mm.pdf

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? This question will be addressed by comparing indicator values to the relevant benchmarks or objectives and/or to background conditions.

2. What is the extent and magnitude of the current or potential receiving water problems? This question will be addressed by mapping the spatial extent and/or temporal persistence of problems, the severity of impacts, and/or the degree to which benchmarks are exceeded.
3. What is the relative urban runoff contribution to the receiving water problem(s)? This question will be addressed by comparing concentrations and loads of priority constituents to those from other sources, including background.

4. What are the sources of urban runoff that contribute to receiving water problem(s)? This question will be addressed by characterizing and prioritizing discharges and using targeted source identification protocols to track the origin of specific constituents.

5. Are conditions in receiving waters getting better or worse? This question will be addressed by time series analyses of individual indicators and/or of aggregate or cumulative indices of condition.

Given that substantial work has already been accomplished and other work is ongoing to address the questions related to receiving water condition assessment (questions 1, 2, 5), the Copermittees shall focus their efforts principally on questions 3 and 4. All five questions need not be addressed simultaneously to the same degree. As watershed problems are identified, effort should shift to diagnosis (questions 4 and 5) until the problems have been addressed, at which point effort may shift back to broader assessment (questions 1 and 2) in search of other problems to address.

During the transitional (pre-WQIP) period, where feasible the Copermittees shall develop more specific monitoring questions to guide the design of specific monitoring activities and address specific assessment needs. The information so generated will be used to guide management actions, based on the results of the monitoring data assessments.

As part of each WQIP, the Copermittees shall develop a water quality Monitoring and Assessment Program (Monitoring and Assessment Program) for each Watershed Management Area (WMA), as provided in Table B-1. Using the overarching SMC management questions as guidance, each Monitoring and Assessment Program shall include specific monitoring questions appropriate to address the assessment needs of each specific WMA. The monitoring activities shall be designed to generate data needed to address priority issues identified in the WQIPs, and the resulting monitoring data and assessments shall be supplied to program planners to help inform management actions. If a WMA has an approved Comprehensive Load Reduction Plan (CLRP), the CLRP shall be incorporated into the WQIP.

Each Copermittee covered by this permit shall participate in development and implementation of the Monitoring and Assessment Program for each WMA in which they have jurisdiction. The Copermittees shall consider the needs of regional monitoring and assessment activities in the development of each Monitoring and Assessment Program and make allowances as needed for regional coordination.

1. Receiving Waters Monitoring

Until approval and implementation of the WQIPs, the Copermittees shall perform receiving water monitoring to address management questions and specific questions, as specified in Provisions D.1.a-D.1.g below:

a. SMC Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall participate in the SMC Regional Monitoring Program through its planned completion. The SMC monitoring program seeks to coordinate and leverage existing monitoring efforts to produce regional estimates of condition, improve data comparability and quality assurance, and maximize data availability, while conserving monitoring expenditures. The primary goal of this program is to implement an ongoing, large scale regional monitoring program for southern California's coastal streams and rivers. A comprehensive program was designed by the SMC, in which each participating group assesses its local watersheds and then contributes their portion to the overall regional assessment. The SMC Regional Monitoring Program involves a probabilistic design for characterization of coastal watersheds using bioassessment metrics and related analyses, including, but may not be limited to: physical habitat characterization, Southern California Index of Biological Integrity scoring, macroinvertebrate and algal taxonomy, algal biomass, water chemistry, and toxicity. The study incorporates both reference and non-reference streams and may identify additional biological and/or chemical stressors affecting stream health, such as channel alteration and presence of invasive species.

b. Southern California Bight Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall participate in the Southern California Bight Regional Monitoring program as a trade-off with other routine monitoring requirements. The Bight program involves detailed characterization of coastal and offshore receiving waters, as well as targeted special studies. The Bight regional monitoring effort is designed to build upon the data collected during the previous Bight regional programs, to assess the extent of contamination in the Southern California Bight. Receiving water samples are collected in or near coastal areas, bays, estuaries, offshore islands, and open water/deep ocean within the Bight. Water quality and sediment samples may be collected to provide data for model input, to assess long-term trends, and to answer management questions developed by the diverse group of stakeholders in the Southern California Bight Region as part of the program. In addition, special studies such as potential new technology implementation (i.e. bioanalytical screening and/or genetic coding) may be conducted as part of the Bight Regional Monitoring.

c. SEDIMENT QUALITY MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

Specific Question: What is the condition of sediments in enclosed bays and estuaries with respect to the statewide sediment quality objectives?

Copermittees shall perform monitoring of bay and lagoon sediments, as applicable, under the Copermittees' responsibility to conform to the requirements of the Statewide Sediment Quality Objectives regulatory program, per State Water Resources Control Board Resolution No. 2008-0070 – Adoption of a Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality.

d. HYDROMODIFICATION MANAGEMENT PLAN (HMP) MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall perform receiving water monitoring as required per their Hydromodification Management Plan Monitoring Plans, as approved by the California Regional Water Quality Control Board, San Diego Region.

e. TMDL MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

Specific question: What is the progress in achieving and complying with adopted TMDL targets?

The Copermittees shall conduct receiving water monitoring to address monitoring requirements associated with TMDLs as specified below.

(1) The Copermittees shall perform water quality monitoring as required per the Implementation Plans or approved CLRPs of effective TMDLs, including compliance monitoring for the following TMDLs:

(a) TMDL for Diazinon in Chollas Creek Watershed Resolution No. R9-2002-0123; Effective as of September 11, 2003.

(b) TMDLs for Dissolved Copper in Shelter Island Yacht Basin Resolution No. R9-2005-0019; Effective as of December 2, 2005.

(c) TMDLs for Dissolved Copper, Lead, and Zinc in Chollas Creek Resolution No. R9-2007-0043; Effective as of October 22, 2008.

(d) TMDLs for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Resolution No. R9-2008-0027; Effective as of September 15, 2009.

(e) Revised TMDLs for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) Resolution No. R9-2010-0001; Effective as of April 4, 2011.

(2) TMDL monitoring shall be coordinated and/or integrated with monitoring specified in an approved CLRP or equivalent implementation plan.

f. ASBS SPECIAL PROTECTIONS MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

The Copermittees responsible for discharges to Areas of Special Biological Significance (ASBS) as regulated per the Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges, State Water Resources Control Board Resolution No. 2012-0012, shall perform receiving water monitoring as required, per the adopted ASBS Special Protections.

g. SAN DIEGO REGIONAL REFERENCE STREAM STUDY

Management Question: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

Specific Question: What are the concentrations/loads of bacteria, nutrients, and metals in reference streams in Southern California?

The Copermittees shall participate in reference stream receiving water monitoring and data analysis under the San Diego Regional Reference Stream Study as a Regional Study. The San Diego Regional Reference Stream Study is intended to characterize background concentrations of bacteria, nutrients, and metals in natural streams within the jurisdiction of the San Diego Water Board (Region 9). Samples shall be collected during wet and dry weather at sites considered representative of natural conditions (a contributing drainage area at least 95 percent undeveloped) and that vary in regards to hydrology, catchment size, and geology. The results of the study may be used to assist determination of scientifically-based reference stream numeric goals for indicator bacteria, nutrients, and metals.

h. LONG-TERM RECEIVING WATER MONITORING, POST-WQIP ADOPTION

Management Question: Are conditions in receiving waters getting better or worse?

Following adoption of the WQIPs, the Copermittees shall conduct long-term receiving water monitoring to be performed in each WMA during WQIP implementation, for assessment of long-term trends, as specified below:

(1) The Copermittees in each Watershed Management Area shall select one long-term receiving water station from among the existing mass loading stations (MLS) and temporary watershed assessment stations (TWAS) to be representative of receiving water quality within the WMA.

(2) During the permit term, the Copermittees shall perform monitoring during three wet weather events and three dry weather events at each of the long-term stations selected by the Copermittees and approved by the San Diego Water Board.

(3) Dry Weather Receiving Water Monitoring

During the permit term, the Copermittees shall perform monitoring during three dry weather events, at minimum, at each of the long-term stations. One event must be conducted during the dry season (May 1-September 30) and one event must be conducted during a dry weather period during the wet season (October 1 –April 30), after the first wet weather event of the season, with an antecedent dry period of at least 72 hours following any storm event producing measurable rainfall of greater than 0.1 inch.

(a) For each dry weather receiving water monitoring event, the Copermittees must record field observations consistent with Table D-1 at each monitoring station.

Table D-1. Field Observations for Dry Weather Ambient Receiving Water Monitoring Stations

Field Observations
• Station identification and location. • Presence of flow, or pooled or ponded water. • If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate), - Flow characteristics (i.e. presence of floatables, surface scum, or sheens, odor, color), • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, or sheens, odor, color). • Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology). • Presence and assessment of trash in and around station.

(b) If flow is present during the dry weather watershed monitoring event, and conditions allow the collection of the data, the Copermittee must monitor and record the parameters in Table D-2.

Table D-2. Field Monitoring Parameters for Receiving Water and Persistent MS4 Monitoring Stations

Parameters
• pH • Temperature • Specific conductivity • Dissolved oxygen • Turbidity

(c) Samples must be collected and analyzed as follows:

(i) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, indicator bacteria, and toxicity. Analytes that are field measured do not need to be analyzed by a laboratory.

(ii) For all other constituents, composite samples shall be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques: time-weighted composites composed of 24 discrete hourly samples, or flow-weighted composites collected over a typical 24 hour period. Only one analysis of the composite of aliquots is required.

ADMINISTRATIVE DRAFT

(d) Samples shall be collected for analysis of the following parameters: TMDL or CLRP constituents in watersheds where the Copermittees are responsible parties in an adopted TMDL Implementation Plan, constituents listed as a cause of impairment on a CWA Section 303(d) listing for the receiving water body reach to which the outfall discharges, applicable NAL constituents, and constituents identified by the Copermittees as the watershed priorities in their respective WQIPs, as well as the constituents listed in Table D-3.

Table D-3. Analytical Monitoring Constituents for Receiving Water Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Metals (Total and Dissolved)	Pesticides	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Turbidity[1] • Total Organic Carbon • Dissolved Organic Carbon • Sulfate • Methylene Blue Active Substances (MBAS) • Total Phosphorus[1] • Orthophosphate • Nitrite[1,2] • Nitrate[1,2] • Total Kjeldahl Nitrogen • Ammonia	• Arsenic • Cadmium[1] • Chromium • Copper[1] • Iron • Lead[1] • Mercury • Nickel • Selenium • Thallium • Zinc[1]	• Organo-phosphate pesticides • Pyrethroid pesticides	•Total Coliform • Fecal Coliform[3] •*Enterococcus*

Notes:
1. Constituent with a storm water action level (SAL) specified under Provision C.2.
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
3. *E. Coli* may be substituted for Fecal Coliform.

(e) Dry Weather Receiving Water Toxicity Monitoring:

For each dry weather monitoring event, grab or composite samples from each monitoring station must be collected and analyzed for toxicity in accordance with Table D-4.

Table D-4. Toxicity Testing for Receiving Water Monitoring Stations

Freshwater Organism	Test Approach per Event	EPA Protocol[1]
Pimephales promelas (fathead minnow)	Wet: 1 acute Dry: 1 acute and chronic	EPA-821-R-02-012
Hyalella azteca	Wet: 1 acute Dry: 1 acute and chronic	EPA-821-R-02-012
Psuedokirchneriella subcapitata (formerly *Selenastrum capricornutum*, unicellular algae)	Wet: 1 acute Dry: 1 acute and chronic	EPA-821-R-02-013

Notes:
1. EPA protocols shall be utilized for toxicity testing unless alternate toxicity testing protocols have been approved by the San Diego Regional Water Quality Control Board. Chronic toxicity testing will also be conducted at dry weather mass loading stations unless the channel flows are diverted year-round during dry weather conditions to the sanitary sewer for treatment

(f) Receiving Water Bioassessment Monitoring:

Copermittees shall perform Bioassessment monitoring once during the permit term in accordance with the SMC Model Monitoring Program "Triad" assessment approach (SMC, 2004). Copermittees shall conduct sampling, analysis, and reporting of specified in-stream biological and habitat data according to the protocols specified in the SCCWRP Tech Report No. 539, or subsequent protocols, if developed, that have been widely-accepted as an appropriate alternative for Southern California receiving waters. Bioassessment monitoring may be conducted in conjunction with SMC Regional Monitoring and/or other dry weather receiving water monitoring. A physical assessment shall be conducted that will include details of the channel condition including channel dimensions, hydrologic and geomorphic conditions, and presence and condition of vegetation and habitat.

(4) Wet Weather Receiving Water Monitoring

During the permit term, Copermittees shall perform monitoring during three wet weather events at each of the long-term receiving water monitoring stations. Each monitoring station must be monitored during the wet season beginning October 1 and ending April 30.

(a) For each wet weather monitoring event, the following narrative descriptions and observations must be recorded at each monitoring station:

(i) A narrative description of the station that includes the location, date and duration of the storm event(s) sampled, rainfall estimates of the storm event, and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(ii) The flow rates and volumes measured or estimated. Data from nearby USGS gauging stations may be utilized, or flow rates may be measured or estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), section 3.2.1, or other method proposed by the Copermittees that is acceptable to the San Diego Water Board;

(iii) Station condition (i.e. deposits or stains, vegetation condition, structural condition, observable biology); and

(iv) Presence and assessment of trash in and around station.

(b) For each wet weather receiving water monitoring event, the parameters in Table D-2 must be monitored and recorded in the field.

(c) Samples must be collected and analyzed as follows:

(i) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, indicator bacteria, and toxicity. Analytes that are field measured do not need to be analyzed by a laboratory.

(ii) For all other constituents, composite samples shall be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques: time-weighted composites composed of 24 discrete hourly samples, or flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter. Only one analysis of the composite of aliquots is required.

(iii) Copermittees should implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods.

(d) Samples shall be collected for analysis of the following parameters: TMDL or CLRP constituents in watersheds where the Copermittees are responsible parties in an adopted TMDL Implementation Plan, constituents listed as a cause of impairment on a CWA Section 303(d) listing for the receiving water body reach to which the outfall discharges,

applicable SAL constituents, and constituents identified by the Copermittees as the watershed priorities in their respective WQIPs, as well as the constituents listed in Table D-3.

(e) Wet Weather Receiving Water Toxicity Monitoring

Grab samples or composites from each monitoring station must be collected and analyzed for toxicity in accordance with Table D-4.

i. OTHER RECEIVING WATER MONITORING, POST-WQIP ADOPTION

After adoption of the WQIPs, the Copermittees shall conduct monitoring based on the approved WQIPs, in addition to long-term receiving water monitoring as described in Provision D.1.h, to include constituents identified by the Copermittees as the watershed priorities in their respective WQIPs. Nothing in this Provision is intended to prevent Copermittee collection of additional receiving water data, as necessary, to support and implement respective WQIPs. This monitoring shall include, at minimum, integration of the following receiving water requirements within the WQIPs, as appropriate for specific watersheds:

(a) Participation in SMC Regional Monitoring Program, where applicable

(b) Sediment Quality Monitoring in applicable estuaries

(c) Hydromodification Management Plan (HMP) Monitoring as applicable

(d) TMDL Monitoring where implementation plans have been approved and are under implementation, and

(e) ASBS Special Protections Monitoring, where applicable.

j. RECEIVING WATER MONITORING REPORTING

The Copermittees shall report on the progress of the receiving water monitoring and the results or findings of such monitoring, when completed, in the Annual Report pursuant to Provision F.3.b.

2. MS4 Outfall Discharge Monitoring

Discharge monitoring shall involve both Non-Storm Water (Dry Weather) and Storm Water (Wet Weather) components. The Copermittees shall perform monitoring, as necessary, to identify non-storm water discharges and illegal connections/illicit discharges (IC/IDs) pursuant to Provision E.2 of this Order. To accomplish this, the monitoring may include a variety of water quality and other monitoring techniques, including visual and other observations. Copermittees shall investigate dry weather flows and prioritize outfalls with observed flows for follow-up action as detailed below.

a. Storm Water Outfall Inventory

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

- Each Copermittee shall identify all major outfalls, as defined by 40 CFR §122.26(b)(5-6), that discharge directly to named receiving waters within its jurisdiction, and geo-locate those outfalls on a map of the MS4 pursuant to Provision E.2.b of this Order. This information shall be compiled in a storm water outfall inventory, which also shall include applicable information including HSA, jurisdiction, outlet size, and approximate drainage area. Only MS4 outfalls with safe access and for which access is gained without disturbing critical habitat will be considered in the number of eligible major MS4 outfalls.

b. Non-Storm Water Transient Flow (Dry Weather) Monitoring, IDDE Investigation

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which non-storm water discharges are transient and which are persistent? Which discharges should be investigated as potential IDDEs? Which outfalls exhibit persistent dry weather flows?

The Copermittees shall perform non-storm transient flow discharge monitoring to address the above management and specific questions as follows:

(1) Each Copermittee shall prioritize the major MS4 outfalls within its jurisdiction from the list of major outfalls developed pursuant to Provision D.a., based on criteria and rationale that include potential threat to water quality.

(2) Copermittees with less than 125 major MS4 outfalls that discharge to a receiving water shall visually inspect 80% of the outfalls twice per year during dry weather.

(3) Copermittees with 125 or more but less than 250 major MS4 outfalls that discharge to a receiving water shall visually inspect a prioritized list of major MS4 outfalls that discharge to a receiving water annually. The total number of inspections per Copermittees with 125 or more but less than 250 major MS4s will be a minimum of the total number of all major MS4 outfalls locations once with annual visual inspections. Major MS4 outfalls shall be prioritized based on threat to water quality and will consider factors such as:

- Assessment of connectivity of the discharge to a flowing receiving water
- Reported exceedances in water quality data
- Surrounding land use
- Presence of watershed priority constituents, TMDLs & CWA 303(d) list of impaired water bodies
- Flow rate

(4) Copermittees with 250 or more major MS4 outfalls that discharge to a receiving water shall visually inspect a prioritized list of major MS4 outfalls that discharge to a receiving water annually. The total number of inspections per Copermittees with 250 or greater major MS4s will be a minimum of 250 to a maximum of 500 locations with annual visual inspections. Where possible, inspections will be conducted year round. Major MS4 outfalls shall be prioritized based on threat to water quality and will consider factors such as:

- Assessment of connectivity of the discharge to a flowing receiving water
- Reported exceedances in water quality data
- Surrounding land use
- Presence of watershed priority constituents, TMDLs & CWA 303(d) list of impaired water bodies
- Flow rate

(5) Obvious illicit discharges (i.e., unusual color, unusual odor, or high flow) shall be investigated immediately pursuant to Provision E.2.

(6) An antecedent dry period of at least 72 hours following any storm event producing measurable rainfall of greater than 0.1 inch is required prior to conducting dry weather visual inspections.

(7) During a visual inspection, field personnel shall note visual and other

observations, including those provided in Table D-5 of this Order.

(a) During a visual inspection, an inspection form will be filled out documenting observations in conformance with table D-5.

(b) Inspections of major outfalls conducted pursuant to Provision E of this order, including but not limited to complaint follow-ups, may be accounted for as the visual inspection for the major outfall under this Provision.

Table D-5. Field Observations for Non-Storm Water MS4 Monitoring Stations

Field Observations
• Station identification and location. • Presence of flow, or pooled or ponded water from the outfall. • If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate), - Flow characteristics (i.e. presence of floatables, surface scum, or sheens, odor, color), - Flow source(s) suspected or identified from non-storm water source investigation, and - Flow source(s) eliminated during non-storm water source identification. • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, or sheens, odor, color), and - Known or suspected source(s) of pooled or ponded water. • Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology). • Presence and assessment of trash in and around station. • Evidence or signs of illicit connections or illegal dumping.

(8) Evidence of obvious illegal discharges, such as obvious odor, discoloration, or floating foam or scum, shall be followed up immediately.

(9) The field observations shall be evaluated together with existing information available from prior inspections and prior monitoring results to determine whether the non-storm water (dry weather) discharge flow is likely to be transient or persistent[12].

[12] Persistent flow, as modified from the SMC Model Monitoring Program definition of persistent WQO exceedance, is defined as "the presence of flow, pooled, or ponded water more than 72 hours after a measureable rainfall event of 0.1 inch of precipitation during three consecutive monitoring and/or inspection events". All other flow is considered transient.

(a) If the flow is deemed to be transient, observations shall be used to conduct IDD E investigations where warranted pursuant to Provision E.2.

(b) If the nature and source of the observed flow is already known, this shall be noted on the field log, including whether the observed flow results from a non-storm water discharge conditionally allowed per Provision E.2.a.

(10) Where the non-storm water (dry weather) discharge flow is deemed to be persistent in Provision D.2.a.(8), the outfall shall be referred to the characterization and prioritization process described in Provision D.2.c. .

(11) The framework developed in the transitional monitoring program shall be used as a basis to design a continuing IDDE monitoring program as part of the Monitoring and Assessment Program in each WQIP.

c. NON-STORM WATER PERSISTENT FLOW (DRY WEATHER) OUTFALL MONITORING

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which outfalls exhibit persistent dry weather flows? Do discharge concentrations at MS4 outfalls meet applicable permit action levels? Which MS4 outfalls impact receiving water quality during dry weather?

The Copermittees shall perform non-storm water persistent flow discharge monitoring to address the above-listed management and specific questions as follows:

(1) Based upon the results of the investigation conducted pursuant to Provision D.2.b., each Copermittee shall add to the storm water outfall inventory compiled pursuant to Provision D.2.a., a classification of whether the outfall produces persistent discharge flow, transient flow, or no dry weather flow. The inventory shall provide notations on the basis for that classification; the classification may be based on historical data and/or contemporary observations, including information generated per Provision D.2.b..

(2) The Copermittees shall prioritize the outfalls identified as having persistent dry weather in the stormwater outfall inventory, pursuant to Provision D.2.c.(1). Historical data may be used to assist prioritization, where available. The prioritization shall be prepared based on criteria to be developed by the Copermittees, and a brief rationale for the prioritization shall be provided to accompany the map.

(3) Based on the prioritization of major outfalls developed under Provision

D.2.c.(2), the Copermittees shall identify, at minimum, a number of major outfalls to monitor within each watershed management area equivalent to the number of urbanized HSAs within the WMA.. The selected outfalls shall be listed by urbanized HSA and indicated on the map prepared pursuant to Provision D.2.a..

(4) The Copermittees shall monitor each major outfall identified in Provision D.2.c.(3) two times annually under dry weather conditions until one of the following occurs, at which point the outfall may be removed from the list:

(a) Flows are reduced to near-zero for three consecutive visits, or

(b) The source(s) of flows are determined to be derived from a non-storm water discharge source conditionally allowed per Provision E.2.a, or

(c) The source of the discharge is determined to be covered by a separate NPDES permit.

(d) The Copermittees shall document any such removal of sites from the outfall monitoring list in their annual report. Outfalls so removed must be replaced with then next highest prioritized MS4 outfall in the WMA per Provision D.2.c.(3), unless there are no remaining qualifying outfalls within the urbanized HSAs of the WMA.

(e) Where these criteria are not met but the threat to water quality is reduced, the outfall may be prioritized accordingly for continued follow up activity.

(5) During each semi-annual visit, the Copermittee must record field observations consistent with Table D-5 at each non-storm water MS4 monitoring station within its jurisdiction.

(6) Prior to WQIP approval, each semi-annual visit in which measurable flow is present from an outfall listed under Provision D.2.c.(3) must include the following:

(a) Grab samples shall be collected for analysis for the constituents listed in Table D-6, unless the Copermittee has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary.

Table D-6. Analytical Monitoring Constituents for Non-Storm Water MS4 Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Total Phosphorus • Ortho-phosphate • Nitrite[1] • Nitrate[1] • Total Kjeldahl Nitrogen • Ammonia as N • Chlorine	• Cadmium • Copper • Lead • Zinc	• Total Coliform • Fecal Coliform[2] • *Enterococcus*

Notes:
1. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
2. *E. Coli* may be substituted for Fecal Coliform.

(b) Field measurements shall be collected for the parameters listed in Table D-2.

(c) If the Copermittee identifies and eliminates the source of non-storm water discharge, analysis of the sample is not required.

(7) As part of the WQIP, Copermittees must develop a program to characterize the persistent non-storm water discharges and pollutant loads from the Copermittee's major MS4 outfalls. As part of the development of the Monitoring and Assessment Program for each WMA, the number and selection of outfalls shall be re-evaluated and determined anew for each WMA, along with the appropriate monitoring frequency and methods.

(8) After WQIP approval, each visit in which measurable flow is present from an outfall listed under Provision D.2.c.(3), as modified by approved changes pursuant to Provision D.2.c.(7) must include the following:

(a) Samples shall be collected for analysis of the following parameters:

(i) Constituents identified by the Copermittees as highest watershed priorities,

(ii) TMDL constituents in watersheds where the Copermittees are responsible parties in an effective TMDL Implementation Plan for the receiving water body reach to which the outfall discharges,

(iii) Constituents listed as a cause of impairment on a CWA Section

303(d) listing for the receiving water body reach to which the outfall discharges, and

(iv) Applicable NAL constituents.

(b) Field measurements shall be collected for the parameters listed in Table D-2.

(9) Annually, the Copermittees shall evaluate the data produced by the persistent flow outfall monitoring and inspections, rank the outfalls according to potential threat to receiving water quality, and produce a prioritized list of major outfalls for follow-up action. The prioritized list shall be used to update the WQIP, with the goal of reducing flows and/or loads in order of the ranked priority list through targeted programmatic actions and source investigations.

d. STORM WATER (WET WEATHER) OUTFALL MONITORING

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which MS4 outfalls impact receiving water quality during wet weather? Do discharge concentrations at MS4 outfalls meet applicable permit action levels? How do representative MS4 outlet discharge concentrations, loads, and flows change over time?

The Copermittees shall perform storm water discharge monitoring to address the above-listed management and specific questions as follows:

(1) Prior to adoption of the WQIPs, the San Diego Copermittees shall continue the MS4 outfall monitoring program implemented under Order No. R9-2007-0001 per RWQCB approved plan through its planned completion to continue to obtain data from a representative cross-section of discharges.

(2) Prior to adoption of the WQIPs, the San Diego Copermittees shall perform storm water discharge monitoring based on representative outfalls to address the above-listed management questions as follows:

(a) The Copermittees shall select, at minimum, three monitoring stations at representative major MS4 outfalls with homogenous land use types and/or typical mixed-use drainage areas per WMA from the map developed pursuant to Provision D.2.a. Historical data may be used to assist site selection, where available. These outfalls shall be geo-located on a map showing the urban hydrologic sub-areas (HSAs), land use drainage areas, and jurisdictional boundaries within the permitted area.

(b) Each selected monitoring station must be monitored twice during the wet season, beginning October 1 and ending April 30.

(c) For each wet weather monitoring event, the following narrative descriptions and observations must be recorded at each monitoring station:

(i) A narrative description of the station that includes the location, date and duration of the storm event(s) sampled, rainfall estimates of the storm event, and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(ii) The flow rates and volumes measured or estimated. Data from nearby USGS gauging stations may be utilized, or flow rates may be measured or estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), section 3.2.1, or other method proposed by the Copermittees that is acceptable to the San Diego Water Board;

(d) For each wet weather monitoring event, the parameters in Table D-2 must be monitored and recorded in the field. Samples shall be collected for analysis of parameters listed in Table D-7, according to the following methods:

(i) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, and indicator bacteria. Analytes that are field measured do not need to be analyzed by a laboratory.

(ii) For all other constituents, composite samples shall be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques:

[a] Through use of automated equipment to collect time-weighted composites composed of 24 discrete hourly samples, or flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter. Only one analysis of the composite of aliquots is required.

[b] If automated compositing is not feasible, a composite sample may be collected using a minimum of 4 grab samples, collected during the first 24 hours of the storm water discharge, or for the entire storm water discharge if the storm event is less than 24 hours. Only one analysis of the composite of aliquots is required.

(iii) Copermittees should implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods.

Table D-7. Analytical Monitoring Constituents for Wet Weather MS4 Outfall Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Turbidity[1] • Total Organic Carbon • Dissolved Organic Carbon • Sulfate • Methylene Blue Active Substances (MBAS) • Total Phosphorus[1] • Orthophosphate • Nitrite[1,2] • Nitrate[1,2] • Total Kjeldahl Nitrogen • Ammonia	• Arsenic • Cadmium[1] • Chromium • Copper[1] • Iron • Lead[1] • • Nickel • Selenium • Thallium • Zinc[1]	•Total Coliform • Fecal Coliform[3] •*Enterococcus*

Notes:
1. Constituent with a storm water action level (SAL) specified under Provision C.2.
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
3. *E. Coli* may be substituted for Fecal Coliform.

(3) After adoption of the WQIPs, the Copermittees shall perform storm water discharge monitoring based on representative major MS4 outfalls to address the above-listed management questions, and according to the needs for outfall monitoring as defined in the monitoring and assessment sections of the WQIPs. Samples shall be collected for analysis of parameters identified by the Copermittees as watershed priorities in the WQIP. Copermittees shall consider constituents based on factors including, but not limited to:

(a) Constituents identified as the highest water quality priorities.

(b) TMDL constituents in watersheds where the Copermittees are responsible parties in an effective TMDL Implementation Plan for the receiving water body reach to which the outfall discharges,

(c) Constituents listed as a cause of impairment on a CWA Section 303(d) listing for the receiving water body reach to which the outfall discharges, and

(d) Applicable SAL constituents.

e. MS4 Outfall Discharge Monitoring Reporting

The Copermittees shall report on the progress of the MS4 outfall monitoring and the results or findings of such monitoring, when completed, in the Annual Report pursuant to Provision F.3.b.

3. Source/Stressor Identification

Management Question: What are the sources of urban runoff that contribute to receiving water problem(s)?

The Copermittees shall perform Source/Stressor Identification studies as needed to investigate sources of pollutants or stressors in cases where MS4 discharges are deemed to be causing or contributing to receiving water priorities, based on monitoring performed under Provisions D.1 and D.2. The results of the Stressor/Source Identification studies may be shared regionally among the Copermittees to provide information useful in improving adaptive management of urban runoff through implementation of the WQIPs.

The principal role of Source/Stressor Identification is to identify and prioritize pollutant generating activities and source categories. Identification of high-priority sources is an important step in support of the WQIP process, to help inform the development of effective pollutant reduction strategies for particular priority constituents on a watershed-specific basis.

Source identification shall be conducted on a constituent-specific basis. The source identification efforts shall focus on constituents identified as watershed priorities, and include prioritization of sources based on magnitude, controllability, and other factors. The constituent-specific source identification process shall include, at a minimum, the following steps:

- Step 1: Compile known information on the specific priority constituent. This information includes data on potential sources and movement of a particular constituent within the urban watershed. Data generated by the Copermittees and others, as well as information available from a literature research on the priority constituent shall be compiled and analyzed as appropriate.

- Step 2: Based on the compiled information generated on the priority constituent, identify data gaps, if any. Targeted studies may be planned where appropriate to fill identified data gaps; such studies would be performed as Special Studies per Provision D.4. For example, targeted studies may be performed to quantify the relative loading of a priority constituent from a particular pollutant generating activity, or to improve understanding of the fate of a constituent in the environment.

- Step 3: Based on the information compiled, develop an inventory of sources and consider how to prioritize them within the watershed for potential follow-up action. Examples of prioritization criteria for sources include relative magnitude in discharges, geographical distribution (i.e., regional or localized), frequency of occurrence in discharges, human health risk, and controllability.

- Step 4: Develop a prioritized list of sources for the priority constituent and deliver to the Copermittee staff responsible for implementing WQIPs.

Prior to adoption of the WQIPs, the San Diego Copermittees shall continue source identification studies pertaining to compliance with TMDLs and the development of the CLRP implemented under Order No. R9-2007-0001.

Following adoption of the WQIPs, the Copermittees shall conduct source/stressor identification studies as necessary to support the WQIP watershed priorities and strategies. The plans for source/stressor ID studies must be submitted as part of the Monitoring and Assessment Programs included as part of the WQIPs required pursuant to Provision B of this Order.

The Copermittees shall report on the progress of the source/stressor ID studies and the results or findings of such studies, when completed, in the Annual Report pursuant to Provision F.3.b.

4. Special Studies

The Copermittees shall conduct Special Studies to address information needs as identified for receiving waters per monitoring performed pursuant to Provision D.1, for MS4 outfall discharges per monitoring performed pursuant to Provision D.2, and in Source/Stressor Identification studies per Provision D.3; to provide information on BMP effectiveness; and otherwise as needed to support implementation or evaluation of the WQIP strategies for the identified highest water quality priorities.

Within the permit term, two Special Studies shall be conducted within each Watershed Management Area, to address specific questions developed for each Watershed Management Area, and two regional special studies shall be conducted to answer regional questions.

a. The monitoring plans for the special studies must be submitted as part of the Monitoring and Assessment Programs included as part of the Water Quality Improvement Plans required pursuant to Provision B. The special studies must, at a minimum, be in conformance with the following criteria:

(1) The special studies must be related to water quality priorities identified by the Copermittees within the Watershed Management Area or San Diego Region, and the monitoring plans for the special studies must address specific watershed or regional questions;

(2) The special studies must be implemented within specific Watershed Management Areas or regionally within the San Diego Region;

(3) The special studies must include some form of participation by all Copermittees within the Watershed Management Area or San Diego Region, as applicable;

(4) One of the two required special studies within each Watershed Management Area may be replaced by a regional special study pursuant to D.4.a. (1) through D.4.a.(3); and

(5) A special study done pursuant to D.4.a. (1) through D.4.a.(4) that is started prior to the submittal of the WQIP, but is completed during the permit term, shall meet the requirements of a special study for a Watershed Management Area or San Diego Region, as applicable.

b. The Copermittees shall report on the progress of the special studies and the results or findings of such studies, when completed, in the Annual Report pursuant to Provision F.3.b.

Examples of special studies include:

- Enhance outreach & education by expanding residential BMP rebate programs (irrigation, rainwater harvesting and turf conversion) to multi-family housing
- Enhance outreach & education by increasing enforcement of over-irrigation regulation
- Conduct Catch Basin Inlet Cleaning Study assessment
- Implement Residential & Commercial Area Patrolling
- Implement Targeted Aggressive Street Sweeping Study
- Develop Watershed Urban Runoff Management Program Inspection Program (separate from commercial/industrial inspections, targets all businesses in specific areas)
- Conduct an investigation to improve the understanding of the linkage between groundwater and surface water hydrology and potential impacts to receiving water beneficial uses
- Conduct targeted field investigations to provide additional spatial or temporal information on the highest priority constituents or activities to inform or improve the efficiency of implementation efforts in the WMA.

The Regional Reference Stream Study is an example of a regional special study.

5. Assessment Requirements

The Copermittees must report the progress and findings of the following assessments, when available and as applicable to each WMA, as part of the Annual Report for each WMA, as required pursuant to Provision F. Assessments that occur only once per permit term, or are based on monitoring that occurs only once per permit term, shall be reported as part of the applicable Annual Report, or included within the Copermittees' Report of Waste Discharge, prior to commencement of the subsequent permit term.

a. RECEIVING WATER MONITORING

The Copermittees shall perform analysis and assessments of data and information produced per Provision D.1, addressing for each Receiving Water Monitoring element the management and specific questions as shown in Provision D.1 and below. The analysis and assessments shall relate the monitoring data compiled for each component to the conditions of affected receiving waters and status of relevant receiving water beneficial uses.

(1) SMC Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall incorporate results of the SMC Regional Monitoring Program, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The SMC Program is designed to provide a representative sampling of receiving water quality in coastal rivers and streams in the region's watersheds, based on a probabilistic design for characterization of coastal watersheds, using bioassessment metrics and related analyses. The analysis and assessments of the data shall relate the SMC monitoring data to the condition of receiving waters and status of receiving water beneficial uses.

(2) Bight Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall incorporate results of the Bight Regional Monitoring Program, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The Bight regional monitoring effort involves detailed characterization of coastal and offshore receiving waters, as well as targeted special studies. The analysis and assessments of the data shall relate the Bight monitoring data to the condition of receiving waters and status of receiving water beneficial uses.

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(3) Sediment Quality

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

Specific Question: What is the condition of sediments in enclosed bays and estuaries with respect to the statewide sediment quality objectives?

The Copermittees shall incorporate results of the sediment quality monitoring of bay and estuarine sediments, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the data shall relate sediment quality data to the condition of receiving waters and status of receiving water beneficial uses.

The analysis of sediment quality data also shall conform to the requirements of the Statewide Sediment Quality Objectives regulatory program, per State Water Resources Control Board Resolution No. 2008-0070 – Adoption of a Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(4) Hydromodification Management Plan (HMP) Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall incorporate results of the receiving water monitoring required per their Hydromodification Management Monitoring Plans, as approved by the California Regional Water Quality Control Board, San Diego Region, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the data shall relate HMP monitoring data to the condition of receiving waters and status of receiving water beneficial uses. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(5) TMDL Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

Specific question: What is the progress in achieving and complying with adopted TMDL targets?

The Copermittees shall incorporate results of TMDL monitoring, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the TMDL monitoring data shall be integrated with other receiving water data in assessments of the condition of receiving waters and status of receiving water beneficial uses.

The Copermittees shall annually evaluate receiving water data produced per Provision D.1.e. to determine whether TMDL targets are being met, for applicable receiving waters as specified in adopted TMDLs and include the results of this evaluation, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

The analysis of TMDL monitoring data also shall conform to the requirements of the adopted TMDLs and associated Implementation Plans, to demonstrate compliance with the applicable terms of adopted TMDLs and Implementation Plans.

(6) ASBS Special Protections Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

The Copermittees responsible for discharges to Areas of Special Biological Significance (ASBS) as regulated per the Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges, State Water Resources Control Board Resolution No. 2012-0012, shall incorporate results of ASBS monitoring, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the ASBS monitoring data shall be integrated with other receiving water data in assessments of the condition of receiving waters and status of receiving water beneficial uses.

The Copermittees for whom ASBS monitoring is required under the terms of the adopted ASBS Special Protections shall evaluate the data as required per State Water Resources Control Board Resolution No. 2012-0012, and include the results of this evaluation, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(7) Long-Term Receiving Water Monitoring

Management Question: Are conditions in receiving waters getting better or worse?

The Copermittees shall incorporate the results of the Long-Term Receiving Water Monitoring into the analysis and assessments conducted as part of the adaptive management process. The analysis and assessments of the Long-Term monitoring data shall be integrated with other receiving water data in assessments of the condition of receiving waters and status of receiving water beneficial uses.

The Copermittees shall evaluate the data produced by the receiving water monitoring pursuant to Provision D.1.g, and incorporate new receiving water data into time series plots for each long-term monitoring constituent, for each WMA. Once per permit term the Copermittee shall perform statistical trends analysis on the cumulative long-term receiving water data set.

(8) Integrated Receiving Water Assessment

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems? Are conditions in receiving waters getting better or worse?

Once during the permit term, for each watershed management area, the Copermittees shall integrate the analyses and assessments of the results of the SMC Regional Monitoring Program, Bight Regional Monitoring Program, Sediment Quality monitoring, HMP Monitoring, TMDL monitoring, ASBS monitoring, and Long-term receiving water monitoring, as performed per Provisions D.5.a.(1)-D.5.a.(7), as well as other data as available and applicable, to assess the condition of receiving waters and status of receiving water beneficial uses, and identify data or information gaps. The integrated assessment shall include, as appropriate to address any identified data gaps, recommendations for additional monitoring as may be required to adequately characterize conditions in receiving waters, or where special studies may be needed to address specific information needs.

b. MS4 Outfall Discharge Monitoring

The Copermittees shall perform analysis and assessments of data and information produced per Provision D.2, addressing the management and specific questions as shown in Provision D.2 and below. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(1) Transient Non-Storm Water (Dry Weather) Monitoring, IC/ID Investigation

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which non-storm water discharges are transient and which are persistent? Which discharges should be investigated as potential IC/IDs? Which outfalls exhibit persistent dry weather flows?

(a) Where the presence of non-storm water (dry weather) flow is noted from an outfall during a visual inspection, field personnel shall note visual and other observations (including approximate/estimated flow rate, changes in flow rate during inspection, changes in flow rate over previous inspections, color, presence of foam or sheen, and odor) on a field log. Inspectors also shall note where there is evidence of past flow and record pertinent observations at all sites visited.

(b) The field observations shall be evaluated together with existing information available from prior inspections and prior monitoring results to determine whether the non-storm water (dry weather) discharge flow is likely to be transient or persistent. If the flow is deemed to be transient as indicated by pooled or ponded water or other evidence of recent flow, and there is evidence of an illicit discharge such as obvious odor, discoloration, foam or scum, the observations shall be used to conduct IC/ID investigations pursuant to Provision E.2. If the nature and source of the observed flow is already known, this shall be noted on the field log, including whether the observed flow results from a non-storm water discharge conditionally allowed per Provision E.2.a.

(c) Where the non-storm water (dry weather) discharge flow is deemed to be persistent in Provision D.2.b.(9), the outfall shall be referred to the characterization and prioritization process described in Provision D.2.c.

(2) <u>Persistent Non-Storm Water (Dry Weather) Outfall Monitoring</u>

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which outfalls exhibit persistent dry weather flows? Do discharge concentrations at MS4 outfalls meet applicable permit action levels? Which MS4 outfalls impact receiving water quality during dry weather?

(a) Identification and Prioritization of Outfalls with Persistent Flow

Annually, the Copermittees shall evaluate the data produced by the dry weather outfall monitoring pursuant to Provision D.2.c., rank the outfalls according to potential threat to receiving water quality, and produce a prioritized list of outfalls for follow-up action. The Copermittees must analyze the non-storm water monitoring data collected pursuant to Provision D.2.c. and consider NAL exceedances in prioritizing outfalls. The prioritized list shall be provided in the Annual Report for each WMA pursuant to Provision F.3.b. The prioritized list shall be used to update the WQIPs with the goal of reducing flows/ loads in order of the ranked priority list, through targeted programmatic actions and source investigations.

(b) Evaluate Potential Impacts to Receiving Waters from Persistent Non-Storm Water Outfall Flows

Annually, the Copermittees shall evaluate the data produced by the dry weather outfall monitoring pursuant to Provision D.2.c., and compare the outfall monitoring data to relevant receiving water quality data, to identify outfalls that may cause or contribute to receiving water quality problems.

(c) Calculate Loadings to Receiving Waters from Persistent Non-Storm Water Outfall Flows

Annually, the Copermittees shall estimate discharge loadings from the data produced by the dry weather outfall monitoring pursuant to Provision D.2.c., and rank the monitored outfalls in order from highest to lowest loading, to identify outfalls that may cause or contribute to receiving water quality problems. As part of this annual estimation, the Copermittees shall identify areas where program implementation is thought to have resulted in reductions or elimination of loads from MS4 outfalls.

(d) The Copermittees in each Watershed Management Area must review the non-storm water flow and pollutant load analyses required pursuant to Provision D.4.b.(2)(d) on an annual basis to:

(i) Identify the pollutant load reductions that are thought to be attributable to water quality management actions within the high priority outfall drainage areas

(ii) Assess the effectiveness of the water quality improvement strategies being implemented within the Watershed Management Area toward reducing or eliminating non-storm water discharges and pollutant loads discharging from the MS4 to receiving waters; and

(iii) Identify modifications necessary to increase the effectiveness of the water quality improvement strategies toward reducing or eliminating non-storm water discharges and pollutant loads discharging from the MS4 to receiving waters.

(3) Storm Water (Wet Weather) Outfall Monitoring

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Do discharge concentrations at MS4 outfalls meet applicable permit action levels? Which MS4 outfalls impact receiving water quality during wet weather? How do representative MS4 outlet discharge concentrations, loads, and flows change over time?

(a) Comparisons of Wet Weather Outfall Quality to Storm Water Action Levels

The Copermittees shall analyze the storm water monitoring data collected pursuant to Provision D.2.c and consider SAL exceedances in prioritizing outfalls for further investigation, and assessing progress towards addressing WQIP priorities.

(b) Evaluate Potential Impacts to Receiving Waters

Annually, the Copermittees shall evaluate the data produced by the wet weather outfall monitoring pursuant to Provision D.2.c, and compare the outfall monitoring data to relevant receiving water quality data, to identify outfalls that may cause or contribute to receiving water quality problems.

(c) Calculate Loadings to Receiving Waters from Storm Water Outfall Flows

Annually, the Copermittees shall estimate discharge loadings from the data produced by the wet weather outfall monitoring pursuant to Provision D.2.c. As part of this annual estimation, the Copermittees shall identify areas where program implementation is thought to have resulted in reductions or elimination of loads from MS4 outfalls.

(d) The Copermittees in each Watershed Management Area must review the storm water flow and pollutant load analyses required pursuant to Provision D.5.b.(3)(c) on an annual basis to:

(i) Identify the pollutant load reductions that are thought to be attributable to water quality management actions within the monitored outfall drainage areas

(ii) Assess the effectiveness of the water quality improvement strategies being implemented within the Watershed Management Area toward reducing storm water pollutant loads discharging from the MS4 to receiving waters; and

(iii) Identify modifications necessary to increase the effectiveness of the water quality improvement strategies toward reducing storm water pollutant loads discharging from the MS4 to receiving waters.

(e) Characterization of Trends Over Time

The Copermittees shall evaluate the data produced by the wet weather outfall monitoring pursuant to Provision D.2.c, and incorporate new outfall monitoring data into time series plots for each long-term monitoring constituent, for each WMA. Once per permit term the Copermittee shall perform statistical trends analysis on the cumulative long-term MS4 outfall water quality data set.

c. Source Identification

Management Question: What are the sources of urban runoff that contribute to receiving water problem(s)?

The principal role of Source/Stressor Identification is to identify and prioritize pollutant generating activities and source categories. Identification of high-priority sources is an important step in support of the WQIP process, to help inform the development of effective pollutant reduction strategies for particular priority constituents on a watershed-specific basis.

Source identification shall be conducted on a constituent-specific basis. The source identification efforts shall focus on constituents identified as watershed priorities, and include prioritization of sources based on magnitude, controllability, and other factors.

Following WQIP approval and implementation, source identification studies shall be used to improve WQIP effectiveness. For each Watershed Management Area, the Copermittees shall perform the investigation pursuant to Provision D.3, as necessary to address identified watershed priorities, including production of a prioritized list of sources or potential sources that warrant additional investigation and/or development of control strategies through the WQIPs.

Annually, the Copermittees shall evaluate the results and findings produced by the source/stressor identification studies conducted pursuant to Provision D.3, and inform Copermittee staff responsible for WQIP implementation of the relative magnitudes and/or priority rankings of identified sources. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

d. SPECIAL STUDIES

Following WQIP approval and implementation, special studies shall be identified to fill data gaps and provide targeted information to improve WQIP effectiveness. Upon completion of each Special Study conducted pursuant to Provision D.4, the Copermittees shall evaluate the study results and apply the results to the implementation of WQIPs within each Watershed Management Area as applicable.

Annually, the Copermittees shall evaluate the results and findings produced by the special studies conducted pursuant to Provision D.4, and assess their relevance to the Copermittees' efforts to better characterize WMAs and receiving water conditions, to understand urban runoff pollutant sources, and to control and limit the discharges of pollutants from MS4 outfalls to the maximum extent practicable. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

e. INTEGRATED EVALUATION OF WATER QUALITY IMPROVEMENT STRATEGIES

Once during the permit term, for each watershed management area, the Copermittees shall integrate the analyses and results of the monitoring performed pursuant to Provisions D.1-D.4, and the results of the assessments performed pursuant to Provision D.5.a.-D.5.d, as well as other data as available and applicable, to assess: 1) progress towards achieving the numeric goals and schedules established per the approved WQIPs, 2) progress toward addressing the highest priority receiving water conditions established for each Watershed Management Area, and 3) water quality improvements that are thought to be attributable to the Copermittees' implementation of the requirements of Provision B. For Watershed Management Areas with applicable TMDLs, the integrated evaluation must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-0012. The integrated evaluation shall include the following:

(1) The conditions of receiving waters and status of receiving water beneficial uses,

(2) The extent to which MS4 discharges cause or contribute to receiving water problems during both dry weather and wet weather,

(3) The estimated reductions in loadings from MS4 discharges attributable to the Copermittees' stormwater management activities, for both dry and wet weather,

(4) The principal identified sources of pollutants that are responsible for constituents in MS4 discharges that cause or contribute to receiving water

problems,

(5) The results of the cumulative special studies and their application to improvement of the WQIPs for the Watershed Management Areas,

(6) Progress toward achieving the interim and final numeric targets for restoring impacted beneficial uses in receiving waters with adopted TMDL Implementation Plans;

(7) Any identified data or information gaps, along with recommendations for additional monitoring, special studies, or other investigations to address the data and information needs.

~~D.~~E. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAMS

The purpose of this provision is for each Copermittee to implement a program to control the ~~contribution~~discharge of pollutants to and ~~the discharges~~ from ~~the MS4 with~~ its respective MS4 to receiving waters within its jurisdiction. The goals of this ~~provision~~ program ~~is~~ are to: 1) effectively prohibit non-storm water discharges into the MS4s, 2) reduce pollutants in storm water discharges from the MS4s to the MEP, and 3) ~~to reduce the discharge of pollutants in storm water to the MEP and effectively prohibit non-storm water discharges to provide~~ support the attainment and the reasonable protection, preservation,~~,~~ and enhancement~~, and restoration of~~ water quality and designated beneficial uses of waters of the ~~state~~U.S. The~~i~~se goals will be accomplished through compliance with the jurisdictional runoff management program requirements of this Provision, and as modified or supplemented per Provision B (Water Quality Improvement Plans).

Each Copermittee must implement all the requirements of Provision E no later than ~~12~~ 18 months after the adoption of this Order, or in accordance with Provision F.5.a. Each Copermittee must update its jurisdictional runoff management program document, in accordance with Provision F.2.a, to include all the requirements of Provision E. The jurisdictional runoff management programs implemented by each Copermittee must be consistent with the Water Quality Improvement Plan for the applicable Watershed Management Area required by Provision B. Until the Copermittee has updated its jurisdictional runoff management program document with the requirements of Provision E, the Copermittee must continue implementing its current jurisdictional runoff management program.

Modification of Jurisdictional Runoff Management Program Requirements

The requirements of this section apply to each Copermittee on a jurisdiction-wide basis. Copermittees that are in multiple WMAs may implement any activity or requirement at a level different than a specified minimum within any individual WMA so long as the requirement (as specified below) is met for the jurisdiction as a whole and compliance with all other applicable permit directives is maintained jurisdictionally and within each WMA.

Upon approval of the Executive Officer, specific requirements may be reduced or waived on a jurisdictional basis only where the following conditions have been met:

- The Copermittee's proposed JRMP modifications must be submitted to the San Diego Water Board for a 30 day public review and comment period. The San Diego Water Board will issue a public notice and solicit public comments on the JRMP modification for a minimum of 30 days. Based on the comments received, the San Diego Water Board will determine whether to hold a public hearing or to limit public input to submittal of written comments. If no hearing is held the San Diego Water Board will notify the Copermittee that the JRMP modification has been approved following its review and determination that it meets the requirements of this Order;

- On RWQCB approval, the Copermittee's JRMP must be amended per Section II.F.2.a. to incorporate the modification(s);
- Applicable portions of any WQIP to which an approved modification applies must be modified to reference or incorporate it, and the updated WQIP made available on the Regional Clearinghouse pursuant to Provision F.4.

1. Legal Authority Establishment and Enforcement

a. Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through statute, ordinance, permit, contract, order, or similar means to the extent allowable by law. This legal authority must ~~, at a minimum,~~ authorize the Copermittee to:

(1) Effectively ~~P~~prohibit and eliminate all illicit discharges and illicit connections to its MS4;

(2) Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites, including industrial and construction sites ~~which~~that do not have coverage under the statewide General Permit for Discharges of Storm Water Associated with Industrial Activities (Industrial General Permit) or General Permit for Discharges of Storm Water Associated with Construction Activities (Construction General Permit~~), as well as to those sites which do not;~~);

(3) Control the discharge of spills, dumping, or disposal of materials other than storm water into its MS4;

~~(4) Control through interagency agreements among Copermittees~~Coordinate, as possible, with other agencies to minimize the contribution of ~~pollutants~~pollutant discharges from ~~one portion MS4 to another portion of~~ the ~~MS4;~~

~~(5)~~

~~(6)~~(4) ~~Control through interagency agreements with other owners of the MS4 such as Caltrans, the U.S. federal government, or sovereign Native American Tribes, where possible, the contribution of pollutants from one~~Copermittee's portion of the MS4 to ~~another portion of~~ portions of the MS4 under another agency's jurisdiction and from the other agency's portions of the MS4 to the ~~MS4~~portion of the MS4 under the Copermittee's jurisdiction;

~~(7)~~(5) Require compliance with conditions in its statutes, ordinances, permits, contracts, orders, or similar means to hold dischargers to its MS4 accountable for their contributions of pollutants and flows;

~~(8)~~(6) Require the use of BMPs to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;

~~(9)~~(7) Require documentation on the effectiveness of BMPs implemented to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;

~~(10)~~(8) Utilize enforcement mechanisms to require compliance with its statutes, ordinances, permits, contracts, orders, or similar means; and

~~(11)~~(9) Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with its statutes, ordinances, permits, contracts, orders, or similar means and with the requirements of this Order, including the prohibition of illicit discharges and connections to its MS4; the Copermittee must also have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities, including construction sites, discharging into its MS4.

b. With the first Annual Report required by Provision F.3.b, each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in this Order.

2. Illicit Discharge Detection and Elimination

Each Copermittee must implement a program to actively detect and eliminate illicit discharges and improper disposal into the MS4, or otherwise require the discharger to apply for and obtain a separate NPDES permit. The illicit discharge detection and elimination program must include, at a minimum, the following requirements:

a. Non-Storm Water Discharges

To the extent allowable by law, ~~E~~each Copermittee must address all non-storm water discharges as illicit discharges~~,~~ where the likelihood exists that they are a source of pollutants to waters of the U.S., unless a non-storm water discharge is either identified as a discharge authorized by a separate NPDES permit, or identified as a category of non-storm water discharges or flows that must be addressed pursuant to the following requirements:

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(1) Discharges of non-storm water to the MS4 from uncontaminated pumped groundwater ~~the following categories~~ must be addressed as illicit discharges where there is evidence that suggests that they are the source of pollutants to waters of the U.S., unless the discharge has coverage under NPDES Permit No. CAG919001 (Order No. R9-2007-0034, or subsequent order) for discharges to San Diego Bay, or NPDES Permit No. CAG919002 (Order No. R9-2008-0002, or subsequent order) for discharges to surface waters other than San Diego Bay:

~~(a) Uncontaminated pumped ground water;~~

~~(b) Discharges from foundation drains;~~

~~(c) Water from crawl space pumps; and~~

~~(d) Water from footing drains.~~

(2) Discharges of non-storm water from water line flushing and water main breaks to the MS4 must be addressed as illicit discharges unless the discharge has coverage under a valid NPDES Permit ~~No. CAG 679001 (~~, Order No. R9-2010-0003, or a subsequent order~~)~~.. This includes water line flushing and water main break discharges from water purveyors under the Copermittee's jurisdiction that has been issued a water supply permit by the California Department of Public Health or federal military installations. Discharges from recycled or reclaimed water lines to the MS4 must be addressed as illicit discharges, unless the discharges have coverage under a separate NPDES permit.

(3) Discharges of non-storm water to the MS4 from the following categories must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a anthropogenic source of pollutants to receiving waters within the Copermittee's jurisdiction:

(a) Discharges from foundation drains;

(b) Water from crawl space pumps;

(c) Water from footing drains.

~~(a)~~(d) Diverted stream flows;

~~(b)~~(e) Rising ground waters;

~~(c)~~(f) Uncontaminated ground water infiltration to MS4s;

~~(d)~~(g) Springs;

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~~(e)~~(h) Flows from riparian habitats and wetlands; and

~~(f)~~(i) Discharges from potable water sources.

(4) Discharges of non-storm water to the MS4 from the following categories must be controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means where there is evidence that those discharges are a source of pollutants to waters of the~~.~~ U.S. Discharges of non-storm water to the MS4 from the following categories not controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means must be addressed by the Copermittee as illicit discharges.

(a) Air conditioning condensation

The discharge of air conditioning condensation ~~must~~ should be directed to landscaped areas or other pervious surfaces where feasible;

(b) Individual residential vehicle washing

The discharge of wash water must be ~~directed to landscaped areas or other pervious surfaces where feasible, and~~encouraged through public outreach and education:

(i) To be directed to landscaped areas or other pervious surfaces where feasible, and

~~(i)~~(ii) To ~~M~~minimize the use of water for vehicle washing, use as little washing detergent and other vehicle wash products as possible, wash vehicles at commercial wash facilities, and implement other practices or behaviors that will prevent the discharge of pollutants associated with individual residential vehicle washing from entering the MS4; and

(c) Dechlorinated swimming pool discharges

(i) Eliminate residual chlorine, algaecide, filter backwash, or other pollutants from swimming pools prior to discharging to the MS4, and

(ii) The discharge of saline swimming pool water ~~to the MS4~~ must be directed to the sanitary sewer, landscaped areas, ~~or~~ other pervious surfaces that can accommodate the volume of water, or to the MS4 if the MS4 discharges to a saltwater receiving water.

(5) Firefighting discharges to the MS4 must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a significant source of pollutants to receiving waters. Firefighting discharges to the MS4 not identified as a significant source of pollutants to receiving waters, must be addressed, at a minimum, as follows:

(a) Non-emergency firefighting discharges

(i) Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) to the MS4 must be addressed as illicit discharges where BMPs are not implemented.

(ii) Non-emergency firefighting discharges (i.e., discharges from controlled or practice blazes, firefighting training, and maintenance activities not associated with building fire suppression systems) must be addressed by a program, to be developed and implemented by the Copermittee, to reduce or eliminate pollutants in such discharges from entering the MS4.

(b) Emergency firefighting discharges

Each Copermittee ~~must~~ should develop and encourage implementation of BMPs to reduce or eliminate pollutants in emergency firefighting discharges to the MS4s and receiving waters within its jurisdiction. During emergency situations, priority of efforts should be directed toward life, property, and the environment (in descending order). BMPs ~~should~~ shall not interfere with immediate emergency response operations or impact public health and safety.

(6) If the Copermittee or San Diego Water Board identifies any category of non-storm water discharges listed under Provisions E.2.a.(1)-(4) as a source of pollutants to receiving waters, the category must be prohibited through ordinance, order, or similar means and addressed as an illicit discharge.

b. Prevent and Detect Illicit Discharges And Connections

Each Copermittee must include the following measures within its program to prevent and detect illicit discharges to the MS4:

(1) Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas. The accuracy of the MS4 map must be confirmed during non-storm water MS4 monitoring events. The MS4 map must be included as part of the jurisdictional runoff management program document. Any geographic information system (GIS) layers or files used by the Copermittee to maintain the MS4 map must be made available to the San Diego Water Board upon request. The MS4 map must identify the following:

(a) All segments of the MS4 owned, operated, and maintained by the Copermittee,

(b) All known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4,

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(c) All known locations of connections with other MS4s not owned or operated by the Copermittee (e.g. Caltrans MS4s),

(d) All known locations of MS4 outfalls as defined by 40 CFR §122.26(B)(5-6) and private outfalls as defined by 40 CFR §122.26(B)(9) that discharge runoff collected from areas within the Copermittee's jurisdiction,

(e) All segments of receiving waters within the Copermittee's jurisdiction that receive and convey runoff discharged from the Copermittee's MS4 outfalls ~~(i.e., receiving water segments that are both a receiving water and part of the MS4)~~, and

(f) Locations of the non-storm water MS4 monitoring stations, identified pursuant to Provision D.2.b, within its jurisdiction;

(2) Each Copermittee must use Copermittee personnel and contractors to assist in identifying and reporting illicit discharges and connections, if observed, during the course of their daily employment activities;

(3) Each Copermittee must promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges to or from the MS4. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by the Copermittees. All public hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week;

(4) Each Copermittee must implement practices and procedures (including a notification mechanism) to prevent, respond to, contain, and clean up any spills that may discharge into the MS4 within their jurisdiction from any source. The Copermittee must coordinate with spill response teams to prevent to the extent possible entry of spills into the MS4, and prevent contamination ~~of surface water, ground water, and soil~~waters of the ~~.~~U.S. The Copermittee must coordinate spill prevention, containment, and response activities throughout all appropriate Copermittee departments, programs, and agencies;~~ and~~

~~(4)~~(5) Copermittees are responsible for control of discharges to their MS4. In the event that the source of an illicit discharge or connection is from another MS4, the Copermittee shall notify and, if necessary coordinate, with the upstream MS4 to implement and/or enforce corrective actions; and

~~(5)~~(6) Each Copermittee must implement practices and procedures to prevent and limit infiltration of seepage from sanitary sewers (including private laterals and failing septic systems) to the MS4.

c. Visual Observations, Field Screening, And/or Monitoring

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Each Copermittee must conduct visual observations, field screening and/or monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect non-storm water and illicit discharges and connections to the MS4 in accordance with the jurisdictional non-storm water MS4 monitoring program requirements in Provision D.2.b.

d. Investigate and Eliminate Illicit Discharges And Connections

Each Copermittee must include the following measures within its program to investigate and eliminate illicit discharges to the MS4:

(1) Each Copermittee must prioritize and determine when follow-up investigations will be performed in response to visual observations and/or water quality monitoring data collected during an investigation of a detected non-storm water or illicit discharge to or from the MS4. The criteria for follow-up investigations must include the following:

(a) Pollutants identified as causing or contributing to the highest water quality priorities identified in the Water Quality Improvement Plan;

(b) Pollutants identified as causing or contributing, or threatening to cause or contribute to impairments in water bodies on the 303(d) List and/or in environmentally sensitive areas (ESAs), located within its jurisdiction;

(c) Pollutants identified from sources or land uses known to exist within the area, drainage basin, or watershed that discharges to the portion of the MS4 within its jurisdiction included in the investigation; and

(d) Pollutants identified as causing or contributing to and exceedance of an NAL[13] where the source has not been identified as natural described in Provision C.1; and

(e) Pollutants identified as a threat to human health or the environment.

(2) Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that~~,~~ based on reports or notifications, visual observations, field screening ~~and~~, monitoring, or other appropriate information, indicate a reasonable potential of ~~receiving, containing, or~~ discharging pollutants to receiving waters within the Copermittees jurisdiction due to illicit discharges, illicit connections, or other sources of non-storm water. ~~The procedures must include the following:~~

(a) The Copermittee may develop criteria to assess the validity of, and prioritize the response to, each report or notification received. Each Copermittee must respond to each report or notification (e.g., public hotline reports, staff or contractor reports and notifications, etc.) of an incident in a timely manner. ~~The Copermittee may develop criteria to assess the validity of, and prioritize the response to, each report or notification received;~~

(b) ~~Each Copermittee must immediately investigate and seek~~Procedures should address field investigations to identify sources or potential sources for the discharge, unless the source or potential source has already been

[13] NAL exceedances discovered during the course of IDDE monitoring and/or investigations may trigger action levels, including but not limited to, follow-up investigations based on the highest watershed priorities set forth and the iterative process provided in the WQIP.

identified during previous investigations. The criteria established in Provision E.d.(2)(a) shall be used to prioritize response based on highest watershed priorities as established for the iterative process and determined in the Water Quality Improvement Plan, including:

(i) Obvious illicit discharges must be immediately investigated to identify the source(s) of discharges of non-storm water where flows are observed in and from the MS4 during the field screening and monitoring required pursuant to Provision D.2.b;~~.~~

(ii) The investigation must include field investigations to identify sources or potential sources for the discharge, unless the source or potential source has already been identified during previous investigations;

(iii) The investigation may include field investigations, reviewing Copermittee inventories, and other land use data to identify potential sources of the discharge; and

~~(i)~~(iv) Procedures should address tracking of illicit discharges and connections.

~~(i)~~

~~(b) Each Copermittee must investigate and seek to identify the source(s) of non-storm water discharges from the MS4 where there is evidence of non-storm water having been discharged into or from the MS4 (e.g., pooled water). The investigation may include field investigations, reviewing Copermittee inventories, and other land use data to identify potential sources of the discharge; and~~

(3) Each Copermittee must maintain records and a database of the investigations, including the following information:

(a) Location of incident, including hydrologic subarea, portion of MS4 receiving the non-storm water or illicit discharge, and point of discharge or potential discharge from MS4 to receiving water,

(b) Source of information initiating the investigation (e.g., public hotline reports, staff or contractor reports and notifications, monitoring data, etc.),

(c) Date the information used to initiate the investigation was received,

(d) Date the investigation was initiated,

(e) Dates of follow-up investigations,

(i) Identified or suspected source of the illicit discharge or connection, if determined,

(f) Known or suspected related incidents, if any,

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(g) Result of the investigation, and

(h) If a source cannot be identified and the investigation is not continued, a rationale for why a discharge does not pose a threat to water quality and/or does not require additional investigation.

(4) Each Copermittee must initiate the implementation of procedures, in a timely manner, to eliminate all detected and identified illicit discharges and connections within its jurisdiction. The procedures must include the following:

~~Each Copermittee must enforce its~~

(a) Procedures outlined by the Copermittee should address legal authority, as required under Provision E.1, to ~~eliminate~~enforce the elimination of illicit discharges and connections to ~~its~~the MS4. If the Copermittee identifies the source as a controllable source of non-storm water or illicit discharge or connection, the Copermittee must implement its Enforcement Response Plan pursuant to Provision E.6 and enforce its legal authority ~~to prohibit~~to effectively prohibit and eliminate illicit discharges and connections to its MS4~~;~~. Responses to discharges may include:

(i) If the Copermittee identifies the source of the discharge as a category of non-storm water discharges in Provision E.2.a, and the discharge ~~to or from the MS4 is~~ in exceedance of NALs developed ~~under Provision ,~~in the Water Quality Implementation Plan, then the Copermittees must determine if this is an isolated incident or set of circumstances, or if the category of discharge must be addressed through the prohibition of that category of discharge as an illicit discharge pursuant to Provision E.2.a.(6);

(ii) If the Copermittee suspects the source of the non-storm water discharge as natural in origin (i.e. non-anthropogenically influenced) and in conveyance into the MS4, then the Copermittee must ~~collect the data and evidence necessary to demonstrate to the San Diego Water Board that it is natural in origin; and~~document the rationale for why the discharge does not need further investigation. This documentation shall be included in the Annual Report.

(iii) If the Copermittee is unable to identify and document the source of a recurring non-storm water discharge to or from the MS4, then the Copermittee must address the discharge as an illicit discharge and update its jurisdictional runoff management program to address the common and suspected sources of the non-storm water discharge within its jurisdiction in accordance with the Copermittee's priorities.

(5) Each Copermittee must submit a summary of the non-storm water discharges and illicit discharges and connections investigated and eliminated within its

jurisdiction with each Annual Report required under Provision F.3.b of this Order.

3. Development Planning

Each Copermittee ~~must use~~, within ~~their land use/planning authorities to~~ its respective jurisdiction, must implement a development planning program that includes, at a minimum, the following requirements.

a. Permanent BMP Requirements for All Development Projects

Each Copermittee~~-~~, as practical and feasible, must prescribe ~~the following~~ BMP requirements during the planning process (i.e. prior to project approval and issuance of grading or building permits) for all development projects ~~(regardless of project type or size),~~ where local permits are issued, including unpaved roads and flood management projects, except emergency projects implemented for the protection of persons and property:

(1) General Requirements

(a) All BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters, and as close to the source as possible;

(b) Multiple development projects may use shared permanent BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any development project from which the BMP will receive runoff; and

(c) Permanent BMPs must not be constructed within ~~a~~ waters of the U.S.~~ or waters of the state.~~

(2) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The following source control BMPs must be implemented at all development projects where applicable and feasible:

(a) Prevention of illicit discharges into the MS4;

(b) Storm drain system stenciling or signage;

(c) Properly designed outdoor material storage areas;

(d) Properly designed outdoor work areas;

(e) Properly designed trash storage areas; and

(f) Any additional BMPs necessary to minimize pollutant generation at each project.

(3) Low Impact Development (LID) BMP Requirements

The following LID BMPs must be implemented at all development projects where applicable and feasible:

(a) Maintenance or restoration of natural storage reservoirs and drainage corridors (including topographic depressions, areas of permeable soils, natural swales, and ephemeral and intermittent streams);[14]

(b) Buffer zones for natural water bodies (where buffer zones are technically infeasible, require project applicant to include other buffers such as trees, access restrictions, etc.);

(c) Conservation of natural areas within the project footprint including existing trees, other vegetation, and soils;

(d) Construction of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided public safety is not compromised;

(e) Minimization of the impervious footprint of the project;

(f) Minimization of soil compaction to landscaped areas;

(g) Disconnection of impervious surfaces through distributed pervious areas;

(h) Landscaped or other pervious areas designed and constructed to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4;

(i) Small collection strategies located at, or as close as possible to, the source (i.e. the point where storm water initially meets the ground) to minimize the transport of runoff and pollutants to receiving waters;

(j) Use of permeable materials for projects with low traffic areas and appropriate soil conditions;

(k) Landscaping with native or drought tolerant species; and

[14] Development projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. Projects proposing to dredge or fill waters of the State must obtain Waste Discharge Requirements.

(l) Harvesting and using precipitation.

~~(4) Long-Term Permanent BMP Maintenance~~

~~Each Copermittee must require the project applicant to submit proof of the mechanism under which ongoing long-term maintenance of all permanent BMPs will be conducted.~~

~~(5) Infiltration and Groundwater Protection~~

~~(a) Infiltration and treatment control BMPs designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins) must not cause or contribute to an exceedance of an applicable groundwater quality objective. At a minimum, such infiltration and treatment control BMPs must be in conformance with the design criteria listed below, unless the development project applicant demonstrates to the Copermittee that one or more of the specific design criteria listed below are not necessary to protect groundwater quality. The design criteria listed below do not apply to small infiltration systems dispersed throughout a development project.~~

~~(i) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;~~

~~(ii) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;~~

~~(iii) Infiltration treatment control BMPs must be adequately maintained to remove pollutants in storm water to the MEP;~~

~~(iv) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;~~

~~(v) The soil through which infiltration is to occur must have physical and chemical characteristics (e.g., appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;~~

~~(vi) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities as designated by each Copermittee, unless first treated or filtered to remove pollutants prior to infiltration; and~~

~~(vii) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.~~

~~(b) The Copermittees may collectively or individually develop alternative mandatory design criteria to that listed above for infiltration and treatment control BMPs which are designed to primarily function as centralized infiltration devices. Before implementing the alternative design criteria in the development planning process the Copermitee(s) must:~~

~~(i) Notify the San Diego Water Board of the intent to implement the alternative design criteria submitted; and~~

~~(ii) Comply with any conditions set by the San Diego Water Board.~~

b. Priority Development Projects

(1) Definition of Priority Development Project

Priority Development Projects include the following:

(a) All new development projects that fall under the Priority Development Project categories listed under Provision E.3.b.(2). Where a new development project feature, such as a parking lot, falls into a Priority Development Project category, the entire project footprint is subject to Priority Development Project requirements; and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site, ~~or~~ and the redevelopment project is a Priority Development Project category listed under Provision E.3.b.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to Priority Development Project requirements, the performance and sizing requirements discussed in Provisions E.3.c.(2) and E.3.c.(3) apply only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development and was not subject to previous Priority Project Development requirements, the performance and sizing requirements apply to the entire development.

(c) Projects where redevelopment results in an increase of more than fifty percent of impervious surfaces of a previously existing development, and the existing development was subject to previous Priority Project Development requirements, only the altered portion of development is subject to the Priority Development Project requirements in this Order.

(2) Priority Development Project Categories

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(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This category includes commercial, industrial, residential, mixed-use, and public development projects on public or private land which fall under the planning and building authority of the Copermittee.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is 5,000 square feet or more~~.~~ of impervious surface.

(d) Hillside development projects. This category includes any development which creates 5,000 square feet or more of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally sensitive areas (ESAs). This category includes any development located within, directly adjacent to, or discharging directly to an ESA, which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent to” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that collects runoff from the subject development or redevelopment site ~~and~~ which terminates at or in receiving waters within the ESA and is not comingled with flows from adjacent lands.

(f) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce that has 5,000 square feet or more of impervious surface.

(g) Streets, roads, highways, and freeways~~, and residential driveways~~. This category is defined as any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more of impervious surface or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(i) Large development projects. This category includes any post-construction pollutant-generating new development projects that result in the disturbance of one acre or more of land.

(3) Priority Development Project Exemptions

Each Copermittee has the discretion to exempt the following projects from being defined as Priority Development Projects:

(a) Sidewalks constructed as part of new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(b) Bicycle lanes that are constructed as part of new streets or roads but are not hydraulically connected to the new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(c) Impervious trails and driveways constructed and designed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas;

(d) Sidewalks, bicycle lanes, driveways, parking lots, or trails constructed with permeable surfaces.

(e) Single-family residential projects that are not part of a larger development or proposed subdivision and implement BMPs that meet minimum performance standards, as outlined in the BMP Design Manual.[15]

(f) Any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles that follows the USEPA guidance regarding Management Wet Weather with Green Infrastructure: Green Streets[16] to the MEP.

[15] The BMP Design Manual was formerly known as the Standard Urban Storm Water Mitigation Plan under Order Nos. R9-2007-0001, R9-2009-0002, and R9-2010-0016.
[16] http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm

c. Priority Development Project ~~Permanent~~ Structural BMP Performance and Sizing Requirements

In addition to the BMP requirements listed for all development projects under Provision E.3.a, Priority Development Projects must also implement ~~permanent~~ structural BMPs that conform to performance and sizing requirements.

~~(1) Source Control BMP Requirements~~

~~Each Copermittee must require each Priority Development Project to implement applicable source control BMPs listed under Provision E.3.a.(2).~~

(1) Retention and Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement BMPs to retain and treat pollutants onsite in the following order:

(a) Each Priority Development Project must be required to implement LID BMPs as described in Provision E.3.a.(3); and~~.~~

(b) Each Priority Development Project must be required to implement LID BMPs that are sized and designed to retain the difference in volume ~~equivalent to~~between the runoff volume produced in the post-development condition as compared to the pre-development runoff condition resulting from a 24-hour 85th percentile storm event[17] ("design capture volume[18]"); or

(c) If onsite retention of the design capture volume using LID BMPs is technically infeasible per Provision E.3.c.(4), flow-thru LID and/or conventional treatment control BMPs must be implemented to provide equal pollutant removal for ~~treat~~ the portion of the design capture volume that is not retained onsite. Flow-thru LID treatment control BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP; or~~.~~

~~(c)~~(d) If retention and/or equivalent pollutant removal of the design capture volume to meet E.3.c.(2)(a) or E.3.c.(2)(b) are infeasible

[17] This volume is not a single volume to be applied to all areas covered by this Order. The size of the 85th percentile storm event is different for various parts of the San Diego Region. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its BMP Design Manuals.

[18] Design capture volume is a single event based volume occurring after an extended dry period.

onsite~~Additionally~~, project applicants must perform mitigation for the portion of the pollutant load in the design capture volume that is not retained or equally treated onsite, as described in Provision E.3.c.(5~~4~~)(c).

~~(d)~~(e) All onsite treatment control BMPs must:

(i) Be correctly sized and designed so as to remove pollutants from storm water to the MEP;

(ii) Be sized to comply with the following numeric sizing criteria:

[a] Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained onsite; or

[b] Flow-based treatment control BMPs must be designed to mitigate (filter or treat) either: 1) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or 2) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(iii) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(2) Hydromodification Management BMP Requirements

Each Copermittee must require each Priority Development ~~Project~~Project disturbing greater than one acre to implement hydromodification management BMPs, ~~so that:~~as described in the Copermittees current HMP, as applicable.

(a) Post-project runoff flow rates and durations do not exceed pre-development ~~(naturally occurring)~~ runoff flow rates and durations by more than 10 percent (for the range of flows that result in increased potential for erosion or degraded channel conditions downstream of Priority Development Projects).

(i) In evaluating the range of flows that results in increased potential for erosion of natural (non-hardened) channels, the lower boundary must correspond with the critical channel flow that produces the

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critical shear stress that initiates channel bed movement or that erodes the toe of channel banks.

(ii) For artificially hardened channels, analysis to identify the lower boundary must use characteristics of a natural stream segment similar to that found in the watershed. The lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or erodes the toe of the channel banks.

~~(i)~~(iii) The Copermittees may use monitoring results pursuant to Provision D.5.a.(4) to re-define the range of flows resulting in increased potential for erosion or degraded channel conditions, as warranted by the data.

(b) Projects shall preserve (where feasible) or provide compensation for significant losses of sediment supply anticipated as a result of development. ~~Post-project runoff flow rates and durations must compensate for the loss of sediment supply due to the development project, should loss of sediment supply occur as a result of the development project.~~

(c) If hydromodification management BMPs are technically infeasible per Provision E.3.c.(~~5~~4), project applicants must perform mitigation for the portion of the runoff volume that is not controlled and will cause or contribute to increased potential for erosion of receiving waters downstream of the Priority Development Project, as described in Provision E.3.c.(~~5~~4)(c).

(d) Exemptions

Each Copermittee has the discretion to exempt a Priority Development Project from the hydromodification management BMP requirements where the project:

(i) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean;

(ii) Discharges storm water runoff into conveyance channels whose bed and bank are stabilized (e.g. concrete lined, ~~-~~an engineered interlocking paver, gabion system etc…) all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean; or

(iii) Discharges storm water runoff into other areas identified by the San Diego Water Board as exempt from the requirements of Provisions E.3.c.(3) ~~-~~.

(3) Long-Term Structural BMP Maintenance

Each Copermittee must require the project applicant to submit proof of the mechanism under which ongoing long-term maintenance of all structural BMPs will be conducted.

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(4) Infiltration and Groundwater Protection

(a) Infiltration and treatment control BMPs designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins) must not cause or contribute to an exceedance of an applicable groundwater quality objective. At a minimum, such infiltration and treatment control BMPs must be in conformance with the design criteria listed below, unless the development project applicant demonstrates to the Copermittee that one or more of the specific design criteria listed below are not necessary to protect groundwater quality. The design criteria listed below do not apply to small infiltration systems dispersed throughout a development project.

(i) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(ii) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(iii) Infiltration treatment control BMPs must be adequately maintained to remove pollutants in storm water to the MEP;

(iv) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(v) The soil through which infiltration is to occur must have physical and chemical characteristics (e.g., appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(vi) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities as designated by each Copermittee, unless runoff does not exceed Basin Plan water quality standards or runoff is first treated or filtered to remove pollutants prior to infiltration; and

(vii) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(b) The Copermittees may collectively or individually develop alternative mandatory design criteria to that listed above for infiltration and treatment control BMPs which are designed to primarily function as centralized

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infiltration devices. Before implementing the alternative design criteria in the development planning process the Copermittee(s) must:

(i) Notify the San Diego Water Board of the intent to implement the alternative design criteria submitted; and

(ii) Comply with any conditions set by the San Diego Water Board.

~~(3)~~(5) Alternative Compliance for Technical Infeasibility

At the discretion of each Copermittee, alternative compliance may be allowed for certain Priority Development Projects to comply with Provisions E.3.c.(1~~2~~) and E.3.c.(2~~3~~)~~,~~. Alternative compliance is an optional program for the Copermittees to utilize if it is determined to provide an equal or greater benefit than onsite compliance. Where alternative compliance is allowed, it is the sole responsibility of the project applicant to execute the alternative compliance and comply with the following requirements:~~subject to the following requirements:~~

(a) Applicability

Priority Development Projects may be allowed alternative compliance if:

(i) The Copermittee reviews and ~~approves~~ accepts site-specific hydrologic and/or design analysis performed by a registered professional engineer, geologist, architect, or landscape architect;

(ii) The project applicant demonstrates, and the Copermittee determines and documents, that ~~retention LID and/or hydromodification management~~ BMPs per Provisions E.3.c.(1~~2~~) and E.3.c.(2~~3~~) were incorporated into the project design to the maximum extent technically feasible given the project site conditions;

(iii) The project applicant is required to perform mitigation described in Provision E.3.c.(5~~4~~)(c)~~(c)~~ with a net result of at least the same level of water quality protection as would have been achieved if the Priority Development Project had fully implemented the ~~retention LID and hydromodification management~~ BMP requirements under Provisions E.3.c.(1~~2~~) and E.3.c.(2~~3~~) onsite.

(b) Criteria For Technical Infeasibility

Each Copermittee must develop, or develop in collaboration with the other Copermittees, criteria to determine technical infeasibility for fully implementing the ~~retention LID and hydromodification management~~ BMP requirements under Provisions E.3.c.(~~2~~1) and E.3.c.(2~~3~~) and include these requirements in the ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual pursuant to Provision E.3.d. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in Provision E.3.c~~a~~.(4~~5~~) due to the presence of shallow bedrock, contaminated soils, near surface groundwater, underground facilities, or utilities;

(ii) Brownfield development sites or other locations where pollutant mobilization is a documented concern;

(iii) The design of the site precludes the use of soil amendments, plantings of vegetation, or other designs that can be used to infiltrate and evapotranspirate runoff;

(iv) Soils cannot be sufficiently amended to provide for the requisite infiltration rates;

(v) Locations with geotechnical hazards;

(vi) Insufficient onsite and/or offsite demand for storm water use;

(vii) Modifications to an existing building to manage storm water are not feasible due to structural or plumbing constraints;

~~(vii)~~(viii) HMP flow rate requirements that result in BMP orifice sizes too small for efficient maintenance; and

~~(viii)~~(ix) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with Provisions E.3.c.(2) and E.3.c.(3) onsite.

(c) Mitigation

Priority Development Projects that meet the Copermittee's technical infeasibility criteria developed pursuant to Provision E.3.c.(~~5~~4)(b)~~(b)~~ must be required to mitigate for the increased flow rates, increased flow durations, and/or ~~increased pollutant loads~~water quality equivalence expected to be discharged from the site.

(i) The Project applicant must perform offsite mitigation for:

[a] The portion of the pollutant load in the design capture volume that is not retained or equally treated onsite, and/or

[b] The portion of the increased potential erosion of downstream receiving waters not fully controlled with hydromodification management BMPs onsite.

~~For the pollutant load in the volume of storm water not retained onsite with retention LID BMPs, or increased potential erosion of downstream receiving waters not fully controlled onsite with hydromodification management BMPs, the Copermittee must require the project applicant to either 1) implement an offsite mitigation project, and/or 2) provide sufficient funding for a public or private offsite mitigation project via a mitigation fund.~~

~~(i)~~(ii) Mitigation Project Locations

Offsite mitigation projects must be implemented within the same ~~hydrologic unit~~Watershed Management Area as the Priority Development Project, and preferably within the same hydrologic subarea. Mitigation projects outside of the hydrologic subarea but within the same ~~hydrologic unit~~Watershed Management Area may be approved provided that the project applicant demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar potential impacts expected from the Priority Development Project.

~~(ii)~~(iii) Mitigation Project Types

Offsite mitigation projects ~~must~~ may include, where applicable and feasible, retrofitting opportunities and stream and/or habitat rehabilitation or restoration opportunities identified in the Water Quality Improvement Plans, identified pursuant to Provision B.3.. Other offsite mitigation projects may include green streets or infrastructure projects, groundwater recharge projects, or regional BMPs upstream of receiving waters. Mitigation credit will not be given to portions of in stream mitigation projects using impervious~~In-stream rehabilitation or restoration measures to protect or prevent adverse physical changes to creek bed and banks must not include the use of non-naturally occurring~~ hardscape materials such as concrete~~, riprap, or gabions~~. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of Provision E.3.c.(4).

~~(iii)~~(iv) Mitigation Project Timing

The Copermittee and/or project applicant must develop a schedule for the completion of offsite mitigation projects, including milestone dates to identify, fund, design, and construct the projects. Offsite mitigation funding ~~projects~~ must be secured by the applicant and verified by the Copermittee prior to granting construction permits or recording of maps, whichever comes first. ~~completed upon the granting of occupancy for the first project that contributed funds toward the offsite mitigation project, unless a longer period is authorized by the San Diego Water Board.~~.

~~(iv)~~(v) Mitigation Fund

A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as a means for developing and implementing offsite mitigation projects, provided the projects conform to the requirements for project locations, types, and timing described above.

d. Update ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual ~~(BMP Design Manual)~~

Each Copermittee must update its ~~Permanent BMP Sizing Criteria Design Manual (~~BMP Design Manual~~)~~[19] pursuant to Provision F.2.b or Provision F.5.a. Until the Copermittee has updated its BMP Design Manual with the requirements of Provision E.3.c, the Copermittee must continue implementing its current BMP Design Manual. Unless directed otherwise by the San Diego Water Board, the Copermittee must implement the BMP Design Manual within 180 days of completing the update. The update of the BMP Design Manual must include the

~~[19] The Permanent BMP Sizing Criteria Design Manual was formerly known as the Standard Storm Water Mitigation Plan under Order Nos. R9-2007-0001, R9-2009-0002, and R9-2010-0016.~~

following:

(1) Updated procedures to determine the nature and extent of storm water requirements applicable to a potential development or redevelopment project. These procedures must inform project applicants of the storm water management requirements applicable to their project including, but not limited to, general requirements for all development projects, LID and conventional BMP design procedures and requirements, hydromodification management requirements, requirements specific to phased projects, and procedures specific to private developments and public improvement projects;

(2) Updated procedures to identify pollutants and conditions of concern for selecting the most appropriate ~~permanent~~ structural BMPs that consider, at a minimum, the following:

(a) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d));

(b) Priority pollutants or receiving water conditions contributing to the highest water quality priorities identified in the Water Quality Improvement Plan;

(c) Land use type of the project and pollutants associated with that land use type; and

(d) Pollutants expected to be present onsite.

(3) Updated procedures for designing ~~permanent~~ structural BMPs, including any updated performance and sizing requirements to be consistent with the requirements of Provision E.3.c for all BMPs listed in the BMP Design Manual;

(4) Long-term maintenance criteria for each BMP listed in the BMP Design Manual; and

(5) Criteria and mitigation requirements, in accordance with the requirements under Provision E.3.c.(4), if the Copermittee elects to allow alternative compliance for technical infeasibility within its jurisdiction.

e. Priority Development Project BMP Implementation and Oversight

Each Copermittee must implement a program to ensure structural ~~permanent~~ BMPs on all Priority Development Projects are designed, constructed, and maintained to remove pollutants in storm water to the MEP.

(1) Structural~~Permanent~~ BMP Approval and Verification Process

(a) Each Copermittee must ensure that for all Priority Development Project applications that have not received prior lawful approval by the Copermittee by 18~~2~~ months after the adoption of this Order, or pursuant to Provision F.5.a~~a~~, the requirements of Provision E.3 are implemented. For project applications that have received prior lawful approval by 18~~2~~ months after the adoption of this Order, or pursuant to Provision F.5.a~~a~~, the Copermittee may allow previous land development requirements to apply.

(b) Each Copermittee must identify the roles and responsibilities of various municipal departments in implementing the structural~~permanent~~ BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections.

(c) Each Copermittee must ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(d) Each Copermittee must ensure that prior to occupancy and/or intended use of any portion of the Priority Development Project, each ~~permanent~~ structural BMP must be inspected to verify that they have been constructed and are operating in compliance with all of its specifications, plans, permits, ordinances, and the requirements of this Order.

(2) Priority Development Project Inventory and Prioritization

(a) Each Copermittee must develop and ~~continuously~~regularly maintain a watershed-based database to track and inventory all Priority Development Projects and associated structural~~permanent~~ BMPs within their jurisdiction. Inventories must be accurate and complete beginning from January 2002 for the San Diego County Copermittees, February 2003 for the Orange County Copermittees, and July 2005 for the Riverside County Copermittees, where data is available. The database must include, at a minimum, the following information:

(i) Priority Development Project location (address and hydrologic subarea);

(ii) Descriptions of structural BMP type(s);

(iii) Date(s) of construction;

(iv) Party responsible for ~~permanent~~ structural BMP maintenance;

(v) Dates and findings of ~~permanent~~ structural BMP maintenance verifications; and

(vi) Corrective actions and/or resolutions.

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(b) Each Copermittee must prioritize the Priority Development Projects with ~~permanent~~ structural BMPs within its jurisdiction. The designation of Priority Development Projects as high priority must consider the following:

(i) The highest water quality priorities identified in the Water Quality Improvement Plan;

(ii) Receiving water quality;

(iii) Number and sizes of ~~permanent~~ structural BMPs;

(iv) Recommended maintenance frequency of ~~permanent~~ structural BMPs;

(v) Likelihood of operation and maintenance issues of structural ~~permanent~~ BMPs;

(vi) Land use and expected pollutants generated; and

(vii) Compliance record.

(3) Structural ~~Permanent~~ BMP Maintenance Verifications and Inspections

Each Copermittee is required to verify that structural ~~permanent~~ BMPs on each Priority Development Project are adequately maintained, and continue to operate effectively to remove pollutants in storm water to the MEP through inspections, self-certifications, surveys, or other equally effective approaches.

(a) All (100 percent) of the structural ~~permanent~~ BMPs at Priority Development Projects that are designated as high priority must be inspected directly by the Copermittee annually prior to each rainy season;

(b) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be required by the Copermittee to provide assurance that the required maintenance of structural ~~permanent~~ BMPs at each Priority Development Project has been completed; and

(c) Appropriate follow-up measures (including re-inspections, enforcement, etc.) must be conducted to ensure that structural ~~permanent~~ BMPs at each Priority Development Project continue to reduce pollutants in storm water to the MEP as originally designed.

f. Development Project Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all development projects, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement

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Response Plan pursuant to Provision E.6.

4. Construction Management

Each Copermittee must implement a construction management program that includes~~, at a minimum,~~ the following requirements:

a. Construction Program Management

Each Copermittee must define in the Jurisdictional Runoff Management Plan the following:

(1) Define construction sites to be inventoried, such as sites that involve ground disturbance or soil disturbing activities; and

(2) Define a process for ensuring adequate construction BMP implementation for non-inventoried sites. Non-inventoried sites involve minor construction activities that are not anticipated to create storm water pollution such as interior improvements, small miscellaneous residential improvements such as patio covers, plumbing, electrical, and mechanical work.

~~a.~~**b.** Project Approval Process

Prior to ~~approval and~~ issuance of any local permit that allows commencement of construction~~, grading, or building permits~~ activities for any inventoried construction site, ~~a project~~ each Copermittee must:

(1) Require a ~~project~~site-specific ~~storm water pollution prevention plan (SWPPP)~~Pollution Control Plan, or equivalent construction BMP or erosion control plan, to be submitted by the project applicant ~~for~~ to the Copermittee~~'s approval~~;

(2) ~~Ensure~~ Confirm the Pollution Control Plan~~SWPPP~~, or equivalent construction BMP or erosion control plan, complies with the local grading ordinance, other applicable local ordinances, and the requirements of this Order; and

(3) ~~Ensure~~ Confirm the Pollution Control Plan~~SWPPP~~, or equivalent construction BMP or erosion control plan, includes seasonally appropriate and effective BMPs and management measures described in Provision E.4.c, as applicable to the project.

~~(1) Verify that the project applicant has obtained coverage under applicable permits, including, but not limited to the Construction General Permit, Clean Water Act Section 401 Water Quality Certification and Section 404 Permit, and California Department of Fish and Game Streambed Alteration Agreement.~~

~~b.~~**c.** Construction Site Inventory and Tracking

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(1) Each Copermittee must maintain, and update at least monthly, a watershed-based inventory of all applicable construction sites ~~requiring construction, grading, or building permits~~ within its jurisdiction. The inventory must include:

(a) Relevant contact information for each site (e.g., name, address, phone, and email for the owner and contractor);

(b) The basic site information including location (address and hydrologic subarea), Waste Discharge Identification (WDID) number (if applicable), size of the site, and approximate area of disturbance;

(c) Whether or not the site is considered a high threat to water quality, as defined in Provision E.4.b.(2) below;

~~(a) The project start and anticipated completion dates;~~

(d) Current construction phase;

(e) The required inspection frequency, as defined in the Copermittee's jurisdictional runoff management program document;

(f) The date the Copermittee ~~approved~~ accepted the project-specific Pollution Control Plan~~SWPPP~~, or equivalent construction BMP or erosion control plan; and

(g) Whether or not there are ongoing enforcement actions administered to the site.

(2) Each Copermittee must identify all construction sites within its jurisdiction that represent a high threat to downstream surface water quality. At a minimum, high threat to water quality sites must include:

(a) Sites located within a hydrologic subarea where sediment is known or suspected to contribute to the highest water quality priorities identified in the Water Quality Improvement Plan;

(b) Sites located within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment;

(c) Sites located within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(d) Other sites determined by the Copermittees or the San Diego Water Board as a high threat to water quality.

~~c.~~d. Construction Site BMP and Management Measure Implementation

Each Copermittee must implement, or require the implementation of effective BMPs to reduce discharges of pollutants in storm water from construction sites to the MEP, and prevent non-storm water discharges into the MS4. These BMPs must be site specific, seasonally appropriate, and construction phase appropriate. BMPs and management measures must be implemented at each construction site year round. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30). Copermittees must implement, or require the implementation of, BMPs and management measures in the following categories:

(1) Project Planning;

(2) Good Site Management "Housekeeping", including waste management;

(3) Non-storm Water Management;

(4) Erosion Control;

(5) Sediment Control;

(6) Run-on and Run-off Control; and

(7) Active/Passive Sediment Treatment Systems, where applicable.

~~d.~~e. Construction Site Inspections

Each Copermittee must conduct construction site inspections to ~~ensure~~ confirm compliance with its permits and applicable local ordinances, and the requirements of this Order. Priority for site inspections must consider threat to water quality pursuant to Provision E.4.b as well as the nature of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) Inspection Frequency

(a) Each Copermittee must conduct inspections at all inventoried sites, including high threat to water quality sites, at an appropriate frequency for each phase of construction to ~~ensure~~ confirm the site reduces the discharge of pollutants in storm water from construction sites to the MEP, and prevents non-storm water discharges from entering the MS4.

(b) Each Copermittee must establish appropriate inspection frequencies for high threat to water quality sites, and all other sites, for each phase of construction. Inspection frequencies appropriate for addressing the highest water quality priorities identified in the Water Quality Improvement Plan, and for complying with the requirements of this Order must be identified in each Copermittee's jurisdictional runoff management program document.

(c) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to ~~ensure~~ confirm site compliance with its permits and applicable local ordinances, and the requirements of this Order.

(2) Inspection Content

Inspections of construction sites by the Copermittee must include, at a minimum:

(a) Verification of coverage under the Construction General Permit (Notice of Intent (NOI) and/or WDID number) during initial inspections, when applicable;

(b) Assessment of compliance with its permits and applicable local ordinances related to pollution prevention, including the implementation and maintenance of applicable BMPs;

(c) Assessment of BMP adequacy and effectiveness;

(d) Visual observations of actual non-storm water discharges;

(e) Visual observations of actual or potential discharge of sediment and/or construction related materials from the site;

(f) Visual observations of actual or potential illicit connections; and

(g) If any violations are found and BMP enhancements are needed, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.

(3) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried construction sites. The Copermittee must retain all inspection records in an electronic database or tabular format, which must be made available to the San Diego Water Board upon request. Inspection records must include, at a minimum:

(a) Site name, location (address and hydrologic subarea), and WDID number (if applicable);

(b) Inspection date;

(c) Weather conditions during inspection;

~~(a) Approximate amount of rainfall since last inspection;~~
(d) Description ~~and photo documentation~~ of problems observed with BMPs and indication of need for BMP addition/repair/replacement and any scheduled re-inspection, and date of re-inspection;

(e) Descriptions of any other specific inspection comments which must, at a minimum, include rationales for longer compliance time~~.~~;

(f) Description of enforcement actions issued in accordance with the Enforcement Response Plan pursuant to Provision E.6; and

(g) Resolution of problems noted and date problems fixed.

~~e.~~f. Construction Site Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried construction sites, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

5. Existing Development Management
[NOTE: This section is provided as an alternate to the original language.]

Each Copermittee must implement an existing development management program that includes the following requirements:

a. Industrial, Commercial, and Municipal Sources

~~(4)~~(1) Source Identification and Prioritization

Each Copermittee must identify sources and maintain an updated watershed-based inventory of its existing industrial, commercial, and municipal development that has the reasonable potential to discharge a pollutant load to and from the MS4. The use of an automated database system, such as GIS, is highly recommended. The inventory must, at a minimum, include:

(a) Name, location (address and hydrological subarea) of each source;

(b) A designation of the source as municipal, commercial, or industrial;

(c) SIC Code or NAICS Code, if applicable;

(d) Industrial General Permit NOI and/or WDID number, if applicable;

(e) Identification of pollutants generated or potentially generated by the source;

(f) Whether the source is adjacent to an ESA;

(g) Whether the source is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates or potentially generates pollutants for which the water body segment is impaired; and

(h) Whether the source contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan;

~~(5)~~(2) BMP Implementation and Maintenance

Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development with the reasonable potential to discharge pollutant loads from their MS4, including special event venues. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(a) Pollution Prevention

Each Copermittee must promote the use of pollution prevention methods, where appropriate.

(b) BMP Operation and Maintenance

(i) Each Copermittee must properly operate and maintain, or require the proper operation and maintenance of designated BMPs at sources within its jurisdiction.

(ii) Each Copermittee must implement a schedule of operation and maintenance activities for its MS4 and related structures (including but not limited to catch basins, storm drain inlets, detention basins, etc.), and verify proper operation of all its municipal structural treatment controls. Operations and maintenance activities may include:

[a] Inspections of MS4 and related structures;

[b] Cleaning of MS4 and related structures; and

[c] Proper disposal of materials removed from cleaning of MS4 and related structures.

(iii) Each Copermittee must implement a schedule of operation and maintenance activities for public: streets, unpaved roads, paved roads, and paved highways and freeways within its jurisdiction.

(iv) Each Copermittee must implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers. Copermittees that operate both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate seeping sewage from infiltrating the MS4. Copermittees that do not operate both a municipal sanitary sewer system and a MS4 are encouraged to coordinate with sewering agencies to keep themselves informed of relevant and appropriate maintenance activities and capital projects in their jurisdiction.

(c) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must implement procedures, or require the implementation of procedures, as appropriate, to reduce discharges of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers at sources within its jurisdiction.

~~(6)~~(3) Measures to Address Highest Water Quality Priorities

Each Copermittee must conduct or require measures as necessary to address sources or areas that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. These measures must be identified as applicable in each WQIP strategy, and may include any of the following:

(a) Copermittee Program Activities

Each Copermittee may make modifications to its program activities (e.g. increased or focused education, inspections, etc.) to address sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(b) Additional Control Measures

Each Copermittee may require additional pollution prevention measures and control measures at sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan, including consideration of retrofit and channel rehabilitation and improvement opportunities, as identified in Provision 5.a.2.(c)

(c) Retrofit

Each Copermittee must develop a strategy to facilitate the implementation of retrofit projects. Existing development in high priority areas should be assessed for inclusion in the retrofit plan. Retrofit plans should focus on pollutants and areas identified as high priority within the Water Quality Improvement Plans, with the highest priority projects included in the Water Quality Improvement Plans.

(i) Retrofit projects may be prioritized based on their relative benefit to water quality, feasibility, cost effectiveness, and community acceptance.

(ii) Retrofit projects in the highest priority areas should be included in the review for the Water Quality Improvement Plan to provide additional pollutant removal from storm water discharges.

(d) <u>Channel Rehabilitation and Improvement</u>

Each Copermittee must develop a strategy to facilitate the implementation of channel rehabilitation and improvement projects. Existing channels in high priority areas should be assessed for inclusion in the channel rehabilitation and improvement plan. Channel rehabilitation and improvement plans should focus on pollutants and areas identified as high priority within the Water Quality Improvement Plans.

(i) Channel rehabilitation and improvement projects may be selected to address hydromodification, restore wetland and riparian habitat, or to address other water quality issues prioritized in the Water Quality Improvement Plan.

(ii) Channel rehabilitation and improvement projects may be prioritized based on their relative benefit to water quality, feasibility, cost effectiveness, and community acceptance.

(iii) Channel rehabilitation and improvement projects in the highest priority areas should be included in the review for the Water Quality Improvement Plan to provide additional pollutant removal from storm water discharges.

~~(7)~~<u>(4)</u> Inspection Requirements:

(a) <u>Inspection Frequency</u>

(i) Each Copermittee must establish appropriate inspection frequencies for inventoried industrial, commercial, and municipal sources based on the potential for discharging pollutants via storm water and non-storm water discharges, and should reflect the priorities set forth in the Water Quality Improvement Plan.

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(ii) Each Copermittee must conduct inspections annually with a level of effort equivalent to 20% of their industrial, commercial, and municipal inventory combined[2021]. If facilities require multiple inspections during any given year, those additional inspections may count towards this total.

(iii) Inventoried existing development must be inspected, as needed, in response to valid public complaints and findings from the Copermittee's municipal and contract staff inspections.

(iv) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e. education and outreach, re-inspection, enforcement) as necessary to confirm compliance in accordance with its enforcement response plan pursuant to Provision E.6.

(b) Inspection Content

Inspections of industrial, commercial, and municipal facilities by the Copermittee may include the following:

(i) Industrial, commercial, and municipal facilities name and location (address and hydrologic subarea);

(ii) Inspection and re-inspection date(s);

(iii) Assessment of compliance with its applicable local ordinances and permits related to non-storm water and storm water discharges and runoff;

(iv) Assessment of BMPs implementation;

(v) Verification of coverage under the Industrial General Permit (NOI and/or WDID number), when applicable;

(vi)

(vii) Visual observations of actual non-storm water discharges, if present;

(viii) Visual observations of actual or potential discharge of pollutants, if present; and

(ix) Visual observations of actual or potential illicit connections, if present.

[20] Excludes linear facilities (MS4 and roads).

(c) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried industrial, commercial, and municipal facilities. The Copermittee must maintain all inspection records in an electronic database or tabular format, either in paper or electronic inspection records files, which must be made available to the San Diego Water Board upon request.

Inspection records must include the information necessary to effectively manage and implement the industrial, commercial, and municipal facilities inspection program, as described in each Copermittee's jurisdictional runoff management plan

b. Residential Sources

(1) Source Identification and Prioritization:

An inventory of residential sources within each Copermittees jurisdiction must be developed as follows:

(a) Designation of Residential Management Areas

Each Copermittee must divide areas of residential development into Residential Management Areas. Residential Management Areas may be designated by one or more of the following: Hydrologic Sub Area, land use (e.g. single family, multi family, rural, Common Interest Areas, ~~or~~ Home Owner Associations), and/or residential target audiences, and/or other accepted methods to be included in each Copermittee-approved jurisdictional runoff management plan.

(b) Prioritization of Residential Management Areas

Copermittees must prioritize Residential Management Areas for the purposes of ~~prioritizing and~~ directing their residential programs. Prioritization must consider whether the Residential Management Area contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan, and consideration of other program information or information from other relevant programs:

(c) A regularly updated map must be developed showing the locations of the highest priority inventoried Residential Management Areas, watershed boundaries, and water bodies at or near them.

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(2) BMP Implementation and Maintenance

(a) Designate BMPs

Each Copermittee must designate and ~~require~~ encourage the implementation of a minimum set of BMPs for all residential sources or residential target audiences with the reasonable potential to discharge significant pollutant loads from their MS4.The designated minimum BMPs must be source-specific, and must address each of the following as appropriate.

(i) Pollution Prevention

Each Copermittee must promote the use of pollution prevention methods, where appropriate.

(ii) BMP Operation and Maintenance

Each Copermittee must ~~operate~~ designate and ~~maintain, or~~ require the operation and maintenance of designated BMPs for residential sources within its jurisdiction.

(iii) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must ~~require~~ designate and encourage, as appropriate, the implementation of practices to reduce discharges of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers at residential sources within its jurisdiction.

(3) Measures to Address Highest Water Quality Priorities

Each Copermittee must ~~conduct~~ designate or require measures as necessary to address residential sources or ~~areas~~ residential target audiences that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. These measures must be identified as applicable in each WQIP strategy, and may include any of the following:

(a) Copermittee Program Activities

Each Copermittee may make modifications to its program activities (e.g. increased or focused education, inspections, etc.) to address residential sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(b) Additional Control Measures

Each Copermittee may require additional pollution prevention and control measures at sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(c) Retrofit

Each Copermittee must encourage through education or other means the implementation of retrofit projects at residential sources or areas.

(4) Residential Management Area Oversight:

(a) Residential Area Assessment

Each Copermittee must conduct representative evaluations (e.g. visual observations, water use analysis, and other historical data) of its high ~~prioritized~~ priority Residential Management Areas as defined in the Water Quality Improvement Plan to update implementation strategies. Each Copermittee must develop a program to facilitate oversight and assessment in residential areas. Oversight may include complaint investigation, IDDE Activities, follow-up on monitoring obdervations, visual observations, outreach and education, water use analysis, or other methods deemed necessary to facilitate BMP implementation. Each Copermittee should conduct assessment of its oversight activities in prioritized residential areas to inform any updates to the WQIP.

~~(b) Residential Program Update~~

~~Within two years, each Copermittee must develop and submit for Regional Board approval an updated residential program strategy based on assessment findings. Until Copermittees implement an updated residential program, they must continue performing their existing programs.~~

~~(c)~~(b) Follow up Actions

Each Copermittee must prioritize ~~and implement~~ its follow up actions and enforcement (e.g. education and outreach, re-assessment~~, enforcement~~) in accordance with its Enforcement Response Plan pursuant to Provision E.6.

~~(d)~~(c) ~~Assessment Tracking and~~ Record-keepings

~~Assessment r~~Records must be ~~tracked and~~ sufficiently detailed in order to determine compliance with the requirements of this Order and any progress made toward the modification of residential management

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strategies, or addressing the highest water quality priorities identified in the Water Quality Improvement Plan.

~~1) The following municipal facilities:~~

~~(a) Flood management and flood control devices and structures,~~

~~(b) Operating or closed municipal landfills,~~

~~(c) Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewer collection systems,~~

~~(d) Corporate yards, including maintenance and storage yards for materials, waste, equipment, and vehicles,~~

~~(e) Hazardous waste collection facilities, and~~

~~(f) Other treatment, storage or disposal facilities for municipal waste;~~

~~2) Identification if a business is a mobile business;~~

~~3) SIC Code, if applicable;~~

~~4) Industrial General Permit NOI and/or WDID number, if applicable;~~

~~5) Identification if an area is a Common Interest Area (CIA) / Home Owner Association (HOA), or mobile home park;~~

~~6) Identification of pollutants generated and potentially generated by the facility, area, and/or activity;~~

~~7) Status of facility, area, and/or activity as active or inactive;~~

~~8) Whether the facility, area, and/or activity is adjacent to an ESA;~~

~~9) Whether the facility, area, and/or activity is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired;~~

~~10) Whether the facility, area, and/or activity contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan; and~~

~~11) A continually updated map showing the location of inventoried existing development, watershed boundaries, water bodies, and pollutants generated at the inventoried existing development.~~

~~**c.** Retrofitting and Channel Rehabilitation in Areas of Existing Development~~

~~Each Copermittee must develop and implement a program to retrofit areas of existing development to reduce the discharge of pollutants in storm water from the MS4 to the MEP and effectively prohibit non-storm water discharges into its MS4, and rehabilitate channels to restore impaired beneficial uses of streams within its jurisdiction.~~

~~(1) Each Copermittee must identify areas of existing development as candidates for retrofitting, and channels in areas of existing development as candidates for rehabilitation within its jurisdiction. Areas of existing development must be selected based on a likelihood that retrofitting and channel rehabilitation will address the highest water quality priorities identified in the Water Quality Improvement Plan prepared pursuant to Provision B.~~

~~(2) Each Copermittee must evaluate and rank the areas of existing development identified pursuant to Provisions E.5.a and E.5.b.(1) for retrofitting and channel rehabilitation. The evaluation must include an assessment of those areas where pollutant removal from storm water and effective prohibition of non-storm water discharges through retrofitting existing development will provide the most benefit to water quality. The evaluation must also include an assessment of the channels within its jurisdiction where channel rehabilitation will improve beneficial uses of streams within the Copermittee's jurisdiction. Data collected during the implementation of the Water Quality Improvement Plan must be used to inform each area assessment and rank determination.~~

~~(3) Each Copermittee must implement retrofit and channel rehabilitation projects that address the highest water quality priorities identified in the Water Quality Improvement Plan pursuant to Provision B.3.a. The Copermittee must encourage private landowners to implement retrofit and channel rehabilitation projects whenever practical. Private landowners should be encouraged through the Copermittee's use of subsidies, penalties, or other incentives.~~

~~(4) Each Copermittee must evaluate the flood management and flood control devices and structures in its inventory to determine if it is feasible to retrofit the device or structure, to provide additional pollutant removal from storm water. A Copermittee must consider the highest water quality priorities identified in their Water Quality Improvement Plan as part of each assessment.~~

~~(5) Where retrofitting and channel rehabilitation within specific areas of existing development are determined to be infeasible to restore and protect receiving waters from the highest water quality priorities identified in the Water Quality Improvement Plan, each Copermittee must identify, develop, and implement regional retrofitting and channel rehabilitation projects (i.e. projects that can receive and/or treat storm water from one or more areas of existing development and will result in a net benefit to water quality and the environment) adjacent to and/or downstream of the areas of existing development. The Copermittees may collaborate and cooperate with each~~

~~other to develop regional retrofitting and channel rehabilitation projects. The Copermittees are also encouraged to partner with existing efforts in other Watershed Management Areas, and the Integrated Regional Water Management (IRWM) Groups in San Diego County, South Orange County, and Southwest Riverside County.~~

~~**d.** Existing Development BMP Implementation and Maintenance~~

~~**1)** Pollution Prevention~~

~~Each Copermittee must require the use of pollution prevention methods by the inventoried existing development.~~

~~**2)** Designate BMPs~~

~~Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development, including special event venues, that have the potential to generate pollutants. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.~~

~~**3)** BMP Implementation~~

~~Each Copermittee must implement, or require the implementation of, designated BMPs at inventoried existing development that have the potential to generate pollutants. A Copermittee must require additional pollution prevention measures and enhanced BMPs at inventoried existing development that discharges pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.~~

4) ~~BMP Operation and Maintenance~~

~~Each Copermittee must operate and maintain, or require the operation and maintenance of designated BMPs at all inventoried existing development.~~

~~(b) Each Copermittee must implement a schedule of operation and maintenance activities for its MS4 and related structures (including but not limited to catch basins, storm drain inlets, detention basins, etc.), and verify proper operation of all its municipal structural treatment controls designed to reduce pollutants (including floatables) in storm water discharges to or from its MS4s and related drainage structures.~~

~~(c) Each Copermittee must implement procedures during the operation and maintenance of public streets, unpaved roads, paved roads, and paved highways and freeways that will reduce the contribution of storm water pollutants to the MEP and effectively prohibit non-storm water pollutants from the MS4 to receiving water bodies. During maintenance of unpaved roads, each Copermittee must examine the feasibility of replacing existing culverts or designing new culverts/bridge crossings to maintain natural stream geomorphology.~~

~~(d) Each Copermittee must implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers. Copermittees that operate both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate seeping sewage from infiltrating the MS4. Copermittees that do not operate both a municipal sanitary sewer system and a MS4 must keep themselves informed of relevant and appropriate maintenance activities and sanitary sewage projects in their jurisdiction that may cause or contribute to seepage of sewage into the MS4.~~

5) ~~Pesticides, Herbicides, and Fertilizers BMPs~~

~~Each Copermittee must implement procedures, or require the implementation of procedures, to reduce the contribution of pollutants in storm water to the MEP and effectively prohibit non-storm water discharges associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from inventoried existing development into and from the MS4s. The Copermittee must require additional pollution prevention measures and enhanced BMPs at inventoried existing development that discharges pesticides, herbicides, or fertilizers identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. Such BMPs must include, as appropriate educational activities, permits, certifications and other measures for applicators and distributors.~~

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~~**e.** Existing Development Inspections~~

~~Each Copermittee must conduct inspections of inventoried existing development to ensure compliance with applicable local ordinances and permits, and the requirements of this Order.~~

~~(1) Inspection Frequency~~

~~(a) Each Copermittee must establish appropriate inspection frequencies for inventoried existing development based on the priorities set forth in the Water Quality Improvement Plan, and the potential for discharging pollutants via storm water and non-storm water runoff. At a minimum, inventoried existing development must be inspected once every five years. Inventoried existing development must also be inspected within six months of any change in property ownership or change in pollutant generating activity. The frequency of inspection at inventoried existing development must be appropriate to ensure that applied BMPs are sufficient to reduce the discharge of pollutants in storm water from the MS4 to the MEP and effectively prohibit non-storm water discharges to the MS4.~~

~~(b) Inventoried existing development must be inspected, as needed, in response to valid public complaints and findings from the Copermittee's municipal and contract staff inspections.~~

~~(c) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e. re-inspection, enforcement) necessary to ensure compliance with its applicable local ordinances and permits, the most current jurisdictional runoff management program document, the Water Quality Improvement Plan, and the requirements of this Order.~~

~~(2) Inspection Content~~

~~Inspections of existing development by the Copermittee must include, at a minimum:~~

~~(a) Assessment of compliance with its applicable local ordinances and permits related to non-storm water and storm water discharges and runoff;~~

~~(b) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;~~

~~(c) Verification of coverage under the Industrial General Permit (NOI and/or WDID number), when applicable;~~

~~(d) Visual observations of actual non-storm water discharges;~~

~~(e) Visual observations of actual or potential discharge of pollutants;~~

~~(f) Visual observations of actual or potential illicit connections; and~~

~~(g) If any violations are found and BMP enhancements are needed, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.~~

~~(3) Inspection Tracking and Records~~

~~Each Copermittee must track all inspections and re-inspections at all inventoried existing development. The Copermittee must retain all inspection records in an electronic database or tabular format, which must be made available to the San Diego Water Board upon request. Inspection records must be sufficiently detailed in order to determine compliance with the requirements of this Order and any progress made towards addressing the highest water quality priorities identified in the Water Quality Improvement Plan. Inspection records must include, at a minimum:~~

~~(a) Existing development name and location (address and hydrologic subarea);~~

~~(b) Inspection and re-inspection date(s);~~

~~(c) Weather conditions during inspection;~~

~~(d) Description and photo documentation of problems observed with BMPs and indication of need for BMP addition/repair/replacement and any scheduled re-inspection, and date of re-inspection;~~

~~(e) Description of actions to reduce pollutants in storm water runoff to the MEP and actions to effectively prohibit non-storm discharges into the MS4 at the inventoried existing development;~~

~~(f) Photo documentation of observed actions or BMPs to reduce pollutants in storm water runoff to the MEP and actions to effectively prohibit non-storm discharges into the storm drain;~~

~~(g) If the facility, area, and/or activity has been designated or identified as a contributor to the highest water quality priorities identified in the Water Quality Improvement Plan, then the inspection report must include a description of any specific or additional actions taken to reduce or eliminate the contribution of the facility, area, and/or activity to the highest water quality priorities;~~

~~(h) Descriptions of any other specific inspection comments which must, at a minimum, include rationales for longer compliance time;~~

~~(i) Description of enforcement actions issued in accordance with the Enforcement Response Plan pursuant to Provision E.6; and~~

~~(j) Resolution of problems noted and date problems fixed.~~

~~f.~~c. Existing Development Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried existing development identified by the Copermittee as having the reasonable potential to discharge pollutant loads from the MS4 within their jurisdiction, ~~as necessary, to achieve compliance with the requirements of this Order,~~ in accordance with its Enforcement Response Plan pursuant to Provision E.6.

~~5.~~6. Enforcement Response Plans

Each Copermittee must develop and implement an Enforcement Response Plan ~~-~~as part of its jurisdictional runoff management program document. The Enforcement Response Plan must ~~include the protocols for progressively stricter responses, including timeframes allowed for corrections of problems, and for various field violation scenarios~~describe the applicable protocols and options for enforcing compliance with the provisions of this Order. The Enforcement Response Plan must include ~~, at a minimum,~~ the following ~~requirements~~:

a. Enforcement Response Plan Components

The Enforcement Response Plans shall include the following individual components:

(1) The Illicit Discharge Detection and Elimination Enforcement Components provided in Provision E.2;

(2) The Development Planning Enforcement Component provided in Provision E.3;

(3) The Construction Management Enforcement Component provided in Provision E.4; and

(4) The Existing Development Management Enforcement Component provided in Provision E.5.

Existing enforcement plans or procedures may be used to partially or wholly satisfy the requirements of any Enforcement Response Plan component.

b. Enforcement Approaches and Options

Each Enforcement Response Plan component must describe the Copermittee's approach to correcting noncompliance with its permits, applicable local ordinances, and this Order. It must describe protocols for progressively stricter responses, including, as applicable, timeframes allowed to bring areas or facilities into compliance. The enforcement process must include appropriate sanctions to compel compliance, such as:

(1) Verbal and written notices of violation;
(2) Cleanup requirements;
(3) Fines
(4) Bonding requirements;
(5) Administrative and criminal (if intentional or criminally negligent) penalties;
(6) Liens;
(7) Stop work orders; and

(8) Permit and occupancy denials.

c. CORRECTION OF VIOLATIONS

(1) Violations must be corrected in a timely manner with the goal of correcting them within 30 calendar days after the violations are discovered, and prior to the next predicted rain event, when possible.

(2) If more than 30 calendar days are required for compliance, then a rationale must be recorded in the applicable electronic database or tabular system used to track compliance.

d. ESCALATED ENFORCEMENT PRIORITIES

(1) Each Enforcement Response Plan must include a definition of "escalated enforcement priorities". Escalated enforcement priorities shall be defined to include any enforcement scenario where a violation or other non-compliance is determined to constitute a significant contribution to any of the highest water quality priorities identified in the Water Quality Improvement Plan. Escalated enforcement priorities may be defined differently for development planning; construction sites; commercial, industrial, and municipal sources; and residential management areas.

(2) Where a violation involving a pollutant or stressor that has been identified as a highest water quality priority is not determined to represent an escalated enforcement priority, a rationale must be recorded in the applicable electronic database or tabular system used to track compliance.

(3) Escalated enforcement actions must continue to increase in severity, as necessary, to compel compliance as soon as possible.

~~**a.** Illicit Discharge Detection and Elimination Enforcement Component~~

~~The Enforcement Response Plan must describe required enforcement actions to eliminate non-storm water discharges and illicit discharges or connections to the Copermittee's MS4.~~

~~(1) The Enforcement Response Plan must include a definition of "high level enforcement" for non-storm water discharges and illicit discharges or connections. "High level enforcement" for non-storm water discharges and illicit discharges or connections may be defined differently for construction sites, municipal, commercial, industrial, and residential areas of existing development.~~

~~(2) Non-storm water discharges and illicit discharges or connections must be addressed with an escalating series of enforcement actions as follows:~~

~~(a) If the non-storm water discharge and illicit discharge or connection is a source of pollutants contributing to the highest water quality priorities identified in the Water Quality Improvement Plan, then high level enforcement actions must be immediately issued, and subsequent high level enforcement actions must continue to escalate, as necessary, to compel the elimination of the discharge or connection as soon as possible; or~~

~~(b) If the non-storm water discharge and illicit discharge or connection is not a source of pollutants contributing to the highest water quality priorities identified in the Water Quality Improvement Plan, then escalating enforcement actions must be issued, and enforcement actions must result in the elimination of the discharge or connection as quickly as the Copermittee's available resources allow.~~

~~(3) If the Copermittee identifies the source, and the source is a controllable non-storm water discharge (i.e. anthropogenically influenced) or a controllable illicit discharge or connection, then the Copermittee must implement the following:~~

~~(a) Immediately enforce its legal authority to eliminate controllable sources of non-storm water and illicit discharges or connections upon identifying the source; and~~

~~(b) For controllable sources of non-storm water discharges and illicit discharges or connections that cannot be eliminated immediately upon identification, the discharge or connection must be eliminated in a timely manner with the goal of eliminating the discharge or connection within 10 business days after the source is identified. If more than 10 business days are required to eliminate the discharge or connection, a rationale must be recorded in the electronic database or equivalent tabular system used to track the investigations of non-storm water and illicit discharges and connections.~~

~~(4) If the Copermittee identifies the source as a non-storm water discharge to or from the MS4 that is in exceedance of NALs developed pursuant to Provision C.1, and in violation or threatened violation of an existing separate NPDES permit (e.g. the groundwater dewatering NPDES permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.~~

~~**b.** Development Projects Enforcement Component~~

~~The Enforcement Response Plan must describe required enforcement actions to compel compliance with the Copermittee's BMP Design Manual requirements for~~

~~development projects.~~

~~(1) The Enforcement Response Plan must include a definition of "high level enforcement" for development projects.~~

~~(2) The enforcement process must include appropriate sanctions to compel compliance with requirements of the Copermittee's BMP Design Manual or this Order. Sanctions must include, at a minimum, the following tools or their equivalent:~~

~~(a) Non-monetary penalties;~~

~~(b) Fines;~~

~~(c) Bonding requirements;~~

~~(d) Administrative and criminal penalties;~~

~~(e) Liens; and~~

~~(f) Permit or occupancy denials.~~

~~(3) Occupancy must be denied until a development project is in full compliance with the Copermittee's BMP Design Manual requirements. Documentation of full compliance with the Copermittee's BMP Design Manual requirements must be recorded in the electronic database or equivalent tabular system used to track development projects.~~

~~(4) Violations or other non-compliance that contribute or potentially contribute to the highest water quality priorities identified in the Water Quality Improvement Plan must be issued high level enforcement actions. High level enforcement actions must continue to escalate, as necessary, to compel compliance as soon as possible.~~

~~(5) For violations of permanent BMP maintenance requirements, all violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale must be recorded in the electronic database or equivalent tabular system used to track permanent BMP inspections.~~

~~**a.** Construction / Existing Development Enforcement Component~~

~~The Enforcement Response Plan must describe required enforcement actions to compel compliance with its permits and applicable local ordinances, and the requirements of this Order, at construction sites and areas of existing development.~~

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~~(1) The Enforcement Response Plan must include a definition of "high level enforcement" for construction sites and areas of existing development. "High level enforcement" may be defined differently for construction sites, municipal, commercial, industrial, and residential areas of existing development.~~

~~(2) The enforcement process must include, at a minimum, appropriate sanctions to compel compliance, such as:~~

~~(a) Verbal and written notices of violation;~~

~~(b) Cleanup requirements;~~

~~(c) Fines;~~

~~(d) Bonding requirements;~~

~~(e) Administrative and criminal penalties;~~

~~(f) Liens;~~

~~(g) Stop work orders; and~~

~~(h) Permit and occupancy denials.~~

~~(3) Violations or other non-compliance that contribute or potentially contribute to the highest water quality priorities identified in the Water Quality Improvement Plan must be issued high level enforcement actions. High level enforcement actions must continue to escalate, as necessary, to compel compliance as soon as possible.~~

~~(4) All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, then a rationale must be recorded in the electronic database or equivalent tabular system used to track construction site and existing development inspections.~~

~~g.~~ e. REPORTING OF NON-COMPLIANT SITES

(1) Each Copermittee must notify the San Diego Water Board verbally within 24 hours and in writing within ~~48 hours~~ 5 calendar days of issuing ~~high level~~escalated enforcement (as defined in the Copermittee's Enforcement Response Plan) to a construction site that poses a significant threat to water quality as a result of violations or other non-compliance with its permits and applicable local ordinances, and the requirements of this Order. Written notification may be provided electronically in email form.

(2) Each Copermittee must notify the San Diego Water Board of non-filers under the Industrial General Permit and Construction General Permit by email to Nonfilers_R9@waterboards.ca.gov.

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~~6.~~7. Public Education and Participation

a. Each Copermittee must implement a public education and participation program, as appropriate, to promote and encourage the development of programs, management practices, control techniques and systems, design and engineering methods, and behaviors that reduce the discharge of pollutants in storm water to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving waters. The public education program must include~~, at a minimum,~~ the following:

(1) Educational activities, public information activities, and other appropriate outreach activities intended to reduce pollutants ~~associated with the application of pesticides, herbicides and fertilizer in storm water discharges to and~~of concern from its MS4 to the MEP. Activities shall be determined and prioritized by Copermittees by jurisdiction and/or watershed (Section 5.c.(5) to address the highest threats to water quality (e.g. pesticides, herbicides and fertilizers, used oil, toxic waste, etc.);

~~(1) Educational activities, public information activities, and other appropriate outreach activities to facilitate the proper management and disposal of used oil and toxic materials; and~~

(2) Appropriate education and training measures for ~~construction site operators and other~~ specific target audiences, as determined and prioritized by the Copermittee(s) by jurisdiction and watershed, based on high risk behaviors and pollutants of concern, such as construction site operators, residents, underserved target audiences and school-aged children.

b. Each Copermittee shall incorporate a mechanism for evaluation and assessment of educational and other outreach activities, as needed, to identify progress and incorporate modifications necessary to increase the effectiveness of the public education program.

~~b.~~c. Each Copermittee may determine, where appropriate and effective, mechanisms for intergovernmental coordination on education and outreach activities.~~must incorporate a mechanism for public participation and where necessary intergovernmental coordination in updating, developing, and implementing its jurisdictional runoff management program.~~

~~7.~~8. Fiscal Analysis

a. Each Copermittee must secure the resources necessary to meet all the requirements of this Order.

b. Each Copermittee must conduct an annual fiscal analysis of their jurisdictional runoff management programs in their entirety. The fiscal analysis must include the following:

Identification of the various categories of expenditures necessary to implement the requirements of this Order, including a description of the specific items to be accounted for in each category of expenditures;
~~(1) The capital and operation and maintenance expenditures necessary to implement the requirements of this Order;~~

(1) The staff resources needed and allocated to meet the requirements of this Order, including any development, implementation, and enforcement activities required;
(2) The fiscal analysis must provide estimated expenditures for Provisions E.8.b.0 and E.8.b.(1) for each Copermittee's jurisdictional runoff management program budget for the current reporting period.~~during the reporting period, the preceding reporting period, and the next reporting period; and~~

(3) The source(s) of funds that are proposed to meet the necessary expenditures described in Provisions E.8.b.0 and E.8.b.(1), including legal restrictions on the use of such funds.

c. Each Copermittee must submit a summary of the annual fiscal analysis with each Annual Report required pursuant to Provision F.3.b.

d. Each Copermittee must provide the documentation used to develop the summary of the annual fiscal analysis upon request by the San Diego Water Board.

~~E.~~F. REPORTING

The purpose of this provision is to determine and document compliance with the requirements set forth in this Order. The goal of this provision is to communicate to the San Diego Water Board and the people of the State of California the implementation status of each jurisdictional runoff management program and compliance with the requirements of this Order. This goal is to be accomplished through the submittal of specific deliverables to the San Diego Water Board by the Copermittees.

1. Water Quality Improvement Plans

The Copermittees for each Watershed Management Area must develop and submit a complete Water Quality Improvement Plan in accordance with the requirements of Provision B, no later than ~~12~~ 18 months after the adoption of this Order for a 30 day public review and comment period. The San Diego Water Board will issue a public notice and solicit public comments on the Water Quality Improvement Plan for a minimum of 30 days. Based on the comments received, the San Diego Water Board will determine whether to hold a public hearing or to limit public input to submittal of written comments. If no hearing is held the San Diego Water Board will notify the Copermittees that the Water Quality Improvement Plan has been accepted as complete following its review and determination that the Water Quality Improvement Plan meets the requirements of this Order Water Quality Improvement Plans are deemed approved if no response is provided to the Copermittees within 2 months of the submittal date. Water Quality Improvement Plans must be made available on the Regional Clearinghouse required pursuant to Provision F.4.

a. Water Quality Improvement Plan Submittal and Implementation

Copermittees must submit requested modifications to the Water Quality Improvement Plan either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b. Once approved by the San Diego Water Board Executive Officer, the Copermittees must implement any modifications to the Water Quality Improvement Plan in accordance with the schedules developed pursuant to Provisions B.2 and B.3.b. Requests for modification are deemed approved if no response is provided to the requesting Copermittee(s) within 2 months of the request date.

b. Corresponding Modifications to Jurisdictional Runoff Management Programs and Monitoring and Assessment Programs

Copermittees must submit requested modifications to the jurisdictional runoff management programs and monitoring and assessment programs either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b. Once approved by the San Diego Water Board Executive Officer, the Copermittees must implement any modifications to the Water Quality Improvement Plan in

accordance with the schedules developed pursuant to Provisions B.3.b. Requests for modification are deemed approved if no response is provided to the requesting Copermittee(s) within 2 months of the request date.

2. Updates

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATES

Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E. The update must be completed no later than ~~12~~18 months after the adoption of this Order. Updated jurisdictional runoff management program documents must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Subsequent updates may be submitted as part of the Annual Reports, and updated jurisdictional runoff management program documents must be made available on the Regional Clearinghouse.

Jurisdictional Runoff Management Program document updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

b. ~~PERMANENT~~ BMP ~~SIZING CRITERIA~~ DESIGN MANUAL UPDATES

Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provision E.3.d. The update must be completed no later than 18~~12~~ months after the adoption of this Order. Updated BMP Design Manuals must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Subsequent updates may be submitted as part of the Annual Reports. Updated BMP Design Manuals must be made available on the Regional Clearinghouse.

BMP Design Manual updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

c. WATER QUALITY IMPROVEMENT PLAN UPDATES

The Copermittees for each Watershed Management Area must submit updates to the Water Quality Improvement Plan as part of the Annual Reports. Updated Water Quality Improvement Plans must be made available on the Regional Clearinghouse required pursuant to Provision F.4.

Water Quality Improvement Plan updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

3. Progress Reporting

a. PROGRESS REPORT PRESENTATIONS

The Copermittees for each Watershed Management Area must appear before the San Diego Water Board, as requested by the San Diego Water Board, to provide progress reports on the implementation of the Water Quality Improvement Plan and jurisdictional runoff management programs.

b. ANNUAL REPORTS

(1) The Copermittees for each Watershed Management Area must submit an Annual Report for each reporting period, which begins July 1 and ends June ~~-~~30 in the following year, no later than ~~October~~ January 31 of the following ~~the end of the reporting period~~year. This is to accommodate the monitoring year from October 1 to September 30 of the subsequent year. The first Annual Report must be prepared for the reporting period beginning ~~from~~July 1 after adoption of the ~~date the~~permit, and upon San Diego Water Board ~~determines~~determination that the Water Quality Improvement Plan meets the requirements of this Order to June 30 in the following year. Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each Annual Report must include the following:

~~(a) The jurisdictional and watershed monitoring data collected pursuant to Provisions D.1 and D.2, summarized and presented in tabular and graphical form;~~

~~(b) Progress of the special studies required pursuant to Provisions D.2 and D.3, and the results or findings when a special study, or each phase of a special study, is completed;~~

~~(c) The findings from the assessments required pursuant to Provision D.4;~~

(a) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following:

(i) The progress toward achieving the interim and final numeric ~~targets~~goals for the highest water quality priorities for the Watershed Management Area,

(ii) The water quality improvement strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods, and are planned to be implemented during the next reporting period,

(iii) Proposed modifications to water quality improvement or jurisdictional strategies with associated rationale for such modifications,

(iv) Previously proposed modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area,

[a] The monitoring data collected pursuant to Provision D, summarized and presented in tabular and graphical form;

[b] Progress of the special studies required pursuant to Provision D, and the results or findings when a special study, or each phase of a special study, is completed;

[c] The findings from the assessments required pursuant to Provision D; and

~~[a] and~~

(v) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;

(b) A completed Jurisdictional Runoff Management Program Annual Report Form (Attachment D or approved revision) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative.

(2) Each Copermittee must complete and submit a Jurisdictional Runoff Management Program Annual Report Form (Attachment D or approved revision) no later than October 31 of each year until the first Annual Report is required to be submitted. Each Copermittee's Annual Report form must summarize the jurisdictional activities in the WMAs in which the Copermittee has jurisdiction.

(3) Each Copermittee must provide any data or documentation utilized in developing the Annual Report upon request by the San Diego Water Board. Any monitoring data utilized in developing the Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN).[22] Any monitoring and assessment data utilized in developing the

[22] Data must be uploaded to CEDEN Southern California Regional Data Center (http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx) using the templates provided on the CEDEN website.

Annual Report must be provided on the Regional Clearinghouse required pursuant to Provision F.4.

c. REGIONAL MONITORING AND ASSESSMENT REPORT

(1) The Copermittees must submit a Regional Monitoring and Assessment Report no later than 180 days in advance of the expiration date of this Order. The Regional Monitoring and Assessment Report may be submitted as part of the ROWD required pursuant to Provision F.5.b. The Copermittees must review the jurisdictional and watershed monitoring data, data analyses, and assessments required pursuant to Provision D.4, to assess the following:

(a) The beneficial uses of the receiving waters within the San Diego Region that are protected or must be restored;

(b) The progress toward restoring impacted beneficial uses in the receiving waters within the San Diego Region; and

(c) Pollutants or conditions of emerging concern that may impact beneficial uses in the receiving waters within the San Diego Region.

(2) The Regional Monitoring and Assessment Report must include recommendations for improving the implementation and assessment of the Water Quality Improvement Plans and jurisdictional runoff management programs.

(3) Each Copermittee must provide any data or documentation utilized in developing the Regional Monitoring and Assessment Report upon request by the San Diego Water Board. Any monitoring and assessment data utilized in developing the Regional Monitoring and Assessment Report must be provided on the Regional Clearinghouse required pursuant to Provision F.4.

4. Regional Clearinghouse

The Copermittees[23] must develop, update, and maintain an internet-based Regional Clearinghouse that can be used to store, disseminate, and share the Copermittees' Water Quality Improvement Plans, Annual Reports, jurisdictional runoff management program documents, monitoring data, special studies, and any other data or information generated by the Copermittees during the implementation of this Order. Monitoring data collected pursuant to Provision D must be uploaded to CEDEN,[24]

[23] The Copermittee may elect to develop and maintain the clearinghouse(s) provided by other Copermittees or agencies.

[24] Data must be uploaded to CEDEN Southern California Regional Data Center (http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx) using the templates provided on the CEDEN website.

with links to the uploaded data available on the Regional Clearinghouse. The Regional Clearinghouse may be linked to other internet-based data portals and databases where the original documents and data are stored. The Regional Clearinghouse must be available and accessible to members of the public. The Regional Clearinghouse must be developed and made available to the public no later than 18~~2~~ months after the adoption of this Order.

5. Report of Waste Discharge

a. The Orange County Copermittees and the Riverside County Copermittees, are required to submit a complete ROWD pursuant to the requirements of their current Orders and are enrolled under this Order upon expiration of their current Orders. Upon expiration of their current Orders, the Copermittees in each county must comply with the requirements of this Order by July 1 after enrollment under this Order, unless early enrollment is granted pursuant to Provision F.6 of ~~-~~this Order. The current Orders for the Orange County Copermittees and Riverside County Copermittees are rescinded upon their expiration date except for enforcement purposes.

b. The Copermittees must submit to the San Diego Water Board a complete ROWD as an application for the re-issuance of this NPDES permit. The ROWD must be submitted no later than 180 days in advance of the expiration date of this Order. The Copermittee may elect to develop and submit the in conjunction with or provided by another Copermittee. The ROWD must contain the following minimum information:

(1) Names and addresses of the Copermittees;

(2) Names and titles of the primary contacts of the Copermittees;

(1) Proposed changes to the Copermittees' Water Quality Improvement Plans and the supporting justification;

(3) Proposed changes to the Copermittees' jurisdictional runoff management programs and the supporting justification;

(4) Any other information necessary for the re-issuance of this Order; and

(5) Any other information required by federal regulations for NPDES permit reissuance.

6. Application for Early Enrollment

a. The Orange County Copermittees, collectively, or Riverside County Copermittees, collectively, may apply for early enrollment under this Order by submitting a Report of Waste Discharge Form 200 for each individual

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Copermittee in the respective county, with a written request for early enrollment under this Order that certifies the following conditions have been met:

(1) A Water Quality Improvement Plan has been developed in accordance with the requirements of Provision B, which can and will be implemented immediately upon enrollment under this Order;

(2) Each Copermittee in the county has updated its jurisdictional runoff management program document to incorporate the requirements of Provision E, which can and will be implemented immediately upon enrollment under this Order; and

(3) Each Copermittee in the county has updated its BMP Design Manual to incorporate the requirements of Provision E.3.d, which can and will be implemented immediately upon enrollment under this Order.

b. The San Diego Water Board will review the application for early enrollment and associated documents for completeness. A Notice of Enrollment (NOE) under this Order will be issued to the Copermittees in the respective county by the San Diego Water Board upon completion of the early enrollment application requirements. The effective enrollment date will be specified in the NOE and the Copermittees in the respective county are authorized to have MS4 discharges pursuant to the requirements of this Order starting on the date specified in the NOE. The existing Order for that county is rescinded upon the effective enrollment date specified in the NOE except for enforcement purposes.

7. Reporting Provisions

Each Copermittee must comply with all the reporting and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

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~~F.~~G. PRINCIPAL WATERSHED COPERMITTEE RESPONSIBILITIES

1. The Copermittees within each Watershed Management Area must designate a Principal Watershed Copermittee and notify the San Diego Water Board of the name of the Principal Watershed Copermittee. ~~An individual Copermittee should not be designated a Principal Watershed Copermittee for more than two Watershed Management Areas.~~ The notification may be submitted with the Water Quality Improvement Plan required pursuant to Provision F.1 of this Order.

2. The Principal Watershed Copermittee is responsible for, at a minimum, the following:

a. Serving as liaison between the Copermittees in the Watershed Management Area and the San Diego Water Board on general permit issues, and when necessary and appropriate, representing the Copermittees in the Watershed Management Area before the San Diego Water Board.

b. Facilitating the development of the Water Quality Improvement Plan in accordance with the requirements of Provision B of this Order

c. Coordinating the submittal of the deliverables required by Provisions F.1, F.2, F.3.a, and F.3.b of this Order.

d. Coordinating and developing, with the other ~~Principal Watershed~~ Copermittees, the requirements of Provisions F.3.c, F.4, and F.5.b~~b~~ of this Order.

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~~G.~~H. MODIFICATION OF PROGRAMS

1. Modifications of the Order may be initiated by the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the San Diego Water Board.

2. Minor modifications to the Order may be made by the San Diego Water Board where the proposed modification complies with all the prohibitions and limitations, and other requirements of this Order.

3. Proposed modifications outside of the WQIP process that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

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~~H.~~I. STANDARD PERMIT PROVISIONS AND GENERAL PROVISIONS

Each Copermittee must comply with all the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

ATTACHMENT A

DISCHARGE PROHIBITIONS

1. Basin Plan Waste Discharge Prohibitions

California Water Code Section 13243 provides that a Regional Water Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste or certain types of waste is not permitted. The following waste discharge prohibitions in the Water Quality Control Plan for the San Diego Basin (Basin Plan) are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by a National Pollutant Discharge Elimination System (NPDES) permit or a dredged or fill material permit (subject to the exemption described in California Water Code Section 13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this San Diego Water Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services (DHS) and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the San Diego Water Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the San Diego Water Board.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the San Diego Water Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "*storm water*" is prohibited unless authorized by the San Diego Water Board. [The federal regulations, 40 CFR 122.26(b)(13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities.] [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the San Diego Water Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

16. The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

17. The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

18. The discharge of treated sewage from vessels, which do not have a properly functioning ~~US~~ U.S.Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at mean lower low water (MLLW) is prohibited.

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2. Attachment B to State Water Board Resolution 2012-0012~~X~~

Copermittees that discharge into Areas of Special Biological Significance must comply with State Water Board Resolution No. 2012-0012.

~~**Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges**~~

~~I. PROVISIONS FOR POINT SOURCE DISCHARGES OF STORM WATER AND NONPOINT SOURCE WASTE DISCHARGES~~

~~The following terms, prohibitions, and special conditions (hereafter collectively referred to as special conditions) are established as limitations on point source storm water and nonpoint source discharges. These special conditions provide Special Protections for marine aquatic life and natural water quality in Areas of Special Biological Significance (ASBS), as required for State Water Quality Protection Areas pursuant to California Public Resources Code Sections 36700(f) and 36710(f). These Special Protections are adopted by the State Water Board as part of the California Ocean Plan (Ocean Plan) General Exception.~~

~~The special conditions are organized by category of discharge. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) will determine categories and the means of regulation for those categories [e.g., Point Source Storm Water National Pollutant Discharge Elimination System (NPDES) or Nonpoint Source].~~

~~**A. PERMITTED POINT SOURCE DISCHARGES OF STORM WATER**~~

~~1. General Provisions for Permitted Point Source Discharges of Storm Water~~

~~a. Existing storm water discharges into an ASBS are allowed only under the following conditions:~~

~~(1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;~~

~~(2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in these Special Protections; and~~

~~(3) The discharges:~~

~~(i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;~~

~~(ii) Are designed to prevent soil erosion;~~

~~(iii) Occur only during wet weather;~~

~~(iv) Are composed of only storm water runoff.~~

~~b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.~~

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~~c. The discharge of trash is prohibited.~~

~~d. Only discharges from existing storm water outfalls are allowed. Any proposed or new storm water runoff discharge shall be routed to existing storm water discharge outfalls and shall not result in any new contribution of waste to an ASBS (i.e., no additional pollutant loading). "Existing storm water outfalls" are those that were constructed or under construction prior to January 1, 2005. "New contribution of waste" is defined as any addition of waste beyond what would have occurred as of January 1, 2005. A change to an existing storm water outfall, in terms of re-location or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.~~

~~e. Non-storm water discharges are prohibited except as provided below:~~

~~(1) The term "non-storm water discharges" means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.~~

~~(2) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:~~

~~(i) Discharges associated with emergency fire fighting operations.~~

~~(ii) Foundation and footing drains.~~

~~(iii) Water from crawl space or basement pumps.~~

~~(iv) Hillside dewatering.~~

~~(v) Naturally occurring groundwater seepage via a storm drain.~~

~~(vi) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.~~

~~(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.~~

~~2. Compliance Plans for Inclusion in Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP).~~

~~The discharger shall specifically address the prohibition of non-storm water runoff and the requirement to maintain natural water quality for storm water discharges to an ASBS in an ASBS Compliance Plan to be included in its SWMP or a SWPPP, as appropriate to permit type. If a statewide permit includes a SWMP, then the discharger shall prepare a stand-alone compliance plan for ASBS discharges . The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (for permits issued by Regional Water Boards).~~

~~a. The Compliance Plan shall include a map of surface drainage of storm water runoff, showing areas of sheet runoff, prioritize discharges, and describe any structural Best~~

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~~Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat and which are identified to require installation of structural BMPs. The map shall also show the storm water conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion, and waste and hazardous material storage areas, if applicable. The SWMP or SWPPP shall also include a procedure for updating the map and plan when changes are made to the storm water conveyance facilities.~~

~~b. The ASBS Compliance Plan shall describe the measures by which all non-authorized non-storm water runoff (e.g., dry weather flows) has been eliminated, how these measures will be maintained over time, and how these measures are monitored and documented.~~

~~c. For Municipal Separate Storm Sewer System (MS4s), the ASBS Compliance Plan shall require minimum inspection frequencies as follows:~~

~~(1) The minimum inspection frequency for construction sites shall be weekly during rainy season;~~

~~(2) The minimum inspection frequency for industrial facilities shall be monthly during the rainy season;~~

~~(3) The minimum inspection frequency for commercial facilities (e.g., restaurants) shall be twice during the rainy season; and~~

~~(4) Storm water outfall drains equal to or greater than 18 inches (457 mm) in diameter or width shall be inspected once prior to the beginning of the rainy season and once during the rainy season and maintained to remove trash and other anthropogenic debris.~~

~~d. The ASBS Compliance Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that such installation would pose a threat to health or safety. BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:~~

~~(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or~~

~~(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges. The baseline for the reduction is the effective date of the Exception. The baseline for these determinations is the effective date of the Exception, and the reductions must be achieved and documented within four (4) years of the effective date.~~

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~~e. The ASBS Compliance Plan shall address erosion control and the prevention of anthropogenic sedimentation in ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.~~

~~f. The ASBS Compliance Plan shall describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule. The ASBS Compliance Plan shall include non-structural BMPs that address public education and outreach. Education and outreach efforts must adequately inform the public that direct discharges of pollutants from private property not entering an MS4 are prohibited. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development (LID) measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control storm water runoff discharges (at the end-of-pipe) during a design storm, permittees must first consider using LID practices to infiltrate, use, or evapotranspirate storm water runoff on-site.~~

~~g. The BMPs and implementation schedule shall be designed to ensure that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.~~

~~h. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results.~~

~~(1) The report shall identify the constituents in storm water runoff that alter natural ocean water quality and the sources of these constituents.~~

~~(2) The report shall describe BMPs that are currently being implemented, BMPs that are identified in the SWMP or SWPPP for future implementation, and any additional BMPs that may be added to the SWMP or SWPPP to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.~~

~~(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits), the discharger shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required.~~

~~(4) As long as the discharger has complied with the procedures described above and is implementing the revised SWMP or SWPPP, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent.~~

~~(5) Compliance with this section does not excuse violations of any term, prohibition, or condition contained in these Special Protections.~~

~~3. Compliance Schedule~~

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~~a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.~~

~~b. Within one year from the effective date of the Exception, the discharger shall submit a written ASBS Compliance Plan to the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that describes its strategy to comply with these special conditions, including the requirement to maintain natural water quality in the affected ASBS. The ASBS Compliance Plan shall include a time schedule to implement appropriate non-structural and structural controls (implementation schedule) to comply with these special conditions for inclusion in the discharger's SWMP or SWPPP, as appropriate to permit type.~~

~~c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these special conditions shall be implemented.~~

~~d. Within four (4) years of the effective date of the Exception, any structural controls identified in the ASBS Compliance Plan that are necessary to comply with these special conditions shall be operational.~~

~~e. Within four (4) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water, pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data, and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.~~

~~f. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.~~

~~If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.~~

~~The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:~~

~~(1) for municipalities, a demonstration of significant hardship to discharger ratepayers, by showing the relationship of storm water fees to annual household income for~~

~~residents within the discharger's jurisdictional area, and the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or~~

~~(2) for other governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process.~~

~~B. NONPOINT SOURCE DISCHARGES~~

~~[NOT INCLUDED]~~
~~[PROVISIONS FOR NONPOINT SOURCE DISCHARGES NOT APPLICABLE]~~

~~II. ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES~~

~~[NOT INCLUDED]~~
~~[ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES NOT APPLICABLE]~~

~~III. ADDITIONAL REQUIREMENTS – WATERFRONT AND MARINE OPERATIONS~~

~~[NOT INCLUDED]~~
~~[ADDITIONAL REQUIREMENTS FOR WATERFRONT AND MARINE OPERATIONS NOT APPLICABLE]~~

~~IV. MONITORING REQUIREMENTS~~

~~Monitoring is mandatory for all dischargers to assure compliance with the Ocean Plan. Monitoring requirements include both: (A) core discharge monitoring, and (B) ocean receiving water monitoring. The State and Regional Water Boards must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).~~

~~Safety concerns: Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notification to the State and Regional Water Boards if hazardous conditions prevail.~~

~~Analytical Chemistry Methods: All constituents must be analyzed using the lowest minimum detection limits comparable to the Ocean Plan water quality objectives. For metal analysis, all samples, including storm water effluent, reference samples, and ocean receiving water samples, must be analyzed by the approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the Ocean Plan.~~

~~A. CORE DISCHARGE MONITORING PROGRAM~~

~~1. General sampling requirements for timing and storm size:~~

~~Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected when post-storm receiving water is sampled, and analyzed for the same constituents as receiving water and reference site samples (see section IV B) as described below.~~

~~2. Runoff flow measurements~~

~~a. For municipal/industrial storm water outfalls in existence as of December 31, 2007, 18 inches (457mm) or greater in diameter/width (including multiple outfall pipes in combination having a width of 18 inches, runoff flows must be measured or calculated, using a method acceptable to and approved by the State and Regional Water Boards.~~
~~b. This will be reported annually for each precipitation season to the State and Regional Water Boards.~~

~~3. Runoff samples – storm events~~

~~a. For outfalls equal to or greater than 18 inches (0.46m) in diameter or width:~~

~~(1) samples of storm water runoff shall be analyzed during the same storm as receiving water samples for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination, ; and~~

~~(2) samples of storm water runoff shall be analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS~~

~~(3) If an applicant has no outfall greater than 36 inches, then storm water runoff from the applicant's largest outfall shall be further analyzed during the same storm as receiving water samples for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates).~~

~~b. For outfalls equal to or greater than 36 inches (0.91m) in diameter or width:~~

~~(1) samples of storm water runoff shall be analyzed during the same storm as receiving water samples for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and~~

~~(2) samples of storm water runoff shall be further analyzed during the same storm as receiving water samples for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates) and~~

~~(3) samples of storm water runoff shall be analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.~~

c. ~~For an applicant not participating in a regional monitoring program [see below in Section IV (B)] in addition to (a.) and (b.) above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Ocean Plan Table A constituents, Table B constituents for marine aquatic life protection (except for toxicity, only chronic toxicity for three species shall be required), DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, and Ocean Plan indicator bacteria. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each Region.~~

4. ~~The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.~~

~~B. OCEAN RECEIVING WATER AND REFERENCE AREA MONITORING PROGRAM~~

~~In addition to performing the Core Discharge Monitoring Program in Section II.A above, all applicants having authorized discharges must perform ocean receiving water monitoring. In order to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS, dischargers may choose either (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program.~~

1. ~~Individual Monitoring Program: The requirements listed below are for those dischargers who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met:~~

   a. ~~Three times annually, during wet weather (storm events), the receiving water at the point of discharge from the outfalls described in section (IV)(A)(3)(c) above shall be sampled and analyzed for Ocean Plan Table A constituents, Table B constituents for marine aquatic life, DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and Ocean Plan indicator bacteria.~~

   ~~The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where storm water runoff is sampled. Receiving water shall be sampled at approximately the same time prior to (pre-storm) and during (or immediately after) the same storm (post storm). Reference water quality shall also be sampled and analyzed for the same constituents pre-storm and post-storm, during the same storms when receiving water is sampled. Reference stations will be determined by the State Water Board's Division of Water Quality and the applicable Regional Water Board(s).~~

   b. ~~Sediment sampling shall occur at least three times during every five (5) year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Ocean Plan Table B constituents for marine aquatic life, DDT, PCBs, PAHs,~~

~~pyrethroids, and OP pesticides. For sediment toxicity testing, only an acute toxicity test using the amphipod Eohaustorius estuarius must be performed.~~

~~c. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and at a reference site. The survey shall be performed at least once every five (5) year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.~~

~~d. Once during each five (5) year period, a bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge sites and at representative reference sites. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (Mytilus californianus) and/or sand crabs (Emerita analoga or Blepharipoda occidentalis). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, or add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.~~

~~e. Marine Debris: Representative quantitative observations for trash by type and source shall be performed along the coast of the ASBS within the influence of the discharger's outfalls. The design, including locations and frequency, of the marine debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.~~

~~f. The monitoring requirements of the Individual Monitoring Program in this section are minimum requirements. After a minimum of one (1) year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board (statewide permits) or Executive officer of the Regional Water Board (Regional Water Board permits) may require additional monitoring, or adjust, reduce or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.~~

~~2. Regional Integrated Monitoring Program: Dischargers may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise prescribed individual monitoring approach (in Section IV.B.1) if approved by the State Water Board's Division of Water Quality and the Regional Water Boards.~~

~~a. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10% development), and shall not be located in CWA Section 303(d) listed waterbodies or have tributaries that are 303(d)~~

~~listed. Reference areas shall be free of wastewater discharges and anthropogenic non-storm water runoff. A minimum of low threat storm runoff discharges (e.g. stream highway overpasses and campgrounds) may be allowed on a case-by-case basis. Reference areas shall be located in the same region as the ASBS receiving water monitoring occurs. The reference areas for each Region are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.~~

~~b. ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e. at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e. co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.~~

~~c. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected when annual storm water runoff is sampled. Sampling shall occur in a minimum of two storm seasons. For those ASBS dischargers that have already participated in the Southern California Bight 2008 ASBS regional monitoring effort, sampling may be limited to only one storm season.~~

~~d. Receiving water and reference samples shall be analyzed for the same constituents as storm water runoff samples. At a minimum, constituents to be sampled and analyzed in reference and discharge receiving waters must include oil and grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, Ocean Plan PAHs, pyrethroids, OP pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed.~~

~~3. Waterfront and Marine Operations: In addition to the above requirements for ocean receiving water monitoring, additional monitoring must be performed for marinas and boat launch and pier facilities:~~

~~a. For all marina or mooring field operators, in mooring fields with 10 or more occupied moorings, the ocean receiving water must be sampled for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.~~

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~~(1) For mooring field operators opting for an individual monitoring program (Section IV.B.1 above), this sampling must occur weekly (on the weekend) from May through October.~~

~~(2) For mooring field operators opting to participate in a regional integrated monitoring program (Section IV.B.2 above), this sampling must occur monthly from May through October on a high use weekend in each month. The Water Boards may allow a reduction in the frequency of sampling, through the regional monitoring program, after the first year of monitoring.~~

~~b. For all mooring field operators, the subtidal sediment (sand or finer, if present) within mooring fields and below piers shall be sampled and analyzed for Ocean Plan Table B metals (for marine aquatic life beneficial use), acute toxicity, PAHs, and tributyltin. For sediment toxicity testing, only an acute toxicity test using the amphipod Eohaustorius estuarius must be performed. This sampling shall occur at least three times during a five (5) year period. For mooring field operators opting to participate in a regional integrated monitoring program, the Water Boards may allow a reduction in the frequency of sampling after the first sampling effort's results are assessed.~~

ATTACHMENT B

STANDARD PERMIT PROVISIONS AND GENERAL PROVISIONS

1. Standard Permit Provisions

Code of Federal Regulations Title 40 Section 122.41 (40 CFR 122.41) includes conditions, or provisions, that apply to all National Pollutant Discharge Elimination System (NPDES) permits. Additional provisions applicable to NPDES permits are in 40 CFR 122.42. All applicable provisions in 40 CFR 122.41 and 40 CFR 122.42 must be incorporated into this Order and NPDES permit. The applicable 40 CFR 122.41 and 40 CFR 122.42 provisions are as follows:

a. DUTY TO COMPLY [40 CFR 122.41(a)]

The Copermittee must comply with all of the provisions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

(1) The Copermittee must comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement. [40 CFR 122.41(a)(1)]

(2) The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the CWA, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who *negligently* violates Section 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the CWA, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal

penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.
[40 CFR 122.41(a)(2)]

(3) Any person may be assessed an administrative penalty by the San Diego Regional Water Quality Control Board (San Diego Water Board), State Water Resources Control Board (State Water Board), or United States Environmental Protection Agency (USEPA) for violating Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.
[40 CFR 122.41(a)(3)]

b. DUTY TO REAPPLY [40 CFR 122.41(B)]

If a Copermittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Copermittee must apply for and obtain a new permit.

c. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE [40 CFR 122.41(C)]

It shall not be a defense for a Copermittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

d. DUTY TO MITIGATE [40 CFR 122.41(D)]

The Copermittee must take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

e. PROPER OPERATION AND MAINTENANCE [40 CFR 122.41(E)]

The Copermittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Copermittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a Copermittee only when the operation is necessary to achieve compliance with the conditions of this permit.

f. PERMIT ACTIONS [40 CFR 122.41(F)]

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Copermittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

g. PROPERTY RIGHTS [40 CFR 122.41(G)]

This permit does not convey any property rights of any sort, or any exclusive privilege.

h. DUTY TO PROVIDE INFORMATION [40 CFR 122.41(H)]

The Copermittee must furnish to the San Diego Water Board, State Water Board, or USEPA within a reasonable time, any information which the San Diego Water Board, State Water Board, or USPEA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Copermittee must also furnish to the San Diego Water Board, State Water Board, or USPEA upon request, copies of records required to be kept by this permit.

i. INSPECTION AND ENTRY [40 CFR 122.41(I)]

The Copermittee must allow the San Diego Water Board, State Water Board, USEPA, and/or their authorized representative (including an authorized contractor acting as their representative), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the Copermittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit; [40 CFR 122.41(i)(1)]

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit; [40 CFR 122.41(i)(2)]

(3) Inspect and photograph at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; [40 CFR 122.41(i)(3)] and

(4) Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location. [40 CFR 122.41(i)(4)]

j. MONITORING AND RECORDS [40 CFR 122.41(J)]

(1) Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity. [40 CFR 122.41(j)(1)]

(2) Except for records of monitoring information required by this permit related to the Copermittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR Part 503), the Copermittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board at any time. [40 CFR 122.41(j)(2)]

(3) Records for monitoring information must include: [40 CFR 122.41(j)(3)]

(a) The date, exact place, and time of sampling or measurements; [40 CFR 122.41(j)(3)(i)]
(b) The individual(s) who performed the sampling or measurements; [40 CFR 122.41(j)(3)(ii)]
(c) The date(s) analyses were performed; [40 CFR 122.41(j)(3)(iii)]
(d) The individual(s) who performed the analyses; [40 CFR 122.41(j)(3)(iv)]
(e) The analytical techniques or methods used; [40 CFR 122.41(j)(3)(v)] and
(f) The results of such analyses. [40 CFR 122.41(j)(3)(vi)]

(4) Monitoring must be conducted according to test procedures under 40 CFR Part 136 unless another method is required under 40 CFR Subchapters N or O.
[40 CFR 122.41(j)(4)]

In the case of pollutants for which there are no approved methods under 40 CFR Part 136 or otherwise required under 40 CFR Subchapters N and O, monitoring must be conducted according to a test procedure specified in the permit for such pollutants. [40 CFR 122.44(i)(1)(iv)]

(5) The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not

more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. [40 CFR 122.41(j)(5)]

k. SIGNATORY REQUIREMENT [40 CFR 122.41(K)]

(1) All applications, reports, or information submitted to the San Diego Water Board, State Water Board, or USEPA must be signed and certified. (See 40 CFR 122.22) [40 CFR 122.41(k)(1)]

(a) *For a municipality, State, Federal, or other public agency.* [All applications must be signed] [b]y either a principal executive officer or ranking elected official. [40 CFR 122.22(a)(3)]

(b) All reports required by permits, and other information requested by the San Diego Water Board, State Water Board, or USEPA must be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if: [40 CFR 122.22(b)]

(i) The authorization is made in writing by a person described in paragraph (a) of this section; [40 CFR 122.22(b)(1)]

(ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company, (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) [40 CFR 122.22(b)(2)] and,

(iii) The written authorization is submitted to the San Diego Water Board and State Water Board. [40 CFR 122.22(b)(3)]

(c) *Changes to authorization.* If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the San Diego Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative. [40 CFR 122.22(c)]

(d) *Certification.* Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." [40 CFR 122.22(d)]

(2) The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both. [40 CFR 122.41(k)(2)]

l. REPORTING REQUIREMENTS [40 CFR 122.41(L)]

(1) *Planned changes.* The Copermittee must give notice to the San Diego Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when: [40 CFR 122.41(l)(1)]

(a) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b);
[40 CFR 122.41(l)(1)(i)] or

(b) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).
[40 CFR 122.41(l)(1)(ii)]

(c) The alteration or addition results in a significant change in the Copermittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. [40 CFR 122.41(l)(1)(iii)]

(2) Anticipated noncompliance. The Copermittee must give advance notice to the San Diego Water Board or State Water Board of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
[40 CFR 122.41(l)(2)]

(3) *Transfers*. This permit is not transferable to any person except after notice to the San Diego Water Board. The San Diego Water Board may require modification or revocation and reissuance of the permit to change the name of the Copermittee and incorporate such other requirements as may be necessary under the CWA.
[40 CFR 122.41(l)(3)]

(4) Monitoring reports. Monitoring results must be reported at the intervals specified elsewhere in this permit. [40 CFR 122.41(l)(4)]

(a) Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the San Diego Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. [40 CFR 122.41(l)(4)(i)]

(b) If the Copermittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or another method required for an industry-specific waste stream under 40 CFR Subchapters N or O, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the San Diego Water Board or State Water Board.
[40 CFR 122.41(l)(4)(ii)]

(c) Calculations for all limitations which require averaging of measurements must utilize an arithmetic mean unless otherwise specified in the permit.
[40 CFR 122.41(l)(4)(iii)]

(5) *Compliance schedules*. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date. [40 CFR 122.41(l)(5)]

(6) Twenty-four hour reporting.

(a) The Copermittee must report any noncompliance that may endanger health or the environment. Any information must be provided orally within 24 hours from the time the Copermittee becomes aware of the circumstances. A written submission must also be provided within five (5) days of the time the Copermittee becomes aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6)(i)]

(b) The following must be included as information which must be reported within 24 hours under this paragraph: [40 CFR 122.41(l)(6)(ii)]

(i) Any unanticipated bypass that exceeds any effluent limitation in the permit (See 40 CFR 122.41(g)). [40 CFR 122.41(l)(6)(ii)(A)]

(ii) Any upset which exceeds any effluent limitation in the permit. [40 CFR 122.41(l)(6)(ii)(B)] and,

(iii) Violation of a maximum daily discharge limitation for any of the pollutants listed by the San Diego Water Board in the permit to be reported within 24 hours. (See 40 CFR 122.44(g)) [40 CFR 122.41(l)(6)(ii)(C)]

(c) The San Diego Water Board may waive the above-required written report on a case-by-case basis if the oral report has been received within 24 hours. [40 CFR 122.41(l)(6)(iii)]

(7) .*Other noncompliance.* The Copermittee must report all instances of noncompliance not reported in accordance with the standard provisions required under 40 CFR 122.41(l)(4), (5), and (6), at the time monitoring reports are submitted. The reports must contain the information listed in the standard provisions required under 40 CFR 122.41(l)(6). [40 CFR 122.41(l)(7))]

(8) *Other information.* When the Copermittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the San Diego Water Board, State Water Board, or USEPA, the Copermittee must promptly submit such facts or information. [40 CFR 122.41(l)(8)]

~~a. **BYPASS** [40 CFR 122.41(m)]~~

~~(1) *Definitions.*~~

~~(a) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. [40 CFR 122.41(m)(1)(i)] or~~

~~(b) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. [40 CFR 122.41(m)(1)(ii)]~~

~~(2) *Bypass not exceeding limitations*. The Copermittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the standard provisions required under 40 CFR 122.41(m)(3) and (4). [40 CFR 122.41(m)(2)]~~

~~(3) *Notice.*~~

~~(a) *Anticipated bypass*. If the Copermittee knows in advance of the need for a bypass, it must submit a notice, if possible at least ten days before the date of the bypass. [40 CFR 122.41(m)(3)(i)] or~~

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~~(b) *Unanticipated bypass*. The Copermittee must submit notice of an unanticipated bypass in accordance with the standard provisions required under 40 CFR 122.41(l)(6) (24-hour notice).~~
~~[40 CFR 122.41(m)(3)(ii)]~~

~~(4) *Prohibition of Bypass.*~~

~~(a) Bypass is prohibited, and the San Diego Water Board may take enforcement action against a Copermittee for bypass, unless:~~
~~[40 CFR 122.41(m)(4)(i)]~~

~~(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; [40 CFR 122.41(m)(4)(i)(A)]~~
~~(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance;~~
~~[40 CFR 122.41(m)(4)(i)(B)] and,~~
~~(iii) The Copermittee submitted notice in accordance with the standard provisions required under 40 CFR 122.41(m)(3).~~
~~[40 CFR 122.41(m)(4)(i)(C)]~~

~~(b) The San Diego Water Board may approve an anticipated bypass, after considering its adverse effects, if the San Diego Water Board determines that it will meet the three conditions listed above.~~
~~[40 CFR 122.41(m)(4)(ii)]~~

m. UPSET [40 CFR 122.41(N)]

(1) *Definition.* "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Copermittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. [40 CFR 122.41(n)(1)]

(2) *Effect of an upset*. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the standard provisions required under 40 CFR 122.41(n)(3) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. [40 CFR 122.41(n)(2)]

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(3) *Conditions necessary for a demonstration of upset*. A Copermittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
[40 CFR 122.41(n)(3)]

(a) An upset occurred and that the Copermittee can identify the cause(s) of the upset; [40 CFR 122.41(n)(3)(i)]
(b) The permitted facility was at the time being properly operated; [40 CFR 122.41(n)(3)(ii)] and
(c) The Copermittee submitted notice of the upset in accordance with the standard provisions required under 40 CFR 122.41(l)(6)(ii)(B) (24-hour notice).
[40 CFR 122.41(n)(3)(iii)]
(d) The Copermittee complied with any remedial measures pursuant to the standard provisions required under 40 CFR 122.41(d).
[40 CFR 122.41(n)(3)(iii)]

(4) *Burden of proof*. In any enforcement proceeding, the Copermittee seeking to establish the occurrence of an upset has the burden of proof.
[40 CFR 122.41(n)(4)]

n. STANDARD PERMIT PROVISIONS FOR MUNICIPAL SEPARATE STORM SEWER SYSTEMS [40 CFR 122.42(C)]

The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the San Diego Water Board or State Water Board under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report must include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions; [40 CFR 122.42(c)(1)]

(1) ~~Proposed changes to the storm water management programs that are established as permit conditions. Such proposed changes must be consistent with 40 CFR 122.26(d)(2)(iii); [40 CFR 122.42(c)(2)] and~~e

(2) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under 40 CFR 122.26(d)(2)(iv) and (v);
[40 CFR 122.42(c)(3)]

(3) A summary of data, including monitoring data, that is accumulated throughout the reporting year; [40 CFR 122.42(c)(4)]

(4) Annual expenditures and budget for year following each annual report;
[40 CFR 122.42(c)(5)]

(5) A summary describing the number and nature of enforcement actions, inspections, and public education programs; [40 CFR 122.42(c)(6)]

(6) Identification of water quality improvements or degradation. [40 CFR 122.42(c)(7)]

o. STANDARD PERMIT PROVISIONS FOR STORM WATER DISCHARGES [40 CFR 122.42(D)]

The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) must require compliance with the conditions of the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

2. General Provisions

In addition to the standard provisions required to be incorporated into the Order and NPDES permit pursuant to 40 CFR 122.41 and 40 CFR 122.42, several other general provisions apply to this Order. The general provisions applicable to this Order and NPDES permit are as follows:

a. DISCHARGE OF WASTE IS A PRIVILEGE

No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights. [CWC Section 13263(g)]

b. DURATION OF ORDER AND NPDES PERMIT

(1) *Effective date*. This Order and NPDES permit becomes effective on the date of its adoption provided the USEPA has no objection. If the USEPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. R9-2007-0001 upon the effective date of this Order, and supercedes Order Nos. R9-2009-0002 and R9-2010-0016 upon their expiration.

(2) *Expiration*. This Order and NPDES permit expires five years after adoption. [40 CFR 122.46(a)]

(3) *Continuation of expired order*. After this Order and NPDES permit expires, the terms and conditions of this Order and NPDES permit are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

c. AVAILABILITY

A copy of this Order must be kept at a readily accessible location and must be available to on-site personnel at all times.

d. CONFIDENTIALITY OF INFORMATION

Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the San Diego Water Board office.

Claims of confidentiality for the following information will be denied: [40 CFR 122.7(b)]

(1) The name and address of any permit applicant or Copermittee; [40 CFR 122.7(b)(1)] and

(2) Permit applications and attachments, permits, and effluent data. [40 CFR 122.7(b)(2)]

e. EFFLUENT LIMITATIONS

(1) *Interim effluent limitations*. The Copermittee must comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by the San Diego Water Board.

(2) *Other effluent limitations and standards*. If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in the permit, the San Diego Water Board shall institute proceedings under these regulations to modify or revoke and reissue the permit to conform to the toxic effluent standard or prohibition. [40 CFR 122.44(b)(1)]

f. DUTY TO MINIMIZE OR CORRECT ADVERSE IMPACTS

The Copermittee must take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

g. PERMIT ACTIONS

The filing of a request by the Copermittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order. (See 40 CFR 122.41(f)) In addition, the following provisions apply to this Order:

(1) Upon application by any affected person, or on its own motion, the San Diego Water Board may review and revise the requirements in this Order. All requirements must be reviewed periodically. [CWC Section 13263(e)]

(2) This Order may be terminated or modified for cause, including, but not limited to, all of the following: [CWC Section 13381]

(a) Violation of any condition contained in the requirements of this Order. [CWC Section 13381(a)]

(b) Obtaining the requirements in this Order by misrepresentation, or failure to disclose fully all relevant facts. [CWC Section 13381(b)]

(c) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. [CWC Section 13381(c)]

(3) When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

h. NPDES PERMITTED NON-STORM WATER DISCHARGES

The San Diego Water Board has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The San Diego Water Board or State Water Board may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to an MS4.

i. MONITORING

In addition to the standard provisions required under 40 CFR 122.41(j) and (l)(4), the following general monitoring provisions apply to this Order:

(1) Where procedures are not otherwise specified in Order, sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's Surface Water Ambient Monitoring Program (SWAMP), adopted by the State Water Resources Control Board (State Water Board).

(2) Pursuant to 40 CFR 122.41(j)(2) and CWC Section 13383(a), each Copermittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least five (5) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board at any time.

(3) All chemical, bacteriological, and toxicity analyses must be conducted at a laboratory certified for such analyses by the California Department of Public Health or a laboratory approved by the San Diego Water Board.

(4) For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Copermittees must instruct their laboratories to establish

calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Copermittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR Part 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Copermittee must submit documentation from the laboratory to the San Diego Water Board for approval prior to raising the ML for any priority toxic pollutant.

j. ENFORCEMENT

(1) The San Diego Water Board is authorized to enforce the terms of this Order under several provisions of the CWC, including, but not limited to, CWC Sections 13385, 13386, and 13387.

(2) Nothing in this Order shall be construed to protect the Copermittee from its liabilities under federal, state, or local laws.

(3) The CWC provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

(4) Except as provided in the standard conditions required under 40 CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the Copermittee from civil or criminal penalties for noncompliance.

(5) Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties to which the Copermittee is or may be subject to under Section 311 of the CWA.

(6) Nothing in this Order shall be construed to preclude institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

k. SEVERABILITY

The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

l. APPLICATIONS

Any application submitted by a Copermittee for reissuance or modification of this Order must satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the California Code of Regulations.

m. IMPLEMENTATION

All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

n. REPORT SUBMITTALS

(1) All report submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

(2) Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal.

(3) The Principal Watershed Copermittee(s) must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

(4) Unless otherwise directed, the Copermittees must submit one hard copy and one electronic copy of each report required under this Order to the San Diego Water Board, and one electronic copy to the USEPA.

(5) The Copermittees must submit reports and provide notifications as required by this Order to the following:

EXECUTIVE OFFICER
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

ADMINISTRATIVE DRAFT

ATTACHMENT C

ACRONYMS AND ABBREVIATIONS

1. Acronyms and Abbreviations

AMAL	Average Monthly Action Level
ASBS	Area(s) of Special Biological Significance
BMP	Best Management Practice
~~BMP Design Manual~~	~~Permanent BMP Sizing Criteria Design Manual~~
Basin Plan	Water Quality Control Plan for the San Diego Basin
CEQA	California Environmental Quality Act
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
ERP	Enforcement Response Plan
ESAs	Environmentally Sensitive Areas
GIS	Geographic Information System
IBI	Index of Biotic Integrity
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
ML	Minimum Level
MS4	Municipal Separate Storm Sewer System
NAL	Non-Storm Water Action Level
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
ROWD	Report of Waste Discharge (application for NPDES reissuance)
SAL	Storm Water Action Level
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SIC	Standard Industrial Classification Code
State Water Board	State Water Resources Control Board
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
Waters of the U.S.	Waters of the United States

WDID	Waste Discharge Identification Number
WLA	Waste Load Allocation
WQBEL	Water Quality Based Effluent Limitation

DEFINITIONS

2. Definitions

Active/Passive Sediment Treatment - Using mechanical, electrical or chemical means to flocculate or coagulate suspended sediment for removal from runoff from construction sites prior to discharge.

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Average Monthly Action Level – The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month or the geometric mean for bacteria, as applicable.~~.~~

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote tangible and intangible economic, social, and environmental goals. "Beneficial Uses" of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. ~~-~~In the case of municipal ~~storm water~~discharge permits, BMPs may be used in place of numeric effluent limits.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biotic integrity) of a water body.

Biocriteria - Under the CWA, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The USEPA defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use… (that)…describe the characteristics of water body segments least impaired by human activities."

Biofiltration - Practices that use vegetation and amended soils to detain and treat runoff from impervious areas. Treatment is through filtration, infiltration, adsorption, ion exchange, and biological uptake of pollutants.

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. *Environmental Management* 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

BMP Design Manual – A plan developed to eliminate, reduce, or mitigate the impacts of runoff from development projects, including Priority Development Projects.

Channel Rehabilitation and Improvement –Remedial measures or activities for the purpose of improving or restoring the environmental health of streams, channels or river systems. Techniques may vary from in-stream restoration techniques to off-line stormwater management practices installed in the system corridor or upland areas. Rehabilitation techniques may include, but are not limited to the following: riparian zone restoration, constructed wetlands, bank stabilization, channel modifications, and daylighting of drainage systems. Effectiveness may be measured in various manners, including: assessments of habitat, reduced streambank erosion, and restoration of water and sediment transport balance.

Clean Water Act Section 303(d) Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Construction Site – Any project, including projects requiring coverage under the Construction General Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, disturbances to ground such as stockpiling, and excavation. This does not include minor construction activities such as interior remodeling, plumbing, electrical, or mechanical work.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

Copermittee – An incorporated city within the County of Orange, County of Riverside, or County of San Diego in the San Diego Region (Region 9), the County of Orange, the County of Riverside, the County of San Diego, the Orange County Flood Control District, the Riverside County Water Conservation and Flood Control District, the San Diego Regional Airport Authority, or the Unified Port District of San Diego.

Copermittees – All of the individual Copermittees, collectively.

Critical Channel Flow (Qc) – The channel flow that produces the critical shear stress that initiates bed movement or that erodes the toe of channel banks. When measuring Qc, it should be based on the weakest boundary material – either bed or bank.

Daily Discharge – Defined as either: (1) the total mass of the constituent discharged over the calendar day or any 24 hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g. concentration.)

The Daily Discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day, or other 24 hour period other than a day), or by the arithmetic mean of analytical results from one or more grab samples taken over the course of a day.

Development Projects - Construction, rehabilitation, redevelopment, or reconstruction of any public or private projects involving land disturbance activities. ~~residential project, industrial, commercial, or any other projects.~~

Dry Season – ~~The period of time from~~ May 1 to September 30. ~~when rainfall is not expected to occur the San Diego.~~

Dry Weather – Weather is considered dry if the preceding 72 hours has been without measurable precipitation (>0.1 inch).

Enclosed Bays – Enclosed bays are indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost bay works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Environmentally Sensitive Areas (ESAs) - Areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Orange; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees.

Estuaries – Waters, including coastal lagoons, located at the mouth of streams that serve as areas of mixing fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and ocean water. Estuaries do not include inland surface waters or ocean waters.

Existing Development – Any area that has been developed and exists for municipal, commercial, industrial, or residential purposes, uses, or activities. May include areas that are not actively used for its originally developed purpose, but may be re-purposed or redeveloped for another use or activity.

Flow Duration – The long-term period of time that flows occur above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams (not a single storm event duration). The simplest way to visualize this is to consider a histogram of pre- and post-project flows using long-term records of hourly data. To maintain pre-development flow duration means that the total number of hours (counts) within each range of flows in a flow-duration histogram cannot increase between the pre- and post-development condition. Flow duration within the range of geomorphologically significant flows is important for managing erosion.

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical reactivity. These also include materials named by the USEPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as “any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code” [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Hydromodification – The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport. In addition, alteration of stream and river channels, such as stream channelization, concrete lining, installation of dams and water impoundments, and excessive streambank and shoreline erosion are also considered hydromodification, due to their disruption of natural watershed hydrologic processes.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Inactive Areas – Areas of construction activity that are not active and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

Infiltration – Water other than wastewater that enters a sewer system (including sewer service connections and foundation drains) from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow [40 CFR 35.2005(20)].

Inland Surface Waters – Includes all surface waters of the ~~State~~ U.S. that do not include the ocean, enclosed bays, or estuaries.

Jurisdictional Runoff Management Program Document – A written description of the specific jurisdictional runoff management measures and programs that each Copermittee will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

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Low Impact Development (LID) – A storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions.

Low Impact Development Best Management Practices (LID BMPs) – LID BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States through storm water management and land development strategies that emphasize conservation ~~s~~and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. LID BMPs include retention practices that do not allow runoff, such as infiltration, rain water harvesting and reuse, and evapotranspiration. LID BMPs also include flow-through practices such as biofiltration that may have some discharge of storm water following pollutant reduction.

Major Outfall – As defined in the Code of Federal Regulations, a major outfall is a MS4 outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (i.e. discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres); or, for MS4s that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or equivalent), a MS4 outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (i.e. discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

Maximum Daily Action Level (MDAL) –The highest allowable daily discharge of a pollutant, over a calendar day (or 24 hour period). For pollutants with action levels expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with action levels expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Maximum Extent Practicable (MEP) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) for storm water that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their runoff management programs. Their total collective and individual activities conducted pursuant to the runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the San Diego Water Board, the San Diego Water Board defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> "*To achieve the MEP standard, municipalities must employ whatever Best Management*

Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
c. Public Acceptance: Does the BMP have public support?
d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc.?

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Monitoring Year – The monitoring year begins annually on July 1st and ends on June 30th.

Municipal Separate Storm Sewer System (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26. "Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.26(a)(3)(vi).

National Pollutant Discharge Elimination System (NPDES) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges and NPDES permitted discharges.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act, a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during~~,~~ or as a result of~~,~~ the treatment or disposal of wastes."

Ocean Waters – the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Board's California Ocean Plan.

Order – Unless otherwise specified, refers to this Order, Order No. R9-2012-0011 (NPDES No. CAS0109266).
~~**Permanent BMP Sizing Criteria Design Manual** – A plan developed to eliminate, reduce, or mitigate the impacts of runoff from development projects, including Priority Development Projects.~~
Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act, pollution is "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Permanent BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, remove, or educate to prevent the release of pollutants to surface waters from development projects in perpetuity, after construction of a project is completed.

Pre-Development Runoff Conditions ~~**(Discharge Rates, Durations, Etc.)**~~ – "Runoff conditions that exist~~ed~~ onsite immediately before the ~~existing development was constructed, or exists onsite before~~ planned development activities occur. Pre-development is not intended to be interpreted as that period before any human-induced land disturbance activity has occurred." 64 FR 68761.~~This definition includes natural watershed hydrology before any human induced land alterations.~~

Priority Development Projects - New development and redevelopment projects defined under Provision E.3.b of Order No. R9-2012-0011.

Properly Designed – Designed in accordance with the Copermittee's BMP Design Manual and/or any appropriate design requirements set forth by the Copermittee and based on widely accepted design criteria.

Public Education, Outreach and Participation – Programs to educate residents, businesses and visitors about the importance of water quality and water quality programs so that they will support local efforts and understand their role in protecting receiving waters. The Education and Outreach Program will increase knowledge and awareness, improve attitudes toward storm pollution prevention, and provide a foundation for changing behaviors that contribute to storm water pollution.

Rainy Season (aka Wet Season) –~~–The period of time from~~ October 1 to April 30. ~~when the San Diego Region experiences the most rainfall.~~

Receiving Waters – Waters of the ~~United States~~U.S.

Receiving Water Limitations - Waste discharge requirements issued by the San Diego Water Board typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; parking lots; resurfacing existing roadways; cutting and reconfiguring of surface parking lots; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair.

Retain –Keep or hold in a particular place, condition, or position without discharge to surface waters.

Retrofit – Retrofit is defined as a stormwater management practice (usually structural) put into place after development has occurred in watersheds where practices previously did not exist or are ineffective. The purpose of retrofits is to improve water quality, protect downstream channels, reduce flooding, or meet other specific objectives. Some examples of retrofits include, but are not limited to the following: green roofs, downspout and impervious cover disconnection,

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permeable pavement, bioretention, rain barrels, rain gardens, vacant lot stabilization, trash area enclosures, additional trash and waste disposal containers.

Runoff - All flows in a storm water conveyance system that consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water including dry weather flows.

San Diego Water Board – As used in this document the term "San Diego Water Board" is synonymous with the term "Regional Board" as defined in Water Code section 13050(b) and is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment Control BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and runoff.

State Water Quality Protection Area – A nonterrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration in natural water quality, including, but not limited to, areas of special biological significance that have been designated by the State Water Board through its water quality control planning process. Areas of special biological significance are a subset of State Water Quality Protection Areas, and require special protection as determined by the State Water Resources Control Board pursuant to the California Ocean Plan adopted and reviewed pursuant to Article 4 (commencing with Section 13160) of Chapter 3 of Division 7 of the California Water Code and pursuant to the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (California Thermal Plan) adopted by the State Water Board.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage. ~~Surface runoff and drainage pertains to runoff and drainage resulting from precipitation events.~~

Structural BMP – Any structural control which detains, retains, or filters, to reduce the release of pollutants to surface waters from development projects (e.g. treatment control BMPs) which remains after construction.

Total Maximum Daily Load (TMDL) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Basin Plan, state in part…"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge".

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Unpaved Road – Any long, narrow stretch without pavement used for traveling by motor passenger vehicles between two or more points. Unpaved roads are generally constructed of dirt, gravel, aggregate or macadam and may be improved or unimproved.

Waste - As defined in CWC Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans. Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

Water Quality Standards - Water quality standards, as defined in Clean Water Act section 303(c) consist of the beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of a water body and criteria (referred to as water quality objectives in the California Water Code) necessary to protect those uses. Under the Water Code, the water boards establish beneficial uses and water quality objectives in water quality control or basin plans. Together with an anti-degradation policy, these beneficial uses and water quality objectives serve as water quality standards under the Clean Water Act. In Clean Water Act parlance, state beneficial uses are called "designated uses" and state water quality objectives are called "criteria." Throughout this Order, the relevant term is used depending on the statutory scheme.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State ~~regardless of circumstances or condition.~~. Under this definition, portions of a MS4 ~~is always~~may be considered to be a Waters of the State. However, man-made portions of the MS4 constructed for the sole purpose of flow and/or pollutant reduction are not considered waters of the state.

Waters of the United States - As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: "(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Wet Season (aka Rainy Season) – The period of time from October 1 to April 30 when the San Diego Region experiences the most rainfall.

Wet Weather – Weather is considered wet if there is a storm event of 0.1 inches and greater and the following 72 hours, unless defined in another regulatory mechanism such as a TMDL.

ATTACHMENT D

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY _______________

I. COPERMITTEE INFORMATION		
Copermittee Name:		
Copermittee Primary Contact Name:		
Copermittee Primary Contact Information: Address: City: County: State: Zip: Telephone: Fax: Email:		
II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☐ ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	☐ ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☐ ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Number of non-storm water discharges reported by the public		
Number of non-storm water discharges detected by Copermittee staff or contractors		
Number of non-storm water discharges investigated by the Copermittee		
Number of sources of non-storm water discharges identified		
Number of non-storm water discharges eliminated		
Number of sources of illicit discharges or connections identified		
Number of illicit discharges or connections eliminated		
Number of enforcement actions issued		
Number of high level enforcement actions issued		
V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Was an update to the ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual required or recommended by the San Diego Water Board?	YES NO	☐ ☐
If YES to the question above, did the Copermittee update its ~~Permanent~~ BMP ~~Sizing Criteria~~ Design Manual and make it available on the Regional Clearinghouse?	YES NO	☐ ☐
Number of proposed development projects in review		
Number of Priority Development Projects in review		
Number of Priority Development Projects approved		
Number of approved Priority Development Projects exempt from any BMP requirements		
Number of approved Priority Development Projects requiring mitigation		
Number of Priority Development Projects granted occupancy		
Number of completed Priority Development Projects in inventory		
Number of high priority Priority Development Project ~~permanent~~ structural BMP inspections		
Number of Priority Development Project ~~permanent~~ structural BMP violations		
Number of enforcement actions issued		

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
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Number of high level enforcement actions issued	

FY ________________

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

Number of construction sites in inventory	
Number of active construction sites in inventory	
Number of inactive construction sites in inventory	
Number of construction sites closed/completed during reporting period	
Number of construction site inspections	
Number of construction site violations	
Number of enforcement actions issued	
Number of high level enforcement actions issued	

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

	Municipal	Commercial	Industrial	Residential
Number of existing developments in inventory				
Number of existing development inspections				
Number of follow-up inspections				
Number of existing development violations				
Number of enforcement actions issued				
Number of high level enforcement actions issued				

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Has the Copermittee implemented a mechanism for public participation and where necessary intergovernmental coordination that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☐ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature	Date
Print Name	Title
Telephone Number	Email

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
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ATTACHMENT E

SPECIFIC PROVISIONS FOR TOTAL MAXIMUM DAILY LOADS
APPLICABLE TO ORDER NO. R9-2012-0011

These provisions implement Total Maximum Daily Loads (TMDLs), adopted by the San Diego Water Board and approved by USEPA under Clean Water Act section 303(c), which are applicable to discharges regulated under this Order. The provisions and schedules for implementation of the TMDLs described below must be incorporated into the Water Quality Improvement Plans and monitoring requirements, required pursuant to Provision~~ ~~s B and D of this Order, respectively, for the specified Watershed Management Areas.

1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed~~Total Maximum Daily Load for Diazinon in Chollas Creek Watershed~~ Resolution No. R9-2002-0123
2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin Resolution No. R9-2005-0019
~~3. Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed~~
~~4.~~3. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek Resolution No. R9-2007-0043
~~5.~~4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Resolution No. R9-2008-0027
~~6.~~5. Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) Resolution No. R9-2010-0001

1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed

a. Applicability

(1) TMDL Basin Plan Amendment: Resolution No. R9-2002-0123

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	August 14, 2002
State Water Board Approval Date:	July 16, 2003
Office of Administrative Law Approval Date:	September 11, 2003
US EPA Approval Date:	November 3, 2003

(3) TMDL Effective Date: September 11, 2003

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Chollas Creek

(6) Responsible Copermittees: City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, Unified Port District of San Diego

b. Water Quality Based Effluent Limitations

The WQBELs for Chollas Creek consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 1.~~II~~c:

Table 1.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Receiving Water Limitation	Averaging Period
Diazinon	Acute	0.08 µg/L	1 hour
	Chronic	0.05 µg/L	4 days

(2) Effluent Limitations

Discharges from the MS4s must not contain concentrations that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 1.~~II~~c:

Table 1.2
Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Constituent	Exposure Duration	Effluent Limitation	Averaging Period
Diazinon	Acute	0.072 µg/L	1 hour
	Chronic	0.045 µg/L	4 days

(3) Best Management Practices

~~The following~~ BMPs for Chollas Creek ~~must~~may be incorporated into the Water Quality Improvement Plan for the San Diego Bay Watershed Management Area and implemented by the Responsible Copermittees:

~~(a) The Responsible Copermittees must implement BMPs capable of achieving the WQBELs under Specific Provision 1. for Chollas Creek.~~
~~(b) Responsible Copermittees must implement the Diazinon Toxicity Control Plan and Diazinon Public Outreach/Education Program as described in the report titled, *Technical Report for Total Maximum Daily Load for Diazinon in Chollas Creek Watershed, San Diego County*, dated August 14, 2002, including subsequent modifications, in order to achieve the WQBELs under Specific Provision 1..~~

~~(c)~~(a) The Responsible Copermittees should coordinate ~~the~~any implemented BMPs to address this TMDL with Caltrans ~~wherever and whenever~~ , as possible.

c. Compliance Schedule

The Responsible Copermittees were required to achieve their WLA by December 31, 2010. The Responsible Copermittees must be in compliance with the WQBELs under Specific Provision 1.~~kk~~b.

d. Compliance Determination

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

~~d.~~e. Specific Monitoring and Assessment Requirements

(a) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Investigation Order No. R9-2004-0277, *California Department of Transportation and San Diego Municipal Separate Storm Sewer System Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed*. The monitoring reports required under Investigation Order No. R9-2004-0277 must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

~~The Responsible Copermittees must monitor the effluent of the MS4 outfalls for diazinon within the Chollas Creek watershed, and calculate or estimate the monthly and annual diazinon loads, in accordance with the requirements of Provisions , , and of this Order. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision of this Order.~~

2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin

a. Applicability

(1) TMDL Basin Plan Amendment: Resolution No. R9-2005-0019

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	February 9, 2005
State Water Board Approval Date:	September 22, 2005
Office of Administrative Law Approval Date:	December 2, 2005
US EPA Approval Date:	February 8, 2006

(3) TMDL Effective Date: December 2, 2005

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Shelter Island Yacht Basin

(6) Responsible Copermittees: City of San Diego, San Diego Unified Port District

b. Water Quality Based Effluent Limitations

The WQBELs for Shelter Island Shoreline Park consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 2.~~qq~~c:

Table 2.1
Receiving Water Limitations as Concentrations in Shelter Island Yacht Basin

Constituent	Exposure Duration	Effluent Limitation	Averaging Period
Dissolved Copper	Acute	4.8 µg/L	1 hour
	Chronic	3.1 µg/L	4 days

(2) Effluent Limitations

Discharges from the MS4s must not contain pollutant loads that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 2.c~~qq~~:

Table 2.2
Effluent Limitations as Annual Loads in MS4 Discharges to Shelter Island Yacht Basin

Constituent	Effluent Limitation
Dissolved Copper	30 kg/yr

(3) Best Management Practices

The Responsible Copermittees ~~must~~may implement BMPs ~~capable of achieving~~to support the achievement of WQBELs under Specific Provision 2.~~pp~~ b for Shelter Island Yacht Basin.

c. COMPLIANCE SCHEDULE

The Responsible Copermittees ~~was~~ are required to achieve ~~its~~ respective WLAs ~~upon the effective date of the TMDL,~~by December 2, ~~2005~~2022. The Responsible Copermittees must be in compliance with the WQBELs under Specific Provision 2.~~pp~~b.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

~~d.~~e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

The Responsible Copermittees must ~~monitor~~implement the ~~effluent of its MS4 outfalls for dissolved copper, and calculate or estimate the monthly and annual dissolved copper loads, in accordance with the~~ monitoring and assessment requirements ~~of Provisions , , and of this~~ issued under Order~~.~~ No. R9-2005-0019. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

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~~3. Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in Rainbow Creek Watershed~~

~~4.~~

~~5. Applicability~~

~~6.~~

~~7. TMDL Basin Plan Amendment: Resolution No. R9-2005-0036~~

~~8.~~

~~9. TMDL Adoption and Approval Dates:~~

~~10.~~

~~11. San Diego Water Board Adoption Date: February 9, 2005~~

~~12. State Water Board Approval Date: November 16, 2005~~

~~13. Office of Administrative Law Approval Date: February 1, 2006~~

~~14. US EPA Approval Date: March 22, 2006~~

~~15.~~

~~16. TMDL Effective Date: February 1, 2006~~

~~17.~~

~~18. Watershed Management Area: Santa Margarita River~~

~~19.~~

~~20. Water Body: Rainbow Creek~~

~~21.~~

~~22. Responsible Copermittee: County of San Diego~~

~~23.~~

~~24. Water Quality Based Effluent Limitations~~

~~25.~~

~~26. The WQBELs for Rainbow Creek consist of the following~~

~~27.~~

~~28. Receiving Water Limitations~~

~~29.~~

~~30. Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 3.c.(1):~~

~~31.~~

~~32. Table 3.1~~

~~33. Receiving Water Limitations as~~

~~34. Concentrations in Rainbow Creek~~

~~35. Constituent~~	~~36. Receiving Water 37. Limitation~~
~~38. Nitrate (as N)~~	~~39. 10 mg/L~~
~~40. Total Nitrogen~~	~~41. 1 mg/L~~
~~42. Total Phosphorus~~	~~43. 0.1 mg/L~~

~~44.~~

~~46.~~
~~47. Effluent Limitations~~
~~48.~~
~~49. Discharges from the MS4s must not contain concentrations that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 3.c.(1):~~
~~50.~~
~~51. Table 3.2~~
~~52. Effluent Limitations as Concentrations in~~
~~53. MS4 Discharges to Rainbow Creek~~

~~54. Constituent~~	~~55. Effluent 56. Limitation~~
~~57. Nitrate (as N)~~	~~58. 10 mg/L~~
~~59. Total Nitrogen~~	~~60. 1 mg/L~~
~~61. Total Phosphorus~~	~~62. 0.1 mg/L~~

~~63.~~
~~64. Pollutant loads from given land uses discharging to and from the MS4s must not exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 3.c.(1):~~
~~65.~~
~~66. Table 3.3~~
~~67. Effluent Limitations as Annual Loads in~~
~~68. MS4 Discharges to Rainbow Creek~~

~~69. Land Use~~	~~70. Total N~~	~~71. Total P~~
~~72. Commercial nurseries~~	~~73. 116 kg/yr~~	~~74. 3 kg/yr~~
~~75. Park~~	~~76. 3 kg/yr~~	~~77. 0.1 kg/yr~~
~~78. Residential areas~~	~~79. 149 kg/yr~~	~~80. 12 kg/yr~~
~~81. Urban areas~~	~~82. 27 kg/yr~~	~~83. 6 kg/yr~~

~~84.~~
~~85. Interim effluent limitations expressed as pollutant loads are given in the compliance schedule under Specific Provision 3.0.~~
~~86.~~
~~87. Best Management Practices~~
~~88.~~
~~89. The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 3.b for Rainbow Creek.~~
~~90.~~

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~~**91. The Responsible Copermittee should coordinate the BMPs to address this TMDL with Caltrans and other sources wherever and whenever possible.**~~

~~**92.**~~

~~94. Compliance Schedule~~

~~95.~~

~~96. WLA Compliance Date~~

~~97.~~

~~98. The Responsible Copermittee is required to achieve its WLAs, thus must be in compliance with the WQBELs under Specific Provision 3.b, by December 31, 2021.~~

~~99.~~

~~100. Interim Compliance Requirements~~

~~101.~~

~~102. Table 3.4~~

~~103. Interim Effluent Limitations as Annual Loads in~~

~~104. MS4 Discharges from Specific Land Uses to Rainbow Creek~~

~~105.~~	~~106. Total N 107. Interim Effluent Limitations 108. (kg/yr)~~			~~109. Total P 110. Interim Effluent Limitations 111. (kg/yr)~~		
~~112.~~	~~113. Interim Compliance Date~~			~~114. Interim Compliance Date~~		
~~115. Land Use~~	~~116. 2009~~	~~117. 2013~~	~~118. 2017~~	~~119. 2009~~	~~120. 2013~~	~~121. 2017~~
~~122. Commercial nurseries~~	~~123. 399~~	~~124. 299~~	~~125. 196~~	~~126. 20~~	~~127. 16~~	~~128. 10~~
~~129. Park~~	~~130. 5~~	~~131. 3~~	~~132. 3~~	~~133. 0.15~~	~~134. 0.10~~	~~135. 0.10~~
~~136. Residential areas~~	~~137. 507~~	~~138. 390~~	~~139. 260~~	~~140. 99~~	~~141. 74~~	~~142. 47~~
~~143. Urban areas~~	~~144. 40~~	~~145. 27~~	~~146. 27~~	~~147. 9~~	~~148. 6~~	~~149. 6~~

~~150.~~

~~151. Specific Monitoring and Assessment Requirements~~

~~152.~~

~~153. The Responsible Copermittee must implement the Sampling and Analysis Plan for Rainbow Creek Nutrient Reduction TMDL Implementation Water Quality Monitoring, dated January 2010. The results of any monitoring conducted during the reporting period, and assessment of whether the interim and final WQBELs have been achieved must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.~~

~~154.~~

~~155.~~3. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2007-0043

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	June 13, 2007
State Water Board Approval Date:	July 15, 2008
Office of Administrative Law Approval Date:	October 22, 2008
US EPA Approval Date:	December 18, 2008

(3) TMDL Effective Date: October 22, 2008

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Chollas Creek

(6) Responsible Copermittees: City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, San Diego Unified Port District ~~of San Diego~~

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for Chollas Creek consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 4.c.(1):

Table 3.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
Dissolved Copper	Acute	$(0.96) \times e^{[0.9422 \times \ln(\text{hardness}) - 1.700]} \times \text{WER*}$	1 hour
	Chronic	$(0.96) \times e^{[0.8545 \times \ln(\text{hardness}) - 1.702]} \times \text{WER*}$	4 days
Dissolved Lead	Acute	$[1.46203 – 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 1.460]} \times \text{WER*}$	1 hour
	Chronic	$[1.46203 – 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 4.705]} \times \text{WER*}$	4 days
Dissolved Zinc	Acute	$(0.978) \times e^{[0.8473 \times \ln(\text{hardness}) + 0.884]} \times \text{WER*}$	1 hour
	Chronic	$(0.986) \times e^{[0.8473 \times \ln(\text{hardness}) + 0.884]} \times \text{WER*}$	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

(2) Effluent Limitations

Discharges from the MS4s must not contain pollutant loads that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 4.c.(1):

Table 3.2
Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
Dissolved Copper	Acute	90% x (0.96) x $e^{[0.9422 \times \ln(hardness) - 1.700]}$ x WER*	1 hour
	Chronic	90% x (0.96) x $e^{[0.8545 \times \ln(hardness) - 1.702]}$ x WER*	4 days
Dissolved Lead	Acute	90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(hardness) - 1.460]}$ x WER*	1 hour
	Chronic	90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(hardness) - 4.705]}$ x WER*	4 days
Dissolved Zinc	Acute	90% x (0.978) x $e^{[0.8473 \times \ln(hardness) + 0.884]}$ x WER*	1 hour
	Chronic	90% x (0.986) x $e^{[0.8473 \times \ln (hardness) + 0.884]}$ x WER*	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

(3) Best Management Practices

(a) The Responsible Copermittee ~~must~~may implement BMPs ~~capable of achieving~~to support the achievement of WQBELs under Specific Provision 4.c~~uu~~ for Chollas Creek.

(b) The Responsible Copermittees should coordinate the BMPs to address this TMDL with Caltrans and the U.S. Navy ~~wherever and whenever~~, as possible.

c. COMPLIANCE SCHEDULE

(1) WLA Compliance Date

The Responsible Copermittee is required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 4.b~~uu,~~ by October 22, 2028.

(2) Interim Compliance Requirements

The Responsible Copermittee must comply with the following interim WQBELs by the interim compliance date:

Table 3.3
Interim Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Interim Compliance Date	Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
October 22, 2018	Dissolved Copper	Acute	$1.2 \times 90\% \times (0.96) \times e^{[0.9422 \times \ln(hardness) - 1.700]} \times WER^*$	1 hour
		Chronic	$1.2 \times 90\% \times (0.96) \times e^{[0.8545 \times \ln(hardness) - 1.702]} \times WER^*$	4 days
	Dissolved Lead	Acute	$1.2 \times 90\% \times [1.46203 - 0.145712 \times \ln(hardness)] \times e^{[1.273 \times \ln(hardness) - 1.460]} \times WER^*$	1 hour
		Chronic	$1.2 \times 90\% \times [1.46203 - 0.145712 \times \ln(hardness)] \times e^{[1.273 \times \ln(hardness) - 4.705]} \times WER^*$	4 days
	Dissolved Zinc	Acute	$1.2 \times 90\% \times (0.978) \times e^{[0.8473 \times \ln(hardness) + 0.884]} \times WER^*$	1 hour
		Chronic	$1.2 \times 90\% \times (0.986) \times e^{[0.8473 \times \ln (hardness) + 0.884]} \times WER^*$	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

d. Compliance Determination

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

~~d.~~e. Specific Monitoring and Assessment Requirements

(a) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Investigation Order No. R9-2004-0277, *California Department of Transportation and San Diego Municipal Separate Storm Sewer System Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed*, when it is amended to include monitoring requirements for the Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek. The monitoring reports required under Investigation Order No. R9-2004-0277 must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

(b) The Responsible Copermittees must ~~monitor~~implement the ~~effluent of the MS4 outfalls discharging to Chollas Creek for dissolved copper, lead, and zinc, and calculate or estimate the monthly and annual dissolved copper, lead, and zinc loads, in accordance with the~~ monitoring and assessment requirements ~~of Provisions , , and of~~ issued under Order No. R9-2007-0043, as consistent with this Order~~.~~.. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

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~~156.~~4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2008-0027

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date: June 11, 2008
State Water Board Approval Date: June 16, 2009
Office of Administrative Law Approval Date: September 15, 2009
US EPA Approval Date: October 26, 2009

(3) TMDL Effective Date: September 15, 2009

(4) Watershed Management Areas: See Table 5.0

(5) Water Bodies: See Table 5.0

(6) Responsible Copermittees: See Table 5.0

Table 4.0
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County	Dana Point Harbor	Baby Beach	-City of Dana Point -County of Orange
San Diego Bay	San Diego Bay	Shelter Island Shoreline Park	-Unified Port of San Diego

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b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for segments or areas of the water bodies listed in Table 5.0 consist of the following:

(1) Receiving Water Limitations

(a) Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedules under Specific Provisions 5.c.(1)(a) and 5.c.(2):

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Table 4.1
Receiving Water Limitations as Bacteria Densities in the Water Body

	Receiving Water Limitations	
Constituent	**Single Sample Maximum[1,2]**	**30-Day Geometric Mean[2]**
Total Coliform	10,000 MPN/100mL	1,000 MPN/100mL
Fecal Coliform	400 MPN/100mL	200 MPN/100mL
Enterococcus	104 MPN/100mL	35 MPN/100mL

Notes:
1. During wet weather days, only the single sample maximum receiving water limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved.

(b) If the above receiving water limitations are not met in the receiving water, the Responsible Copermittees must demonstrate that the discharges from the MS4s are not causing or contributing to the violation of receiving water limitations. The Copermittee must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 5.b.(2).

(2) Effluent Limitations

Discharges from the MS4s must not contain densities that exceed the following effluent limitations by the end of the compliance schedules under Specific Provisions 5.c.(1)(a) and 5.c.(2) to demonstrate the discharge is not causing or contributing to a violation of receiving water quality standards:

Table 4.2
Effluent Limitations as Bacteria Densities in MS4 Discharges to the Water Body

	Effluent Limitations	
Constituent	**Single Sample Maximum[1,2]**	**30-Day Geometric Mean[2]**
Total Coliform	10,000 MPN/100mL	1,000 MPN/100mL
Fecal Coliform	400 MPN/100mL	200 MPN/100mL
Enterococcus	104 MPN/100mL	35 MPN/100mL

Notes:
1. During wet weather days, only the single sample maximum effluent limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean effluent limitations are required to be achieved.

Interim effluent limitations expressed as pollutant loads are given in the compliance schedule under Specific Provision 5.c~~aaa~~.

(3) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 5.0 fulfill the Bacteria Load Reduction Plan (BLRP) requirements in Resolution No. R9-2008-0027.

(b) The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 5.0 for the segments or areas of the water bodies listed in Table 5.0

c. COMPLIANCE SCHEDULE

(1) Baby Beach in Dana Point Harbor

(a) WLA Compliance Dates

The Responsible Copermittees for MS4 discharges to Baby Beach are required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 5.0, according to the following compliance schedule:

Table 4.3
Compliance Schedule Dates to Achieve Baby Beach WLAs

Constituent	Dry Weather WLA Compliance Date	Wet Weather WLA Compliance Date
Total Coliform	September 15, 2014	September 15, 2009
Fecal Coliform		September 15, 2009
Enterococcus		September 15, 2019

(b) Interim Compliance Requirements

The Responsible Copermittees for MS4 discharges to Baby Beach must comply with the following interim WQBELs by the interim compliance date:

Table 4.4
Interim Effluent Limitations as Loads in MS4 Discharges to Baby Beach

Constituent	Interim Compliance Date	Dry Weather Interim Effluent Limitation	Wet Weather Interim Effluent Limitation
Total Coliform	September 15, 2012	5.32×10^9 MPN/day	NA*
Fecal Coliform	September 15, 2012	0.59×10^9 MPN/day	NA*
Enterococcus	September 15, 2012	0.42×10^9 MPN/day	NA**
	September 15, 2016	NA*	207×10^9 MPN/30days

Notes:
* The WQBELs under Specific Provision 5.b must already be achieved by the given interim compliance date.
** There is no corresponding interim WQBEL for the given interim compliance date.

(2) Shelter Island Shoreline Park in San Diego Bay

The Responsible Copermittee for MS4 discharges to Shelter Island Shoreline Park is required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 5.0, by December 31, 2012.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water

quality objective, or

(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or

(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

~~d.~~e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

(1) Monitoring Stations and Procedures

~~(a)~~ The Responsible Copermittees must implement the monitoring requirements issued under Order No. R9-2008-0027. ~~designate the MS4 outfalls within their jurisdiction discharging to the segments or areas of the water bodies listed in Table 5.0 as high priority non-storm water MS4 monitoring stations, in accordance with the requirements of Provision D.1.~~

~~(b)~~

~~(c) The Responsible Copermittees must establish at least one monitoring station within the receiving water body.~~

~~(2) Monitoring Procedures~~

~~(a) The Responsible Copermittees must monitor the effluent of the designated MS4 outfalls within their jurisdiction discharging during dry weather conditions to the segments or areas of the water bodies listed in Table 5.0 in accordance with the dry weather jurisdictional monitoring requirements of Provision D.1.a.(1)(b). Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(b) The Responsible Copermittees must monitor, within the first 24 hours of each storm event,[25] the effluent of the designated MS4 outfalls within their jurisdiction discharging to the segments or areas of the water bodies listed in Table 5.0 in accordance with the wet weather jurisdictional monitoring requirements of Provision D.1.b.(1)(b) of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(c) The Responsible Copermittees must collect samples from the monitoring stations within the receiving water body for each dry weather and wet weather MS4 outfall monitoring event. Samples must be analyzed for total~~

~~[25] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].~~

~~coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(3)~~(2) Assessment and Reporting Requirements

(a) The Responsible Copermittees must analyze the dry weather and wet weather monitoring data to assess whether the interim and final WQBELs have been achieved.

(b) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

~~157.~~5. Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2010-0001

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date: February 10, 2010
State Water Board Approval Date: December 14, 2010
Office of Administrative Law Approval Date: April 4, 2011
US EPA Approval Date: June 22, 2011

(3) TMDL Effective Date: April 4, 2011

(4) Watershed Management Areas: See Table 6.0

(5) Water Bodies: See Table 6.0

The water bodies identified in Table 6.0 are subject to the requirements of this Attachment E, except those water bodies listed in Table 6.0 that have been delisted from the 303(d) list for REC-1 bacteria impairments. These delisted water bodies are not subject to the requirements of this Attachment E so long as monitoring data continues to support compliance with water quality standards.

(6) Responsible Copermittees: See Table 6.0

Table 5.0
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County	Pacific Ocean Shoreline	Cameo Cove at Irvine Cove Drive – Riviera Way	-City of Laguna Beach -County of Orange -Orange County Flood Control District
		at Heisler Park - North	
	Pacific Ocean Shoreline	at Main Laguna Beach	-City of Aliso Viejo -City of Laguna Beach -City of Laguna Woods -County of Orange -Orange County Flood Control District
		Laguna Beach at Ocean Avenue	
		Laguna Beach at Cleo Street	
		Arch Cove at Bluebird Canyon Road	
		Laguna Beach at Dumond Drive	

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Table 5.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County (cont'd)	Pacific Ocean Shoreline	Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach	-City of Aliso Viejo -City of Laguna Beach -City of Laguna Hills -City of Laguna Niguel -City of Laguna Woods -City of Lake Forest -City of Mission Viejo -County of Orange -Orange County Flood Control District
	Aliso Creek	Entire reach (7.2 miles) and associated tributaries: - Aliso Hills Channel - English Canyon Creek - Dairy Fork Creek - Sulfur Creek - Wood Canyon Creek	
	Aliso Creek Mouth	at mouth	
	Pacific Ocean Shoreline	Aliso Beach at West Street	-City of Dana Point -City of Laguna Beach -City of Laguna Niguel -County of Orange -Orange County Flood Control District
		Aliso Beach at Table Rock Drive	
		100 Steps Beach at Pacific Coast Hwy at hospital (9^{th} Avenue)	
		at Salt Creek (large outlet)	
		Salt Creek Beach at Salt Creek service road	
		Salt Creek Beach at Strand Road	
	Pacific Ocean Shoreline	at San Juan Creek	-City of Dana Point -City of Laguna Hills -City of Laguna Niguel -City of Mission Viejo -City of Rancho Santa Margarita -City of San Juan Capistrano -County of Orange -Orange County Flood Control District
	San Juan Creek	lower 1 mile	
	San Juan Creek Mouth	at mouth	

Table 5.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I- Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County (cont'd)	Pacific Ocean Shoreline	at Poche Beach Ole Hanson Beach Club Beach at Pico Drain San Clemente City Beach at El Portal Street Stairs San Clemente City Beach at Mariposa Street San Clemente City Beach at Linda Lane San Clemente City Beach at South Linda Lane San Clemente City Beach at Lifeguard Headquarters under San Clemente Municipal Pier San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane) San Clemente State Beach at Riviera Beach Can Clemente State Beach at Cypress Shores	- City of Dana Point -City of San Clemente -County of Orange -Orange County Flood Control District
San Luis Rey River	Pacific Ocean Shoreline	at San Luis Rey River mouth	-City of Oceanside -City of Vista -County of San Diego
Carlsbad	Pacific Ocean Shoreline	at Moonlight State Beach	-City of Carlsbad -City of Encinitas -City of Escondido -City of Oceanside -City of San Marcos -City of Solana Beach ~~-City of Vista~~ -County of San Diego
San Dieguito River	Pacific Ocean Shoreline	at San Dieguito Lagoon mouth	-City of Del Mar -City of Escondido -City of Poway -City of San Diego -City of Solana Beach -County of San Diego
Penasquitos (Miramar Reservior HA)	Pacific Ocean Shoreline	Torrey Pines State Beach at Del Mar (Anderson Canyon)	-City of Del Mar -City of Poway -City of San Diego -County of San Diego
Mission Bay	Pacific Ocean Shoreline	La Jolla Shores Beach at El Paseo Grande La Jolla Shores Beach at Caminito del Oro	-City of San Diego

Table 5.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I- Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
		La Jolla Shores Beach at Vallecitos	
Mission Bay (cont'd)	Pacific Ocean Shoreline	La Jolla Shores Beach at Avenida de la Playa	-City of San Diego
		at Casa Beach, Children's Pool	
		South Casa Beach at Coast Boulevard	
		Whispering Sands Beach at Ravina Street	
		Windansea Beach at Vista de la Playa	
		Windansea Beach at Bonair Street	
		Windansea Beach at Playa del Norte	
		Windansea Beach at Palomar Avenue	
		at Tourmaline Surf Park	
		Pacific Beach at Grand Avenue	
	Tecolote Creek	Entire reach and tributaries	-City of San Diego
San Diego River	Forrester Creek	lower 1 mile	City of El Cajon ~~-City of La Mesa~~ -City of Santee -County of San Diego
	San Diego River	lower 6 miles	-City of El Cajon -City of La Mesa -City of San Diego -City of Santee -County of San Diego
	Pacific Ocean Shoreline	at San Diego River mouth at Dog Beach	
San Diego Bay	Chollas Creek	lower 1.2 miles	-City of La Mesa -City of Lemon Grove -City of San Diego -County of San Diego -San Diego Unified Port District

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for segments or areas of the water bodies listed in Table 6.0 consist of the following:

(1) Receiving Water Limitations

(a) Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedules under Specific Provision 6.c.(1):

Table 5.1
Receiving Water Limitations as Bacteria Densities and Allowable Exceedance Frequencies in the Water Body

	Receiving Water Limitations			
Constituent	Single Sample Maximum[1,2] (MPN/100mL)	Single Sample Maximum Allowable Exceedance Frequency[3]	30-Day Geometric Mean[2] (MPN/100mL)	30-Day Geometric Mean Allowable Exceedance Frequency
Total Coliform	10,000	22% / 0%	1,000	0%
Fecal Coliform	400	22% / 0%	200	0%
Enterococcus	104[4] / 61[5]	22% / 0%	35[4] / 33[5]	0%

Notes:
1. During wet weather days, only the single sample maximum receiving water limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved.
3. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days. The 0% single sample maximum allowable exceedance frequency applies to dry weather days.
4. This *Enterococcus* receiving water limitation applies to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.
5. This *Enterococcus* receiving water limitations applies to segments or areas of creeks or creek mouths listed in Table 6.0.

Interim receiving water limitations expressed as allowable exceedance frequencies are given in the compliance schedule under Specific Provision 6.c~~fff~~.

(b) If the above receiving water limitations are not met in the receiving water, the Responsible Copermittees must demonstrate that the discharges from the MS4s are not causing or contributing to the violation of receiving water limitations. The Copermittee must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 6.b~~.~~.

(2) Effluent Limitations

Discharges from the MS4s must not ~~contain densities that exceed the following effluent limitations by the end of the compliance schedules under Specific Provision 6.c. to demonstrate the discharge is not causing~~cause or ~~contributing~~contribute to a violation of receiving water ~~quality standards~~limitations. The mass-based waste load allocations presented in Resolution No. R9-2010-0001 can be used to demonstrate that loading from the MS4 is such that it does not cause water quality objective exceedances, as described in bullet (4) under Specific Provision 6.d. ~~:~~

~~**Table 6.2**~~
~~*Effluent Limitations as Bacteria Densities and Allowable Exceedance Frequencies in MS4 Discharges to the Water Body*~~

	~~Effluent Limitations~~			
~~Constituent~~	~~Single Sample Maximum[1,2] (MPN/100mL)~~	~~Single Sample Maximum Allowable Exceedance Frequency[3]~~	~~30-Day Geometric Mean[2] (MPN/100mL)~~	~~30-Day Geometric Mean Allowable Exceedance Frequency~~
~~Total Coliform~~	~~10,000~~	~~22% / 0%~~	~~1,000~~	~~0%~~
~~Fecal Coliform~~	~~400~~	~~22% / 0%~~	~~200~~	~~0%~~
~~*Enterococcus*~~	~~104[4] / 61[5]~~	~~22% / 0%~~	~~35[4] / 33[5]~~	~~0%~~

~~Notes:~~
~~1. During wet weather days, only the single sample maximum effluent limitations are required to be achieved.~~
~~2. During dry weather days, the single sample maximum and 30-day geometric mean effluent limitations are required to be achieved.~~
~~3. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days. The 0% single sample maximum allowable exceedance frequency applies to dry weather days~~
~~4. This *Enterococcus* effluent limitation applies to MS4 discharges to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.~~
~~5. This *Enterococcus* effluent limitation applies to MS4 discharges to segments or areas of creeks or creek mouths listed in Table 6.0.~~

~~Interim effluent limitations expressed as allowable exceedance frequencies are given in the compliance schedule under Specific Provision 6.c.~~

(3) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 6.0 ~~fulfill~~will incorporate the Comprehensive Load Reduction ~~Plan~~Plans (CLRP) ~~requirements in~~drafted pursuant to Resolution No. R9-2010-0001.

(b) The Responsible Copermittee ~~must~~may implement BMPs ~~capable of achieving~~to support the achievement of WQBELs under Specific Provision 6.b~~ee~~ for the segments or areas of the water bodies listed in Table 6.0.

(c) The Responsible Copermittees ~~should coordinate~~may implement BMPs to support the ~~BMPs~~achievement of ~~to address~~ this TMDL with Caltrans and owners/operators of small MS4s ~~wherever and whenever~~, as possible.

c. COMPLIANCE SCHEDULE

(1) WLA Compliance Dates

The Responsible Copermittees for MS4 discharges to a segment or area of the water bodies listed in Table 6.0 are required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 6.b, according to the following compliance schedule:

Table 5.2
Compliance Schedule Dates to Achieve Indicator Bacteria WLAs

Constituent	Dry Weather WLA Compliance Date	Wet Weather WLA Compliance Date
Total Coliform[1]	April 4, 2021	April 4, 2031
Fecal Coliform		
Enterococcus		

1 - Total coliform receiving water limitations apply only to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.

(2) Interim Compliance Requirements

The Responsible Copermittees must comply with the ~~following~~ interim WQBELs by the interim compliance dates~~:~~ provided as part of the CLRP and supported by Order No. R9-2010-0001.

(a) Interim Dry Weather WQBELs

Interim dry weather WQBELS are expressed as receiving water limitations. The Responsible Copermittee must calculate the "existing" exceedance frequencies of the 30-day geometric mean water quality objectives for each of the indicator bacteria by analyzing the monitoring data collected between January 1, 2002 and April 4, 2011. "Existing" exceedance frequencies may be calculated by segment or area of a water body, or by water body, and/or by Watershed Management Area listed in Table 6.0. Separate "existing" exceedance frequencies must be calculated for beaches and creeks/creek mouths.

The Responsible Copermittees must achieve a 50 percent reduction in the "existing" exceedance frequency of the 30-day geometric mean WQBELs for the segments or areas of the water bodies listed in Table 6.0 ~~by the interim compliance dates for achieving the interim dry weather WQBELs given in Table 6.5~~. A 50 percent reduction in the "existing" exceedance frequency is equivalent to half of the "existing" exceedance frequency of the 30-day geometric mean WQBELs.

(3) Submittals to Support TMDL Basin Plan Amendment

The Responsible Copermittees are encouraged to submit data to support the TMDL reopener scheduled for April 2016 including but not limited to data related to reference watershed monitoring and beneficial use usage frequency.

~~d. The "existing" exceedance frequencies and the interim dry weather allowable exceedance frequencies (i.e. interim dry weather WQBELs) calculated by the Responsible Copermittees must be included in the Water Quality Improvement Plans for the applicable Watershed Management Areas.~~

~~e.~~

~~f. Interim Wet Weather WQBELs~~

~~g.~~

~~h. The Responsible Copermittees must achieve the interim wet weather WQBELs in~~

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~~Table 6.4, expressed as interim allowable exceedance frequencies, by the interim compliance dates for achieving the interim wet weather WQBELs given in Table 6.5.~~

~~i.~~

~~j. Table 6.4~~

~~k. Interim Wet Weather WQBELs Expressed as~~

~~l. Interim Wet Weather Allowable Exceedance Frequencies~~

~~m. Watershed~~ ~~r. Management Area~~	~~n.~~ ~~s. Water Body~~	~~o.~~ ~~t. Segment or Area~~	~~p. Interim Wet Weather q. Allowable Exceedance Frequencies~~ ~~u.~~ ~~Total Coliform~~	~~v.~~ ~~Fecal Coliform~~	~~w.~~ ~~Enterococcus~~
~~x. South Orange County~~	~~y. Pacific Ocean Shoreline~~	~~z. Cameo Cove at Irvine Cove Drive – Riviera Way~~	~~aa. 38%~~	~~bb. 37%~~	~~cc. 39%~~
		~~dd. at Heisler Park - North~~			
	~~ee. Pacific Ocean Shoreline~~	~~ff. at Main Laguna Beach~~			
		~~gg. Laguna Beach at Ocean Avenue~~			
		~~hh. Laguna Beach at Cleo Street~~			
		~~ii. Arch Cove at Bluebird Canyon Road~~			
		~~jj. Laguna Beach~~			

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		~~at Dumond Drive~~			
	~~kk. Pacific Ocean Shoreline~~	~~ll. Laguna Beach at Lagunita Place /~~ ~~mm. Blue Lagoon Place at Aliso Beach~~	~~nn. 41%~~	~~oo. 41%~~	~~pp. 42%~~
	~~qq. Aliso Creek~~	~~rr. Entire reach (7.2 miles) and associated tributaries:~~ ~~ss. - Aliso Hills Channel~~ ~~tt. - English Canyon Creek~~ ~~uu. - Dairy Fork Creek~~ ~~vv. - Sulfur Creek~~ ~~ww. - Wood Canyon Creek~~	~~xx. 41%~~	~~yy. 41%~~	~~zz. 42%~~
	~~aaa. Aliso Creek Mouth~~	~~bbb. at mouth~~	~~ccc. 41%~~	~~ddd. 41%~~	~~eee. 42%~~
	~~fff. Pacific Ocean Shoreline~~	~~ggg. Aliso Beach at West Street~~	~~hhh. 36%~~	~~iii. 36%~~	~~jjj. 36%~~
		~~kkk. Aliso Beach at Table Rock Drive~~			
		~~lll. 100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)~~			
		~~mmm. at Salt Creek (large outlet)~~			

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		~~nnn. Salt Creek Beach at Salt Creek service road~~			
		~~ooo. Salt Creek Beach at Strand Road~~			

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~~qqq. Table 6.4 (Cont'd)~~
~~rrr. Interim Wet Weather WQBELs Expressed as~~
~~sss. Interim Wet Weather Allowable Exceedance Frequencies~~

~~ttt. Watershed~~ ~~vvv. Management Area~~	~~uuu.~~ ~~zzz. Water Body~~	~~vvv.~~ ~~aaaa. Segment or Area~~	~~www. Interim Wet Weather xxx. Allowable Exceedance Frequencies~~		
			~~bbb! Tetal Celifern~~	~~ccc(Fecal Celifern~~	~~ddd- Epterecoccus~~
~~eeee. South Orange County~~	~~gggg. Pacific Ocean Shoreline~~	~~hhhh. at San Juan Creek~~	~~iiii. 44%~~	~~jjjj. 44%~~	~~kkkl 48%~~
	~~llll. San Juan Creek~~	~~mmmm. lower 1 mile~~	~~nnn 44%~~	~~ooo 44%~~	~~ppp 47%~~
~~ffff. (cont'd)~~	~~qqqq. San Juan Creek Mouth~~	~~rrrr. at mouth~~	~~ssss 44%~~	~~tttt. 44%~~	~~uuu 47%~~

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		~~**wwwww.** at Poche Beach~~			
		~~**aaaaa.** Ole Hanson Beach Club Beach at Pico Drain~~			
		~~**bbbbb.** San Clemente City Beach at El Portal Street Stairs~~			
		~~**ccccc.** San Clemente City Beach at Mariposa Street~~			
		~~**ddddd.** San Clemente City Beach at Linda Lane~~			
	~~**vvvv.** Pacific Ocean Shoreline~~	~~**eeeee.** San Clemente City Beach at South Linda Lane~~	~~**xxxx** 35%~~	~~**yyyy** 35%~~	~~**zzzz** 36%~~
		~~**fffff.** San Clemente City Beach at Lifeguard Headquarters~~			
		~~**ggggg.** under San Clemente Municipal Pier~~			
		~~**hhhhh.** San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane)~~			
		~~**iiiii.** San Clemente State Beach at Riviera Beach~~			
		~~**jjjjj.** Can Clemente State Beach at Cypress Shores~~			

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~~kkkkk. San Luis Rey River~~	~~lllll. Pacific Ocean Shoreline~~	~~mmmmm. at San Luis Rey River mouth~~	~~nnn 45%~~	~~ooo 44%~~	~~ppp 47%~~
~~qqqqq. Carlsbad~~	~~rrrrr. Pacific Ocean Shoreline~~	~~sssss. at Moonlight State Beach~~	~~ttttt. 40%~~	~~uuu 40%~~	~~vvv 41%~~
~~wwwww San Dieguito River~~	~~xxxxx. Pacific Ocean Shoreline~~	~~yyyyy. at San Dieguito Lagoon mouth~~	~~zzzz 33%~~	~~aaaa 33%~~	~~bbb 36%~~

~~**dddddd.** Table 6.4 (Cont'd)~~
~~**eeeeee.** Interim Wet Weather WQBELs Expressed as~~
~~**ffffff.** Interim Wet Weather Allowable Exceedance Frequencies~~

~~**gggggg** Watershed~~ ~~**llllll.** Management Area~~	~~**hhhhhh**~~ ~~**mmmmm** Water Body~~	~~**iiiiii.**~~ ~~**nnnnnn.** Segment or Area~~	~~**jjjjjj.** Interim Wet Weather~~ ~~**kkkkkk.** Allowable Exceedance Frequencies~~ ~~**ooo** Total Coliform~~	~~**ppp** Fecal Coliform~~	~~**qqq** Enterococcus~~
~~**rrrrrr.** Penasquitos~~	~~**ssssss.** Pacific Ocean Shoreline~~	~~**tttttt.** Torrey Pines State Beach at Del Mar (Anderson Canyon)~~	~~**uuu** 26%~~	~~**vvvv** 26%~~	~~**www** 26%~~
	~~**xxxxxx.** Pacific Ocean Shoreline~~	~~**yyyyyy.** La Jolla Shores Beach at El Paseo Grande~~	~~**zzzz** 37%~~	~~**aaaa** 37%~~	~~**bbbb** 37%~~
		~~**ccccccc.** La Jolla Shores Beach at Caminito del Oro~~			
		~~**ddddddd.** La Jolla Shores Beach at Vallecitos~~			

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		~~eeeeeee. La Jolla Shores Beach at Avenida de la Playa~~			
		~~fffffff. at Casa Beach, Children's Pool~~			
		~~ggggggg. South Casa Beach at Coast Boulevard~~			
		~~hhhhhhh. Whispering Sands Beach at Ravina Street~~			
		~~iiiiiii. Windansea Beach at Vista de la Playa~~			
		~~jjjjjjj. Windansea Beach at Bonair Street~~			
		~~kkkkkkk. Windansea Beach at Playa del Norte~~			
		~~lllllll. Windansea Beach at Palomar Avenue~~			
		~~mmmmmmm. at Tourmaline Surf Park~~			
		~~nnnnnnn. Pacific Beach at Grand Avenue~~			
	~~ooooooo Tecolote Creek~~	~~ppppppp. Entire reach and tributaries~~	~~qqq 49%~~	~~rrrr 49%~~	~~ssss 51%~~

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~~ttttttt. San Diego River~~	~~uuuuuu For rest er Cre ek~~	~~vvvvvvv. lower 1 mile~~	~~www 4 6 9~~	~~xxxx 4 3 9~~	~~yyyy 4 9 9~~
	~~zzzzzzz. San Die go Riv er~~	~~aaaaaaaa. lower 6 miles~~	~~bbb 4 6 9~~	~~cccc 4 3 9~~	~~ddd 4 9 9~~
	~~eeeeeee Pac ific Oc ean Sh orel ine~~	~~ffffffff. at San Diego River mouth at Dog Beach~~	~~ggg 4 6 9~~	~~hhh 4 3 9~~	~~iiiiiii 5 1 9~~
~~jjjjjjjj. San Diego Bay~~	~~kkkkkkk Ch olla s Cre ek~~	~~llllllll. lower 1.2 miles~~	~~mm 4 1 9~~	~~nnn 4 1 9~~	~~ooo 4 3 9~~

~~pppppppp.~~
~~qqqqqqqq.~~

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~~**ssssssss.** Interim WQBEL Compliance Dates~~

~~**tttttttt.**~~

~~**uuuuuuuu.** The Responsible Copermittees must achieve the interim WQBELs under Specific Provisions 6.c.(2) and 6.c.(2) by the interim compliance dates given in Table 6.5.~~

~~**vvvvvvvv.**~~

~~**wwwwwwwww.** Table 6.5~~

~~**xxxxxxxx.** Interim Compliance Dates to Achieve Interim WQBELs~~

~~**yyyyyyyy.**~~ ~~**ccccccccc.** Watershed Management Area~~	~~**zzzzzzzz.**~~ ~~**ddddddddd.** Water Body~~	~~**aaaaaaaaa.**~~ ~~**eeeeeeeee.** Segment or Area~~	~~**bbbbbbbbb.** Inte… Dates~~ ~~**fffffffff.** Interim~~ ~~**ggggggggg.** Dry Weather~~ ~~**hhhhhhhhh.** WQBELs~~	
~~**lllllllll.** South Orange County~~	~~**mmmmmmmm** Pacific Ocean Shoreline~~	~~**nnnnnnnnn.** Cameo Cove at Irvine Cove Drive – Riviera Way~~	~~**ooooooooo.** April 4, 2016~~	
		~~**qqqqqqqqq.** at Heisler Park - North~~		
	~~**rrrrrrrrr.** Pacific Ocean Shoreline~~	~~**sssssssss.** at Main Laguna Beach~~	~~**ttttttttt.** April 4, 2016~~	
		~~**vvvvvvvvv.** Laguna Beach at Ocean Avenue~~		
		~~**wwwwwwwwww.** Laguna Beach at Cleo Street~~		
		~~**xxxxxxxxx.** Arch Cove at Bluebird Canyon Road~~		
		~~**yyyyyyyyy.** Laguna Beach at Dumond~~		

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		~~Drive~~		
	~~zzzzzzzzz. Pacific Ocean Shoreline~~	~~aaaaaaaaaa. Laguna Beach at Lagunita Place /~~ ~~bbbbbbbbbb. Blue Lagoon Place at Aliso Beach~~	~~cccccccccc. April 4, 2016~~	
	~~eeeeeeeeee. Aliso Creek~~	~~ffffffffff. Entire reach (7.2 miles) and associated tributaries:~~ ~~gggggggggg. - Aliso Hills Channel~~ ~~hhhhhhhhhh. - English Canyon Creek~~ ~~iiiiiiiiii. - Dairy Fork Creek~~ ~~jjjjjjjjjj. - Sulfur Creek~~ ~~kkkkkkkkkk. - Wood Canyon Creek~~	~~llllllllll. April 4, 2018~~	
	~~nnnnnnnnnn. Aliso Creek Mouth~~	~~oooooooooo. at mouth~~	~~pppppppppp. April 4, 2018~~	
	~~rrrrrrrrrr. Pacific Ocean Shoreline~~	~~ssssssssss. Aliso Beach at West Street~~	~~tttttttttt. April 4, 2016~~	
		~~vvvvvvvvvv. Aliso Beach at Table Rock Drive~~		

		~~wwwwwwwwwww 100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)~~		
		~~xxxxxxxxxx. at Salt Creek (large outlet)~~		
		~~yyyyyyyyyy. Salt Creek Beach at Salt Creek service road~~	~~zzzzzzzzzz. April 4, 2017~~	
		~~bbbbbbbbbbb. Salt Creek Beach at Strand Road~~	~~ccccccccccc. April 4, 2017~~	

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~~ffffffffff. Table 6.5 (Cont'd)~~

~~ggggggggggg. Interim Compliance Dates to Achieve Interim WQBELs~~

~~hhhhhhhhhhh.~~ ~~lllllllllll. Watershed Management Area~~	~~iiiiiiiiii.~~ ~~mmmmmmmm Water Body~~	~~jjjjjjjjjj.~~ ~~nnnnnnnnnnn. Segment or Area~~	~~kkkkkkkkkkk. Inte~~ ~~Dates~~ ~~ooooooooooo. Interim~~ ~~ppppppppppp. Dry Weather~~ ~~qqqqqqqqqqq. WQBELs~~
~~uuuuuuuuuuu. South Orange County~~ ~~vvvvvvvvvvv. (cont'd)~~	~~wwwwwwwwww Pacific Ocean Shoreline~~	~~xxxxxxxxxxx. at San Juan Creek~~	~~yyyyyyyyyyy. April 4, 2016~~
	~~aaaaaaaaaaa San Juan Creek~~	~~bbbbbbbbbbb. lower 1 mile~~	~~ccccccccccc. April 4, 2018~~
	~~eeeeeeeeeee San Juan Creek Mouth~~	~~fffffffffff. at mouth~~	~~ggggggggggg. April 4, 2016~~
	~~iiiiiiiiiii. Pacific Ocean Shoreline~~	~~jjjjjjjjjjj. at Poche Beach~~	~~kkkkkkkkkkk. April 4, 2016~~
		~~mmmmmmmmm Ole Hanson Beach Club Beach at Pico Drain~~	~~nnnnnnnnnnn. April 4, 2016~~
		~~ppppppppppp. San Clemente City Beach at El Portal Street Stairs~~	~~qqqqqqqqqqq. April 4, 2017~~
		~~sssssssssss. San Clemente City Beach at Mariposa Street~~	

			~~tttttttttttt. San Clemente City Beach at Linda Lane~~	~~uuuuuuuuuuuu. April 4, 2016~~
			~~wwwwwwwwwwww San Clemente City Beach at South Linda Lane~~	~~xxxxxxxxxxxx. April 4, 2018~~
			~~zzzzzzzzzzzz. San Clemente City Beach at Lifeguard Headquarters~~	~~aaaaaaaaaaaa. April 4, 2017~~
			~~cccccccccccc. under San Clemente Municipal Pier~~	
			~~dddddddddddd San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane)~~	~~eeeeeeeeeeee. April 4, 2018~~
			~~gggggggggggg San Clemente State Beach at Riviera Beach~~	~~hhhhhhhhhhhh April 4, 2016~~
			~~jjjjjjjjjjjj. Can Clemente State Beach at Cypress Shores~~	~~kkkkkkkkkkkk. April 4, 2017~~

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~~mmmmmmmmmmm~~ ~~San Luis Rey River~~	~~nnnnnnnnnnn~~ ~~Pacific Ocean Shoreline~~	~~oooooooooooo~~ ~~at San Luis Rey River mouth~~	~~ppppppppppppp~~ ~~April 4, 2017~~	
~~rrrrrrrrrrrr.~~ ~~Carlsbad~~	~~sssssssssss~~ ~~Pacific Ocean Shoreline~~	~~tttttttttttt.~~ ~~at Moonlight State Beach~~	~~uuuuuuuuuuuu~~ ~~April 4, 2016~~	
~~wwwwwwwwwwww~~ ~~San Dieguito River~~	~~xxxxxxxxxxx~~ ~~Pacific Ocean Shoreline~~	~~yyyyyyyyyyyy.~~ ~~at San Dieguito Lagoon mouth~~	~~zzzzzzzzzzzz.~~ ~~April 4, 2016~~	

~~cccccccccccccc. Table 6.5 (Cont'd)~~
~~dddddddddddddd. Interim Compliance Dates to Achieve Interim WQBELs~~

~~eeeeeeeeeeeeee.~~ ~~iiiiiiiiiiiiii. Watershed Management Area~~	~~ffffffffffffff.~~ ~~jjjjjjjjjjjjjj. Water Body~~	~~gggggggggggggg~~ ~~kkkkkkkkkkkkkk. Segment or Area~~	~~hhhhhhhhhh Complianc~~ ~~llllllllllll. Interim~~ ~~mmmmmmmm Dry Weath~~ ~~nnnnnnnnnn WQBELs~~
~~rrrrrrrrrrrrrr. Penasquitos~~	~~ssssssssssssss Pacific Ocean Shoreline~~	~~tttttttttttttt. Torrey Pines State Beach at Del Mar (Anderson Canyon)~~	~~uuuuuuuuuu April 4, 2016~~
	~~wwwwwwwwwwww Pacific Ocean Shoreline~~	~~xxxxxxxxxxxxxx. La Jolla Shores Beach at El Paseo Grande~~	
		~~yyyyyyyyyyyyyy. La Jolla Shores Beach at Caminito del Oro~~	
		~~zzzzzzzzzzzzzz. La Jolla Shores Beach at Vallecitos~~	
		~~aaaaaaaaaaaaaa. La Jolla Shores Beach at Avenida de la Playa~~	
		~~bbbbbbbbbbbbb at Casa Beach, Children's Pool~~	

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			~~cccccccccccccc.~~ ~~South Casa Beach at Coast Boulevard~~	
			~~dddddddddddd~~ ~~Whispering Sands Beach at Ravina Street~~	
			~~eeeeeeeeeeeeeee.~~ ~~Windansea Beach at Vista de la Playa~~	
			~~ffffffffffffff.~~ ~~Windansea Beach at Bonair Street~~	
			~~gggggggggggggg~~ ~~Windansea Beach at Playa del Norte~~	
			~~hhhhhhhhhhhhh~~ ~~Windansea Beach at Palomar Avenue~~	
			~~iiiiiiiiiiiiii.at Tourmaline Surf Park~~	
			~~jjjjjjjjjjjjjj.Pacific Beach at Grand Avenue~~	
		~~kkkkkkkkkkkkk~~ ~~Tecolote Creek~~	~~llllllllllllll.Entire reach and tributaries~~	
		~~nnnnnnnnnnnn~~ ~~Forrester Creek~~	~~oooooooooooooo~~ ~~lower 1 mile~~	
	~~mmmmmmmmmmmm~~ ~~San Diego River~~	~~rrrrrrrrrrrrrr.~~ ~~San Diego River~~	~~sssssssssssssss.~~ ~~lower 6 miles~~	~~pppppppppp~~ ~~April 4, 2018~~
		~~tttttttttttttt.~~ ~~Pacific Ocean Shoreline~~	~~uuuuuuuuuuuuu~~ ~~at San Diego River mouth at Dog Beach~~	

~~vvvvvvvvvvvvvvv.~~ San Diego Bay	~~wwwwwwwwwwww~~ ~~Chollas Creek~~	~~xxxxxxxxxxxxxx~~ ~~lower 1.2 miles~~	~~yyyyyyyyyyyy~~ ~~April 4, 2018~~

d. Compliance Determination

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

Furthermore, as stated in the TMDL:

The Phase I MS4s may demonstrate that their discharges are not causing the exceedances in the receiving waters by providing data from their discharge points to the receiving waters, by providing data collected at jurisdictional boundaries, and/or using other methods accepted by the San Diego Water Board. Otherwise, at the end of the [wet or] dry weather TMDL compliance schedule, the municipal Phase I MS4s will be held responsible and considered out of compliance unless other information or evidence indicates another controllable or uncontrollable source is responsible for the exceedances in the receiving waters. If controllable sources other than discharges from the municipal Phase I MS4s are identified before or after the end of the [wet or] dry weather TMDL Compliance Schedule as causing the exceedances, those controllable sources will be responsible for reducing their bacteria loads and/or demonstrating that discharges from those sources are not causing the exceedances. The San Diego Water Board shall implement additional actions (e.g., issue enforcement actions, amend existing NPDES requirements or conditional waivers), as needed, to bring all controllable sources into compliance with the [wet or] dry weather TMDLs.

~~aaaaaaaaaaaaaaaa.~~e. Specific Monitoring and Assessment Requirements

The Bacteria Load Reduction Plans (BLRPs) and CLRPs to be submitted by the Copermittees and approved by the Regional Board Executive Officer contain monitoring programs. Implementation of those Regional Board-approved monitoring programs constitutes compliance with the Monitoring Station and Monitoring Procedure requirements, described below.

(1) Monitoring and Assessment Requirements for Beaches

(a) Monitoring Stations

~~(i) The Responsible Copermittees must designate the MS4 outfalls within their jurisdiction discharging to the Pacific Ocean Shoreline segments or areas listed in Table 6.0 as high priority non-storm water MS4 monitoring stations, in accordance with the requirements of Provision of this Order.~~

~~(ii) For the Pacific Ocean Shoreline segments or areas listed in Table 6.0 with MS4 outfalls, the Responsible Copermittees must establish at least one monitoring station within the receiving water.~~

For beaches addressed by these TMDLs, monitoring locations should consist of, at a minimum, the same locations used to collect data required under MS4 NPDES monitoring requirements and beach monitoring for Health and Safety Code section 115880.[75] If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters.

[75] Commonly referred to as AB 411 monitoring

(b) Monitoring Procedures

(i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly.

~~(i)~~(ii) ~~The Responsible Copermittees must monitor the effluent of the designated MS4 outfalls within their jurisdiction discharging during dry weather to the Pacific Ocean Shoreline segments or areas listed in Table 6.0 in accordance with the dry weather jurisdictional monitoring requirements of Provision of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

(iii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations at least once within the first 24 hours of the end of a storm event[26] that occurs during the rainy season (i.e., October 1 through April 30).

~~(ii) The Responsible Copermittees must monitor, within the first 24 hours of each storm event,[27] the effluent of the designated MS4 outfalls within their jurisdiction discharging to the Pacific Ocean Shoreline segments or areas listed in Table 6.0 in accordance with the wet weather jurisdictional monitoring requirements of Provision of this Order. Samples required to be submitted to a laboratory for analysis must include analysis for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.~~

~~(iii)~~(iv) ~~The Responsible Copermittees must collect samples from the monitoring stations within the receiving water body for each dry weather and wet weather MS4 outfall monitoring event.~~ Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(c) Assessment and Reporting Requirements

(i) The Responsible Copermittees must analyze the dry weather and wet weather monitoring data to assess whether the interim and final WQBELs for the Pacific Ocean Shoreline segments or areas listed in

[26] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

~~[27] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].~~

Table 6.0 have been achieved.

~~(i)~~(ii) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

(2) Monitoring and Assessment Requirements for Creeks and Creek Mouths

(a) Monitoring Stations

~~(i) The Responsible Copermittees must establish at least one receiving water monitoring station at or near the mouth of the creeks listed in Table 6.0.~~

~~(ii)~~

~~(iii) The Responsible Copermittees must establish at least one receiving water monitoring station upstream of the station established for Specific Provision 6.d.(2)(a). At least one monitoring station must be established for each Responsible Copermittee at the most downstream location within its jurisdiction, and one monitoring station at the most upstream location within its jurisdiction.~~

~~(iv) The Responsible Copermittees must identify the MS4 outfalls discharging to the segments or areas of the creeks and creek mouths listed in Table 6.0. The Responsible Copermittees must identify the MS4 outfalls that are monitored in accordance with the dry weather jurisdictional monitoring requirements of Provision of this Order and the wet weather jurisdictional monitoring requirements of Provision of this Order.~~

For creeks addressed by these TMDLs, monitoring locations should consist of, at a minimum, a location at or near the mouth of the creek (e.g., Mass Loading Station or Mass Emission Station) and one or more locations upstream of the mouth (e.g., Watershed Assessment Stations). If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters.

(b) Monitoring Procedures

(i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations ~~at least monthly.~~ according to the WQIP.

(ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations within the first 24 hours of

(iii) the end of a storm event[28] that occurs during the rainy season (i.e., October 1 through April 30).

(iv)

(v) Samples collected from receiving water monitoring stations must be analyzed for ~~total coliform,~~ fecal coliform~~,~~ and *Enterococcus* indicator bacteria.

(c) Assessment and Reporting Requirements

(i) The Responsible Copermittees must analyze the receiving water monitoring data to assess whether the interim and final receiving water WQBELs for the creeks and creek mouths listed in Table 6.0 have been achieved.

~~(ii) If the receiving water WQBELs for the creeks and creek mouths listed in Table 6.0 have not been achieved, the Responsible Copermittees must review the MS4 outfall monitoring data to assess whether the interim and final effluent WQBELs have been achieved.~~

~~(iii) The Responsible Copermittee must identify and incorporate additional MS4 outfall and receiving water monitoring stations and/or adjust monitoring frequencies to identify sources causing exceedances of the receiving water WQBELs.~~

~~(iv)~~(ii) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

[28] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE
ORDER NO. R9-2012-0011
NPDES NO. CAS0109266

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHEDS WITHIN THE SAN DIEGO REGION

The San Diego County Copermittees in Table 1a are subject to waste discharge requirements within their respective jurisdictions set forth in this Order.

Table 1a. San Diego County Copermittees

City of Carlsbad	City of Oceanside
City of Chula Vista	City of Poway
City of Coronado	City of San Diego
City of Del Mar	City of San Marcos
City of El Cajon	City of Santee
City of Encinitas	City of Solana Beach
City of Escondido	City of Vista
City of Imperial Beach	County of San Diego
City of La Mesa	San Diego County Regional Airport Authority
City of Lemon Grove	Unified Port District of San Diego
City of National City	

The Orange County Copermittees in Table 1b are subject to waste discharge requirements within their respective jurisdictions set forth in this Order upon expiration of Order No. R9-2009-0002, NPDES No. CAS0108740 on December 16, 2014.

Table 1b. Orange County Copermittees

City of Aliso Viejo	City of Ranch Santa Margarita
City of Dana Point	City of San Clemente
City of Laguna Beach	City of San Juan Capistrano
City of Laguna Hills	City of Laguna Woods
City of Laguna Niguel	County of Orange
City of Lake Forest	Orange County Flood Control District
City of Mission Viejo	

The Riverside County Copermittees in Table 1c are subject to waste discharge requirements within their respective jurisdictions set forth in this Order upon expiration of Order No. R9-2010-0016, NPDES No. CAS0108766 on November 10, 2015.

Table 1c. Riverside County Copermittees

City of Murrieta	County of Riverside
City of Temecula	Riverside County Flood Control and Water Conservation District
City of Wildomar	

The Orange County Copermittees and Riverside County Copermittees may enroll under this Order at a date earlier than the expiration date of their current Orders subject to the conditions described in Provision F.6 of this Order and the Copermittees in the respective county receive a Notice of Enrollment (NOE) from the San Diego Water Board.

The term Copermittee in this Order refers to any San Diego County, Orange County, or Riverside County Copermittee enrolled under this Order, unless specified otherwise.

This Order provides permit coverage for the Copermittee discharges described in Table 2. "Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.26(a)(3)(vi).

Table 2. Discharge Locations and Receiving Waters

Discharge Points	Locations throughout San Diego Region
Discharge Description	Municipal Separate Storm Sewer System (MS4) Discharges
Receiving Waters	Waters of the U.S.: Inland Surface Waters, Enclosed Bays and Estuaries, and Coastal Ocean Waters of the San Diego Region

Table 3. Administrative Information

This Order was adopted by the San Diego Water Board on:	**Month Day, 2012**
This Order will become effective on:	**Month Day, 2012**
This Order will expire on:	**Month Day, 2017**
The Copermittees must file a Report of Waste Discharge (ROWD) in accordance with Title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than 180 days in advance of the Order expiration date.	

I, David W. Gibson, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on Month Day, 2012.

TENTATIVE

David W. Gibson
Executive Officer

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I. FINDINGS

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board), finds that:

JURISDICTION

1. **MS4 Ownership or Operation.** Each of the Copermittees owns or operates an MS4, through which it discharges storm water and non-storm water into waters of the U.S. within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

2. **Legal and Regulatory Authority.** This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations (Code of Federal Regulations [CFR] Title 40, Part 122 [40 CFR 122]) adopted by the United States Environmental Protection Agency (USEPA), and chapter 5.5, division 7 of the California Water Code (CWC) (commencing with section 13370). This Order serves as an NPDES permit for discharges from MS4s to surface waters. This Order also serves as waste discharge requirements (WDRs) pursuant to article 4, chapter 4, division 7 of the CWC (commencing with section 13260).

3. **CWA Technology Based Standards and Prohibitions.** Pursuant to CWA section 402(p)(3)(B), NPDES permits for storm water discharges from MS4s must include requirements to effectively prohibit non-storm water discharges into MS4s, and require controls to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP).

4. **CWA NPDES Permit Conditions.** Pursuant to CWA section 402(a)(2), NPDES permits must prescribe conditions to assure compliance with CWA section 402(p)(3)(B) and 40 CFR 122.26(d)(2)(iv)(B). This Order prescribes conditions to assure compliance with the CWA requirements for owners and operators of MS4s to effectively prohibit non-storm water discharges in to the MS4s, and require controls to reduce the discharge of pollutants in storm water from the MS4s to the MEP.

5. **CWA and CWC Monitoring Requirements.** Pursuant to 40 CFR 122.48, NPDES permits must specify requirements for recording and reporting monitoring results. In addition, CWC sections 13267 and 13383 authorize the San Diego Water Board to require technical and monitoring reports. This Order establishes monitoring and reporting requirements to implement federal and State requirements.

6. **Total Maximum Daily Loads.** CWA section 303(d)(1)(A) requires that "[e]ach state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Clean Water Act Section 303(d) List of Water Quality Limited Segments, commonly referred to as the 303(d) List. The CWA requires the 303(d) List to be updated every two years. Requirements of this Order implement the TMDLs adopted by the San Diego Water Board and approved by USEPA.

7. **Non-Storm Water Discharges.** Pursuant to CWA section 402(p)(3)(B)(ii), this Order requires each Copermittee to effectively prohibit discharges of non-storm water into its MS4. Nevertheless, non-storm water discharges into and from the MS4s continue to be reported to the San Diego Water Board by the Copermittees and other persons. Monitoring conducted by the Copermittees, as well as the 303(d) List, have identified dry weather, non-storm water discharges from the MS4s as a source of pollutants causing or contributing to receiving water quality impairments in the San Diego Region. The federal regulations [40 CFR 122.26(d)(2)(iv)(B)] require the Copermittees to have a program to prevent all types of non-storm water discharges, or illicit discharges, from entering the MS4. The federal regulations, however, allow for specific categories of non-storm water discharges or flows to be addressed as illicit discharges only where such discharges are identified as sources of pollutants to waters of the U.S.

8. **In-Stream Treatment Systems.** Pursuant to federal regulations [40 CFR 131.10(a)], in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of a runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Runoff treatment must occur prior to the discharge of runoff into receiving waters. Treatment control best management practices (BMPs) must not be constructed in waters of the U.S. Construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body.

DISCHARGE CHARACTERISTICS AND RUNOFF MANAGEMENT

9. **Point Source Discharges of Pollutants.** Discharges from the MS4s may contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the state. A discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. Storm water and non-storm water discharges from the MS4s may contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4s are subject to the

conditions and requirements established in the Basin Plan for point source discharges.

10. **Potential Beneficial Use Impairment.** The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution, contamination, or nuisance.

11. **Pollutants Generated by Land Development.** Land development has created and continues to create new sources of non-storm water discharges and pollutants in storm water discharges as human population density increases. This brings higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, and trash. Pollutants from these sources are dumped or washed off the surface by non-storm water or storm water flows into and from the MS4s. When development converts natural vegetated pervious ground cover to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area not subject to SUSMP or HMP requirements contains greater pollutant loads and is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area.

12. **Runoff Discharges to Receiving Waters.** The MS4s discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within the eleven hydrologic units comprising the San Diego Region. Numerous receiving water bodies and water body segments have been designated as impaired by the San Diego Water Board pursuant to CWA section 303(d).

13. **Pollutants in Runoff.** The most common pollutants in runoff discharged from the MS4s include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., cadmium, copper, lead, and zinc), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

14. **Human Health and Aquatic Life Impairment.** Pollutants in runoff discharges from the MS4s can threaten and adversely affect human health and aquatic organisms. Adverse responses of organisms to chemicals or physical agents in runoff range from physiological responses such as impaired reproduction or growth anomalies to mortality. Increased volume, velocity, rate, and duration of storm water runoff greatly accelerate the erosion of downstream natural channels. This alters stream channels and habitats and can adversely affect aquatic and terrestrial organisms.

15. **Water Quality Effects.** The Copermittees' water quality monitoring data submitted to date documents persistent exceedances of Basin Plan water quality objectives for runoff-related pollutants at various watershed monitoring stations. Persistent toxicity

has also been observed at several watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity (IBI) ratings. These findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in the San Diego Region. Non-storm water discharges from the MS4s have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds, and contribute significantly to exceedances of applicable receiving water quality objectives.

16. **Non-Storm Water Discharges.** Pursuant to CWA 402(p)(3)(B)(ii), non-storm water discharges into the MS4s must be effectively prohibited.

17. **Best Management Practices.** Pollutants can be effectively reduced in runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and runoff, therefore keeping pollutants onsite and out of receiving waters. Treatment control BMPs remove pollutants that have been mobilized by storm water or non-storm water flows.

18. **BMP Implementation.** Runoff needs to be addressed during the three major phases of development (planning, construction, and use) in order to reduce the discharge of storm water pollutants to the MEP, effectively prohibit non-storm water discharges, and protect receiving waters. Development which is not guided by water quality planning policies and principles can result in increased pollutant load discharges, flow rates, and flow durations which can negatively affect receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development can generate substantial pollutant loads which are discharged in runoff to receiving waters.

19. **Long Term Planning and Implementation.** Federal regulations require municipal storm water permits to expire 5 years from adoption, after which the permit must be renewed and reissued. The San Diego Water Board recognizes that the degradation of water quality and impacts to beneficial uses of the waters in the San Diego Region occurred over several decades. The San Diego Water Board further recognizes that a decade or more may be necessary to realize demonstrable improvement to the quality of waters in the Region. This Order includes a long term planning and implementation approach that will require more than a single permit term to complete.

WATER QUALITY STANDARDS

20. Basin Plan. The San Diego Water Board adopted a Water Quality Control Plan for the San Diego Basin (Basin Plan) on September 8, 1994 that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for receiving waters addressed through the plan. The Basin Plan was subsequently approved by the State Water Resources Control Board (State Water Board) on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and approved by the State Water Board. Requirements of this Order implement the Basin Plan.

The Basin Plan identifies the following existing and potential beneficial uses for inland surface waters in the San Diego Region: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Freshwater Replenishment (FRSH), Hydropower Generation (POW), and Preservation of Biological Habitats of Special Significance (BIOL). The following additional existing and potential beneficial uses are identified for coastal waters of the San Diego Region: Navigation (NAV), Commercial and Sport Fishing (COMM), Estuarine Habitat (EST), Marine Habitat (MAR), Aquaculture (AQUA), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction, and/or Early Development (SPWN), and Shellfish Harvesting (SHELL).

21. Ocean Plan. The State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, and 2005. The State Water Board adopted the latest amendment on April 21, 2005 and it became effective on February 14, 2006. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean. Requirements of this Order implement the Ocean Plan.

The Ocean Plan identifies the following beneficial uses of ocean waters of the state to be protected: Industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture; preservation and enhancement of designated Areas of Special Biological Significance; rare and endangered species; marine habitat; fish spawning and shellfish harvesting

22. Sediment Quality Control Plan. On September 16, 2008, the State Water Board adopted the Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality (Sediment Quality Control Plan). The Sediment Quality Control Plan became effective on August 25, 2009. The Sediment Quality Control Plan establishes 1) narrative sediment quality objectives for benthic community protection from exposure to contaminants in sediment and to protect human health, and 2) a program of implementation using a multiple lines of evidence approach to interpret

the narrative sediment quality objectives. Requirements of this Order implement the Sediment Quality Control Plan.

23. **National Toxics Rule and California Toxics Rule.** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the National toxics Rule (NTR) applied in California. On May 18, 2000, USEPA adopted the California Toxics Rule (CTR). The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants

24. **Antidegradation Policy.** This Order is in conformance with the federal Antidegradation Policy described in 40 CFR 131.12, and State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*. Federal regulations at 40 CFR 131.12 require that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The San Diego Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies.

CONSIDERATIONS UNDER FEDERAL LAW

25. **Coastal Zone Act Reauthorization Amendments.** Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This Order addresses the management measures required for the urban category, with the exception of septic systems. The runoff management programs developed pursuant to this Order fulfill the need for coastal cities to develop a runoff non-point source plan identified in the Non-Point Source Program Strategy and Implementation Plan. The San Diego Water Board addresses septic systems through the administration of other programs.

26. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 USCA sections 1531 to 1544). This Order requires compliance with receiving water limits, and other requirements to protect the beneficial uses of waters of the State. The Copermittees are responsible for meeting all requirements of the applicable Endangered Species Act.

CONSIDERATIONS UNDER STATE LAW

27. Unfunded Mandates. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following:

a. This Order implements federally mandated requirements under CWA section 402. (33 USC 1342(p)(3)(B).)

b. The local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges.

c. The local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order.

d. The Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301(a) (33 USC 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations).

e. The local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

f. The provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 USC 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions and requirements of any applicable wasteload allocation. (40 CFR 122.44(d)(1)(vii)(B).)

28. California Environmental Quality Act. The issuance of WDRs and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with CWC section 13389.

STATE WATER BOARD DECISIONS

29. Compliance with Prohibitions and Limitations. The receiving water limitation language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The receiving water limitation language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the

implementation of improved and better-tailored BMPs over time. Implementation of the iterative approach to comply with receiving water limitations based on applicable water quality standards is necessary to ensure that storm water discharges from the MS4 ultimately will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

30. Special Conditions for Areas of Special Biological Significance. On March 20, 2012, the State Water Board approved Resolution No. 2012-0012 approving an exception to the Ocean Plan prohibition against discharges to Areas of Special Biological Significance (ASBS) for certain nonpoint source discharges and NPDES permitted municipal storm water discharges. The Resolution requires monitoring and testing of marine aquatic life and water quality in several ASBS to protect California's coastline during storms when rain water overflows into coastal waters. Specific terms, prohibitions, and special conditions were adopted to provide special protections for marine aquatic life and natural water quality in ASBSs. The City of San Diego's municipal storm water discharges to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's municipal storm water discharges to the Heisler Park ASBS are subject terms and conditions of the Resolution. The Special Protections contained in Attachment B to the Resolution applicable to these discharges are hereby incorporated in this Order as if fully set forth herein.

ADMINISTRATIVE FINDINGS

31. Executive Officer Delegation of Authority. The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC section 13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC section 13223 or this Order explicitly states otherwise.

32. Standard Provisions. Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment B to this Order.

33. Fact Sheet. The Fact Sheet for this Order contains background information, regulatory and legal citations, references and additional explanatory information and data in support of the requirements of this Order. The Fact Sheet is hereby incorporated into this Order and constitutes part of the Findings of this Order.

34. Public Notice. The San Diego Water Board notified the Copermittees, and interested agencies and persons of its intent to prescribe WDRs for MS4 discharges of pollutants to waters of the U.S. and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet.

35. Public Hearing. The San Diego Water Board held a public hearing on Month Day, 2012 and heard and considered all comments pertaining to the terms and conditions of this Order. Details of the public hearing are provided in the Fact Sheet.

II. PROVISIONS

THEREFORE, IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND LIMITATIONS

[NOTE: The receiving water limitations language contained in provision A raises significant legal and policy issues that require further discussion and revision. The receiving water limitations language in Provision A generally follows the language required by the State Board's precedential Order WQ 99-05. In the State Board's precedential order WQ 2001-15, the State Board determined that the mandatory receiving water limitations language found in Order 99-05 "does not require strict compliance with water quality standards." Instead, the State Board concluded that compliance with water quality standards is "to be achieved over time, through an iterative approach requiring improved BMPs." Despite this policy statement from the State Board, in 2011, the 9th Circuit interpreted the State Board's mandatory language in a manner that requires strict and immediate compliance with water quality standards. The State Board has recently scheduled a workshop for November 20 to address the receiving water limitations language. The San Diego Copermittees support revisions to the receiving water limitations language that align the language with the State Board's policy that compliance with water quality standards is "to be achieved over time, through an iterative approach requiring improved BMPs." Storm water organizations such as CASQA have already submitted language to the State Board designed to address this conflict between the State Board's policy and the 9th Circuit decision. The redlines submitted below are not designed to address all the issues raised by this conflict. Instead, the redlines address, for this draft permit, how compliance with water quality standards will be achieved for water bodies covered by an adopted TMDL or covered in the WQIPs. The San Diego Copermittees will participate in the State Board process regarding the larger issues involving the receiving water limitations language, and encourage the Regional Board to do so as well. The San Diego Copermittees reserve the right to submit additional language intended to align all of the receiving water limitations language in this draft permit with State Board policy as the State Board workshop process evolves. At this time, however, the San Diego Copermittees believe it is premature to submit such language given the pending State Board process and the proposed CASQA language.]

The purpose of this provision is to describe the conditions under which storm water and non-storm water discharges into and from MS4s are prohibited or limited. The goal of this provision is to address the impacts of MS4 discharges so that such discharges do not impair water quality and designated beneficial uses of waters of the U.S. This goal will be accomplished through implementation of control measures that effectively prohibit non-storm water discharges into and from the Copermittees' MS4s, and reduce pollutants in storm water discharges from the Copermittees' MS4s to the MEP. The process for determination of compliance with the Discharge Prohibitions (A.1), Receiving Water Limitations (A.2), and Effluent Limitations (A.3) is defined in Provision A.4.

1. Discharge Prohibitions

a. Discharges from MS4s owned and operated by a Copermittee in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance in receiving waters of the U.S. are effectively prohibited, unless the Copermittee is addressing the discharges through Provision A.1.e or A.4 through the process set forth in Provision A.4.

b. Non-storm water discharges into MS4s are effectively prohibited, unless such discharges are either authorized by a separate NPDES permit, or the discharge is a category of non-storm water discharges or flows that must be addressed pursuant to Provisions E.2.a.(1)-(5) of this Order.

c. Discharges from MS4s are subject to all waste discharge prohibitions in the Basin Plan, included in Attachment A to this Order, unless the Copermittee is addressing the discharges through Provision A.1.e or A.4 through the process set forth in Provision A.4.

d. Storm water discharges from the City of San Diego's MS4 to the San Diego Marine Life Refuge in La Jolla, and the City of Laguna Beach's MS4 to the Heisler Park ASBS are authorized under this Order subject to the Special Protections contained in Attachment B to State Water Board Resolution No. 2012-001**2** applicable to these discharges, included in Attachment A to this Order. All other discharges from MS4s to ASBS are prohibited, unless authorized by a subsequent order.

e. For discharges associated with water body pollutant combinations addressed in a TMDL in Attachment E of this Order, the affected Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions).

2. Receiving Water Limitations

a. Discharges from MS4s owned and operated by a Copermittee must not cause or contribute to the violation of water quality standards in any receiving waters, including all applicable provisions contained in the list below including any modifications unless the Copermittee is addressing the discharges through Provision A.2.b or A.4 through the process set forth in Provision A.4:

(1) The San Diego Water Board's Basin Plan, including beneficial uses, water quality objectives, and implementation plans;

(2) State Water Board plans for water quality control including the following:

(a) Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries (Thermal Plan), and

(b) The Ocean Plan, including beneficial uses, water quality objectives, and implementation plans;

(3) State Water Board policies for water and sediment quality control including the following:

(a) Water Quality Control Policy for the Enclosed Bays and Estuaries of California,

(b) Sediment Quality Control Plan which includes the following narrative objectives for bays and estuaries:

(i) Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities, and

(ii) Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health,

(c) The Statement of Policy with Respect to Maintaining High Quality of Waters in California (State Water Board Resolution No. 68-16).

(4) Priority pollutant criteria promulgated by the USEPA through the following:

(a) National Toxics Rule (NTR)[1] (promulgated on December 22, 1992 and amended on May 4, 1995), and

(b) California Toxics Rule (CTR)[2,3]

b. For receiving water limitations associated with a water body pollutant combination addressed in a TMDL in Attachment E of this Order, the Copermittees shall achieve compliance as outlined in Attachment E (Total Maximum Daily Load Provisions).

3. Effluent Limitations

a. Technology Based Effluent Limits
Pollutants in storm water discharges from MS4s must be reduced to the MEP[4],

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[1] 40 CFR 131.36
[2] 65 Federal Register 31682-31719 (May 18, 2000), adding Section 131.38 to 40 CFR
[3] If a water quality objective and a CTR criterion are in effect for the same priority pollutant, the more stringent of the two applies, unless a previous regulatory action (i.e., TMDL) has specified otherwise.
[4] This does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the

through timely implementation of control measures and other actions as specified in Provisions B and E as described in Provision A.4.

b. Water Quality Based Effluent Limits
For a water body-pollutant combination addressed in a TMDL in Attachment E of this Order, pollutants in discharges from MS4s must be reduced to comply with effluent limitations expressed as WQBELs required to meet the WLAs established for those TMDLs as described in Provision A.4 and Attachment E to this Order, pursuant to the applicable TMDL compliance schedules.

4. Compliance with Discharge Prohibitions, Receiving Water Limitations, and Effluent Limitations

Each Copermittee must comply with the discharge prohibitions (A.1), receiving water limitations (A.2), and effluent limitations (A.3) of this Order through timely implementation of strategies, control measures, and other actions as specified in Provisions B and E of this Order, including any modifications. The Water Quality Improvement Plans described in Provision B shall be designed to achieve compliance with the discharge prohibitions, receiving water limitations, and effluent limitations. Copermittees shall be considered in compliance with A.1, A.2, and A.3 unless the Regional Board has denied approval of a Water Quality Improvement Plan or subsequent update as described in Provisions B and F.1.

a. If exceedance(s) of water quality standards persist in receiving waters notwithstanding implementation of this Order, the Copermittees must comply with the following procedures:

(1) For pollutants that are not in the process of being addressed via specific scheduled actions in a Water Quality Improvement Plan, upon a determination by either the Copermittees or the San Diego Water Board that discharges from the MS4 are causing or contributing to an exceedance of an applicable water quality standard, the Copermittees must submit the following updates to the Water Quality Improvement Plan required under Provision B as part of the Annual Report required under Provision F.3.b or Water Quality Improvement Plan update Provision B.5.a, unless the San Diego Water Board either: 1) directs an earlier submittal; or 2) allows for the adoption of a forthcoming TMDL to establish wasteload allocations that will form the basis of revisions to the Water Quality Improvement Plan:

(a) The water quality improvement strategies being implemented that are effective and will continue to be implemented;

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sanitary sewer). Runoff treatment must occur prior to the discharge of runoff into receiving waters per Finding 8.

(b) Water quality improvement strategies (e.g. BMPs, retrofitting projects, stream and/or habitat rehabilitation, restoration projects, etc.) that will be implemented to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards;

(c) Updates to the schedule for implementation of the existing and additional water quality improvement strategies; and

(d) Updates, when necessary, to the schedule for achieving compliance with the discharge prohibitions and receiving water limitations of this Order;

(e) As described in Provision B.6, Copermittees must submit requested modifications to the Water Quality Improvement Plan either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b. ;;

(f) As described in Provision B.6, upon San Diego Water Board determination that the update to the Water Quality Improvement Plan meets the requirements of this Order, the Copermittees must submit requested modifications to the jurisdictional runoff management programs either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b.; and

(g) The Copermittees must implement the revised jurisdictional runoff management programs and updated jurisdictional monitoring and assessment component of the Water Quality Improvement Plan.

(2) For pollutants in the process of being addressed via a specific, scheduled program in a Water Quality Improvement Plan, the Copermittee(s) shall continue to implement that program as described in the Water Quality Improvement Plan approved by the Regional Board;

b. So long as the Copermittees have complied with the procedures set forth above and are implementing the Water Quality Improvement Plan(s) approved by the Regional Board, the Copermittees do not have to repeat the same procedure for continuing or recurring exceedances of the same discharge prohibitions, effluent limitations, and receiving water limitations unless directed to by the San Diego Water Board.

B. WATER QUALITY IMPROVEMENT PLANS

The purpose of this provision is to develop Water Quality Improvement Plans that guide the Copermittees' jurisdictional runoff management program implementation efforts towards achieving the outcome of improved water quality in MS4 discharges and receiving waters. The goal of the Water Quality Improvement Plan is to 1) effectively prohibit non-storm water discharges into the MS4s, 2) reduce pollutants in storm water discharges from the MS4s to the MEP, and 3) support attainment and reasonable protection, preservation and enhancement of water quality and designated beneficial uses of waters of the state. Therefore, implementation of the WQIPs also provides the basis for complying with Provisions A.1 and A.3, as described in Provision A.4. This goal will be accomplished through an adaptive planning and management process that identifies the highest water quality priorities within a watershed and implements strategies, control measures, and BMPs to achieve improvements in the quality of discharges from the MS4s and receiving waters.

The Copermittees must develop Water Quality Improvement Plans for each Watershed Management Area that 1) prioritize water quality conditions resulting from the Copermittee's MS4 discharges in each Watershed Management Area, 2) identify MS4 pollutant sources associated with the water quality priorities, 3) define numeric goals and schedules to address water quality priorities, 4) describe water quality improvement strategies to achieve numeric goals, and 5) develop and execute a coordinated monitoring and assessment program to facilitate adaptive management of the Water Quality Improvement Plans and determine progress towards achieving improved water quality in MS4 discharges and receiving waters

The Copermittees must submit Water Quality Improvement Plans for public review and Regional Board Executive Officer review and approval per the schedule outline in Provision B.

1. Watershed Management Areas

The Copermittees must develop Water Quality Improvement Plans for each of the Watershed Management Areas in Table B-1. A total of ten Water Quality Improvement Plans must be developed for the San Diego Region.

ADMINISTRATIVE DRAFT

Table B-1. Watershed Management Areas

Watershed Management Area	Hydrologic Unit(s)	Major Surface Water Bodies	Responsible Copermittees
South Orange County	San Juan (901.00)	Aliso Creek San Juan Creek San Mateo Creek Pacific Ocean	- City of Aliso Viejo[1] - City of Dana Point[1] - City of Laguna Beach[1] - City of Laguna Hills[1] - City of Laguna Niguel[1] - City of Laguna Woods[1] - City of Lake Forest[1] - City of Mission Viejo[1] - City of Rancho Santa Margarita[1] - City of San Clemente[1] - City of San Juan Capistrano[1] - County of Orange[1] - Orange County Flood Control District[1]
Santa Margarita River	Santa Margarita (902.00)	Murrieta Creek Temecula Creek Santa Margarita River Santa Margarita Lagoon Pacific Ocean	- City of Murrieta[2] - City of Temecula[2] - City of Wildomar[2] - County of Riverside[2] - County of San Diego[3] - Riverside County Flood Control and Water Conservation District[2]
San Luis Rey River	San Luis Rey (903.00)	San Luis Rey River San Luis Rey Estuary Pacific Ocean	- City of Oceanside - City of Vista - County of San Diego
Carlsbad	Carlsbad (904.00)	Loma Alta Slough Buena Vista Lagoon Agua Hedionda Lagoon Batiquitos Lagoon San Elijo Lagoon Pacific Ocean	- City of Carlsbad - City of Encinitas - City of Escondido - City of Oceanside - City of San Marcos - City of Solana Beach - City of Vista - County of San Diego
San Dieguito River	San Dieguito (905.00)	San Dieguito River San Dieguito Lagoon Pacific Ocean	- City of Del Mar - City of Escondido - City of Poway - City of San Diego - City of Solana Beach - County of San Diego
Penasquitos	Reservoir HA (906.10) Poway HA (906.20) Miramar HA (906.40)	Los Penasquitos Lagoon Pacific Ocean	- City of Del Mar - City of Poway - City of San Diego - County of San Diego
Mission Bay	Scripps HA (906.30) Miramar HA (906.40) Tecolote HA (906.50)	Mission Bay Pacific Ocean	-City of San Diego
San Diego River	San Diego (907.00)	San Diego River Pacific Ocean	- City of El Cajon - City of La Mesa - City of San Diego - City of Santee - County of San Diego

ADMINISTRATIVE DRAFT

Table B-1. Watershed Management Areas

Watershed Management Area	Hydrologic Unit(s)	Major Surface Water Bodies	Responsible Copermittees
San Diego Bay	Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)	Sweetwater River Otay River San Diego Bay Pacific Ocean	- City of Chula Vista - City of Coronado - City of Imperial Beach - City of La Mesa - City of Lemon Grove - City of National City - City of San Diego - County of San Diego - San Diego County Regional Airport Authority - Unified Port of San Diego
Tijuana River	Tijuana (911.00)	Tijuana River Tijuana Estuary Pacific Ocean	- City of Imperial Beach - City of San Diego - County of San Diego

Notes:
1. The Orange County Copermittees will be enrolled under this Order upon expiration of Order No. R9-2009-0002, or earlier if the Orange County Copermittees meet the conditions in Provision F.6.
2. The Riverside County Copermittees will be enrolled under this Order upon expiration of Order No. R9-2010-0016, or earlier if the Riverside County Copermittees meet the conditions in Provision F.6.
3. The County of San Diego will not be required to implement the requirements of Provision B for the Santa Margarita River Watershed Management Area until the Riverside County Copermittees are enrolled under this Order. Until then, the County of San Diego is responsible for implementing and complying with the requirements of Provisions D.1, D.4.a.(1)&(3), E, F.2.a-b, F.3.b, and F.4 for the areas of the Santa Margarita River Watershed Management Area within its jurisdiction.

2. Identification of Water Quality Priorities

The Copermittees must identify the water quality priorities within each Watershed Management Area that will be addressed by the Water Quality Improvement Plan. Where appropriate, Watershed Management Areas may be separated into subwatersheds to focus water quality prioritization and jurisdictional implementation efforts by receiving water.

a. Assessment of Receiving Water Conditions

The Copermittees must consider the following, at a minimum, to support the identification of water quality priorities based on the impacts of MS4 discharges on receiving water beneficial uses:

(1) Receiving waters listed as impaired on the CWA Section 303(d) List of Water Quality Limited Segments (303(d) List);

(2) TMDLs adopted and under development by the San Diego Water Board;

(3) The requirements of Provision A.2;

(4) Receiving waters recognized as sensitive or highly valued by the Copermittees, including estuaries designated under the National Estuary Program under CWA section 320, wetlands defined by the State or U.S. Fish and Wildlife Service's National Wetlands Inventory as wetlands, and

receiving waters identified as ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-001**2** (Attachment A);

(5) Water quality standards established in the Basin Plan;

(6) Known historical versus current physical, chemical, and biological water quality conditions;

(7) Available, relevant, and appropriately collected physical, chemical, and biological receiving water monitoring data meeting appropriate QA/QC standards, including data describing:

(a) Chemical constituents;

(b) Water quality parameters (i.e. pH, temperature, conductivity, etc.);

(c) Toxicity Identification Evaluations for both receiving water column and sediment;

(d) Trash impacts;

(e) Bioassessments; and

(f) Physical habitat.

(8) Available evidence of erosional impacts in receiving waters due to accelerated flows (i.e. hydromodification);

(9) Available evidence of adverse impacts to the chemical, physical, and biological integrity of receiving waters; and

(10) The potential for long-term achievement and maintenance of beneficial use attainment in the Watershed Management Area.

b. ASSESSMENT OF MS4 DISCHARGE QUALITY AND IMPACTS

To support the identification of priorities based on the impacts of MS4 discharges on receiving water beneficial uses, the Copermittees must review appropriately collected MS4 discharge quality data and consider the extent to which MS4s cause or contribute to the adverse impacts to receiving water beneficial uses identified in B.2.a. Considerations include:

(1) Locations of the Copermittees' MS4 discharges with respect to receiving waters;

(2) MS4 discharge quality results relevant to impacts in receiving waters and action levels, including the temporal and geographic variation of the results:

(3) The requirements of Provisions A.1 and A.3.; and

(4) Whether MS4 discharge quality is sufficiently well known or other information is available to assess whether MS4 discharges are causing or contributing to specific receiving water conditions, or whether additional data need to be collected through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan.

c. IDENTIFICATION OF PRIORITY RECEIVING WATER CONDITIONS

The Copermittees must use the information gathered in Provision B.2.a and B.2.b. to develop a list of water quality priorities as pollutants and/or receiving water conditions that are the highest threat to receiving water quality or that most adversely affect the physical, chemical, and biological integrity of receiving waters. The Copermittees must identify the highest water quality priorities to be addressed by the Water Quality Improvement Plan, and describe the reasoning for selecting a subset of receiving water conditions as the highest priority(ies) The Water Quality Improvement Plans shall describe the following for the highest priority receiving water condition:

(1) The beneficial use(s) and pollutant(s) associated with the priority receiving water condition(s);

(2) The geographic extent of the priority receiving water condition(s)within the WMA, if known;

(3) The Copermittees with MS4s that contribute discharges to the priority water receiving condition(s);

(4) The temporal extent of the priority receiving condition(s) (i.e., dry weather and/or wet weather); and

(5) Whether receiving waters have been monitored sufficiently to adequately characterize the priority receiving condition(s), including a consideration of spatial and temporal variation.

d. MS4 POLLUTANT SOURCE IDENTIFICATION

The Copermittees must identify and prioritize known and suspected storm water and non-storm water pollutant sources within the MS4 associated with the highest priority receiving water conditions identified under B.2.c. The identification of known and suspected sources of the highest water quality priorities as identified for Provision B.2.c shall consider the following :

(1) Land uses and their potential contribution to the highest priority receiving water conditions;

(2) Pollutant generating facilities, areas, and/or activities within the Watershed Management Area;

(3) Locations of the Copermittees' MS4s outfalls.

(4) Review of available data, including:

(a) Findings from the Copermittees' illicit discharge detection and elimination programs,

(b) Findings from the Copermittees' MS4 outfall monitoring,

(c) Other available, relevant, and appropriately-collected data, information, or studies related to pollutant sources and pollutant-generating activities that contribute to the highest priority receiving water conditions identified in Provision B.2.c.

(5) Whether MS4 sources are sufficiently well known to design an effective, efficient[5], directed control strategy, or whether additional source/stressor identification needs to be conducted through the Monitoring and Assessment Program developed as part of the Water Quality Improvement Plan to identify and prioritize sources/stressors within the watershed.

e. NUMERIC GOALS

The Copermittees must develop and incorporate interim and final numeric goals[6] into the Water Quality Improvement Plans. Numeric goals and schedules are intended to support Water Quality Improvement Plan development and to measure progress towards addressing the highest priority receiving water conditions identified under B.2.c. Numeric goals are not enforceable compliance standards, effluent limitations, or receiving water limitations. When establishing numeric goals and corresponding schedules, the Copermittees must consider the following:

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[5] Copermittees are encouraged to use a sustainability analysis, or Triple Bottom Line analysis, that considers environmental, social and economic factors when estimating the potential efficiency of control strategies.

[6] Interim and final numeric goals may take a variety of forms such as TMDL targets, TMDL wasteload allocations, TMDL based WQBELs incorporated in Attachment E of this Order, action levels, pollutant concentration, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biotic Integrity (IBI) scores, or other appropriate metrics. Interim and final numeric goals are not necessarily limited to one criterion or indicator, but may include multiple criteria and/or indicators. To the extent that a goal is not based on an enforceable regulatory mechanism (i.e., TMDL, WLA), WQIP goals and schedules may be revised through the iterative process. Numeric goals are not subject to enforcement or non-compliance actions under this Order.

(1) Final numeric goals must be based on measureable criteria or indicators, to be achieved in the receiving waters and/or MS4 discharges for the highest priority receiving water conditions which will be capable of demonstrating progress toward the achievement of the restoration and/or protection of water quality standards in receiving waters; and

(2) Interim numeric goals must be based on measureable criteria or indicators that can demonstrate incremental progress toward achieving the final numeric goals in the receiving waters and/or MS4 discharges.

(3) Schedules must be adequate for measuring progress toward achieving the interim and final numeric goals required for Provisions B.2.d. Schedules must incorporate the following:

(a) Interim dates for achieving the interim numeric goals,

(b) Compliance schedules for any applicable TMDLs in Attachment E to this Order,

(c) Compliance schedules for any ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-001**2** (see Attachment A),

(d) Achievement of the final numeric goals in the receiving waters and/or MS4 discharges for the highest water quality priorities must be as soon as possible, and

(e) Final dates for achieving the final numeric goals must not extend more than 10 years beyond the date this Order is adopted, unless the schedule includes an applicable TMDL in Attachment E to this Order[7].

3. Water Quality Improvement Strategies and Schedules

The Copermittees must develop specific water quality improvement strategies to address the highest priority receiving water conditions identified within a Watershed Management Area. The water quality improvement strategies must address the highest water quality priorities by preventing or eliminating non-storm water discharges to and from the MS4, reducing pollutants in storm water discharges from the MS4 to the MEP, and restoring and/or protecting the water quality standards of receiving waters.

a. WATER QUALITY IMPROVEMENT STRATEGIES

[7] Achievement of final numeric goals within 10 years represents progress towards attainment of water quality standards, but is not a requirement to fully attain all applicable water quality standards or all priority receiving water conditions within 10 years.

The Copermittees must prioritize water quality improvement strategies, based on their likely effectiveness and efficiency, and implement measures, as appropriate, to effectively prohibit non-storm water discharges into its MS4, reduce pollutants in storm water discharges from its MS4 to the MEP, and achieve the interim and final numeric goals in accordance with the schedules in Provision B.2.e. Measures include:

(1) Copermittee-selected activities identified in Provision E ,either as described in the jurisdictional runoff management programs or as modified with justification, that will address priority receiving water conditions; and

(2) Additional structural and/or non-structural BMPs (to include public outreach and participation programs), as selected by the Copermittee, that are designed to achieve the interim and final numeric goals identified in Provision B.2.e.

b. IMPLEMENTATION SCHEDULES

(1) The Copermittees must develop schedules for implementing the water quality improvement strategies identified under Provision B.3.a to achieve the interim and final numeric goals identified in B.2.e in the Watershed Management Area. Schedules must be developed for both the water quality improvement strategies implemented by each Copermittee within its jurisdiction and for strategies that Copermittees' choose to implement on a collaborative basis.

(2) The Copermittees must incorporate the implementation compliance schedules for any ASBS subject to the provisions of Attachment B to State Water Board Resolution No. 2012-0012 (see Attachment A).

4. Water Quality Improvement Monitoring and Assessment

The Copermittees in each Watershed Management Area must develop an integrated Water Quality Improvement Plan Monitoring and Assessment Program that assesses: 1) progress toward achieving the numeric goals and schedules, 2) progress toward addressing the highest priority receiving water conditions for each Watershed Management Area, and 3) each Copermittee's overall efforts implementing the requirements of Provision B. The water quality improvement monitoring and assessment program must include the monitoring and assessment requirements of Provision D, which may be modified for consistency with the priority receiving water conditions of each Watershed Management Area and associated Copermittees. For Watershed Management Areas with applicable TMDLs, the water quality monitoring and assessment program must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-001**2** (see Attachment A).

5. Iterative and Adaptive Management Process

The Copermittees in each Watershed Management Area must implement the iterative process, adapting the Water Quality Improvement Plan, jurisdictional runoff management programs and monitoring and assessment programs, as necessary, to become more effective and meet the requirements of Provisions A, and shall consider the following:

a. PRIORITY RECEIVING WATER CONDITIONS AND NUMERIC GOALS
The priority receiving water conditions and numeric goals, developed pursuant to B.2.c. and B.2.e respectively, shall guide jurisdictional implementation efforts for the duration of this Order. Recommendations for changes to priority receiving water conditions and numeric goals shall be provided in the Report of Waste Discharge and shall consider the following:

(1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan;

(2) Progress toward achieving interim and final numeric goals in receiving waters and/or MS4 discharges for the highest water quality priorities in the Watershed Management Area

(3) New scientific information or new or updated policies or regulations that affect identified numeric goals including revised water quality objectives or TMDLs;

(4) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality problems and implementation measures to address the highest priority receiving water conditions;

(5) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees;

(6) The factors listed in Provision B.2.a.(1)-(10);

(7) San Diego Water Board recommendations; and

(8) Recommendations for modifications solicited through a public participation process.

b. WATER QUALITY IMPROVEMENT STRATEGIES AND SCHEDULES
The water quality improvement strategies and schedules required pursuant to Provisions B.3 and B.4 shall be adapted as new information becomes available

to inform more effective and efficient means of achieving the numeric goals established in Provision B.2.e. Copermittees shall consider adaptation to jurisdictional runoff management programs and monitoring and assessment strategies and schedules at least annually considering the following:

(1) Changes to priority receiving water conditions and numeric goals based on recommendations from B.5.a.;

(2) Measurable or demonstrable reductions of non-storm water discharges to each Copermittee's MS4;

(3) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;

(4) Information on the MS4 sources and/or pollutant-generating activities determined to be most significantly contributing to priority receiving water conditions;

(5) Efficiency in implementing the Water Quality Improvement Plan;

(6) San Diego Water Board recommendations; and

(7) Recommendations for modifications solicited through a public participation process.

6. Water Quality Improvement Plan Submittal, Implementation, and Modifications

Requirements for Water Quality Improvement Plan submittals and modifications are described in Provision F. Requirements for corresponding modifications to the jurisdictional runoff management programs and monitoring and assessment program are also described in Provision F.

Copermittees must commence with implementation of the Water Quality Improvement Plan no later than the fiscal year (July 1) following San Diego Water Board approval of the Water Quality Improvement Plan.

C. ACTION LEVELS

The purpose of this provision is for the Copermittees to incorporate numeric non-storm water and storm water action levels in the Water Quality Improvement Plans. The action levels shall be used to guide the following program planning efforts and measure progress towards attaining the reasonable protection, preservation, and enhancement of water quality and designated beneficial uses of waters of the state:

1. Support development and prioritization of water quality improvement strategies through the Water Quality Improvement Plans. Discharge data above action levels can be evaluated using a statistical approach considering the frequency, magnitude, and loading of discharges to the receiving waters to support development of actions and prioritization of their implementation.
2. Assist in the effective prohibition of non-stormwater discharges from the MS4 pursuant to Provision E.2.
3. Support the detection and elimination of illicit discharges to the MS4 pursuant to Provision E.2.

These goals will be accomplished through monitoring and assessing the quality of the MS4 discharges prior to and during the implementation of the Water Quality Improvement Plans. Exceedances of action levels are not subject to enforcement or non-compliance actions under this Order.

Action levels will be developed and incorporated into the Water Quality Improvement Plans (Provision B) including the Illicit Discharge Detection and Elimination (IDDE) Program (Provision E.2). Depending upon the goals/objectives for the use of the action levels and the priority receiving water conditions, the constituents and values at which they are set may differ between watersheds. Copermittees may develop Watershed Management Area specific numeric action levels for non-storm water and storm water MS4 discharges using an approach approved by the Regional Board or use the default non-stormwater and stormwater action levels prescribed within C.1 and C.2 below, respectively. The Copermittees will submit action levels as part of their Water Quality Improvement Plan(s). The action levels established as part of R9-2007-0001 will serve as the interim action levels until the Water Quality Improvement Plans are completed and approved.

1. Non-Storm Water Action Levels

a. The following non-storm water action levels (NALs) must be incorporated:

(1) Non-Storm Water Discharges from MS4s to Ocean Surf Zone

Table C-1. Non-Storm Water Action Levels for Discharges from MS4s to Ocean Surf Zone

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Total Coliform	MPN/100 ml	1,000	-	10,000/1,000[1]	OP
Fecal Coliform	MPN/100 ml	200[2]	-	400	OP
Enterococci	MPN/100 ml	35	-	104[3]	OP

Abbreviations/Acronyms
AMAL – average monthly action level
MDAL – maximum daily action level
OP – Ocean Plan water quality objective
MPN/100 ml – most probable number per 100 milliliters

Notes:
1. Total coliform density NAL is 1,000 MPN/100 ml when the fecal/total coliform ratio exceeds 0.1
2. Fecal coliform density NAL is 200 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas"

(2) Non-Storm Water Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Table C-2. Non-Storm Water Action Levels for Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Turbidity	NTU	75	-	225	OP
pH	Units	Within limit of 6.0 to 9.0 at all times			OP
Fecal Coliform	MPN/100 ml	200[1]	-	400[2]	BP
Enterococci	MPN/100 ml	35	-	104[3]	BP
Priority Pollutants	ug/L	See Table C-3			

Abbreviations/Acronyms:
AMAL – average monthly action level
MDAL – maximum daily action level
OP – Ocean Plan water quality objective
BP – Basin Plan water quality objective
NTU – Nephelometric Turbidity Units
MPN/100 ml – most probable number per 100 milliliters
ug/L – micrograms per liter

Notes:
1. Based on a minimum of not less than five samples for any 30-day period
2. NAL is reached ifmore than 10 percent of total samples exceed 400 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas" and is not applicable to waterbodies that are not designated REC-1.

Table C-3. Non-Storm Water Action Levels for Priority Pollutants

Parameter	Units	Freshwater (CTR)		Saltwater (CTR)	
		MDAL	AMAL	MDAL	AMAL
Cadmium	ug/L	**	**	16	8
Copper	ug/L	*	*	5.8	2.9
Chromium III	ug/L	**	**	-	-
Chromium VI	ug/L	16	8.1	83	41
Lead	ug/L	*	*	14	2.9
Nickel	ug/L	**	**	14	6.8
Silver	ug/L	*	*	2.2	1.1
Zinc	ug/L	*	*	95	47

Abbreviations/Acronyms:
CTR – California Toxic Rule
ug/L – micrograms per liter
AMAL – average monthly action level
MDAL – maximum daily action level

Notes:
* Action levels developed on a case-by-case basis (see below)
** Action levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels (MCLs) under the California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431

The Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc NALs for MS4 discharges to freshwater receiving waters will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

(3) Non-Storm Water Discharges from MS4s to Inland Surface Waters

Table C-4. Non-Storm Water Action Levels for Discharges from MS4s to Inland Surface Waters

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BP
Turbidity	NTU	-	20	See MDAL	BP
pH	Units	Within limit of 6.5 to 8.5 at all times			BP
Fecal Coliform	MPN/100 ml	200[1]	-	400[2]	BP
Enterococci	MPN/100 ml	33	-	61[3]	BP
Total Nitrogen	mg/L	-	1.0	See MDAL	BP
Total Phosphorus	mg/L	-	0.1	See MDAL	BP
MBAS	mg/L	-	0.5	See MDAL	BP
Iron	mg/L	-	0.3	See MDAL	BP
Manganese	mg/L	-	0.05	See MDAL	BP
Priority Pollutants	ug/L	See Table C-3			

Abbreviations/Acronyms:
AMAL – average monthly action level
MDAL – maximum daily action level
BP – Basin Plan water quality objective
WARM – warm freshwater habitat beneficial use
COLD – cold freshwater habitat beneficial use
MBAS – Methylene Blue Active Substances
NTU – Nephelometric Turbidity Units
MPN/100 ml – most probable number per 100 milliliters
mg/L – milligrams per liter
ug/L – micrograms per liter

Notes:
1. Based on a minimum of not less than five samples for any 30-day period

2. NAL is reached if more than 10 percent of total samples exceed 400 MPN per 100 ml during any 30 day period
3. This value has been set to the Basin Plan water quality objective for freshwater "designated beach areas" and is not applicable to waterbodies that are not designated REC-1.

b. If not identified in Provision C.1.a, NALs must be identified and incorporated in the Water Quality Improvement Plan for any pollutants or waste constituents causing or contributing, or threatening to cause or contribute to a condition of pollution or nuisance in waters of the U.S. associated with the highest water quality priorities related to non-storm water discharges from the MS4s. NALs must be based on:

(1) Applicable water quality standards which may be dependent upon site-specific or receiving water-specific conditions or assumptions to be identified by the Copermittees; or

(2) Applicable numeric WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order.

c. Dry weather monitoring and assessment data from MS4 outfalls collected in accordance with Provision D.1 may be used to develop or revise NALs based upon watershed-specific data. Revision of NALs is subject to Regional Board EO approval.

2. Storm Water Action Levels

a. The following storm water action levels (SALs) for discharges of storm water from the MS4 must be incorporated:

Table C-5. Storm Water Action Levels for Discharges from MS4s to Receiving Waters

Parameter	Units	Action Level
Turbidity	NTU	126
Nitrate & Nitrite (Total)	mg/L	2.6
Phosphorus (Total P)	mg/L	1.46
Cadmium (Total Cd)*	µg/L	3.0
Copper (Total Cu)*	µg/L	127
Lead (Total Pb)*	µg/L	250
Zinc (Total Zn)*	µg/L	976

Abbreviations/Acronyms:
NTU – Nephelometric Turbidity Units
mg/L – milligrams per liter
ug/L – micrograms per liter

Notes:
* The sampling must include a measure of receiving water hardness at each MS4 outfall. If a total metal concentration exceeds the corresponding metals SAL in Table C-5, that concentration must be compared to the California Toxics Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific metal exceeds that SAL, but does not exceed the applicable USEPA 1-hour maximum concentration criterion for the measured level of hardness, then the sample result will not be considered above the SAL for that measurement.

b. If not identified in Provision C.2.a, SALs must be identified and incorporated in the Water Quality Improvement Plan for pollutants or waste constituents causing or contributing, or threatening to cause or contribute to a condition of pollution or nuisance in waters of the state associated with the highest water quality priorities related to storm water discharges from the MS4s. SALs must be based on:

(1) Federal and State water quality guidance and/or water quality standards; or

(2) Site-specific or receiving water-specific conditions; or

(3) One of the approaches recommended by the California Water Board's Storm Water Panel in its report, "The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities" (June 2006).

(4) Applicable numeric WQBELs required to meet the WLAs established for the TMDLs in Attachment E to this Order.

c. Wet weather monitoring and assessment data from MS4 outfalls collected in accordance with Provision D.1.b may be used to develop or revise SALs based upon watershed-specific data. Revision of SALs is subject to San Diego Water Board approval.

D. MONITORING AND ASSESSMENT REQUIREMENTS

[NOTE: This section has been replaced with a proposed alternative version of provision D.]

Water quality monitoring and assessment shall be question-driven and designed to support adaptive storm water management and the iterative process outlined in Provision B. The monitoring and assessment activities shall be based on a logical hierarchy in which overall management goals help define clear management questions, which are addressed by specific monitoring activities designed to produce data targeted to defined assessment needs. The monitoring and assessment activities shall follow relevant and applicable guidance provided in the SWAMP Assessment Framework (Bernstein, 2010[8]), A Framework for Monitoring and Assessment in the San Diego Region (SDRWQCB, 2011[9]), and the Southern California Stormwater Monitoring Coalition's (SMC) Model Monitoring Program (SMC, 2004[10]).

The monitoring and assessment shall be designed in two phases. A transitional program shall be implemented beginning the first day of October in the year following permit adoption, and continue until the first day of October following commencement of Water Quality Improvement Plan implementation, pursuant to Provision B. The transitional ("pre-WQIP") program shall build on the experience gained implementing water quality monitoring programs under previous Orders and shall address the SMC questions as described below. The second ("post-WQIP") phase of the Monitoring and Assessment Program shall address the watershed priorities identified in the Water Quality Improvement Plans as developed for each watershed pursuant to Provision B. This phase of monitoring shall begin with implementation of the approved WQIPs.
The transitional (pre-WQIP) phase of monitoring and assessment applies only to the San Diego County Copermittees; the Orange County and Riverside County permittees affected by this regional permit are expected to participate during the post-WQIP phase, after officially enrolling under the regional permit.

As a starting point, the Monitoring and Assessment Program shall be designed to address the overarching management questions developed by the SMC:

[8] Bernstein, Brock, 2010. "SWAMP Assessment Framework." Prepared for the Surface Water Ambient Monitoring Program (SWAMP). December, 2010).
http://www.swrcb.ca.gov/water_issues/programs/swamp/docs/reports/app_c_assess_frmwrk.pdf.

[9] SDRWQCB, 2011. "A Framework for Monitoring and Assessment in the San Diego Region." California Regional Water Quality Control Board, San Diego Region, Staff Report, Working Draft. May 2012. Prepared by Lilian Busse and Bruce Posthumus.
http://www.waterboards.ca.gov/sandiego/board_info/agendas/2012/Jun/item9/eosr0612MonitoringFramework.SD1.pdf

[10] SMC, 2004. "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California." A report from the Stormwater Monitoring Coalition's Model Monitoring Technical Committee. August 2004. Technical Report #419.
http://www.lmtf.org/FoLM/Poliact/EColi/419_smc_mm.pdf

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? This question will be addressed by comparing indicator values to the relevant benchmarks or objectives and/or to background conditions.

2. What is the extent and magnitude of the current or potential receiving water problems? This question will be addressed by mapping the spatial extent and/or temporal persistence of problems, the severity of impacts, and/or the degree to which benchmarks are exceeded.
3. What is the relative urban runoff contribution to the receiving water problem(s)? This question will be addressed by comparing concentrations and loads of priority constituents to those from other sources, including background.

4. What are the sources of urban runoff that contribute to receiving water problem(s)? This question will be addressed by characterizing and prioritizing discharges and using targeted source identification protocols to track the origin of specific constituents.

5. Are conditions in receiving waters getting better or worse? This question will be addressed by time series analyses of individual indicators and/or of aggregate or cumulative indices of condition.

Given that substantial work has already been accomplished and other work is ongoing to address the questions related to receiving water condition assessment (questions 1, 2, 5), the Copermittees shall focus their efforts principally on questions 3 and 4. All five questions need not be addressed simultaneously to the same degree. As watershed problems are identified, effort should shift to diagnosis (questions 4 and 5) until the problems have been addressed, at which point effort may shift back to broader assessment (questions 1 and 2) in search of other problems to address.

During the transitional (pre-WQIP) period, where feasible the Copermittees shall develop more specific monitoring questions to guide the design of specific monitoring activities and address specific assessment needs. The information so generated will be used to guide management actions, based on the results of the monitoring data assessments.

As part of each WQIP, the Copermittees shall develop a water quality Monitoring and Assessment Program (Monitoring and Assessment Program) for each Watershed Management Area (WMA), as provided in Table B-1. Using the overarching SMC management questions as guidance, each Monitoring and Assessment Program shall include specific monitoring questions appropriate to address the assessment needs of each specific WMA. The monitoring activities shall be designed to generate data needed to address priority issues identified in the WQIPs, and the resulting monitoring data and assessments shall be supplied to program planners to help inform management actions. If a WMA has an approved Comprehensive Load Reduction Plan (CLRP), the CLRP shall be incorporated into the WQIP.

Each Copermittee covered by this permit shall participate in development and implementation of the Monitoring and Assessment Program for each WMA in which they have jurisdiction. The Copermittees shall consider the needs of regional monitoring and assessment activities in the development of each Monitoring and Assessment Program and make allowances as needed for regional coordination.

1. Receiving Waters Monitoring

Until approval and implementation of the WQIPs, the Copermittees shall perform receiving water monitoring to address management questions and specific questions, as specified in Provisions D.1.a-D.1.g below:

a. SMC Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall participate in the SMC Regional Monitoring Program through its planned completion. The SMC monitoring program seeks to coordinate and leverage existing monitoring efforts to produce regional estimates of condition, improve data comparability and quality assurance, and maximize data availability, while conserving monitoring expenditures. The primary goal of this program is to implement an ongoing, large scale regional monitoring program for southern California's coastal streams and rivers. A comprehensive program was designed by the SMC, in which each participating group assesses its local watersheds and then contributes their portion to the overall regional assessment. The SMC Regional Monitoring Program involves a probabilistic design for characterization of coastal watersheds using bioassessment metrics and related analyses, including, but may not be limited to: physical habitat characterization, Southern California Index of Biological Integrity scoring, macroinvertebrate and algal taxonomy, algal biomass, water chemistry, and toxicity. The study incorporates both reference and non-reference streams and may identify additional biological and/or chemical stressors affecting stream health, such as channel alteration and presence of invasive species.

b. Southern California Bight Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall participate in the Southern California Bight Regional Monitoring program as a trade-off with other routine monitoring requirements. The Bight program involves detailed characterization of coastal and offshore receiving waters, as well as targeted special studies. The Bight regional monitoring effort is designed to build upon the data collected during the previous Bight regional programs, to assess the extent of contamination in the Southern California Bight. Receiving water samples are collected in or near coastal areas, bays, estuaries, offshore islands, and open water/deep ocean within the Bight. Water quality and sediment samples may be collected to provide data for model input, to assess long-term trends, and to answer management questions developed by the diverse group of stakeholders in the Southern California Bight Region as part of the program. In addition, special studies such as potential new technology implementation (i.e. bioanalytical screening and/or genetic coding) may be conducted as part of the Bight Regional Monitoring.

c. SEDIMENT QUALITY MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

Specific Question: What is the condition of sediments in enclosed bays and estuaries with respect to the statewide sediment quality objectives?

Copermittees shall perform monitoring of bay and lagoon sediments, as applicable, under the Copermittees' responsibility to conform to the requirements of the Statewide Sediment Quality Objectives regulatory program, per State Water Resources Control Board Resolution No. 2008-0070 – Adoption of a Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality.

d. HYDROMODIFICATION MANAGEMENT PLAN (HMP) MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall perform receiving water monitoring as required per their Hydromodification Management Plan Monitoring Plans, as approved by the California Regional Water Quality Control Board, San Diego Region.

e. TMDL MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

Specific question: What is the progress in achieving and complying with adopted TMDL targets?

The Copermittees shall conduct receiving water monitoring to address monitoring requirements associated with TMDLs as specified below.

(1) The Copermittees shall perform water quality monitoring as required per the Implementation Plans or approved CLRPs of effective TMDLs, including compliance monitoring for the following TMDLs:

(a) TMDL for Diazinon in Chollas Creek Watershed Resolution No. R9-2002-0123; Effective as of September 11, 2003.

(b) TMDLs for Dissolved Copper in Shelter Island Yacht Basin Resolution No. R9-2005-0019; Effective as of December 2, 2005.

(c) TMDLs for Dissolved Copper, Lead, and Zinc in Chollas Creek Resolution No. R9-2007-0043; Effective as of October 22, 2008.

(d) TMDLs for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Resolution No. R9-2008-0027; Effective as of September 15, 2009.

(e) Revised TMDLs for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) Resolution No. R9-2010-0001; Effective as of April 4, 2011.

(2) TMDL monitoring shall be coordinated and/or integrated with monitoring specified in an approved CLRP or equivalent implementation plan.

f. ASBS SPECIAL PROTECTIONS MONITORING

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

The Copermittees responsible for discharges to Areas of Special Biological Significance (ASBS) as regulated per the Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges, State Water Resources Control Board Resolution No. 2012-0012, shall perform receiving water monitoring as required, per the adopted ASBS Special Protections.

g. SAN DIEGO REGIONAL REFERENCE STREAM STUDY

Management Question: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

Specific Question: What are the concentrations/loads of bacteria, nutrients, and metals in reference streams in Southern California?

The Copermittees shall participate in reference stream receiving water monitoring and data analysis under the San Diego Regional Reference Stream Study as a Regional Study. The San Diego Regional Reference Stream Study is intended to characterize background concentrations of bacteria, nutrients, and metals in natural streams within the jurisdiction of the San Diego Water Board (Region 9). Samples shall be collected during wet and dry weather at sites considered representative of natural conditions (a contributing drainage area at least 95 percent undeveloped) and that vary in regards to hydrology, catchment size, and geology. The results of the study may be used to assist determination of scientifically-based reference stream numeric goals for indicator bacteria, nutrients, and metals.

h. Long-Term Receiving Water Monitoring, Post-WQIP Adoption

Management Question: Are conditions in receiving waters getting better or worse?

Following adoption of the WQIPs, the Copermittees shall conduct long-term receiving water monitoring to be performed in each WMA during WQIP implementation, for assessment of long-term trends, as specified below:

(1) The Copermittees in each Watershed Management Area shall select one long-term receiving water station from among the existing mass loading stations (MLS) and temporary watershed assessment stations (TWAS) to be representative of receiving water quality within the WMA.

(2) During the permit term, the Copermittees shall perform monitoring during three wet weather events and three dry weather events at each of the long-term stations selected by the Copermittees and approved by the San Diego Water Board.

(3) Dry Weather Receiving Water Monitoring

During the permit term, the Copermittees shall perform monitoring during three dry weather events, at minimum, at each of the long-term stations. One event must be conducted during the dry season (May 1-September 30) and one event must be conducted during a dry weather period during the wet season (October 1 –April 30), after the first wet weather event of the season, with an antecedent dry period of at least 72 hours following any storm event producing measurable rainfall of greater than 0.1 inch.

(a) For each dry weather receiving water monitoring event, the Copermittees must record field observations consistent with Table D-1 at each monitoring station.

Table D-1. Field Observations for Dry Weather Ambient Receiving Water Monitoring Stations

Field Observations
• Station identification and location. • Presence of flow, or pooled or ponded water. • If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate), - Flow characteristics (i.e. presence of floatables, surface scum, or sheens, odor, color), • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, or sheens, odor, color). • Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology). • Presence and assessment of trash in and around station.

(b) If flow is present during the dry weather watershed monitoring event, and conditions allow the collection of the data, the Copermittee must monitor and record the parameters in Table D-2.

Table D-2. Field Monitoring Parameters for Receiving Water and Persistent MS4 Monitoring Stations

Parameters
• pH • Temperature • Specific conductivity • Dissolved oxygen • Turbidity

(c) Samples must be collected and analyzed as follows:

(i) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, indicator bacteria, and toxicity. Analytes that are field measured do not need to be analyzed by a laboratory.

(ii) For all other constituents, composite samples shall be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques: time-weighted composites composed of 24 discrete hourly samples, or flow-weighted composites collected over a typical 24 hour period. Only one analysis of the composite of aliquots is required.

(d) Samples shall be collected for analysis of the following parameters: TMDL or CLRP constituents in watersheds where the Copermittees are responsible parties in an adopted TMDL Implementation Plan, constituents listed as a cause of impairment on a CWA Section 303(d) listing for the receiving water body reach to which the outfall discharges, applicable NAL constituents, and constituents identified by the Copermittees as the watershed priorities in their respective WQIPs, as well as the constituents listed in Table D-3.

Table D-3. Analytical Monitoring Constituents for Receiving Water Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Metals (Total and Dissolved)	Pesticides	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Turbidity[1] • Total Organic Carbon • Dissolved Organic Carbon • Sulfate • Methylene Blue Active Substances (MBAS) • Total Phosphorus[1] • Orthophosphate • Nitrite[1,2] • Nitrate[1,2] • Total Kjeldahl Nitrogen • Ammonia	• Arsenic • Cadmium[1] • Chromium • Copper[1] • Iron • Lead[1] • Mercury • Nickel • Selenium • Thallium • Zinc[1]	• Organo-phosphate pesticides • Pyrethroid pesticides	•Total Coliform • Fecal Coliform[3] •*Enterococcus*

Notes:
1. Constituent with a storm water action level (SAL) specified under Provision C.2.
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
3. *E. Coli* may be substituted for Fecal Coliform.

(e) Dry Weather Receiving Water Toxicity Monitoring:

For each dry weather monitoring event, grab or composite samples from each monitoring station must be collected and analyzed for toxicity in accordance with Table D-4.

Table D-4. Toxicity Testing for Receiving Water Monitoring Stations

Freshwater Organism	Test Approach per Event	EPA Protocol[1]
Pimephales promelas (fathead minnow)	Wet: 1 acute Dry: 1 acute and chronic	EPA-821-R-02-012
Hyalella azteca	Wet: 1 acute Dry: 1 acute and chronic	EPA-821-R-02-012
Psuedokirchneriella subcapitata (formerly *Selenastrum capricornutum*, unicellular algae)	Wet: 1 acute Dry: 1 acute and chronic	EPA-821-R-02-013

Notes:
1. EPA protocols shall be utilized for toxicity testing unless alternate toxicity testing protocols have been approved by the San Diego Regional Water Quality Control Board. Chronic toxicity testing will also be conducted at dry weather mass loading stations unless the channel flows are diverted year-round during dry weather conditions to the sanitary sewer for treatment

(f) Receiving Water Bioassessment Monitoring:

Copermittees shall perform Bioassessment monitoring once during the permit term in accordance with the SMC Model Monitoring Program "Triad" assessment approach (SMC, 2004). Copermittees shall conduct sampling, analysis, and reporting of specified in-stream biological and habitat data according to the protocols specified in the SCCWRP Tech Report No. 539, or subsequent protocols, if developed, that have been widely-accepted as an appropriate alternative for Southern California receiving waters. Bioassessment monitoring may be conducted in conjunction with SMC Regional Monitoring and/or other dry weather receiving water monitoring. A physical assessment shall be conducted that will include details of the channel condition including channel dimensions, hydrologic and geomorphic conditions, and presence and condition of vegetation and habitat.

(4) Wet Weather Receiving Water Monitoring

During the permit term, Copermittees shall perform monitoring during three wet weather events at each of the long-term receiving water monitoring stations. Each monitoring station must be monitored during the wet season beginning October 1 and ending April 30.

(a) For each wet weather monitoring event, the following narrative descriptions and observations must be recorded at each monitoring station:

(i) A narrative description of the station that includes the location, date and duration of the storm event(s) sampled, rainfall estimates of the storm event, and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(ii) The flow rates and volumes measured or estimated. Data from nearby USGS gauging stations may be utilized, or flow rates may be measured or estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), section 3.2.1, or other method proposed by the Copermittees that is acceptable to the San Diego Water Board;

(iii) Station condition (i.e. deposits or stains, vegetation condition, structural condition, observable biology); and

(iv) Presence and assessment of trash in and around station.

(b) For each wet weather receiving water monitoring event, the parameters in Table D-2 must be monitored and recorded in the field.

(c) Samples must be collected and analyzed as follows:

(i) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, indicator bacteria, and toxicity. Analytes that are field measured do not need to be analyzed by a laboratory.

(ii) For all other constituents, composite samples shall be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques: time-weighted composites composed of 24 discrete hourly samples, or flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter. Only one analysis of the composite of aliquots is required.

(iii) Copermittees should implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods.

(d) Samples shall be collected for analysis of the following parameters: TMDL or CLRP constituents in watersheds where the Copermittees are responsible parties in an adopted TMDL Implementation Plan, constituents listed as a cause of impairment on a CWA Section 303(d) listing for the receiving water body reach to which the outfall discharges,

applicable SAL constituents, and constituents identified by the Copermittees as the watershed priorities in their respective WQIPs, as well as the constituents listed in Table D-3.

(e) Wet Weather Receiving Water Toxicity Monitoring

Grab samples or composites from each monitoring station must be collected and analyzed for toxicity in accordance with Table D-4.

i. OTHER RECEIVING WATER MONITORING, POST-WQIP ADOPTION

After adoption of the WQIPs, the Copermittees shall conduct monitoring based on the approved WQIPs, in addition to long-term receiving water monitoring as described in Provision D.1.h, to include constituents identified by the Copermittees as the watershed priorities in their respective WQIPs. Nothing in this Provision is intended to prevent Copermittee collection of additional receiving water data, as necessary, to support and implement respective WQIPs. This monitoring shall include, at minimum, integration of the following receiving water requirements within the WQIPs, as appropriate for specific watersheds:

(a) Participation in SMC Regional Monitoring Program, where applicable

(b) Sediment Quality Monitoring in applicable estuaries

(c) Hydromodification Management Plan (HMP) Monitoring as applicable

(d) TMDL Monitoring where implementation plans have been approved and are under implementation, and

(e) ASBS Special Protections Monitoring, where applicable.

j. RECEIVING WATER MONITORING REPORTING

The Copermittees shall report on the progress of the receiving water monitoring and the results or findings of such monitoring, when completed, in the Annual Report pursuant to Provision F.3.b.

2. MS4 Outfall Discharge Monitoring

Discharge monitoring shall involve both Non-Storm Water (Dry Weather) and Storm Water (Wet Weather) components. The Copermittees shall perform monitoring, as necessary, to identify non-storm water discharges and illegal connections/illicit discharges (IC/IDs) pursuant to Provision E.2 of this Order. To accomplish this, the monitoring may include a variety of water quality and other monitoring techniques, including visual and other observations. Copermittees shall investigate dry weather flows and prioritize outfalls with observed flows for follow-up action as detailed below.

a. Storm Water Outfall Inventory

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

- Each Copermittee shall identify all major outfalls, as defined by 40 CFR §122.26(b)(5-6), that discharge directly to named receiving waters within its jurisdiction, and geo-locate those outfalls on a map of the MS4 pursuant to Provision E.2.b of this Order. This information shall be compiled in a storm water outfall inventory, which also shall include applicable information including HSA, jurisdiction, outlet size, and approximate drainage area. Only MS4 outfalls with safe access and for which access is gained without disturbing critical habitat will be considered in the number of eligible major MS4 outfalls.

b. Non-Storm Water Transient Flow (Dry Weather) Monitoring, IDDE Investigation

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which non-storm water discharges are transient and which are persistent? Which discharges should be investigated as potential IDDEs? Which outfalls exhibit persistent dry weather flows?

The Copermittees shall perform non-storm transient flow discharge monitoring to address the above management and specific questions as follows:

(1) Each Copermittee shall prioritize the major MS4 outfalls within its jurisdiction from the list of major outfalls developed pursuant to Provision D.a., based on criteria and rationale that include potential threat to water quality.

(2) Copermittees with less than 125 major MS4 outfalls that discharge to a receiving water shall visually inspect 80% of the outfalls twice per year during dry weather.

(3) Copermittees with 125 or more but less than 250 major MS4 outfalls that discharge to a receiving water shall visually inspect a prioritized list of major MS4 outfalls that discharge to a receiving water annually. The total number of inspections per Copermittees with 125 or more but less than 250 major MS4s will be a minimum of the total number of all major MS4 outfalls locations once with annual visual inspections. Major MS4 outfalls shall be prioritized based on threat to water quality and will consider factors such as:

- Assessment of connectivity of the discharge to a flowing receiving water
- Reported exceedances in water quality data
- Surrounding land use
- Presence of watershed priority constituents, TMDLs & CWA 303(d) list of impaired water bodies
- Flow rate

(4) Copermittees with 250 or more major MS4 outfalls that discharge to a receiving water shall visually inspect a prioritized list of major MS4 outfalls that discharge to a receiving water annually. The total number of inspections per Copermittees with 250 or greater major MS4s will be a minimum of 250 to a maximum of 500 locations with annual visual inspections. Where possible, inspections will be conducted year round. Major MS4 outfalls shall be prioritized based on threat to water quality and will consider factors such as:

- Assessment of connectivity of the discharge to a flowing receiving water
- Reported exceedances in water quality data
- Surrounding land use
- Presence of watershed priority constituents, TMDLs & CWA 303(d) list of impaired water bodies
- Flow rate

(5) Obvious illicit discharges (i.e., unusual color, unusual odor, or high flow) shall be investigated immediately pursuant to Provision E.2.

(6) An antecedent dry period of at least 72 hours following any storm event producing measurable rainfall of greater than 0.1 inch is required prior to conducting dry weather visual inspections.

(7) During a visual inspection, field personnel shall note visual and other

observations, including those provided in Table D-5 of this Order.

(a) During a visual inspection, an inspection form will be filled out documenting observations in conformance with table D-5.

(b) Inspections of major outfalls conducted pursuant to Provision E of this order, including but not limited to complaint follow-ups, may be accounted for as the visual inspection for the major outfall under this Provision.

Table D-5. Field Observations for Non-Storm Water MS4 Monitoring Stations

Field Observations
• Station identification and location. • Presence of flow, or pooled or ponded water from the outfall. • If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate), - Flow characteristics (i.e. presence of floatables, surface scum, or sheens, odor, color), - Flow source(s) suspected or identified from non-storm water source investigation, and - Flow source(s) eliminated during non-storm water source identification. • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, or sheens, odor, color), and - Known or suspected source(s) of pooled or ponded water. • Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology). • Presence and assessment of trash in and around station. • Evidence or signs of illicit connections or illegal dumping.

(8) Evidence of obvious illegal discharges, such as obvious odor, discoloration, or floating foam or scum, shall be followed up immediately.

(9) The field observations shall be evaluated together with existing information available from prior inspections and prior monitoring results to determine whether the non-storm water (dry weather) discharge flow is likely to be transient or persistent[11].

[11] Persistent flow, as modified from the SMC Model Monitoring Program definition of persistent WQO exceedance, is defined as "the presence of flow, pooled, or ponded water more than 72 hours after a measureable rainfall event of 0.1 inch of precipitation during three consecutive monitoring and/or inspection events". All other flow is considered transient.

(a) If the flow is deemed to be transient, observations shall be used to conduct IDD E investigations where warranted pursuant to Provision E.2.

(b) If the nature and source of the observed flow is already known, this shall be noted on the field log, including whether the observed flow results from a non-storm water discharge conditionally allowed per Provision E.2.a.

(10) Where the non-storm water (dry weather) discharge flow is deemed to be persistent in Provision D.2.a.(8), the outfall shall be referred to the characterization and prioritization process described in Provision D.2.c. .

(11) The framework developed in the transitional monitoring program shall be used as a basis to design a continuing IDDE monitoring program as part of the Monitoring and Assessment Program in each WQIP.

c. NON-STORM WATER PERSISTENT FLOW (DRY WEATHER) OUTFALL MONITORING

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which outfalls exhibit persistent dry weather flows? Do discharge concentrations at MS4 outfalls meet applicable permit action levels? Which MS4 outfalls impact receiving water quality during dry weather?

The Copermittees shall perform non-storm water persistent flow discharge monitoring to address the above-listed management and specific questions as follows:

(1) Based upon the results of the investigation conducted pursuant to Provision D.2.b., each Copermittee shall add to the storm water outfall inventory compiled pursuant to Provision D.2.a., a classification of whether the outfall produces persistent discharge flow, transient flow, or no dry weather flow. The inventory shall provide notations on the basis for that classification; the classification may be based on historical data and/or contemporary observations, including information generated per Provision D.2.b..

(2) The Copermittees shall prioritize the outfalls identified as having persistent dry weather in the stormwater outfall inventory, pursuant to Provision D.2.c.(1). Historical data may be used to assist prioritization, where available. The prioritization shall be prepared based on criteria to be developed by the Copermittees, and a brief rationale for the prioritization shall be provided to accompany the map.

(3) Based on the prioritization of major outfalls developed under Provision

D.2.c.(2), the Copermittees shall identify, at minimum, a number of major outfalls to monitor within each watershed management area equivalent to the number of urbanized HSAs within the WMA.. The selected outfalls shall be listed by urbanized HSA and indicated on the map prepared pursuant to Provision D.2.a..

(4) The Copermittees shall monitor each major outfall identified in Provision D.2.c.(3) two times annually under dry weather conditions until one of the following occurs, at which point the outfall may be removed from the list:

(a) Flows are reduced to near-zero for three consecutive visits, or

(b) The source(s) of flows are determined to be derived from a non-storm water discharge source conditionally allowed per Provision E.2.a, or

(c) The source of the discharge is determined to be covered by a separate NPDES permit.

(d) The Copermittees shall document any such removal of sites from the outfall monitoring list in their annual report. Outfalls so removed must be replaced with then next highest prioritized MS4 outfall in the WMA per Provision D.2.c.(3), unless there are no remaining qualifying outfalls within the urbanized HSAs of the WMA.

(e) Where these criteria are not met but the threat to water quality is reduced, the outfall may be prioritized accordingly for continued follow up activity.

(5) During each semi-annual visit, the Copermittee must record field observations consistent with Table D-5 at each non-storm water MS4 monitoring station within its jurisdiction.

(6) Prior to WQIP approval, each semi-annual visit in which measurable flow is present from an outfall listed under Provision D.2.c.(3) must include the following:

(a) Grab samples shall be collected for analysis for the constituents listed in Table D-6, unless the Copermittee has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary.

Table D-6. Analytical Monitoring Constituents for Non-Storm Water MS4 Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Total Phosphorus • Ortho-phosphate • Nitrite[1] • Nitrate[1] • Total Kjeldahl Nitrogen • Ammonia as N • Chlorine	• Cadmium • Copper • Lead • Zinc	• Total Coliform • Fecal Coliform[2] • *Enterococcus*

Notes:
1. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
2. *E. Coli* may be substituted for Fecal Coliform.

(b) Field measurements shall be collected for the parameters listed in Table D-2.

(c) If the Copermittee identifies and eliminates the source of non-storm water discharge, analysis of the sample is not required.

(7) As part of the WQIP, Copermittees must develop a program to characterize the persistent non-storm water discharges and pollutant loads from the Copermittee's major MS4 outfalls. As part of the development of the Monitoring and Assessment Program for each WMA, the number and selection of outfalls shall be re-evaluated and determined anew for each WMA, along with the appropriate monitoring frequency and methods.

(8) After WQIP approval, each visit in which measurable flow is present from an outfall listed under Provision D.2.c.(3), as modified by approved changes pursuant to Provision D.2.c.(7) must include the following:

(a) Samples shall be collected for analysis of the following parameters:

(i) Constituents identified by the Copermittees as highest watershed priorities,

(ii) TMDL constituents in watersheds where the Copermittees are responsible parties in an effective TMDL Implementation Plan for the receiving water body reach to which the outfall discharges,

(iii) Constituents listed as a cause of impairment on a CWA Section

303(d) listing for the receiving water body reach to which the outfall discharges, and

(iv) Applicable NAL constituents.

(b) Field measurements shall be collected for the parameters listed in Table D-2.

(9) Annually, the Copermittees shall evaluate the data produced by the persistent flow outfall monitoring and inspections, rank the outfalls according to potential threat to receiving water quality, and produce a prioritized list of major outfalls for follow-up action. The prioritized list shall be used to update the WQIP, with the goal of reducing flows and/or loads in order of the ranked priority list through targeted programmatic actions and source investigations.

d. STORM WATER (WET WEATHER) OUTFALL MONITORING

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which MS4 outfalls impact receiving water quality during wet weather? Do discharge concentrations at MS4 outfalls meet applicable permit action levels? How do representative MS4 outlet discharge concentrations, loads, and flows change over time?

The Copermittees shall perform storm water discharge monitoring to address the above-listed management and specific questions as follows:

(1) Prior to adoption of the WQIPs, the San Diego Copermittees shall continue the MS4 outfall monitoring program implemented under Order No. R9-2007-0001 per RWQCB approved plan through its planned completion to continue to obtain data from a representative cross-section of discharges.

(2) Prior to adoption of the WQIPs, the San Diego Copermittees shall perform storm water discharge monitoring based on representative outfalls to address the above-listed management questions as follows:

(a) The Copermittees shall select, at minimum, three monitoring stations at representative major MS4 outfalls with homogenous land use types and/or typical mixed-use drainage areas per WMA from the map developed pursuant to Provision D.2.a. Historical data may be used to assist site selection, where available. These outfalls shall be geo-located on a map showing the urban hydrologic sub-areas (HSAs), land use drainage areas, and jurisdictional boundaries within the permitted area.

(b) Each selected monitoring station must be monitored twice during the wet season, beginning October 1 and ending April 30.

(c) For each wet weather monitoring event, the following narrative descriptions and observations must be recorded at each monitoring station:

(i) A narrative description of the station that includes the location, date and duration of the storm event(s) sampled, rainfall estimates of the storm event, and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(ii) The flow rates and volumes measured or estimated. Data from nearby USGS gauging stations may be utilized, or flow rates may be measured or estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), section 3.2.1, or other method proposed by the Copermittees that is acceptable to the San Diego Water Board;

(d) For each wet weather monitoring event, the parameters in Table D-2 must be monitored and recorded in the field. Samples shall be collected for analysis of parameters listed in Table D-7, according to the following methods:

(i) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, and indicator bacteria. Analytes that are field measured do not need to be analyzed by a laboratory.

(ii) For all other constituents, composite samples shall be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques:

[a] Through use of automated equipment to collect time-weighted composites composed of 24 discrete hourly samples, or flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter. Only one analysis of the composite of aliquots is required.

[b] If automated compositing is not feasible, a composite sample may be collected using a minimum of 4 grab samples, collected during the first 24 hours of the storm water discharge, or for the entire storm water discharge if the storm event is less than 24 hours. Only one analysis of the composite of aliquots is required.

(iii) Copermittees should implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods.

ADMINISTRATIVE DRAFT

Table D-7. Analytical Monitoring Constituents for Wet Weather MS4 Outfall Monitoring Stations

Conventionals, Nutrients, Hydrocarbons	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Turbidity[1] • Total Organic Carbon • Dissolved Organic Carbon • Sulfate • Methylene Blue Active Substances (MBAS) • Total Phosphorus[1] • Orthophosphate • Nitrite[1,2] • Nitrate[1,2] • Total Kjeldahl Nitrogen • Ammonia	• Arsenic • Cadmium[1] • Chromium • Copper[1] • Iron • Lead[1] • • Nickel • Selenium • Thallium • Zinc[1]	•Total Coliform • Fecal Coliform[3] •*Enterococcus*

Notes:
1. Constituent with a storm water action level (SAL) specified under Provision C.2.
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
3. *E. Coli* may be substituted for Fecal Coliform.

(3) After adoption of the WQIPs, the Copermittees shall perform storm water discharge monitoring based on representative major MS4 outfalls to address the above-listed management questions, and according to the needs for outfall monitoring as defined in the monitoring and assessment sections of the WQIPs. Samples shall be collected for analysis of parameters identified by the Copermittees as watershed priorities in the WQIP. Copermittees shall consider constituents based on factors including, but not limited to:

(a) Constituents identified as the highest water quality priorities.

(b) TMDL constituents in watersheds where the Copermittees are responsible parties in an effective TMDL Implementation Plan for the receiving water body reach to which the outfall discharges,

(c) Constituents listed as a cause of impairment on a CWA Section 303(d) listing for the receiving water body reach to which the outfall discharges, and

(d) Applicable SAL constituents.

e. MS4 Outfall Discharge Monitoring Reporting

The Copermittees shall report on the progress of the MS4 outfall monitoring and the results or findings of such monitoring, when completed, in the Annual Report pursuant to Provision F.3.b.

3. Source/Stressor Identification

Management Question: What are the sources of urban runoff that contribute to receiving water problem(s)?

The Copermittees shall perform Source/Stressor Identification studies as needed to investigate sources of pollutants or stressors in cases where MS4 discharges are deemed to be causing or contributing to receiving water priorities, based on monitoring performed under Provisions D.1 and D.2. The results of the Stressor/Source Identification studies may be shared regionally among the Copermittees to provide information useful in improving adaptive management of urban runoff through implementation of the WQIPs.

The principal role of Source/Stressor Identification is to identify and prioritize pollutant generating activities and source categories. Identification of high-priority sources is an important step in support of the WQIP process, to help inform the development of effective pollutant reduction strategies for particular priority constituents on a watershed-specific basis.

Source identification shall be conducted on a constituent-specific basis. The source identification efforts shall focus on constituents identified as watershed priorities, and include prioritization of sources based on magnitude, controllability, and other factors. The constituent-specific source identification process shall include, at a minimum, the following steps:

- Step 1: Compile known information on the specific priority constituent. This information includes data on potential sources and movement of a particular constituent within the urban watershed. Data generated by the Copermittees and others, as well as information available from a literature research on the priority constituent shall be compiled and analyzed as appropriate.

- Step 2: Based on the compiled information generated on the priority constituent, identify data gaps, if any. Targeted studies may be planned where appropriate to fill identified data gaps; such studies would be performed as Special Studies per Provision D.4. For example, targeted studies may be performed to quantify the relative loading of a priority constituent from a particular pollutant generating activity, or to improve understanding of the fate of a constituent in the environment.

- Step 3: Based on the information compiled, develop an inventory of sources and consider how to prioritize them within the watershed for potential follow-up action. Examples of prioritization criteria for sources include relative magnitude in discharges, geographical distribution (i.e., regional or localized), frequency of occurrence in discharges, human health risk, and controllability.

- Step 4: Develop a prioritized list of sources for the priority constituent and deliver to the Copermittee staff responsible for implementing WQIPs.

Prior to adoption of the WQIPs, the San Diego Copermittees shall continue source identification studies pertaining to compliance with TMDLs and the development of the CLRP implemented under Order No. R9-2007-0001.

Following adoption of the WQIPs, the Copermittees shall conduct source/stressor identification studies as necessary to support the WQIP watershed priorities and strategies. The plans for source/stressor ID studies must be submitted as part of the Monitoring and Assessment Programs included as part of the WQIPs required pursuant to Provision B of this Order.

The Copermittees shall report on the progress of the source/stressor ID studies and the results or findings of such studies, when completed, in the Annual Report pursuant to Provision F.3.b.

4. Special Studies

The Copermittees shall conduct Special Studies to address information needs as identified for receiving waters per monitoring performed pursuant to Provision D.1, for MS4 outfall discharges per monitoring performed pursuant to Provision D.2, and in Source/Stressor Identification studies per Provision D.3; to provide information on BMP effectiveness; and otherwise as needed to support implementation or evaluation of the WQIP strategies for the identified highest water quality priorities.

Within the permit term, two Special Studies shall be conducted within each Watershed Management Area, to address specific questions developed for each Watershed Management Area, and two regional special studies shall be conducted to answer regional questions.

a. The monitoring plans for the special studies must be submitted as part of the Monitoring and Assessment Programs included as part of the Water Quality Improvement Plans required pursuant to Provision B. The special studies must, at a minimum, be in conformance with the following criteria:

(1) The special studies must be related to water quality priorities identified by the Copermittees within the Watershed Management Area or San Diego Region, and the monitoring plans for the special studies must address specific watershed or regional questions;

(2) The special studies must be implemented within specific Watershed Management Areas or regionally within the San Diego Region;

(3) The special studies must include some form of participation by all Copermittees within the Watershed Management Area or San Diego Region, as applicable;

(4) One of the two required special studies within each Watershed Management Area may be replaced by a regional special study pursuant to D.4.a. (1) through D.4.a.(3); and

(5) A special study done pursuant to D.4.a. (1) through D.4.a.(4) that is started prior to the submittal of the WQIP, but is completed during the permit term, shall meet the requirements of a special study for a Watershed Management Area or San Diego Region, as applicable.

b. The Copermittees shall report on the progress of the special studies and the results or findings of such studies, when completed, in the Annual Report pursuant to Provision F.3.b.

Examples of special studies include:

- Enhance outreach & education by expanding residential BMP rebate programs (irrigation, rainwater harvesting and turf conversion) to multi-family housing
- Enhance outreach & education by increasing enforcement of over-irrigation regulation
- Conduct Catch Basin Inlet Cleaning Study assessment
- Implement Residential & Commercial Area Patrolling
- Implement Targeted Aggressive Street Sweeping Study
- Develop Watershed Urban Runoff Management Program Inspection Program (separate from commercial/industrial inspections, targets all businesses in specific areas)
- Conduct an investigation to improve the understanding of the linkage between groundwater and surface water hydrology and potential impacts to receiving water beneficial uses
- Conduct targeted field investigations to provide additional spatial or temporal information on the highest priority constituents or activities to inform or improve the efficiency of implementation efforts in the WMA.

The Regional Reference Stream Study is an example of a regional special study.

5. Assessment Requirements

The Copermittees must report the progress and findings of the following assessments, when available and as applicable to each WMA, as part of the Annual Report for each WMA, as required pursuant to Provision F. Assessments that occur only once per permit term, or are based on monitoring that occurs only once per permit term, shall be reported as part of the applicable Annual Report, or included within the Copermittees' Report of Waste Discharge, prior to commencement of the subsequent permit term.

a. RECEIVING WATER MONITORING

The Copermittees shall perform analysis and assessments of data and information produced per Provision D.1, addressing for each Receiving Water Monitoring element the management and specific questions as shown in Provision D.1 and below. The analysis and assessments shall relate the monitoring data compiled for each component to the conditions of affected receiving waters and status of relevant receiving water beneficial uses.

(1) SMC Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall incorporate results of the SMC Regional Monitoring Program, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The SMC Program is designed to provide a representative sampling of receiving water quality in coastal rivers and streams in the region's watersheds, based on a probabilistic design for characterization of coastal watersheds, using bioassessment metrics and related analyses. The analysis and assessments of the data shall relate the SMC monitoring data to the condition of receiving waters and status of receiving water beneficial uses.

(2) Bight Regional Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall incorporate results of the Bight Regional Monitoring Program, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The Bight regional monitoring effort involves detailed characterization of coastal and offshore receiving waters, as well as targeted special studies. The analysis and assessments of the data shall relate the Bight monitoring data to the condition of receiving waters and status of receiving water beneficial uses.

(3) Sediment Quality

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

Specific Question: What is the condition of sediments in enclosed bays and estuaries with respect to the statewide sediment quality objectives?

The Copermittees shall incorporate results of the sediment quality monitoring of bay and estuarine sediments, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the data shall relate sediment quality data to the condition of receiving waters and status of receiving water beneficial uses.

The analysis of sediment quality data also shall conform to the requirements of the Statewide Sediment Quality Objectives regulatory program, per State Water Resources Control Board Resolution No. 2008-0070 – Adoption of a Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(4) Hydromodification Management Plan (HMP) Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?

The Copermittees shall incorporate results of the receiving water monitoring required per their Hydromodification Management Monitoring Plans, as approved by the California Regional Water Quality Control Board, San Diego Region, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the data shall relate HMP monitoring data to the condition of receiving waters and status of receiving water beneficial uses. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(5) TMDL Monitoring

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

Specific question: What is the progress in achieving and complying with adopted TMDL targets?

The Copermittees shall incorporate results of TMDL monitoring, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the TMDL monitoring data shall be integrated with other receiving water data in assessments of the condition of receiving waters and status of receiving water beneficial uses.

The Copermittees shall annually evaluate receiving water data produced per Provision D.1.e. to determine whether TMDL targets are being met, for applicable receiving waters as specified in adopted TMDLs and include the results of this evaluation, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

The analysis of TMDL monitoring data also shall conform to the requirements of the adopted TMDLs and associated Implementation Plans, to demonstrate compliance with the applicable terms of adopted TMDLs and Implementation Plans.

(6) <u>ASBS Special Protections Monitoring</u>

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?

The Copermittees responsible for discharges to Areas of Special Biological Significance (ASBS) as regulated per the Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges, State Water Resources Control Board Resolution No. 2012-0012, shall incorporate results of ASBS monitoring, when available, into the analysis and assessments conducted as part of WQIP planning and implementation. The analysis and assessments of the ASBS monitoring data shall be integrated with other receiving water data in assessments of the condition of receiving waters and status of receiving water beneficial uses.

The Copermittees for whom ASBS monitoring is required under the terms of the adopted ASBS Special Protections shall evaluate the data as required per State Water Resources Control Board Resolution No. 2012-0012, and include the results of this evaluation, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(7) Long-Term Receiving Water Monitoring

Management Question: Are conditions in receiving waters getting better or worse?

The Copermittees shall incorporate the results of the Long-Term Receiving Water Monitoring into the analysis and assessments conducted as part of the adaptive management process. The analysis and assessments of the Long-Term monitoring data shall be integrated with other receiving water data in assessments of the condition of receiving waters and status of receiving water beneficial uses.

The Copermittees shall evaluate the data produced by the receiving water monitoring pursuant to Provision D.1.g, and incorporate new receiving water data into time series plots for each long-term monitoring constituent, for each WMA. Once per permit term the Copermittee shall perform statistical trends analysis on the cumulative long-term receiving water data set.

(8) Integrated Receiving Water Assessment

Management Questions: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems? Are conditions in receiving waters getting better or worse?

Once during the permit term, for each watershed management area, the Copermittees shall integrate the analyses and assessments of the results of the SMC Regional Monitoring Program, Bight Regional Monitoring Program, Sediment Quality monitoring, HMP Monitoring, TMDL monitoring, ASBS monitoring, and Long-term receiving water monitoring, as performed per Provisions D.5.a.(1)-D.5.a.(7), as well as other data as available and applicable, to assess the condition of receiving waters and status of receiving water beneficial uses, and identify data or information gaps. The integrated assessment shall include, as appropriate to address any identified data gaps, recommendations for additional monitoring as may be required to adequately characterize conditions in receiving waters, or where special studies may be needed to address specific information needs.

b. MS4 OUTFALL DISCHARGE MONITORING

The Copermittees shall perform analysis and assessments of data and information produced per Provision D.2, addressing the management and specific questions as shown in Provision D.2 and below. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

(1) Transient Non-Storm Water (Dry Weather) Monitoring, IC/ID Investigation

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which non-storm water discharges are transient and which are persistent? Which discharges should be investigated as potential IC/IDs? Which outfalls exhibit persistent dry weather flows?

(a) Where the presence of non-storm water (dry weather) flow is noted from an outfall during a visual inspection, field personnel shall note visual and other observations (including approximate/estimated flow rate, changes in flow rate during inspection, changes in flow rate over previous inspections, color, presence of foam or sheen, and odor) on a field log. Inspectors also shall note where there is evidence of past flow and record pertinent observations at all sites visited.

(b) The field observations shall be evaluated together with existing information available from prior inspections and prior monitoring results to determine whether the non-storm water (dry weather) discharge flow is likely to be transient or persistent. If the flow is deemed to be transient as indicated by pooled or ponded water or other evidence of recent flow, and there is evidence of an illicit discharge such as obvious odor, discoloration, foam or scum, the observations shall be used to conduct IC/ID investigations pursuant to Provision E.2. If the nature and source of the observed flow is already known, this shall be noted on the field log, including whether the observed flow results from a non-storm water discharge conditionally allowed per Provision E.2.a.

(c) Where the non-storm water (dry weather) discharge flow is deemed to be persistent in Provision D.2.b.(9), the outfall shall be referred to the characterization and prioritization process described in Provision D.2.c.

(2) <u>Persistent Non-Storm Water (Dry Weather) Outfall Monitoring</u>

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Which outfalls exhibit persistent dry weather flows? Do discharge concentrations at MS4 outfalls meet applicable permit action levels? Which MS4 outfalls impact receiving water quality during dry weather?

(a) Identification and Prioritization of Outfalls with Persistent Flow

Annually, the Copermittees shall evaluate the data produced by the dry weather outfall monitoring pursuant to Provision D.2.c., rank the outfalls according to potential threat to receiving water quality, and produce a prioritized list of outfalls for follow-up action. The Copermittees must analyze the non-storm water monitoring data collected pursuant to Provision D.2.c. and consider NAL exceedances in prioritizing outfalls. The prioritized list shall be provided in the Annual Report for each WMA pursuant to Provision F.3.b. The prioritized list shall be used to update the WQIPs with the goal of reducing flows/ loads in order of the ranked priority list, through targeted programmatic actions and source investigations.

(b) Evaluate Potential Impacts to Receiving Waters from Persistent Non-Storm Water Outfall Flows

Annually, the Copermittees shall evaluate the data produced by the dry weather outfall monitoring pursuant to Provision D.2.c., and compare the outfall monitoring data to relevant receiving water quality data, to identify outfalls that may cause or contribute to receiving water quality problems.

(c) Calculate Loadings to Receiving Waters from Persistent Non-Storm Water Outfall Flows

Annually, the Copermittees shall estimate discharge loadings from the data produced by the dry weather outfall monitoring pursuant to Provision D.2.c., and rank the monitored outfalls in order from highest to lowest loading, to identify outfalls that may cause or contribute to receiving water quality problems. As part of this annual estimation, the Copermittees shall identify areas where program implementation is thought to have resulted in reductions or elimination of loads from MS4 outfalls.

(d) The Copermittees in each Watershed Management Area must review the non-storm water flow and pollutant load analyses required pursuant to Provision D.4.b.(2)(d) on an annual basis to:

(i) Identify the pollutant load reductions that are thought to be attributable to water quality management actions within the high priority outfall drainage areas

(ii) Assess the effectiveness of the water quality improvement strategies being implemented within the Watershed Management Area toward reducing or eliminating non-storm water discharges and pollutant loads discharging from the MS4 to receiving waters; and

(iii) Identify modifications necessary to increase the effectiveness of the water quality improvement strategies toward reducing or eliminating non-storm water discharges and pollutant loads discharging from the MS4 to receiving waters.

(3) Storm Water (Wet Weather) Outfall Monitoring

Management Questions: What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?

Specific Questions: Do discharge concentrations at MS4 outfalls meet applicable permit action levels? Which MS4 outfalls impact receiving water quality during wet weather? How do representative MS4 outlet discharge concentrations, loads, and flows change over time?

(a) Comparisons of Wet Weather Outfall Quality to Storm Water Action Levels

The Copermittees shall analyze the storm water monitoring data collected pursuant to Provision D.2.c and consider SAL exceedances in prioritizing outfalls for further investigation, and assessing progress towards addressing WQIP priorities.

(b) Evaluate Potential Impacts to Receiving Waters

Annually, the Copermittees shall evaluate the data produced by the wet weather outfall monitoring pursuant to Provision D.2.c, and compare the outfall monitoring data to relevant receiving water quality data, to identify outfalls that may cause or contribute to receiving water quality problems.

(c) Calculate Loadings to Receiving Waters from Storm Water Outfall Flows

Annually, the Copermittees shall estimate discharge loadings from the data produced by the wet weather outfall monitoring pursuant to Provision D.2.c. As part of this annual estimation, the Copermittees shall identify areas where program implementation is thought to have resulted in reductions or elimination of loads from MS4 outfalls.

(d) The Copermittees in each Watershed Management Area must review the storm water flow and pollutant load analyses required pursuant to Provision D.5.b.(3)(c) on an annual basis to:

(i) Identify the pollutant load reductions that are thought to be attributable to water quality management actions within the monitored outfall drainage areas

(ii) Assess the effectiveness of the water quality improvement strategies being implemented within the Watershed Management Area toward reducing storm water pollutant loads discharging from the MS4 to receiving waters; and

(iii) Identify modifications necessary to increase the effectiveness of the water quality improvement strategies toward reducing storm water pollutant loads discharging from the MS4 to receiving waters.

(e) Characterization of Trends Over Time

The Copermittees shall evaluate the data produced by the wet weather outfall monitoring pursuant to Provision D.2.c, and incorporate new outfall monitoring data into time series plots for each long-term monitoring constituent, for each WMA. Once per permit term the Copermittee shall perform statistical trends analysis on the cumulative long-term MS4 outfall water quality data set.

c. Source Identification

Management Question: What are the sources of urban runoff that contribute to receiving water problem(s)?

The principal role of Source/Stressor Identification is to identify and prioritize pollutant generating activities and source categories. Identification of high-priority sources is an important step in support of the WQIP process, to help inform the development of effective pollutant reduction strategies for particular priority constituents on a watershed-specific basis.

Source identification shall be conducted on a constituent-specific basis. The source identification efforts shall focus on constituents identified as watershed priorities, and include prioritization of sources based on magnitude, controllability, and other factors.

Following WQIP approval and implementation, source identification studies shall be used to improve WQIP effectiveness. For each Watershed Management Area, the Copermittees shall perform the investigation pursuant to Provision D.3, as necessary to address identified watershed priorities, including production of a prioritized list of sources or potential sources that warrant additional investigation and/or development of control strategies through the WQIPs.

Annually, the Copermittees shall evaluate the results and findings produced by the source/stressor identification studies conducted pursuant to Provision D.3, and inform Copermittee staff responsible for WQIP implementation of the relative magnitudes and/or priority rankings of identified sources. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

d. SPECIAL STUDIES

Following WQIP approval and implementation, special studies shall be identified to fill data gaps and provide targeted information to improve WQIP effectiveness. Upon completion of each Special Study conducted pursuant to Provision D.4, the Copermittees shall evaluate the study results and apply the results to the implementation of WQIPs within each Watershed Management Area as applicable.

Annually, the Copermittees shall evaluate the results and findings produced by the special studies conducted pursuant to Provision D.4, and assess their relevance to the Copermittees' efforts to better characterize WMAs and receiving water conditions, to understand urban runoff pollutant sources, and to control and limit the discharges of pollutants from MS4 outfalls to the maximum extent practicable. The Copermittees shall include the results of this analysis, when available and as applicable to each WMA, in the Annual Report pursuant to Provision F.3.b.

e. INTEGRATED EVALUATION OF WATER QUALITY IMPROVEMENT STRATEGIES

Once during the permit term, for each watershed management area, the Copermittees shall integrate the analyses and results of the monitoring performed pursuant to Provisions D.1-D.4, and the results of the assessments performed pursuant to Provision D.5.a.-D.5.d, as well as other data as available and applicable, to assess: 1) progress towards achieving the numeric goals and schedules established per the approved WQIPs, 2) progress toward addressing the highest priority receiving water conditions established for each Watershed Management Area, and 3) water quality improvements that are thought to be attributable to the Copermittees' implementation of the requirements of Provision B. For Watershed Management Areas with applicable TMDLs, the integrated evaluation must incorporate the specific monitoring and assessment requirements of Attachment E. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must also incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-0012. The integrated evaluation shall include the following:

(1) The conditions of receiving waters and status of receiving water beneficial uses,

(2) The extent to which MS4 discharges cause or contribute to receiving water problems during both dry weather and wet weather,

(3) The estimated reductions in loadings from MS4 discharges attributable to the Copermittees' stormwater management activities, for both dry and wet weather,

(4) The principal identified sources of pollutants that are responsible for constituents in MS4 discharges that cause or contribute to receiving water

problems,

(5) The results of the cumulative special studies and their application to improvement of the WQIPs for the Watershed Management Areas,

(6) Progress toward achieving the interim and final numeric targets for restoring impacted beneficial uses in receiving waters with adopted TMDL Implementation Plans;

(7) Any identified data or information gaps, along with recommendations for additional monitoring, special studies, or other investigations to address the data and information needs.

E. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAMS

The purpose of this provision is for each Copermittee to implement a program to control the discharge of pollutants to and from its respective MS4 to receiving waters within its jurisdiction. The goals of this program are to: 1) effectively prohibit non-storm water discharges into the MS4s, 2) reduce pollutants in storm water discharges from the MS4s to the MEP, and 3) support the attainment and the reasonable protection, preservation, and enhancement water quality and designated beneficial uses of waters of the U.S**.** These goals will be accomplished through compliance with the jurisdictional runoff management program requirements of this Provision, and as modified or supplemented per Provision B (Water Quality Improvement Plans).

Each Copermittee must implement all the requirements of Provision E no later than 18 months after the adoption of this Order, or in accordance with Provision F.5.a. Each Copermittee must update its jurisdictional runoff management program document, in accordance with Provision F.2.a, to include all the requirements of Provision E. The jurisdictional runoff management programs implemented by each Copermittee must be consistent with the Water Quality Improvement Plan for the applicable Watershed Management Area required by Provision B. Until the Copermittee has updated its jurisdictional runoff management program document with the requirements of Provision E, the Copermittee must continue implementing its current jurisdictional runoff management program.

Modification of Jurisdictional Runoff Management Program Requirements

The requirements of this section apply to each Copermittee on a jurisdiction-wide basis. Copermittees that are in multiple WMAs may implement any activity or requirement at a level different than a specified minimum within any individual WMA so long as the requirement (as specified below) is met for the jurisdiction as a whole and compliance with all other applicable permit directives is maintained jurisdictionally and within each WMA.

Upon approval of the Executive Officer, specific requirements may be reduced or waived on a jurisdictional basis only where the following conditions have been met:

- The Copermittee's proposed JRMP modifications must be submitted to the San Diego Water Board for a 30 day public review and comment period. The San Diego Water Board will issue a public notice and solicit public comments on the JRMP modification for a minimum of 30 days. Based on the comments received, the San Diego Water Board will determine whether to hold a public hearing or to limit public input to submittal of written comments. If no hearing is held the San Diego Water Board will notify the Copermittee that the JRMP modification has been approved following its review and determination that it meets the requirements of this Order;

- On RWQCB approval, the Copermittee's JRMP must be amended per Section II.F.2.a. to incorporate the modification(s);

- Applicable portions of any WQIP to which an approved modification applies must be modified to reference or incorporate it, and the updated WQIP made available on the Regional Clearinghouse pursuant to Provision F.4.

1. Legal Authority Establishment and Enforcement

a. Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through statute, ordinance, permit, contract, order, or similar means to the extent allowable by law. This legal authority must authorize the Copermittee to:

(1) Effectively prohibit and eliminate all illicit discharges and illicit connections to its MS4;

(2) Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites, including industrial and construction sites that do not have coverage under the statewide General Permit for Discharges of Storm Water Associated with Industrial Activities (Industrial General Permit) or General Permit for Discharges of Storm Water Associated with Construction Activities (Construction General Permit);

(3) Control the discharge of spills, dumping, or disposal of materials other than storm water into its MS4;

(4) Coordinate, as possible, with other agencies to minimize the contribution of pollutant discharges from the Copermittee's portion of the MS4 to portions of the MS4 under another agency's jurisdiction and from the other agency's portions of the MS4 to the portion of the MS4 under the Copermittee's jurisdiction;

(5) Require compliance with conditions in its statutes, ordinances, permits, contracts, orders, or similar means to hold dischargers to its MS4 accountable for their contributions of pollutants and flows;

(6) Require the use of BMPs to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;

(7) Require documentation on the effectiveness of BMPs implemented to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;

(8) Utilize enforcement mechanisms to require compliance with its statutes, ordinances, permits, contracts, orders, or similar means; and

(9) Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with its statutes, ordinances, permits, contracts, orders, or similar means and with the requirements of this Order, including the prohibition of illicit discharges and connections to its MS4; the Copermittee must also have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities, including construction sites, discharging into its MS4.

b. With the first Annual Report required by Provision F.3.b, each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in this Order.

2. Illicit Discharge Detection and Elimination

Each Copermittee must implement a program to actively detect and eliminate illicit discharges and improper disposal into the MS4, or otherwise require the discharger to apply for and obtain a separate NPDES permit. The illicit discharge detection and elimination program must include, at a minimum, the following requirements:

a. Non-Storm Water Discharges

To the extent allowable by law, each Copermittee must address all non-storm water discharges as illicit discharges where the likelihood exists that they are a source of pollutants to waters of the U.S., unless a non-storm water discharge is either identified as a discharge authorized by a separate NPDES permit, or identified as a category of non-storm water discharges or flows that must be addressed pursuant to the following requirements:

(1) Discharges of non-storm water to the MS4 from uncontaminated pumped groundwater must be addressed as illicit discharges where there is evidence that suggests that they are the source of pollutants to waters of the U.S., unless the discharge has coverage under NPDES Permit No. CAG919001 (Order No. R9-2007-0034, or subsequent order) for discharges to San Diego Bay, or NPDES Permit No. CAG919002 (Order No. R9-2008-0002, or subsequent order) for discharges to surface waters other than San Diego Bay:

(2) Discharges of non-storm water from water line flushing and water main breaks to the MS4 must be addressed as illicit discharges unless the discharge has coverage under a valid NPDES Permit, Order No. R9-2010-0003, or a subsequent order. This includes water line flushing and water

main break discharges from water purveyors under the Copermittee's jurisdiction that has been issued a water supply permit by the California Department of Public Health or federal military installations. Discharges from recycled or reclaimed water lines to the MS4 must be addressed as illicit discharges, unless the discharges have coverage under a separate NPDES permit.

(3) Discharges of non-storm water to the MS4 from the following categories must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a anthropogenic source of pollutants to receiving waters within the Copermittee's jurisdiction:

(a) Discharges from foundation drains;

(b) Water from crawl space pumps;

(c) Water from footing drains.

(d) Diverted stream flows;

(e) Rising ground waters;

(f) Uncontaminated ground water infiltration to MS4s;

(g) Springs;

(h) Flows from riparian habitats and wetlands; and

(i) Discharges from potable water sources.

(4) Discharges of non-storm water to the MS4 from the following categories must be controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means where there is evidence that those discharges are a source of pollutants to waters of the U.S. Discharges of non-storm water to the MS4 from the following categories not controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means must be addressed by the Copermittee as illicit discharges.

(a) Air conditioning condensation

The discharge of air conditioning condensation should be directed to landscaped areas or other pervious surfaces where feasible;

(b) Individual residential vehicle washing

The discharge of wash water must be encouraged through public outreach and education:

(i) To be directed to landscaped areas or other pervious surfaces where feasible, and

(ii) To minimize the use of water for vehicle washing, use as little washing detergent and other vehicle wash products as possible, wash vehicles at commercial wash facilities, and implement other practices or behaviors that will prevent the discharge of pollutants associated with individual residential vehicle washing from entering the MS4; and

(c) Dechlorinated swimming pool discharges

(i) Eliminate residual chlorine, algaecide, filter backwash, or other pollutants from swimming pools prior to discharging to the MS4, and

(ii) The discharge of saline swimming pool water must be directed to the sanitary sewer, landscaped areas, other pervious surfaces that can accommodate the volume of water, or to the MS4 if the MS4 discharges to a saltwater receiving water.

(5) Firefighting discharges to the MS4 must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a significant source of pollutants to receiving waters. Firefighting discharges to the MS4 not identified as a significant source of pollutants to receiving waters, must be addressed, at a minimum, as follows:

(a) Non-emergency firefighting discharges

(i) Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) to the MS4 must be addressed as illicit discharges where BMPs are not implemented.

(ii) Non-emergency firefighting discharges (i.e., discharges from controlled or practice blazes, firefighting training, and maintenance activities not associated with building fire suppression systems) must be addressed by a program, to be developed and implemented by the Copermittee, to reduce or eliminate pollutants in such discharges from entering the MS4.

(b) Emergency firefighting discharges

Each Copermittee should develop and encourage implementation of BMPs to reduce or eliminate pollutants in emergency firefighting discharges to the MS4s and receiving waters within its jurisdiction. During emergency situations, priority of efforts should be directed toward life, property, and the environment (in descending order). BMPs shall not interfere with immediate emergency response operations or impact public health and safety.

(6) If the Copermittee or San Diego Water Board identifies any category of non-storm water discharges listed under Provisions E.2.a.(1)-(4) as a source of pollutants to receiving waters, the category must be prohibited through ordinance, order, or similar means and addressed as an illicit discharge.

b. Prevent and Detect Illicit Discharges And Connections

Each Copermittee must include the following measures within its program to prevent and detect illicit discharges to the MS4:

(1) Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas. The accuracy of the MS4 map must be confirmed during non-storm water MS4 monitoring events. The MS4 map must be included as part of the jurisdictional runoff management program document. Any geographic information system (GIS) layers or files used by the Copermittee to maintain the MS4 map must be made available to the San Diego Water Board upon request. The MS4 map must identify the following:

(a) All segments of the MS4 owned, operated, and maintained by the Copermittee,

(b) All known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4,

(c) All known locations of connections with other MS4s not owned or operated by the Copermittee (e.g. Caltrans MS4s),

(d) All known locations of MS4 outfalls as defined by 40 CFR §122.26(B)(5-6) and private outfalls as defined by 40 CFR §122.26(B)(9) that discharge runoff collected from areas within the Copermittee's jurisdiction,

(e) All segments of receiving waters within the Copermittee's jurisdiction that receive and convey runoff discharged from the Copermittee's MS4 outfalls, and

(f) Locations of the non-storm water MS4 monitoring stations, identified pursuant to Provision D.2.b, within its jurisdiction;

(2) Each Copermittee must use Copermittee personnel and contractors to assist in identifying and reporting illicit discharges and connections, if observed, during the course of their daily employment activities;

(3) Each Copermittee must promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges to or from the MS4. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by the Copermittees. All public hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week;

(4) Each Copermittee must implement practices and procedures (including a notification mechanism) to prevent, respond to, contain, and clean up any spills that may discharge into the MS4 within their jurisdiction from any source. The Copermittee must coordinate with spill response teams to prevent to the extent possible entry of spills into the MS4, and prevent contamination waters of the U.S. The Copermittee must coordinate spill prevention, containment, and response activities throughout all appropriate Copermittee departments, programs, and agencies;

(5) Copermittees are responsible for control of discharges to their MS4. In the event that the source of an illicit discharge or connection is from another MS4, the Copermittee shall notify and, if necessary coordinate, with the upstream MS4 to implement and/or enforce corrective actions; and

(6) Each Copermittee must implement practices and procedures to prevent and limit infiltration of seepage from sanitary sewers (including private laterals and failing septic systems) to the MS4.

c. Visual Observations, Field Screening, And/or Monitoring

Each Copermittee must conduct visual observations, field screening and/or monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect non-storm water and illicit discharges and connections to the MS4 in accordance with the jurisdictional non-storm water MS4 monitoring program requirements in Provision D.2.b.

d. Investigate and Eliminate Illicit Discharges And Connections

Each Copermittee must include the following measures within its program to investigate and eliminate illicit discharges to the MS4:

(1) Each Copermittee must prioritize and determine when follow-up investigations will be performed in response to visual observations and/or water quality monitoring data collected during an investigation of a detected non-storm water or illicit discharge to or from the MS4. The criteria for follow-up investigations must include the following:

(a) Pollutants identified as causing or contributing to the highest water quality priorities identified in the Water Quality Improvement Plan;

(b) Pollutants identified as causing or contributing, or threatening to cause or contribute to impairments in water bodies on the 303(d) List and/or in environmentally sensitive areas (ESAs), located within its jurisdiction;

(c) Pollutants identified from sources or land uses known to exist within the area, drainage basin, or watershed that discharges to the portion of the MS4 within its jurisdiction included in the investigation; and

(d) Pollutants identified as causing or contributing to and exceedance of an NAL[12] where the source has not been identified as natural described in Provision C.1; and

(e) Pollutants identified as a threat to human health or the environment.

(2) Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that based on reports or notifications, visual observations, field screening, monitoring, or other appropriate information, indicate a reasonable potential of discharging pollutants to receiving waters within the Copermittees jurisdiction due to illicit discharges, illicit connections, or other sources of non-storm water.

(a) The Copermittee may develop criteria to assess the validity of, and prioritize the response to, each report or notification received. Each Copermittee must respond to each report or notification (e.g., public hotline reports, staff or contractor reports and notifications, etc.) of an incident in a timely manner.

(b) Procedures should address field investigations to identify sources or potential sources for the discharge, unless the source or potential source has already been identified during previous investigations. The criteria established in Provision E.d.(2)(a) shall be used to prioritize response based on highest watershed priorities as established for the iterative process and determined in the Water Quality Improvement Plan, including:

(i) Obvious illicit discharges must be immediately investigated to identify the source(s) of discharges of non-storm water where flows are observed in and from the MS4 during the field screening and monitoring required pursuant to Provision D.2.b;

[12] NAL exceedances discovered during the course of IDDE monitoring and/or investigations may trigger action levels, including but not limited to, follow-up investigations based on the highest watershed priorities set forth and the iterative process provided in the WQIP.

(ii) The investigation must include field investigations to identify sources or potential sources for the discharge, unless the source or potential source has already been identified during previous investigations;

(iii) The investigation may include field investigations, reviewing Copermittee inventories, and other land use data to identify potential sources of the discharge; and

(iv) Procedures should address tracking of illicit discharges and connections.

(3) Each Copermittee must maintain records and a database of the investigations, including the following information:

(a) Location of incident, including hydrologic subarea, portion of MS4 receiving the non-storm water or illicit discharge, and point of discharge or potential discharge from MS4 to receiving water,

(b) Source of information initiating the investigation (e.g., public hotline reports, staff or contractor reports and notifications, monitoring data, etc.),

(c) Date the information used to initiate the investigation was received,

(d) Date the investigation was initiated,

(e) Dates of follow-up investigations,

(i) Identified or suspected source of the illicit discharge or connection, if determined,

(f) Known or suspected related incidents, if any,

(g) Result of the investigation, and

(h) If a source cannot be identified and the investigation is not continued, a rationale for why a discharge does not pose a threat to water quality and/or does not require additional investigation.

(4) Each Copermittee must initiate the implementation of procedures, in a timely manner, to eliminate all detected and identified illicit discharges and connections within its jurisdiction. The procedures must include the following:

(a) Procedures outlined by the Copermittee should address legal authority, as required under Provision E.1, to enforce the elimination of illicit discharges and connections to the MS4. If the Copermittee identifies the source as a controllable source of non-storm water or illicit discharge or connection, the Copermittee must implement its Enforcement Response Plan pursuant to Provision E.6 and enforce its legal authority to effectively prohibit and eliminate illicit discharges and connections to its MS4. Responses to discharges may include:

(i) If the Copermittee identifies the source of the discharge as a category of non-storm water discharges in Provision E.2.a, and the discharge in exceedance of NALs developed in the Water Quality Implementation Plan, then the Copermittees must determine if this is an isolated incident or set of circumstances, or if the category of discharge must be addressed through the prohibition of that category of discharge as an illicit discharge pursuant to Provision E.2.a.(6);

(ii) If the Copermittee suspects the source of the non-storm water discharge as natural in origin (i.e. non-anthropogenically influenced) and in conveyance into the MS4, then the Copermittee must document the rationale for why the discharge does not need further investigation. This documentation shall be included in the Annual Report.

(iii) If the Copermittee is unable to identify and document the source of a recurring non-storm water discharge to or from the MS4, then the Copermittee must address the discharge as an illicit discharge and update its jurisdictional runoff management program to address the common and suspected sources of the non-storm water discharge within its jurisdiction in accordance with the Copermittee's priorities.

(5) Each Copermittee must submit a summary of the non-storm water discharges and illicit discharges and connections investigated and eliminated within its jurisdiction with each Annual Report required under Provision F.3.b of this Order.

3. Development Planning

Each Copermittee, within its respective jurisdiction, must implement a development planning program that includes, at a minimum, the following requirements.

a. Permanent BMP Requirements for All Development Projects

Each Copermittee, as practical and feasible, must prescribe BMP requirements during the planning process (i.e. prior to project approval and issuance of grading or building permits) for all development projects where local permits are issued, including unpaved roads and flood management projects, except emergency projects implemented for the protection of persons and property:

(1) General Requirements

(a) All BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters, and as close to the source as possible;

(b) Multiple development projects may use shared permanent BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any development project from which the BMP will receive runoff; and

(c) Permanent BMPs must not be constructed within waters of the U.S.

(2) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The following source control BMPs must be implemented at all development projects where applicable and feasible:

(a) Prevention of illicit discharges into the MS4;

(b) Storm drain system stenciling or signage;

(c) Properly designed outdoor material storage areas;

(d) Properly designed outdoor work areas;

(e) Properly designed trash storage areas; and

(f) Any additional BMPs necessary to minimize pollutant generation at each project.

(3) Low Impact Development (LID) BMP Requirements

The following LID BMPs must be implemented at all development projects where applicable and feasible:

(a) Maintenance or restoration of natural storage reservoirs and drainage corridors (including topographic depressions, areas of permeable soils, natural swales, and ephemeral and intermittent streams);[13]

[13] Development projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. Projects proposing to dredge or fill waters of the State must obtain Waste Discharge Requirements.

(b) Buffer zones for natural water bodies (where buffer zones are technically infeasible, require project applicant to include other buffers such as trees, access restrictions, etc.);

(c) Conservation of natural areas within the project footprint including existing trees, other vegetation, and soils;

(d) Construction of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided public safety is not compromised;

(e) Minimization of the impervious footprint of the project;

(f) Minimization of soil compaction to landscaped areas;

(g) Disconnection of impervious surfaces through distributed pervious areas;

(h) Landscaped or other pervious areas designed and constructed to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4;

(i) Small collection strategies located at, or as close as possible to, the source (i.e. the point where storm water initially meets the ground) to minimize the transport of runoff and pollutants to receiving waters;

(j) Use of permeable materials for projects with low traffic areas and appropriate soil conditions;

(k) Landscaping with native or drought tolerant species; and

(l) Harvesting and using precipitation.

b. Priority Development Projects

(1) Definition of Priority Development Project

Priority Development Projects include the following:

(a) All new development projects that fall under the Priority Development Project categories listed under Provision E.3.b.(2). Where a new development project feature, such as a parking lot, falls into a Priority development project category, the entire project footprint is subject to Priority Development Project requirements; and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site, and the redevelopment project is a Priority Development Project category listed under Provision E.3.b.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to Priority Development Project requirements, the performance and sizing requirements discussed in Provisions E.3.c.(2) and E.3.c.(3) apply only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development and was not subject to previous Priority Project Development requirements, the performance and sizing requirements apply to the entire development.

(c) Projects where redevelopment results in an increase of more than fifty percent of impervious surfaces of a previously existing development, and the existing development was subject to previous Priority Project Development requirements, only the altered portion of development is subject to the Priority Development Project requirements in this Order.

(2) Priority Development Project Categories

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This category includes commercial, industrial, residential, mixed-use, and public development projects on public or private land which fall under the planning and building authority of the Copermittee.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is 5,000 square feet or more of impervious surface.

(d) Hillside development projects. This category includes any development which creates 5,000 square feet or more of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally sensitive areas (ESAs). This category includes any development located within, directly adjacent to, or discharging directly to an ESA, which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent to” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that collects runoff from the subject development or redevelopment site which terminates at or in receiving waters within the ESA and is not comingled with flows from adjacent lands.

(f) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce that has 5,000 square feet or more of impervious surface.

(g) Streets, roads, highways, and freeways. This category is defined as any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more of impervious surface or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(i) Large development projects. This category includes any post-construction pollutant-generating new development projects that result in the disturbance of one acre or more of land.

(3) Priority Development Project Exemptions

Each Copermittee has the discretion to exempt the following projects from being defined as Priority Development Projects:

(a) Sidewalks constructed as part of new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(b) Bicycle lanes that are constructed as part of new streets or roads but are not hydraulically connected to the new streets or roads and designed to direct storm water runoff to adjacent vegetated areas;

(c) Impervious trails and driveways constructed and designed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas;

(d) Sidewalks, bicycle lanes, driveways, parking lots, or trails constructed with permeable surfaces.

(e) Single-family residential projects that are not part of a larger development or proposed subdivision and implement BMPs that meet minimum performance standards, as outlined in the BMP Design Manual.[14]

(f) Any paved impervious surface that is 5,000 square feet or more used for the transportation of automobiles, trucks, motorcycles, and other vehicles that follows the USEPA guidance regarding Management Wet Weather with Green Infrastructure: Green Streets[15] to the MEP.

c. Priority Development Project Structural BMP Performance and Sizing Requirements

In addition to the BMP requirements listed for all development projects under Provision E.3.a, Priority Development Projects must also implement structural BMPs that conform to performance and sizing requirements.

(1) Retention and Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement BMPs to retain and treat pollutants onsite in the following order:

(a) Each Priority Development Project must be required to implement LID BMPs as described in Provision E.3.a.(3); and

(b) Each Priority Development Project must be required to implement LID BMPs that are sized and designed to retain the difference in volume between the runoff volume produced in the post-development condition as compared to the pre-development runoff condition resulting from a 24-hour 85th percentile storm event[16] ("design capture volume[17]"); or

(c) If onsite retention of the design capture volume using LID BMPs is technically infeasible per Provision E.3.c.(4), flow-thru LID and/or conventional treatment control BMPs must be implemented to provide equal pollutant removal for the portion of the design capture volume that is

[14] The BMP Design Manual was formerly known as the Standard Urban Storm Water Mitigation Plan under Order Nos. R9-2007-0001, R9-2009-0002, and R9-2010-0016.
[15] http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm
[16] This volume is not a single volume to be applied to all areas covered by this Order. The size of the 85th percentile storm event is different for various parts of the San Diego Region. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its BMP Design Manuals.
[17] Design capture volume is a single event based volume occurring after an extended dry period.

not retained onsite. Flow-thru LID treatment control BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP; or

(d) If retention and/or equivalent pollutant removal of the design capture volume to meet E.3.c.(2)(a) or E.3.c.(2)(b) are infeasible onsite, project applicants must perform mitigation for the portion of the pollutant load in the design capture volume that is not retained or equally treated onsite, as described in Provision E.3.c.(5)(c).

(e) All onsite treatment control BMPs must:

(i) Be correctly sized and designed so as to remove pollutants from storm water to the MEP;

(ii) Be sized to comply with the following numeric sizing criteria:

[a] Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained onsite; or

[b] Flow-based treatment control BMPs must be designed to mitigate (filter or treat) either: 1) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or 2) the maximum flow rate of runoff produced by the 85^{th} percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(iii) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(2) Hydromodification Management BMP Requirements

Each Copermittee must require each Priority Development Project disturbing greater than one acre to implement hydromodification management BMPs, as described in the Copermittees current HMP, as applicable.

(a) Post-project runoff flow rates and durations do not exceed pre-development runoff flow rates and durations by more than 10 percent (for the range of flows that result in increased potential for erosion or degraded channel conditions downstream of Priority Development Projects).

(i) In evaluating the range of flows that results in increased potential for erosion of natural (non-hardened) channels, the lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks.

(ii) For artificially hardened channels, analysis to identify the lower boundary must use characteristics of a natural stream segment similar to that found in the watershed. The lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or erodes the toe of the channel banks.

(iii) The Copermittees may use monitoring results pursuant to Provision D.5.a.(4) to re-define the range of flows resulting in increased potential for erosion or degraded channel conditions, as warranted by the data.

(b) Projects shall preserve (where feasible) or provide compensation for significant losses of sediment supply anticipated as a result of development.

(c) If hydromodification management BMPs are technically infeasible per Provision E.3.c.(5), project applicants must perform mitigation for the portion of the runoff volume that is not controlled and will cause or contribute to increased potential for erosion of receiving waters downstream of the Priority Development Project, as described in Provision E.3.c.(5)(c).

(d) Exemptions

Each Copermittee has the discretion to exempt a Priority Development Project from the hydromodification management BMP requirements where the project:

(i) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean;

(ii) Discharges storm water runoff into conveyance channels whose bed and bank are stabilized (e.g. concrete lined,an engineered interlocking paver, gabion system etc…) all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean; or

(iii) Discharges storm water runoff into other areas identified by the San Diego Water Board as exempt from the requirements of Provisions E.3.c.(3) .

(3) Long-Term Structural BMP Maintenance

Each Copermittee must require the project applicant to submit proof of the mechanism under which ongoing long-term maintenance of all structural BMPs will be conducted.

(4) Infiltration and Groundwater Protection

(a) Infiltration and treatment control BMPs designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins) must not cause or contribute to an exceedance of an applicable groundwater quality objective. At a minimum, such infiltration and treatment control BMPs must be in conformance with the design criteria listed below, unless the development project applicant demonstrates to the Copermittee that one or more of the specific design criteria listed below are not necessary to protect groundwater quality. The design criteria listed below do not apply to small infiltration systems dispersed throughout a development project.

(i) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(ii) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(iii) Infiltration treatment control BMPs must be adequately maintained to remove pollutants in storm water to the MEP;

(iv) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(v) The soil through which infiltration is to occur must have physical and chemical characteristics (e.g., appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(vi) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities as designated by each Copermittee, unless runoff does not exceed Basin Plan water quality standards or runoff is first treated or filtered to remove pollutants prior to infiltration; and

(vii) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(b) The Copermittees may collectively or individually develop alternative mandatory design criteria to that listed above for infiltration and treatment control BMPs which are designed to primarily function as centralized infiltration devices. Before implementing the alternative design criteria in the development planning process the Copermittee(s) must:

(i) Notify the San Diego Water Board of the intent to implement the alternative design criteria submitted; and

(ii) Comply with any conditions set by the San Diego Water Board.

(5) Alternative Compliance for Technical Infeasibility

At the discretion of each Copermittee, alternative compliance may be allowed for certain Priority Development Projects to comply with Provisions E.3.c.(1) and E.3.c.(2). Alternative compliance is an optional program for the Copermittees to utilize if it is determined to provide an equal or greater benefit than onsite compliance. Where alternative compliance is allowed, it is the sole responsibility of the project applicant to execute the alternative compliance and comply with the following requirements:

(a) Applicability

Priority Development Projects may be allowed alternative compliance if:

(i) The Copermittee reviews and accepts site-specific hydrologic and/or design analysis performed by a registered professional engineer, geologist, architect, or landscape architect;

(ii) The project applicant demonstrates, and the Copermittee determines and documents, that BMPs per Provisions E.3.c.(1) and E.3.c.(2) were incorporated into the project design to the maximum extent technically feasible given the project site conditions;

(iii) The project applicant is required to perform mitigation described in Provision E.3.c.(5)(c) with a net result of at least the same level of water quality protection as would have been achieved if the Priority Development Project had fully implemented the BMP requirements under Provisions E.3.c.(1) and E.3.c.(2) onsite.

(b) Criteria For Technical Infeasibility

Each Copermittee must develop, or develop in collaboration with the other Copermittees, criteria to determine technical infeasibility for fully implementing the BMP requirements under Provisions E.3.c.(1) and E.3.c.(2) and include these requirements in the BMP Design Manual pursuant to Provision E.3.d. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in Provision E.3.c.(4) due to the presence of shallow bedrock, contaminated soils, near surface groundwater, underground facilities, or utilities;

(ii) Brownfield development sites or other locations where pollutant mobilization is a documented concern;

(iii) The design of the site precludes the use of soil amendments, plantings of vegetation, or other designs that can be used to infiltrate and evapotranspirate runoff;

(iv) Soils cannot be sufficiently amended to provide for the requisite infiltration rates;

(v) Locations with geotechnical hazards;

(vi) Insufficient onsite and/or offsite demand for storm water use;

(vii) Modifications to an existing building to manage storm water are not feasible due to structural or plumbing constraints;

(viii) HMP flow rate requirements that result in BMP orifice sizes too small for efficient maintenance; and

(ix) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with Provisions E.3.c.(2) and E.3.c.(3) onsite.

(c) Mitigation

Priority Development Projects that meet the Copermittee's technical infeasibility criteria developed pursuant to Provision E.3.c.(5)(b) must be required to mitigate for the increased flow rates, increased flow durations, and/or water quality equivalence expected to be discharged from the site.

(i) The Project applicant must perform offsite mitigation for:

[a] The portion of the pollutant load in the design capture volume that is not retained or equally treated onsite, and/or

[b] The portion of the increased potential erosion of downstream receiving waters not fully controlled with hydromodification management BMPs onsite.

(ii) Mitigation Project Locations

Offsite mitigation projects must be implemented within the same Watershed Management Area as the Priority Development Project, and preferably within the same hydrologic subarea. Mitigation projects outside of the hydrologic subarea but within the same Watershed Management Area may be approved provided that the project applicant demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar potential impacts expected from the Priority Development Project.

(iii) Mitigation Project Types

Offsite mitigation projects may include, where applicable and feasible, retrofitting opportunities and stream and/or habitat rehabilitation or restoration opportunities identified in the Water Quality Improvement Plans, identified pursuant to Provision B.3.. Other offsite mitigation projects may include green streets or infrastructure projects, groundwater recharge projects, or regional BMPs upstream of receiving waters. Mitigation credit will not be given to portions of in stream mitigation projects using impervious hardscape materials such as concrete. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of Provision E.3.c.(4).

(iv) Mitigation Project Timing

The Copermittee and/or project applicant must develop a schedule for the completion of offsite mitigation projects, including milestone dates to identify, fund, design, and construct the projects. Offsite mitigation funding must be secured by the applicant and verified by the Copermittee prior to granting construction permits or recording of maps, whichever comes first. .

(v) Mitigation Fund

A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as a means for developing and implementing offsite mitigation projects, provided the projects conform to the requirements for project locations, types, and timing described above.

d. Update BMP Design Manual

Each Copermittee must update its BMP Design Manual pursuant to Provision F.2.b or Provision F.5.a. Until the Copermittee has updated its BMP Design Manual with the requirements of Provision E.3.c, the Copermittee must continue implementing its current BMP Design Manual. Unless directed otherwise by the San Diego Water Board, the Copermittee must implement the BMP Design Manual within 180 days of completing the update. The update of the BMP Design Manual must include the following:

(1) Updated procedures to determine the nature and extent of storm water requirements applicable to a potential development or redevelopment project. These procedures must inform project applicants of the storm water management requirements applicable to their project including, but not limited to, general requirements for all development projects, LID and conventional BMP design procedures and requirements, hydromodification management requirements, requirements specific to phased projects, and procedures specific to private developments and public improvement projects;

(2) Updated procedures to identify pollutants and conditions of concern for selecting the most appropriate structural BMPs that consider, at a minimum, the following:

(a) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d));

(b) Priority pollutants or receiving water conditions contributing to the highest water quality priorities identified in the Water Quality Improvement Plan;

(c) Land use type of the project and pollutants associated with that land use type; and

(d) Pollutants expected to be present onsite.

(3) Updated procedures for designing structural BMPs, including any updated performance and sizing requirements to be consistent with the requirements of Provision E.3.c for all BMPs listed in the BMP Design Manual;

(4) Long-term maintenance criteria for each BMP listed in the BMP Design Manual; and

(5) Criteria and mitigation requirements, in accordance with the requirements under Provision E.3.c.(4), if the Copermittee elects to allow alternative compliance for technical infeasibility within its jurisdiction.

e. Priority Development Project BMP Implementation and Oversight

Each Copermittee must implement a program to ensure structural BMPs on all Priority Development Projects are designed, constructed, and maintained to remove pollutants in storm water to the MEP.

(1) Structural BMP Approval and Verification Process

(a) Each Copermittee must ensure that for all Priority Development Project applications that have not received prior lawful approval by the Copermittee by 18 months after the adoption of this Order, or pursuant to Provision F.5.a, the requirements of Provision E.3 are implemented. For project applications that have received prior lawful approval by 18 months after the adoption of this Order, or pursuant to Provision F.5.a, the Copermittee may allow previous land development requirements to apply.

(b) Each Copermittee must identify the roles and responsibilities of various municipal departments in implementing the structural BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections.

(c) Each Copermittee must ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(d) Each Copermittee must ensure that prior to occupancy and/or intended use of any portion of the Priority Development Project, each structural BMP must be inspected to verify that they have been constructed and are operating in compliance with all of its specifications, plans, permits, ordinances, and the requirements of this Order.

(2) Priority Development Project Inventory and Prioritization

(a) Each Copermittee must develop and regularly maintain a watershed-based database to track and inventory all Priority Development Projects and associated structural BMPs within their jurisdiction. Inventories must be accurate and complete beginning from January 2002 for the San Diego County Copermittees, February 2003 for the Orange County Copermittees, and July 2005 for the Riverside County Copermittees, where data is available. The database must include, at a minimum, the following information:

(i) Priority Development Project location (address and hydrologic subarea);

(ii) Descriptions of structural BMP type(s);

(iii) Date(s) of construction;

(iv) Party responsible for structural BMP maintenance;

(v) Dates and findings of structural BMP maintenance verifications; and

(vi) Corrective actions and/or resolutions.

(b) Each Copermittee must prioritize the Priority Development Projects with structural BMPs within its jurisdiction. The designation of Priority Development Projects as high priority must consider the following:

(i) The highest water quality priorities identified in the Water Quality Improvement Plan;

(ii) Receiving water quality;

(iii) Number and sizes of structural BMPs;

(iv) Recommended maintenance frequency of structural BMPs;

(v) Likelihood of operation and maintenance issues of structural BMPs;

(vi) Land use and expected pollutants generated; and

(vii) Compliance record.

(3) Structural BMP Maintenance Verifications and Inspections

Each Copermittee is required to verify that structural BMPs on each Priority Development Project are adequately maintained, and continue to operate effectively to remove pollutants in storm water to the MEP through inspections, self-certifications, surveys, or other equally effective approaches.

(a) All (100 percent) of the structural BMPs at Priority Development Projects that are designated as high priority must be inspected directly by the Copermittee annually prior to each rainy season;

(b) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be required by the Copermittee to provide assurance that the required maintenance of structural BMPs at each Priority Development Project has been completed; and

(c) Appropriate follow-up measures (including re-inspections, enforcement, etc.) must be conducted to ensure that structural BMPs at each Priority Development Project continue to reduce pollutants in storm water to the MEP as originally designed.

f. Development Project Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all development projects, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

4. Construction Management

Each Copermittee must implement a construction management program that includes the following requirements:

a. Construction Program Management

Each Copermittee must define in the Jurisdictional Runoff Management Plan the following:

(1) Define construction sites to be inventoried, such as sites that involve ground disturbance or soil disturbing activities; and

(2) Define a process for ensuring adequate construction BMP implementation for non-inventoried sites. Non-inventoried sites involve minor construction activities that are not anticipated to create storm water pollution such as interior improvements, small miscellaneous residential improvements such as patio covers, plumbing, electrical, and mechanical work.

b. Project Approval Process

Prior to issuance of any local permit that allows commencement of construction activities for any inventoried construction site, each Copermittee must:

(1) Require a site-specific Pollution Control Plan, or equivalent construction BMP or erosion control plan, to be submitted by the project applicant to the Copermittee;

(2) Confirm the Pollution Control Plan, or equivalent construction BMP or erosion control plan, complies with the local grading ordinance, other applicable local ordinances, and the requirements of this Order; and

(3) Confirm the Pollution Control Plan, or equivalent construction BMP or erosion control plan, includes seasonally appropriate and effective BMPs and management measures described in Provision E.4.c, as applicable to the project.

c. Construction Site Inventory and Tracking

(1) Each Copermittee must maintain, and update at least monthly, a watershed-based inventory of all applicable construction sites within its jurisdiction. The inventory must include:

(a) Relevant contact information for each site (e.g., name, address, phone, and email for the owner and contractor);

(b) The basic site information including location (address and hydrologic subarea), Waste Discharge Identification (WDID) number (if applicable), size of the site, and approximate area of disturbance;

(c) Whether or not the site is considered a high threat to water quality, as defined in Provision E.4.b.(2) below;

(d) Current construction phase;

(e) The required inspection frequency, as defined in the Copermittee's jurisdictional runoff management program document;

(f) The date the Copermittee accepted the project-specific Pollution Control Plan, or equivalent construction BMP or erosion control plan; and

(g) Whether or not there are ongoing enforcement actions administered to the site.

(2) Each Copermittee must identify all construction sites within its jurisdiction that represent a high threat to downstream surface water quality. At a minimum, high threat to water quality sites must include:

(a) Sites located within a hydrologic subarea where sediment is known or suspected to contribute to the highest water quality priorities identified in the Water Quality Improvement Plan;

(b) Sites located within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment;

(c) Sites located within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(d) Other sites determined by the Copermittees or the San Diego Water Board as a high threat to water quality.

d. Construction Site BMP and Management Measure Implementation

Each Copermittee must implement, or require the implementation of effective BMPs to reduce discharges of pollutants in storm water from construction sites to the MEP, and prevent non-storm water discharges into the MS4. These BMPs must be site specific, seasonally appropriate, and construction phase appropriate. BMPs and management measures must be implemented at each construction site year round. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30). Copermittees must implement, or require the implementation of, BMPs and management measures in the following categories:

(1) Project Planning;

(2) Good Site Management “Housekeeping”, including waste management;

(3) Non-storm Water Management;

(4) Erosion Control;

(5) Sediment Control;

(6) Run-on and Run-off Control; and

(7) Active/Passive Sediment Treatment Systems, where applicable.

e. Construction Site Inspections

Each Copermittee must conduct construction site inspections to confirm compliance with its permits and applicable local ordinances, and the requirements of this Order. Priority for site inspections must consider threat to water quality pursuant to Provision E.4.b as well as the nature of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) Inspection Frequency

(a) Each Copermittee must conduct inspections at all inventoried sites, including high threat to water quality sites, at an appropriate frequency for each phase of construction to confirm the site reduces the discharge of pollutants in storm water from construction sites to the MEP, and prevents non-storm water discharges from entering the MS4.

(b) Each Copermittee must establish appropriate inspection frequencies for high threat to water quality sites, and all other sites, for each phase of construction. Inspection frequencies appropriate for addressing the highest water quality priorities identified in the Water Quality Improvement Plan, and for complying with the requirements of this Order must be identified in each Copermittee's jurisdictional runoff management program document.

(c) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to confirm site compliance with its permits and applicable local ordinances, and the requirements of this Order.

(2) Inspection Content

Inspections of construction sites by the Copermittee must include, at a minimum:

(a) Verification of coverage under the Construction General Permit (Notice of Intent (NOI) and/or WDID number) during initial inspections, when applicable;

(b) Assessment of compliance with its permits and applicable local ordinances related to pollution prevention, including the implementation and maintenance of applicable BMPs;

(c) Assessment of BMP adequacy and effectiveness;

(d) Visual observations of actual non-storm water discharges;

(e) Visual observations of actual or potential discharge of sediment and/or construction related materials from the site;

(f) Visual observations of actual or potential illicit connections; and

(g) If any violations are found and BMP enhancements are needed, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.

(3) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried construction sites. The Copermittee must retain all inspection records in an electronic database or tabular format, which must be made available to the San Diego Water Board upon request. Inspection records must include, at a minimum:

(a) Site name, location (address and hydrologic subarea), and WDID number (if applicable);

(b) Inspection date;

(c) Weather conditions during inspection;

(d) Description of problems observed with BMPs and indication of need for BMP addition/repair/replacement and any scheduled re-inspection, and date of re-inspection;

(e) Descriptions of any other specific inspection comments which must, at a minimum, include rationales for longer compliance time;

(f) Description of enforcement actions issued in accordance with the Enforcement Response Plan pursuant to Provision E.6; and

(g) Resolution of problems noted and date problems fixed.

f. Construction Site Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried construction sites, as necessary, to achieve compliance with the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

5. Existing Development Management
[NOTE: This section is provided as an alternate to the original language.]

Each Copermittee must implement an existing development management program that includes the following requirements:

a. Industrial, Commercial, and Municipal Sources

(1) Source Identification and Prioritization

Each Copermittee must identify sources and maintain an updated watershed-based inventory of its existing industrial, commercial, and municipal development that has the reasonable potential to discharge a pollutant load to and from the MS4. The use of an automated database system, such as GIS, is highly recommended. The inventory must, at a minimum, include:

(a) Name, location (address and hydrological subarea) of each source;

(b) A designation of the source as municipal, commercial, or industrial;

(c) SIC Code or NAICS Code, if applicable;

(d) Industrial General Permit NOI and/or WDID number, if applicable;

(e) Identification of pollutants generated or potentially generated by the source;

(f) Whether the source is adjacent to an ESA;

(g) Whether the source is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates or potentially generates pollutants for which the water body segment is impaired; and

(h) Whether the source contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan;

(2) BMP Implementation and Maintenance

Each Copermittee must designate a minimum set of BMPs required for all inventoried existing development with the reasonable potential to discharge pollutant loads from their MS4, including special event venues. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(a) Pollution Prevention

Each Copermittee must promote the use of pollution prevention methods, where appropriate.

(b) BMP Operation and Maintenance

(i) Each Copermittee must properly operate and maintain, or require the proper operation and maintenance of designated BMPs at sources within its jurisdiction.

(ii) Each Copermittee must implement a schedule of operation and maintenance activities for its MS4 and related structures (including but not limited to catch basins, storm drain inlets, detention basins, etc.), and verify proper operation of all its municipal structural treatment controls. Operations and maintenance activities may include:

[a] Inspections of MS4 and related structures;

[b] Cleaning of MS4 and related structures; and

[c] Proper disposal of materials removed from cleaning of MS4 and related structures.

(iii) Each Copermittee must implement a schedule of operation and maintenance activities for public: streets, unpaved roads, paved roads, and paved highways and freeways within its jurisdiction.

(iv) Each Copermittee must implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers. Copermittees that operate both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate seeping sewage from infiltrating the MS4. Copermittees that do not operate both a municipal sanitary sewer system and a MS4 are encouraged to coordinate with sewering agencies to keep themselves informed of relevant and appropriate maintenance activities and capital projects in their jurisdiction.

(c) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must implement procedures, or require the implementation of procedures, as appropriate, to reduce discharges of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers at sources within its jurisdiction.

(3) Measures to Address Highest Water Quality Priorities

Each Copermittee must conduct or require measures as necessary to address sources or areas that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. These measures must be identified as applicable in each WQIP strategy, and may include any of the following:

(a) Copermittee Program Activities

Each Copermittee may make modifications to its program activities (e.g. increased or focused education, inspections, etc.) to address sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(b) Additional Control Measures

Each Copermittee may require additional pollution prevention measures and control measures at sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan, including consideration of retrofit and channel rehabilitation and improvement opportunities, as identified in Provision 5.a.2.(c)

(c) Retrofit

Each Copermittee must develop a strategy to facilitate the implementation of retrofit projects. Existing development in high priority areas should be assessed for inclusion in the retrofit plan. Retrofit plans should focus on pollutants and areas identified as high priority within the Water Quality Improvement Plans, with the highest priority projects included in the Water Quality Improvement Plans.

(i) Retrofit projects may be prioritized based on their relative benefit to water quality, feasibility, cost effectiveness, and community acceptance.

(ii) Retrofit projects in the highest priority areas should be included in the review for the Water Quality Improvement Plan to provide additional pollutant removal from storm water discharges.

(d) Channel Rehabilitation and Improvement

Each Copermittee must develop a strategy to facilitate the implementation of channel rehabilitation and improvement projects. Existing channels in high priority areas should be assessed for inclusion in the channel rehabilitation and improvement plan. Channel rehabilitation and improvement plans should focus on pollutants and areas identified as high priority within the Water Quality Improvement Plans.

(i) Channel rehabilitation and improvement projects may be selected to address hydromodification, restore wetland and riparian habitat, or to address other water quality issues prioritized in the Water Quality Improvement Plan.

(ii) Channel rehabilitation and improvement projects may be prioritized based on their relative benefit to water quality, feasibility, cost effectiveness, and community acceptance.

(iii) Channel rehabilitation and improvement projects in the highest priority areas should be included in the review for the Water Quality Improvement Plan to provide additional pollutant removal from storm water discharges.

(4) Inspection Requirements:

(a) Inspection Frequency

(i) Each Copermittee must establish appropriate inspection frequencies for inventoried industrial, commercial, and municipal sources based on the potential for discharging pollutants via storm water and non-storm water discharges, and should reflect the priorities set forth in the Water Quality Improvement Plan.

(ii) Each Copermittee must conduct inspections annually with a level of effort equivalent to 20% of their industrial, commercial, and municipal inventory combined[1819]. If facilities require multiple inspections during any given year, those additional inspections may count towards this total.

(iii) Inventoried existing development must be inspected, as needed, in response to valid public complaints and findings from the Copermittee's municipal and contract staff inspections.

(iv) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e. education and outreach, re-inspection, enforcement) as necessary to confirm compliance in accordance with its enforcement response plan pursuant to Provision E.6.

(b) Inspection Content

Inspections of industrial, commercial, and municipal facilities by the Copermittee may include the following:

(i) Industrial, commercial, and municipal facilities name and location (address and hydrologic subarea);

(ii) Inspection and re-inspection date(s);

(iii) Assessment of compliance with its applicable local ordinances and permits related to non-storm water and storm water discharges and runoff;

(iv) Assessment of BMPs implementation;

(v) Verification of coverage under the Industrial General Permit (NOI and/or WDID number), when applicable;

(vi)

(vii) Visual observations of actual non-storm water discharges, if present;

(viii) Visual observations of actual or potential discharge of pollutants, if present; and

(ix) Visual observations of actual or potential illicit connections, if present.

[18] Excludes linear facilities (MS4 and roads).

(c) Inspection Tracking and Records

Each Copermittee must track all inspections and re-inspections at all inventoried industrial, commercial, and municipal facilities. The Copermittee must maintain all inspection records in an electronic database or tabular format, either in paper or electronic inspection records files, which must be made available to the San Diego Water Board upon request.

Inspection records must include the information necessary to effectively manage and implement the industrial, commercial, and municipal facilities inspection program, as described in each Copermittee's jurisdictional runoff management plan

b. Residential Sources

(1) Source Identification and Prioritization:

An inventory of residential sources within each Copermittees jurisdiction must be developed as follows:

(a) Designation of Residential Management Areas

Each Copermittee must divide areas of residential development into Residential Management Areas. Residential Management Areas may be designated by one or more of the following: Hydrologic Sub Area, land use (e.g. single family, multi family, rural, Common Interest Areas, Home Owner Associations), and/or residential target audiences, and/or other accepted methods to be included in each Copermittee-approved jurisdictional runoff management plan.

(b) Prioritization of Residential Management Areas

Copermittees must prioritize Residential Management Areas for the purposes of directing their residential programs. Prioritization must consider whether the Residential Management Area contributes or potentially contributes to the highest water quality priorities identified in the Water Quality Improvement Plan, and consideration of other program information or information from other relevant programs:

(c) A regularly updated map must be developed showing the locations of the highest priority inventoried Residential Management Areas, watershed boundaries, and water bodies at or near them.

(2) BMP Implementation and Maintenance

(a) Designate BMPs

Each Copermittee must designate and encourage the implementation of a minimum set of BMPs for all residential sources or residential target audiences with the reasonable potential to discharge significant pollutant loads from their MS4.The designated minimum BMPs must be source-specific, and must address each of the following as appropriate.

(i) Pollution Prevention

Each Copermittee must promote the use of pollution prevention methods, where appropriate.

(ii) BMP Operation and Maintenance

Each Copermittee must designate and require the operation and maintenance of designated BMPs for residential sources within its jurisdiction.

(iii) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must designate and encourage, as appropriate, the implementation of practices to reduce discharges of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers at residential sources within its jurisdiction.

(3) Measures to Address Highest Water Quality Priorities

Each Copermittee must designate or require measures as necessary to address residential sources or residential target audiences that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan. These measures must be identified as applicable in each WQIP strategy, and may include any of the following:

(a) Copermittee Program Activities

Each Copermittee may make modifications to its program activities (e.g. increased or focused education, inspections, etc.) to address residential sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(b) Additional Control Measures

Each Copermittee may require additional pollution prevention and control measures at sources that discharge pollutants identified as contributing to the highest water quality priorities in the Water Quality Improvement Plan.

(c) Retrofit

Each Copermittee must encourage through education or other means the implementation of retrofit projects at residential sources or areas.

(4) Residential Management Area Oversight:

(a) Residential Area Assessment

Each Copermittee must conduct representative evaluations (e.g. visual observations, water use analysis, and other historical data) of its high priority Residential Management Areas as defined in the Water Quality Improvement Plan to update implementation strategies. Each Copermittee must develop a program to facilitate oversight and assessment in residential areas. Oversight may include complaint investigation, IDDE Activities, follow-up on monitoring obdervations, visual observations, outreach and education, water use analysis, or other methods deemed necessary to facilitate BMP implementation. Each Copermittee should conduct assessment of its oversight activities in prioritized residential areas to inform any updates to the WQIP.

(b) Follow up Actions

Each Copermittee must prioritize its follow up actions and enforcement (e.g. education and outreach, re-assessment) in accordance with its Enforcement Response Plan pursuant to Provision E.6.

(c) Record-keeping

Records must be sufficiently detailed in order to determine compliance with the requirements of this Order and any progress made toward the modification of residential management strategies, or addressing the highest water quality priorities identified in the Water Quality Improvement Plan.

c. Existing Development Enforcement

Each Copermittee must enforce its legal authority established pursuant to Provision E.1 for all its inventoried existing development identified by the

Copermittee as having the reasonable potential to discharge pollutant loads from the MS4 within their jurisdiction, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

6. Enforcement Response Plans

Each Copermittee must develop and implement an Enforcement Response Plan as part of its jurisdictional runoff management program document. The Enforcement Response Plan must describe the applicable protocols and options for enforcing compliance with the provisions of this Order. The Enforcement Response Plan must include the following:

a. Enforcement Response Plan Components

The Enforcement Response Plans shall include the following individual components:

(1) The Illicit Discharge Detection and Elimination Enforcement Components provided in Provision E.2;

(2) The Development Planning Enforcement Component provided in Provision E.3;

(3) The Construction Management Enforcement Component provided in Provision E.4; and

(4) The Existing Development Management Enforcement Component provided in Provision E.5.

Existing enforcement plans or procedures may be used to partially or wholly satisfy the requirements of any Enforcement Response Plan component.

b. Enforcement Approaches and Options

Each Enforcement Response Plan component must describe the Copermittee's approach to correcting noncompliance with its permits, applicable local ordinances, and this Order. It must describe protocols for progressively stricter responses, including, as applicable, timeframes allowed to bring areas or facilities into compliance. The enforcement process must include appropriate sanctions to compel compliance, such as:

(1) Verbal and written notices of violation;
(2) Cleanup requirements;
(3) Fines
(4) Bonding requirements;
(5) Administrative and criminal (if intentional or criminally negligent) penalties;
(6) Liens;
(7) Stop work orders; and
(8) Permit and occupancy denials.

c. CORRECTION OF VIOLATIONS

(1) Violations must be corrected in a timely manner with the goal of correcting them within 30 calendar days after the violations are discovered, and prior to the next predicted rain event, when possible.

(2) If more than 30 calendar days are required for compliance, then a rationale must be recorded in the applicable electronic database or tabular system used to track compliance.

d. ESCALATED ENFORCEMENT PRIORITIES

(1) Each Enforcement Response Plan must include a definition of “escalated enforcement priorities”. Escalated enforcement priorities shall be defined to include any enforcement scenario where a violation or other non-compliance is determined to constitute a significant contribution to any of the highest water quality priorities identified in the Water Quality Improvement Plan. Escalated enforcement priorities may be defined differently for development planning; construction sites; commercial, industrial, and municipal sources; and residential management areas.

(2) Where a violation involving a pollutant or stressor that has been identified as a highest water quality priority is not determined to represent an escalated enforcement priority, a rationale must be recorded in the applicable electronic database or tabular system used to track compliance.

(3) Escalated enforcement actions must continue to increase in severity, as necessary, to compel compliance as soon as possible.

e. REPORTING OF NON-COMPLIANT SITES

(1) Each Copermittee must notify the San Diego Water Board verbally within 24 hours and in writing within 5 calendar days of issuing escalated enforcement (as defined in the Copermittee’s Enforcement Response Plan) to a construction site that poses a significant threat to water quality as a result of violations or other non-compliance with its permits and applicable local ordinances, and the requirements of this Order. Written notification may be provided electronically in email form.

(2) Each Copermittee must notify the San Diego Water Board of non-filers under the Industrial General Permit and Construction General Permit by email to Nonfilers_R9@waterboards.ca.gov.

7. Public Education and Participation

a. Each Copermittee must implement a public education and participation program, as appropriate, to promote and encourage the development of programs, management practices, control techniques and systems, design and engineering methods, and behaviors that reduce the discharge of pollutants in storm water to the MEP, prevent controllable non-storm water discharges from entering the MS4, and protect water quality standards in receiving waters. The public education program must include the following:

(1) Educational activities, public information activities, and other appropriate outreach activities intended to reduce pollutants of concern from its MS4 to the MEP. Activities shall be determined and prioritized by Copermittees by jurisdiction and/or watershed (Section 5.c.(5) to address the highest threats to water quality (e.g. pesticides, herbicides and fertilizers, used oil, toxic waste, etc.);

(2) Appropriate education and training measures for specific target audiences, as determined and prioritized by the Copermittee(s) by jurisdiction and watershed, based on high risk behaviors and pollutants of concern, such as construction site operators, residents, underserved target audiences and school-aged children.

b. Each Copermittee shall incorporate a mechanism for evaluation and assessment of educational and other outreach activities, as needed, to identify progress and incorporate modifications necessary to increase the effectiveness of the public education program.

c. Each Copermittee may determine, where appropriate and effective, mechanisms for intergovernmental coordination on education and outreach activities.

8. Fiscal Analysis

a. Each Copermittee must secure the resources necessary to meet all the requirements of this Order.

b. Each Copermittee must conduct an annual fiscal analysis of their jurisdictional runoff management programs in their entirety. The fiscal analysis must include the following:

Identification of the various categories of expenditures necessary to implement the requirements of this Order, including a description of the specific items to be accounted for in each category of expenditures;

(1) The staff resources needed and allocated to meet the requirements of this Order, including any development, implementation, and enforcement activities required;

(2) The fiscal analysis must provide estimated expenditures for Provisions E.8.b.0 and E.8.b.(1) for each Copermittee's jurisdictional runoff management program budget for the current reporting period.

(3) The source(s) of funds that are proposed to meet the necessary expenditures described in Provisions E.8.b.0 and E.8.b.(1), including legal restrictions on the use of such funds.

c. Each Copermittee must submit a summary of the annual fiscal analysis with each Annual Report required pursuant to Provision F.3.b.

d. Each Copermittee must provide the documentation used to develop the summary of the annual fiscal analysis upon request by the San Diego Water Board.

F. REPORTING

The purpose of this provision is to determine and document compliance with the requirements set forth in this Order. The goal of this provision is to communicate to the San Diego Water Board and the people of the State of California the implementation status of each jurisdictional runoff management program and compliance with the requirements of this Order. This goal is to be accomplished through the submittal of specific deliverables to the San Diego Water Board by the Copermittees.

1. Water Quality Improvement Plans

The Copermittees for each Watershed Management Area must develop and submit a complete Water Quality Improvement Plan in accordance with the requirements of Provision B, no later than 18 months after the adoption of this Order for a 30 day public review and comment period. The San Diego Water Board will issue a public notice and solicit public comments on the Water Quality Improvement Plan for a minimum of 30 days. Based on the comments received, the San Diego Water Board will determine whether to hold a public hearing or to limit public input to submittal of written comments. If no hearing is held the San Diego Water Board will notify the Copermittees that the Water Quality Improvement Plan has been accepted as complete following its review and determination that the Water Quality Improvement Plan meets the requirements of this Order Water Quality Improvement Plans are deemed approved if no response is provided to the Copermittees within 2 months of the submittal date. Water Quality Improvement Plans must be made available on the Regional Clearinghouse required pursuant to Provision F.4.

a. WATER QUALITY IMPROVEMENT PLAN SUBMITTAL AND IMPLEMENTATION

Copermittees must submit requested modifications to the Water Quality Improvement Plan either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b. Once approved by the San Diego Water Board Executive Officer, the Copermittees must implement any modifications to the Water Quality Improvement Plan in accordance with the schedules developed pursuant to Provisions B.2 and B.3.b. Requests for modification are deemed approved if no response is provided to the requesting Copermittee(s) within 2 months of the request date.

b. CORRESPONDING MODIFICATIONS TO JURISDICTIONAL RUNOFF MANAGEMENT PROGRAMS AND MONITORING AND ASSESSMENT PROGRAMS

Copermittees must submit requested modifications to the jurisdictional runoff management programs and monitoring and assessment programs either in the Annual Report required pursuant to Provision F.3.b, or as part of the Report of Waste Discharge (ROWD) required pursuant to Provision F.5.b. Once approved by the San Diego Water Board Executive Officer, the Copermittees must implement any modifications to the Water Quality Improvement Plan in

accordance with the schedules developed pursuant to Provisions B.3.b. Requests for modification are deemed approved if no response is provided to the requesting Copermittee(s) within 2 months of the request date.

2. Updates

a. Jurisdictional Runoff Management Program Document Updates

Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E. The update must be completed no later than 18 months after the adoption of this Order. Updated jurisdictional runoff management program documents must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Subsequent updates may be submitted as part of the Annual Reports, and updated jurisdictional runoff management program documents must be made available on the Regional Clearinghouse.

Jurisdictional Runoff Management Program document updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

b. BMP Design Manual Updates

Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provision E.3.d. The update must be completed no later than 18 months after the adoption of this Order. Updated BMP Design Manuals must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Subsequent updates may be submitted as part of the Annual Reports. Updated BMP Design Manuals must be made available on the Regional Clearinghouse.

BMP Design Manual updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

c. Water Quality Improvement Plan Updates

The Copermittees for each Watershed Management Area must submit updates to the Water Quality Improvement Plan as part of the Annual Reports. Updated Water Quality Improvement Plans must be made available on the Regional Clearinghouse required pursuant to Provision F.4.

Water Quality Improvement Plan updates that modify program elements from the requirements of Provision E must provide rationale for the modifications within the update documents.

3. Progress Reporting

a. PROGRESS REPORT PRESENTATIONS

The Copermittees for each Watershed Management Area must appear before the San Diego Water Board, as requested by the San Diego Water Board, to provide progress reports on the implementation of the Water Quality Improvement Plan and jurisdictional runoff management programs.

b. ANNUAL REPORTS

(1) The Copermittees for each Watershed Management Area must submit an Annual Report for each reporting period, which begins July 1 and ends June 30 in the following year, no later than January 31 of the following year. This is to accommodate the monitoring year from October 1 to September 30 of the subsequent year. The first Annual Report must be prepared for the reporting period beginning July 1 after adoption of the permit, and upon San Diego Water Board determination that the Water Quality Improvement Plan meets the requirements of this Order to June 30 in the following year. Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each Annual Report must include the following:

(a) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following:

(i) The progress toward achieving the interim and final numeric goals for the highest water quality priorities for the Watershed Management Area,

(ii) The water quality improvement strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods, and are planned to be implemented during the next reporting period,

(iii) Proposed modifications to water quality improvement or jurisdictional strategies with associated rationale for such modifications,

(iv) Previously proposed modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area,

[a] The monitoring data collected pursuant to Provision D, summarized and presented in tabular and graphical form;

[b] Progress of the special studies required pursuant to Provision D, and the results or findings when a special study, or each phase of a special study, is completed;

[c] The findings from the assessments required pursuant to Provision D; and

(v) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;

(b) A completed Jurisdictional Runoff Management Program Annual Report Form (Attachment D or approved revision) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative.

(2) Each Copermittee must complete and submit a Jurisdictional Runoff Management Program Annual Report Form (Attachment D or approved revision) no later than October 31 of each year until the first Annual Report is required to be submitted. Each Copermittee's Annual Report form must summarize the jurisdictional activities in the WMAs in which the Copermittee has jurisdiction.

(3) Each Copermittee must provide any data or documentation utilized in developing the Annual Report upon request by the San Diego Water Board. Any monitoring data utilized in developing the Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN).[20] Any monitoring and assessment data utilized in developing the Annual Report must be provided on the Regional Clearinghouse required pursuant to Provision F.4.

c. REGIONAL MONITORING AND ASSESSMENT REPORT

(1) The Copermittees must submit a Regional Monitoring and Assessment Report no later than 180 days in advance of the expiration date of this Order. The Regional Monitoring and Assessment Report may be submitted as part of the ROWD required pursuant to Provision F.5.b. The Copermittees must review the jurisdictional and watershed monitoring data, data analyses, and assessments required pursuant to Provision D.4, to assess the following:

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[20] Data must be uploaded to CEDEN Southern California Regional Data Center (http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx) using the templates provided on the CEDEN website.

(a) The beneficial uses of the receiving waters within the San Diego Region that are protected or must be restored;

(b) The progress toward restoring impacted beneficial uses in the receiving waters within the San Diego Region; and

(c) Pollutants or conditions of emerging concern that may impact beneficial uses in the receiving waters within the San Diego Region.

(2) The Regional Monitoring and Assessment Report must include recommendations for improving the implementation and assessment of the Water Quality Improvement Plans and jurisdictional runoff management programs.

(3) Each Copermittee must provide any data or documentation utilized in developing the Regional Monitoring and Assessment Report upon request by the San Diego Water Board. Any monitoring and assessment data utilized in developing the Regional Monitoring and Assessment Report must be provided on the Regional Clearinghouse required pursuant to Provision F.4.

4. Regional Clearinghouse

The Copermittees[21] must develop, update, and maintain an internet-based Regional Clearinghouse that can be used to store, disseminate, and share the Copermittees' Water Quality Improvement Plans, Annual Reports, jurisdictional runoff management program documents, monitoring data, special studies, and any other data or information generated by the Copermittees during the implementation of this Order. Monitoring data collected pursuant to Provision D must be uploaded to CEDEN,[22] with links to the uploaded data available on the Regional Clearinghouse. The Regional Clearinghouse may be linked to other internet-based data portals and databases where the original documents and data are stored. The Regional Clearinghouse must be available and accessible to members of the public. The Regional Clearinghouse must be developed and made available to the public no later than 18 months after the adoption of this Order.

5. Report of Waste Discharge

a. The Orange County Copermittees and the Riverside County Copermittees, are required to submit a complete ROWD pursuant to the requirements of their current Orders and are enrolled under this Order upon expiration of their current

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[21] The Copermittee may elect to develop and maintain the clearinghouse(s) provided by other Copermittees or agencies.
[22] Data must be uploaded to CEDEN Southern California Regional Data Center (http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx) using the templates provided on the CEDEN website.

Orders. Upon expiration of their current Orders, the Copermittees in each county must comply with the requirements of this Order by July 1 after enrollment under this Order, unless early enrollment is granted pursuant to Provision F.6 of this Order. The current Orders for the Orange County Copermittees and Riverside County Copermittees are rescinded upon their expiration date except for enforcement purposes.

b. The Copermittees must submit to the San Diego Water Board a complete ROWD as an application for the re-issuance of this NPDES permit. The ROWD must be submitted no later than 180 days in advance of the expiration date of this Order. The Copermittee may elect to develop and submit the in conjunction with or provided by another Copermittee. The ROWD must contain the following minimum information:

(1) Names and addresses of the Copermittees;

(2) Names and titles of the primary contacts of the Copermittees;

(1) Proposed changes to the Copermittees' Water Quality Improvement Plans and the supporting justification;

(3) Proposed changes to the Copermittees' jurisdictional runoff management programs and the supporting justification;

(4) Any other information necessary for the re-issuance of this Order; and

(5) Any other information required by federal regulations for NPDES permit reissuance.

6. Application for Early Enrollment

a. The Orange County Copermittees, collectively, or Riverside County Copermittees, collectively, may apply for early enrollment under this Order by submitting a Report of Waste Discharge Form 200 for each individual Copermittee in the respective county, with a written request for early enrollment under this Order that certifies the following conditions have been met:

(1) A Water Quality Improvement Plan has been developed in accordance with the requirements of Provision B, which can and will be implemented immediately upon enrollment under this Order;

(2) Each Copermittee in the county has updated its jurisdictional runoff management program document to incorporate the requirements of Provision E, which can and will be implemented immediately upon enrollment under this Order; and

(3) Each Copermittee in the county has updated its BMP Design Manual to incorporate the requirements of Provision E.3.d, which can and will be implemented immediately upon enrollment under this Order.

b. The San Diego Water Board will review the application for early enrollment and associated documents for completeness. A Notice of Enrollment (NOE) under this Order will be issued to the Copermittees in the respective county by the San Diego Water Board upon completion of the early enrollment application requirements. The effective enrollment date will be specified in the NOE and the Copermittees in the respective county are authorized to have MS4 discharges pursuant to the requirements of this Order starting on the date specified in the NOE. The existing Order for that county is rescinded upon the effective enrollment date specified in the NOE except for enforcement purposes.

7. Reporting Provisions

Each Copermittee must comply with all the reporting and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

ADMINISTRATIVE DRAFT

G. PRINCIPAL WATERSHED COPERMITTEE RESPONSIBILITIES

1. The Copermittees within each Watershed Management Area must designate a Principal Watershed Copermittee and notify the San Diego Water Board of the name of the Principal Watershed Copermittee. The notification may be submitted with the Water Quality Improvement Plan required pursuant to Provision F.1 of this Order.

2. The Principal Watershed Copermittee is responsible for, at a minimum, the following:

a. Serving as liaison between the Copermittees in the Watershed Management Area and the San Diego Water Board on general permit issues, and when necessary and appropriate, representing the Copermittees in the Watershed Management Area before the San Diego Water Board.

b. Facilitating the development of the Water Quality Improvement Plan in accordance with the requirements of Provision B of this Order

c. Coordinating the submittal of the deliverables required by Provisions F.1, F.2, F.3.a, and F.3.b of this Order.

d. Coordinating and developing, with the other Copermittees, the requirements of Provisions F.3.c, F.4, and F.5.b of this Order.

H. MODIFICATION OF PROGRAMS

1. Modifications of the Order may be initiated by the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the San Diego Water Board.

2. Minor modifications to the Order may be made by the San Diego Water Board where the proposed modification complies with all the prohibitions and limitations, and other requirements of this Order.

3. Proposed modifications outside of the WQIP process that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

I. STANDARD PERMIT PROVISIONS AND GENERAL PROVISIONS

Each Copermittee must comply with all the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.

ADMINISTRATIVE DRAFT

ATTACHMENT A

DISCHARGE PROHIBITIONS

1. Basin Plan Waste Discharge Prohibitions

California Water Code Section 13243 provides that a Regional Water Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste or certain types of waste is not permitted. The following waste discharge prohibitions in the Water Quality Control Plan for the San Diego Basin (Basin Plan) are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by a National Pollutant Discharge Elimination System (NPDES) permit or a dredged or fill material permit (subject to the exemption described in California Water Code Section 13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this San Diego Water Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services (DHS) and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the San Diego Water Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the San Diego Water Board.

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7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the San Diego Water Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "*storm water*" is prohibited unless authorized by the San Diego Water Board. [The federal regulations, 40 CFR 122.26(b)(13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities.] [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the San Diego Water Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

16. The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

17. The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

18. The discharge of treated sewage from vessels, which do not have a properly functioningU.S.Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at mean lower low water (MLLW) is prohibited.

2. Attachment B to State Water Board Resolution 2012-0012

Copermittees that discharge into Areas of Special Biological Significance must comply with State Water Board Resolution No. 2012-0012.

ATTACHMENT B

STANDARD PERMIT PROVISIONS AND GENERAL PROVISIONS

1. Standard Permit Provisions

Code of Federal Regulations Title 40 Section 122.41 (40 CFR 122.41) includes conditions, or provisions, that apply to all National Pollutant Discharge Elimination System (NPDES) permits. Additional provisions applicable to NPDES permits are in 40 CFR 122.42. All applicable provisions in 40 CFR 122.41 and 40 CFR 122.42 must be incorporated into this Order and NPDES permit. The applicable 40 CFR 122.41 and 40 CFR 122.42 provisions are as follows:

a. DUTY TO COMPLY [40 CFR 122.41(a)]

The Copermittee must comply with all of the provisions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

(1) The Copermittee must comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement. [40 CFR 122.41(a)(1)]

(2) The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the CWA, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who *negligently* violates Section 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the CWA, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal

penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.
[40 CFR 122.41(a)(2)]

(3) Any person may be assessed an administrative penalty by the San Diego Regional Water Quality Control Board (San Diego Water Board), State Water Resources Control Board (State Water Board), or United States Environmental Protection Agency (USEPA) for violating Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.
[40 CFR 122.41(a)(3)]

b. DUTY TO REAPPLY [40 CFR 122.41(B)]

If a Copermittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Copermittee must apply for and obtain a new permit.

c. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE [40 CFR 122.41(C)]

It shall not be a defense for a Copermittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

d. DUTY TO MITIGATE [40 CFR 122.41(D)]

The Copermittee must take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

e. PROPER OPERATION AND MAINTENANCE [40 CFR 122.41(E)]

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The Copermittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Copermittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a Copermittee only when the operation is necessary to achieve compliance with the conditions of this permit.

f. PERMIT ACTIONS [40 CFR 122.41(F)]

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Copermittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

g. PROPERTY RIGHTS [40 CFR 122.41(G)]

This permit does not convey any property rights of any sort, or any exclusive privilege.

h. DUTY TO PROVIDE INFORMATION [40 CFR 122.41(H)]

The Copermittee must furnish to the San Diego Water Board, State Water Board, or USEPA within a reasonable time, any information which the San Diego Water Board, State Water Board, or USPEA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Copermittee must also furnish to the San Diego Water Board, State Water Board, or USPEA upon request, copies of records required to be kept by this permit.

i. INSPECTION AND ENTRY [40 CFR 122.41(I)]

The Copermittee must allow the San Diego Water Board, State Water Board, USEPA, and/or their authorized representative (including an authorized contractor acting as their representative), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the Copermittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit; [40 CFR 122.41(i)(1)]

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit; [40 CFR 122.41(i)(2)]

(3) Inspect and photograph at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; [40 CFR 122.41(i)(3)] and

(4) Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location. [40 CFR 122.41(i)(4)]

j. MONITORING AND RECORDS [40 CFR 122.41(J)]

(1) Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity. [40 CFR 122.41(j)(1)]

(2) Except for records of monitoring information required by this permit related to the Copermittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR Part 503), the Copermittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board at any time. [40 CFR 122.41(j)(2)]

(3) Records for monitoring information must include: [40 CFR 122.41(j)(3)]

(a) The date, exact place, and time of sampling or measurements; [40 CFR 122.41(j)(3)(i)]
(b) The individual(s) who performed the sampling or measurements; [40 CFR 122.41(j)(3)(ii)]
(c) The date(s) analyses were performed; [40 CFR 122.41(j)(3)(iii)]
(d) The individual(s) who performed the analyses; [40 CFR 122.41(j)(3)(iv)]
(e) The analytical techniques or methods used; [40 CFR 122.41(j)(3)(v)] and
(f) The results of such analyses. [40 CFR 122.41(j)(3)(vi)]

(4) Monitoring must be conducted according to test procedures under 40 CFR Part 136 unless another method is required under 40 CFR Subchapters N or O.
[40 CFR 122.41(j)(4)]

In the case of pollutants for which there are no approved methods under 40 CFR Part 136 or otherwise required under 40 CFR Subchapters N and O, monitoring must be conducted according to a test procedure specified in the permit for such pollutants. [40 CFR 122.44(i)(1)(iv)]

(5) The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not

more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. [40 CFR 122.41(j)(5)]

k. SIGNATORY REQUIREMENT [40 CFR 122.41(K)]

(1) All applications, reports, or information submitted to the San Diego Water Board, State Water Board, or USEPA must be signed and certified. (See 40 CFR 122.22) [40 CFR 122.41(k)(1)]

(a) *For a municipality, State, Federal, or other public agency.* [All applications must be signed] [b]y either a principal executive officer or ranking elected official. [40 CFR 122.22(a)(3)]

(b) All reports required by permits, and other information requested by the San Diego Water Board, State Water Board, or USEPA must be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if: [40 CFR 122.22(b)]

(i) The authorization is made in writing by a person described in paragraph (a) of this section; [40 CFR 122.22(b)(1)]

(ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company, (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) [40 CFR 122.22(b)(2)] and,

(iii) The written authorization is submitted to the San Diego Water Board and State Water Board. [40 CFR 122.22(b)(3)]

(c) *Changes to authorization.* If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the San Diego Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative. [40 CFR 122.22(c)]

(d) *Certification.* Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." [40 CFR 122.22(d)]

(2) The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both. [40 CFR 122.41(k)(2)]

l. REPORTING REQUIREMENTS [40 CFR 122.41(L)]

(1) *Planned changes.* The Copermittee must give notice to the San Diego Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when: [40 CFR 122.41(l)(1)]

(a) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b);
[40 CFR 122.41(l)(1)(i)] or

(b) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).
[40 CFR 122.41(l)(1)(ii)]

(c) The alteration or addition results in a significant change in the Copermittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. [40 CFR 122.41(l)(1)(iii)]

(2) Anticipated noncompliance. The Copermittee must give advance notice to the San Diego Water Board or State Water Board of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
[40 CFR 122.41(l)(2)]

(3) *Transfers*. This permit is not transferable to any person except after notice to the San Diego Water Board. The San Diego Water Board may require modification or revocation and reissuance of the permit to change the name of the Copermittee and incorporate such other requirements as may be necessary under the CWA.
[40 CFR 122.41(l)(3)]

(4) Monitoring reports. Monitoring results must be reported at the intervals specified elsewhere in this permit. [40 CFR 122.41(l)(4)]

(a) Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the San Diego Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. [40 CFR 122.41(l)(4)(i)]

(b) If the Copermittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or another method required for an industry-specific waste stream under 40 CFR Subchapters N or O, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the San Diego Water Board or State Water Board.
[40 CFR 122.41(l)(4)(ii)]

(c) Calculations for all limitations which require averaging of measurements must utilize an arithmetic mean unless otherwise specified in the permit.
[40 CFR 122.41(l)(4)(iii)]

(5) *Compliance schedules*. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date. [40 CFR 122.41(l)(5)]

(6) Twenty-four hour reporting.

(a) The Copermittee must report any noncompliance that may endanger health or the environment. Any information must be provided orally within 24 hours from the time the Copermittee becomes aware of the circumstances. A written submission must also be provided within five (5) days of the time the Copermittee becomes aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6)(i)]

(b) The following must be included as information which must be reported within 24 hours under this paragraph: [40 CFR 122.41(l)(6)(ii)]

(i) Any unanticipated bypass that exceeds any effluent limitation in the permit (See 40 CFR 122.41(g)). [40 CFR 122.41(l)(6)(ii)(A)]

(ii) Any upset which exceeds any effluent limitation in the permit. [40 CFR 122.41(l)(6)(ii)(B)] and,

(iii) Violation of a maximum daily discharge limitation for any of the pollutants listed by the San Diego Water Board in the permit to be reported within 24 hours. (See 40 CFR 122.44(g)) [40 CFR 122.41(l)(6)(ii)(C)]

(c) The San Diego Water Board may waive the above-required written report on a case-by-case basis if the oral report has been received within 24 hours. [40 CFR 122.41(l)(6)(iii)]

(7) .*Other noncompliance.* The Copermittee must report all instances of noncompliance not reported in accordance with the standard provisions required under 40 CFR 122.41(l)(4), (5), and (6), at the time monitoring reports are submitted. The reports must contain the information listed in the standard provisions required under 40 CFR 122.41(l)(6). [40 CFR 122.41(l)(7))]

(8) *Other information.* When the Copermittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the San Diego Water Board, State Water Board, or USEPA, the Copermittee must promptly submit such facts or information. [40 CFR 122.41(l)(8)]

m. UPSET [40 CFR 122.41(N)]

(1) *Definition.* "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Copermittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. [40 CFR 122.41(n)(1)]

(2) *Effect of an upset*. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the standard provisions required under 40 CFR 122.41(n)(3) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. [40 CFR 122.41(n)(2)]

(3) *Conditions necessary for a demonstration of upset*. A Copermittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that: [40 CFR 122.41(n)(3)]

(a) An upset occurred and that the Copermittee can identify the cause(s) of the upset; [40 CFR 122.41(n)(3)(i)]
(b) The permitted facility was at the time being properly operated; [40 CFR 122.41(n)(3)(ii)] and
(c) The Copermittee submitted notice of the upset in accordance with the standard provisions required under 40 CFR 122.41(l)(6)(ii)(B) (24-hour notice).
[40 CFR 122.41(n)(3)(iii)]
(d) The Copermittee complied with any remedial measures pursuant to the standard provisions required under 40 CFR 122.41(d).
[40 CFR 122.41(n)(3)(iii)]

(4) *Burden of proof*. In any enforcement proceeding, the Copermittee seeking to establish the occurrence of an upset has the burden of proof.
[40 CFR 122.41(n)(4)]

n. STANDARD PERMIT PROVISIONS FOR MUNICIPAL SEPARATE STORM SEWER SYSTEMS [40 CFR 122.42(C)]

The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the San Diego Water Board or State Water Board under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report must include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions; [40 CFR 122.42(c)(1)]

(1) e

(2) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under 40 CFR 122.26(d)(2)(iv) and (v); [40 CFR 122.42(c)(3)]

(3) A summary of data, including monitoring data, that is accumulated throughout the reporting year; [40 CFR 122.42(c)(4)]

(4) Annual expenditures and budget for year following each annual report; [40 CFR 122.42(c)(5)]

(5) A summary describing the number and nature of enforcement actions, inspections, and public education programs; [40 CFR 122.42(c)(6)]

(6) Identification of water quality improvements or degradation.
[40 CFR 122.42(c)(7)]

o. STANDARD PERMIT PROVISIONS FOR STORM WATER DISCHARGES [40 CFR 122.42(D)]

The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) must require compliance with the conditions of the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

2. General Provisions

In addition to the standard provisions required to be incorporated into the Order and NPDES permit pursuant to 40 CFR 122.41 and 40 CFR 122.42, several other general provisions apply to this Order. The general provisions applicable to this Order and NPDES permit are as follows:

a. DISCHARGE OF WASTE IS A PRIVILEGE

No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights. [CWC Section 13263(g)]

b. DURATION OF ORDER AND NPDES PERMIT

(1) *Effective date*. This Order and NPDES permit becomes effective on the date of its adoption provided the USEPA has no objection. If the USEPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. R9-2007-0001 upon the effective date of this Order, and supercedes Order Nos. R9-2009-0002 and R9-2010-0016 upon their expiration.

(2) *Expiration*. This Order and NPDES permit expires five years after adoption. [40 CFR 122.46(a)]

(3) *Continuation of expired order*. After this Order and NPDES permit expires, the terms and conditions of this Order and NPDES permit are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

c. AVAILABILITY

A copy of this Order must be kept at a readily accessible location and must be available to on-site personnel at all times.

d. CONFIDENTIALITY OF INFORMATION

Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the San Diego Water Board office.

Claims of confidentiality for the following information will be denied: [40 CFR 122.7(b)]

(1) The name and address of any permit applicant or Copermittee; [40 CFR 122.7(b)(1)] and

(2) Permit applications and attachments, permits, and effluent data. [40 CFR 122.7(b)(2)]

e. EFFLUENT LIMITATIONS

(1) *Interim effluent limitations*. The Copermittee must comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by the San Diego Water Board.

(2) *Other effluent limitations and standards*. If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in the permit, the San Diego Water Board shall institute proceedings under these regulations to modify or revoke and reissue the permit to conform to the toxic effluent standard or prohibition. [40 CFR 122.44(b)(1)]

f. DUTY TO MINIMIZE OR CORRECT ADVERSE IMPACTS

The Copermittee must take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

g. PERMIT ACTIONS

The filing of a request by the Copermittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order. (See 40 CFR 122.41(f)) In addition, the following provisions apply to this Order:

(1) Upon application by any affected person, or on its own motion, the San Diego Water Board may review and revise the requirements in this Order. All requirements must be reviewed periodically. [CWC Section 13263(e)]

(2) This Order may be terminated or modified for cause, including, but not limited to, all of the following: [CWC Section 13381]

(a) Violation of any condition contained in the requirements of this Order. [CWC Section 13381(a)]

(b) Obtaining the requirements in this Order by misrepresentation, or failure to disclose fully all relevant facts. [CWC Section 13381(b)]

(c) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. [CWC Section 13381(c)]

(3) When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

h. NPDES PERMITTED NON-STORM WATER DISCHARGES

The San Diego Water Board has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The San Diego Water Board or State Water Board may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to an MS4.

i. MONITORING

In addition to the standard provisions required under 40 CFR 122.41(j) and (l)(4), the following general monitoring provisions apply to this Order:

(1) Where procedures are not otherwise specified in Order, sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's Surface Water Ambient Monitoring Program (SWAMP), adopted by the State Water Resources Control Board (State Water Board).

(2) Pursuant to 40 CFR 122.41(j)(2) and CWC Section 13383(a), each Copermittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least five (5) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board at any time.

(3) All chemical, bacteriological, and toxicity analyses must be conducted at a laboratory certified for such analyses by the California Department of Public Health or a laboratory approved by the San Diego Water Board.

(4) For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Copermittees must instruct their laboratories to establish

calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Copermittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR Part 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Copermittee must submit documentation from the laboratory to the San Diego Water Board for approval prior to raising the ML for any priority toxic pollutant.

j. ENFORCEMENT

(1) The San Diego Water Board is authorized to enforce the terms of this Order under several provisions of the CWC, including, but not limited to, CWC Sections 13385, 13386, and 13387.

(2) Nothing in this Order shall be construed to protect the Copermittee from its liabilities under federal, state, or local laws.

(3) The CWC provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

(4) Except as provided in the standard conditions required under 40 CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the Copermittee from civil or criminal penalties for noncompliance.

(5) Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties to which the Copermittee is or may be subject to under Section 311 of the CWA.

(6) Nothing in this Order shall be construed to preclude institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

k. SEVERABILITY

The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

l. APPLICATIONS

Any application submitted by a Copermittee for reissuance or modification of this Order must satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the California Code of Regulations.

ADMINISTRATIVE DRAFT

m. IMPLEMENTATION

All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

n. REPORT SUBMITTALS

(1) All report submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

(2) Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal.

(3) The Principal Watershed Copermittee(s) must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

(4) Unless otherwise directed, the Copermittees must submit one hard copy and one electronic copy of each report required under this Order to the San Diego Water Board, and one electronic copy to the USEPA.

(5) The Copermittees must submit reports and provide notifications as required by this Order to the following:

EXECUTIVE OFFICER
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

ADMINISTRATIVE DRAFT

ATTACHMENT C

ACRONYMS AND ABBREVIATIONS

1. Acronyms and Abbreviations

AMAL	Average Monthly Action Level
ASBS	Area(s) of Special Biological Significance
BMP	Best Management Practice
Basin Plan	Water Quality Control Plan for the San Diego Basin
CEQA	California Environmental Quality Act
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
ERP	Enforcement Response Plan
ESAs	Environmentally Sensitive Areas
GIS	Geographic Information System
IBI	Index of Biotic Integrity
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
ML	Minimum Level
MS4	Municipal Separate Storm Sewer System
NAL	Non-Storm Water Action Level
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
ROWD	Report of Waste Discharge (application for NPDES reissuance)
SAL	Storm Water Action Level
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SIC	Standard Industrial Classification Code
State Water Board	State Water Resources Control Board
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
Waters of the U.S.	Waters of the United States
WDID	Waste Discharge Identification Number

WLA	Waste Load Allocation
WQBEL	Water Quality Based Effluent Limitation

DEFINITIONS

2. Definitions

Active/Passive Sediment Treatment - Using mechanical, electrical or chemical means to flocculate or coagulate suspended sediment for removal from runoff from construction sites prior to discharge.

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Average Monthly Action Level – The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month or the geometric mean for bacteria, as applicable.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote tangible and intangible economic, social, and environmental goals. “Beneficial Uses” of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. “Beneficial Uses” are equivalent to “Designated Uses” under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal discharge permits, BMPs may be used in place of numeric effluent limits.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biotic integrity) of a water body.

Biocriteria - Under the CWA, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The USEPA defines biocriteria as: “numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use… (that)…describe the characteristics of water body segments least impaired by human activities.”

Biofiltration - Practices that use vegetation and amended soils to detain and treat runoff from impervious areas. Treatment is through filtration, infiltration, adsorption, ion exchange, and biological uptake of pollutants.

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. *Environmental Management* 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

BMP Design Manual – A plan developed to eliminate, reduce, or mitigate the impacts of runoff from development projects, including Priority Development Projects.

Channel Rehabilitation and Improvement –Remedial measures or activities for the purpose of improving or restoring the environmental health of streams, channels or river systems. Techniques may vary from in-stream restoration techniques to off-line stormwater management practices installed in the system corridor or upland areas. Rehabilitation techniques may include, but are not limited to the following: riparian zone restoration, constructed wetlands, bank stabilization, channel modifications, and daylighting of drainage systems. Effectiveness may be measured in various manners, including: assessments of habitat, reduced streambank erosion, and restoration of water and sediment transport balance.

Clean Water Act Section 303(d) Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Construction Site – Any project, including projects requiring coverage under the Construction General Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, disturbances to ground such as stockpiling, and excavation. This does not include minor construction activities such as interior remodeling, plumbing, electrical, or mechanical work.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

Copermittee – An incorporated city within the County of Orange, County of Riverside, or County of San Diego in the San Diego Region (Region 9), the County of Orange, the County of Riverside, the County of San Diego, the Orange County Flood Control District, the Riverside County Water Conservation and Flood Control District, the San Diego Regional Airport Authority, or the Unified Port District of San Diego.

Copermittees – All of the individual Copermittees, collectively.

Critical Channel Flow (Qc) – The channel flow that produces the critical shear stress that initiates bed movement or that erodes the toe of channel banks. When measuring Qc, it should be based on the weakest boundary material – either bed or bank.

Daily Discharge – Defined as either: (1) the total mass of the constituent discharged over the calendar day or any 24 hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g. concentration.)

The Daily Discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day, or other 24 hour period other than a day), or by the arithmetic mean of analytical results from one or more grab samples taken over the course of a day.

Development Projects - Construction, rehabilitation, redevelopment, or reconstruction of any public or private projects involving land disturbance activities.

Dry Season –May 1 to September 30.

Dry Weather – Weather is considered dry if the preceding 72 hours has been without measurable precipitation (>0.1 inch).

Enclosed Bays – Enclosed bays are indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost bay works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Environmentally Sensitive Areas (ESAs) - Areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Orange; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees.

Estuaries – Waters, including coastal lagoons, located at the mouth of streams that serve as areas of mixing fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and ocean water. Estuaries do not include inland surface waters or ocean waters.

Existing Development – Any area that has been developed and exists for municipal, commercial, industrial, or residential purposes, uses, or activities. May include areas that are not actively used for its originally developed purpose, but may be re-purposed or redeveloped for another use or activity.

Flow Duration – The long-term period of time that flows occur above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams (not a single storm event duration). The simplest way to visualize this is to consider a histogram of pre- and post-project flows using long-term records of hourly data. To maintain pre-development flow duration means that the total number of hours (counts) within each range of flows in a flow-duration histogram cannot increase between the pre- and post-development condition. Flow duration within the range of geomorphologically significant flows is important for managing erosion.

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical reactivity. These also include materials named by the USEPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code" [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Hydromodification – The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport. In addition, alteration of stream and river channels, such as stream channelization, concrete lining, installation of dams and water impoundments, and excessive streambank and shoreline erosion are also considered hydromodification, due to their disruption of natural watershed hydrologic processes.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Inactive Areas – Areas of construction activity that are not active and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

Infiltration – Water other than wastewater that enters a sewer system (including sewer service connections and foundation drains) from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow [40 CFR 35.2005(20)].

Inland Surface Waters – Includes all surface waters of the U.S. that do not include the ocean, enclosed bays, or estuaries.

Jurisdictional Runoff Management Program Document – A written description of the specific jurisdictional runoff management measures and programs that each Copermittee will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

Low Impact Development (LID) – A storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions.

Low Impact Development Best Management Practices (LID BMPs) – LID BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States through storm water management and land development strategies that emphasize conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. LID BMPs include retention practices that do not allow runoff, such as infiltration, rain water harvesting and reuse, and evapotranspiration. LID BMPs also include flow-through practices such as biofiltration that may have some discharge of storm water following pollutant reduction.

Major Outfall – As defined in the Code of Federal Regulations, a major outfall is a MS4 outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (i.e. discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres); or, for MS4s that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or equivalent), a MS4 outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (i.e. discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

Maximum Daily Action Level (MDAL) –The highest allowable daily discharge of a pollutant, over a calendar day (or 24 hour period). For pollutants with action levels expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with action levels expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Maximum Extent Practicable (MEP) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) for storm water that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) <u>in combination</u> with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their runoff management programs. Their total collective and individual activities conducted pursuant to the runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the San Diego Water Board, the San Diego Water Board defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> "*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective*

BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
c. Public Acceptance: Does the BMP have public support?
d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc.?

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Monitoring Year – The monitoring year begins annually on July 1st and ends on June 30th.

Municipal Separate Storm Sewer System (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26. "Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR §122.26(a)(3)(vi).

National Pollutant Discharge Elimination System (NPDES) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges and NPDES permitted discharges.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act, a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during or as a result of the treatment or disposal of wastes."

Ocean Waters – the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Board's California Ocean Plan.

Order – Unless otherwise specified, refers to this Order, Order No. R9-2012-0011 (NPDES No. CAS0109266).

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act, pollution is "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Permanent BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, remove, or educate to prevent the release of pollutants to surface waters from development projects in perpetuity, after construction of a project is completed.

Pre-Development Runoff Conditions – "Runoff conditions that exist onsite immediately before the planned development activities occur. Pre-development is not intended to be interpreted as that period before any human-induced land disturbance activity has occurred." 64 FR 68761.

Priority Development Projects - New development and redevelopment projects defined under Provision E.3.b of Order No. R9-2012-0011.

Properly Designed – Designed in accordance with the Copermittee's BMP Design Manual and/or any appropriate design requirements set forth by the Copermittee and based on widely accepted design criteria.

Public Education, Outreach and Participation – Programs to educate residents, businesses and visitors about the importance of water quality and water quality programs so that they will support local efforts and understand their role in protecting receiving waters. The Education and Outreach Program will increase knowledge and awareness, improve attitudes toward storm pollution prevention, and provide a foundation for changing behaviors that contribute to storm water pollution.

Rainy Season (aka Wet Season) –October 1 to April 30.

Receiving Waters – Waters of the U.S.

Receiving Water Limitations - Waste discharge requirements issued by the San Diego Water Board typically include both: (1) “Effluent Limitations” (or “Discharge Limitations”) that specify the technology-based or water-quality-based effluent limitations; and (2) “Receiving Water Limitations” that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the “Receiving Water Limitations” provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; parking lots; resurfacing existing roadways; cutting and reconfiguring of surface parking lots; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair.

Retain –Keep or hold in a particular place, condition, or position without discharge to surface waters.

Retrofit – Retrofit is defined as a stormwater management practice (usually structural) put into place after development has occurred in watersheds where practices previously did not exist or are ineffective. The purpose of retrofits is to improve water quality, protect downstream channels, reduce flooding, or meet other specific objectives. Some examples of retrofits include, but are not limited to the following: green roofs, downspout and impervious cover disconnection, permeable pavement, bioretention, rain barrels, rain gardens, vacant lot stabilization, trash area enclosures, additional trash and waste disposal containers.

Runoff - All flows in a storm water conveyance system that consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water including dry weather flows.

San Diego Water Board – As used in this document the term "San Diego Water Board" is synonymous with the term "Regional Board" as defined in Water Code section 13050(b) and is intended to refer to the California Regional Water Quality Control Board for the San Diego

Region as specified in Water Code Section 13200.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment Control BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and runoff.

State Water Quality Protection Area – A nonterrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration in natural water quality, including, but not limited to, areas of special biological significance that have been designated by the State Water Board through its water quality control planning process. Areas of special biological significance are a subset of State Water Quality Protection Areas, and require special protection as determined by the State Water Resources Control Board pursuant to the California Ocean Plan adopted and reviewed pursuant to Article 4 (commencing with Section 13160) of Chapter 3 of Division 7 of the California Water Code and pursuant to the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (California Thermal Plan) adopted by the State Water Board.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage.

Structural BMP – Any structural control which detains, retains, or filters, to reduce the release of pollutants to surface waters from development projects (e.g. treatment control BMPs) which remains after construction.

Total Maximum Daily Load (TMDL) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Basin Plan, state in part…"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge".

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Unpaved Road – Any long, narrow stretch without pavement used for traveling by motor passenger vehicles between two or more points. Unpaved roads are generally constructed of dirt, gravel, aggregate or macadam and may be improved or unimproved.

Waste - As defined in CWC Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans. Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

Water Quality Standards - Water quality standards, as defined in Clean Water Act section 303(c) consist of the beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of a water body and criteria (referred to as water quality objectives in the California Water Code) necessary to protect those uses. Under the Water Code, the water boards establish beneficial uses and water quality objectives in water quality control or basin plans. Together with an anti-degradation policy, these beneficial uses and water quality objectives serve as water quality standards under the Clean Water Act. In Clean Water Act parlance, state beneficial uses are called "designated uses" and state water quality objectives are called "criteria." Throughout this Order, the relevant term is used depending on the statutory scheme.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State. Under this definition, portions of a MS4 may be considered to be a Waters of the State. However, man-made portions of the MS4 constructed for the sole purpose of flow and/or pollutant reduction are not considered waters of the state.

Waters of the United States - As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: "(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Wet Season (aka Rainy Season) – The period of time from October 1 to April 30 when the San Diego Region experiences the most rainfall.

Wet Weather – Weather is considered wet if there is a storm event of 0.1 inches and greater and the following 72 hours, unless defined in another regulatory mechanism such as a TMDL.

ATTACHMENT D

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM
FY ______________

I. COPERMITTEE INFORMATION		
Copermittee Name:		
Copermittee Primary Contact Name:		
Copermittee Primary Contact Information: Address: City: County: State: Zip: Telephone: Fax: Email:		
II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☐ ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	☐ ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☐ ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Number of non-storm water discharges reported by the public		
Number of non-storm water discharges detected by Copermittee staff or contractors		
Number of non-storm water discharges investigated by the Copermittee		
Number of sources of non-storm water discharges identified		
Number of non-storm water discharges eliminated		
Number of sources of illicit discharges or connections identified		
Number of illicit discharges or connections eliminated		
Number of enforcement actions issued		
Number of high level enforcement actions issued		
V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES NO	☐ ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	☐ ☐
Number of proposed development projects in review		
Number of Priority Development Projects in review		
Number of Priority Development Projects approved		
Number of approved Priority Development Projects exempt from any BMP requirements		
Number of approved Priority Development Projects requiring mitigation		
Number of Priority Development Projects granted occupancy		
Number of completed Priority Development Projects in inventory		
Number of high priority Priority Development Project structural BMP inspections		
Number of Priority Development Project structural BMP violations		
Number of enforcement actions issued		
Number of high level enforcement actions issued		

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY ______________

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

Number of construction sites in inventory	
Number of active construction sites in inventory	
Number of inactive construction sites in inventory	
Number of construction sites closed/completed during reporting period	
Number of construction site inspections	
Number of construction site violations	
Number of enforcement actions issued	
Number of high level enforcement actions issued	

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

	Municipal	Commercial	Industrial	Residential
Number of existing developments in inventory				
Number of existing development inspections				
Number of follow-up inspections				
Number of existing development violations				
Number of enforcement actions issued				
Number of high level enforcement actions issued				

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program that complies with Order No. R9-2012-0011?	YES NO	☐ ☐
Has the Copermittee implemented a mechanism for public participation and where necessary intergovernmental coordination that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2012-0011?	YES NO	☐ ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☐ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

______________________________ ______________________________
Signature Date

______________________________ ______________________________
Print Name Title

______________________________ ______________________________
Telephone Number Email

ADMINISTRATIVE DRAFT

ATTACHMENT E

SPECIFIC PROVISIONS FOR TOTAL MAXIMUM DAILY LOADS APPLICABLE TO ORDER NO. R9-2012-0011

These provisions implement Total Maximum Daily Loads (TMDLs), adopted by the San Diego Water Board and approved by USEPA under Clean Water Act section 303(c), which are applicable to discharges regulated under this Order. The provisions and schedules for implementation of the TMDLs described below must be incorporated into the Water Quality Improvement Plans and monitoring requirements, required pursuant to Provisions B and D of this Order, respectively, for the specified Watershed Management Areas.

1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed Resolution No. R9-2002-0123
2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin Resolution No. R9-2005-0019
3. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek Resolution No. R9-2007-0043
4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Resolution No. R9-2008-0027
5. Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) Resolution No. R9-2010-0001

1. Total Maximum Daily Load for Diazinon in Chollas Creek Watershed

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2002-0123

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	August 14, 2002
State Water Board Approval Date:	July 16, 2003
Office of Administrative Law Approval Date:	September 11, 2003
US EPA Approval Date:	November 3, 2003

(3) TMDL Effective Date: September 11, 2003

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Chollas Creek

(6) Responsible Copermittees: City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, Unified Port District of San Diego

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for Chollas Creek consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 1.c:

Table 1.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Receiving Water Limitation	Averaging Period
Diazinon	Acute	0.08 µg/L	1 hour
	Chronic	0.05 µg/L	4 days

(2) Effluent Limitations

Discharges from the MS4s must not contain concentrations that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 1.c:

Table 1.2
Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Constituent	Exposure Duration	Effluent Limitation	Averaging Period
Diazinon	Acute	0.072 µg/L	1 hour
	Chronic	0.045 µg/L	4 days

(3) Best Management Practices

BMPs for Chollas Creek may be incorporated into the Water Quality Improvement Plan for the San Diego Bay Watershed Management Area and implemented by the Responsible Copermittees:

(a) The Responsible Copermittees should coordinate any implemented BMPs to address this TMDL with Caltrans, as possible.

c. COMPLIANCE SCHEDULE

The Responsible Copermittees were required to achieve their WLA by December 31, 2010. The Responsible Copermittees must be in compliance with the WQBELs under Specific Provision 1.b.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

(a) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Investigation Order No. R9-2004-0277, *California Department of Transportation and San Diego Municipal Separate Storm Sewer System Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed*. The monitoring reports required under Investigation Order No. R9-2004-0277 must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

2. Total Maximum Daily Loads for Dissolved Copper in Shelter Island Yacht Basin

a. Applicability

(1) TMDL Basin Plan Amendment: Resolution No. R9-2005-0019

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	February 9, 2005
State Water Board Approval Date:	September 22, 2005
Office of Administrative Law Approval Date:	December 2, 2005
US EPA Approval Date:	February 8, 2006

(3) TMDL Effective Date: December 2, 2005

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Shelter Island Yacht Basin

(6) Responsible Copermittees: City of San Diego, San Diego Unified Port District

b. Water Quality Based Effluent Limitations

The WQBELs for Shelter Island Shoreline Park consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 2.c:

Table 2.1
Receiving Water Limitations as Concentrations in Shelter Island Yacht Basin

Constituent	Exposure Duration	Effluent Limitation	Averaging Period
Dissolved Copper	Acute	4.8 µg/L	1 hour
	Chronic	3.1 µg/L	4 days

(2) Effluent Limitations

Discharges from the MS4s must not contain pollutant loads that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 2.c:

Table 2.2
Effluent Limitations as Annual Loads in MS4 Discharges to Shelter Island Yacht Basin

Constituent	Effluent Limitation
Dissolved Copper	30 kg/yr

(3) Best Management Practices

The Responsible Copermittees may implement BMPs to support the achievement of WQBELs under Specific Provision 2.b for Shelter Island Yacht Basin.

c. COMPLIANCE SCHEDULE

The Responsible Copermittees are required to achieve respective WLAs by December 2, 2022. The Responsible Copermittees must be in compliance with the WQBELs under Specific Provision 2.b.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

The Responsible Copermittees must implement the monitoring and assessment requirements issued under Order No. R9-2005-0019. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

3. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2007-0043

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date: June 13, 2007
State Water Board Approval Date: July 15, 2008
Office of Administrative Law Approval Date: October 22, 2008
US EPA Approval Date: December 18, 2008

(3) TMDL Effective Date: October 22, 2008

(4) Watershed Management Area: San Diego Bay

(5) Water Body: Chollas Creek

(6) Responsible Copermittees: City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, San Diego Unified Port District

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for Chollas Creek consist of the following:

(1) Receiving Water Limitations

Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedule under Specific Provision 4.c.(1):

Table 3.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
Dissolved Copper	Acute	$(0.96) \times e^{[0.9422 \times \ln(\text{hardness}) - 1.700]} \times \text{WER}^*$	1 hour
	Chronic	$(0.96) \times e^{[0.8545 \times \ln(\text{hardness}) - 1.702]} \times \text{WER}^*$	4 days
Dissolved Lead	Acute	$[1.46203 - 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 1.460]} \times \text{WER}^*$	1 hour
	Chronic	$[1.46203 - 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 4.705]} \times \text{WER}^*$	4 days
Dissolved Zinc	Acute	$(0.978) \times e^{[0.8473 \times \ln(\text{hardness}) + 0.884]} \times \text{WER}^*$	1 hour
	Chronic	$(0.986) \times e^{[0.8473 \times \ln(\text{hardness}) + 0.884]} \times \text{WER}^*$	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

(2) Effluent Limitations

Discharges from the MS4s must not contain pollutant loads that exceed the following effluent limitations by the end of the compliance schedule under Specific Provision 4.c.(1):

Table 3.2
Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
Dissolved Copper	Acute	90% x (0.96) x $e^{[0.9422 \times \ln(\text{hardness}) - 1.700]}$ x WER*	1 hour
	Chronic	90% x (0.96) x $e^{[0.8545 \times \ln(\text{hardness}) - 1.702]}$ x WER*	4 days
Dissolved Lead	Acute	90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(\text{hardness}) - 1.460]}$ x WER*	1 hour
	Chronic	90% x [1.46203 – 0.145712 x ln(hardness)] x $e^{[1.273 \times \ln(\text{hardness}) - 4.705]}$ x WER*	4 days
Dissolved Zinc	Acute	90% x (0.978) x $e^{[0.8473 \times \ln(\text{hardness}) + 0.884]}$ x WER*	1 hour
	Chronic	90% x (0.986) x $e^{[0.8473 \times \ln (\text{hardness}) + 0.884]}$ x WER*	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

(3) Best Management Practices

(a) The Responsible Copermittee may implement BMPs to support the achievement of WQBELs under Specific Provision 4.c for Chollas Creek.

(b) The Responsible Copermittees should coordinate the BMPs to address this TMDL with Caltrans and the U.S. Navy, as possible.

c. COMPLIANCE SCHEDULE

(1) WLA Compliance Date

The Responsible Copermittee is required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 4.b, by October 22, 2028.

(2) Interim Compliance Requirements

The Responsible Copermittee must comply with the following interim WQBELs by the interim compliance date:

Table 3.3
Interim Effluent Limitations as Concentrations in MS4 Discharges to Chollas Creek

Interim Compliance Date	Constituent	Exposure Duration	Effluent Limitation (µg/L)	Averaging Period
October 22, 2018	Dissolved Copper	Acute	$1.2 \times 90\% \times (0.96) \times e^{[0.9422 \times \ln(\text{hardness}) - 1.700]} \times \text{WER}^*$	1 hour
		Chronic	$1.2 \times 90\% \times (0.96) \times e^{[0.8545 \times \ln(\text{hardness}) - 1.702]} \times \text{WER}^*$	4 days
	Dissolved Lead	Acute	$1.2 \times 90\% \times [1.46203 - 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 1.460]} \times \text{WER}^*$	1 hour
		Chronic	$1.2 \times 90\% \times [1.46203 - 0.145712 \times \ln(\text{hardness})] \times e^{[1.273 \times \ln(\text{hardness}) - 4.705]} \times \text{WER}^*$	4 days
	Dissolved Zinc	Acute	$1.2 \times 90\% \times (0.978) \times e^{[0.8473 \times \ln(\text{hardness}) + 0.884]} \times \text{WER}^*$	1 hour
		Chronic	$1.2 \times 90\% \times (0.986) \times e^{[0.8473 \times \ln(\text{hardness}) + 0.884]} \times \text{WER}^*$	4 days

Notes:
* The Water Effect Ratio (WER) is assumed to be 1.0 unless there is a site-specific and chemical-specific WER.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or
(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or
(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

(a) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Investigation Order No. R9-2004-0277, *California Department of Transportation and San Diego Municipal Separate Storm Sewer System Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed*, when it is amended to include monitoring requirements for the Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek. The monitoring reports required under Investigation Order No. R9-2004-0277 must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

(b) The Responsible Copermittees must implement the monitoring and assessment requirements issued under Order No. R9-2007-0043, as consistent with this Order.. The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

4. Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay

a. Applicability

(1) TMDL Basin Plan Amendment: Resolution No. R9-2008-0027

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date: June 11, 2008
State Water Board Approval Date: June 16, 2009
Office of Administrative Law Approval Date: September 15, 2009
US EPA Approval Date: October 26, 2009

(3) TMDL Effective Date: September 15, 2009

(4) Watershed Management Areas: See Table 5.0

(5) Water Bodies: See Table 5.0

(6) Responsible Copermittees: See Table 5.0

Table 4.0
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County	Dana Point Harbor	Baby Beach	-City of Dana Point -County of Orange
San Diego Bay	San Diego Bay	Shelter Island Shoreline Park	-Unified Port of San Diego

b. Water Quality Based Effluent Limitations

The WQBELs for segments or areas of the water bodies listed in Table 5.0 consist of the following:

(1) Receiving Water Limitations

(a) Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedules under Specific Provisions 5.c.(1)(a) and 5.c.(2):

Table 4.1
Receiving Water Limitations as Bacteria Densities in the Water Body

Constituent	Receiving Water Limitations: Single Sample Maximum[1,2]	Receiving Water Limitations: 30-Day Geometric Mean[2]
Total Coliform	10,000 MPN/100mL	1,000 MPN/100mL
Fecal Coliform	400 MPN/100mL	200 MPN/100mL
Enterococcus	104 MPN/100mL	35 MPN/100mL

Notes:
1. During wet weather days, only the single sample maximum receiving water limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved.

(b) If the above receiving water limitations are not met in the receiving water, the Responsible Copermittees must demonstrate that the discharges from the MS4s are not causing or contributing to the violation of receiving water limitations. The Copermittee must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 5.b.(2).

(2) Effluent Limitations

Discharges from the MS4s must not contain densities that exceed the following effluent limitations by the end of the compliance schedules under Specific Provisions 5.c.(1)(a) and 5.c.(2) to demonstrate the discharge is not causing or contributing to a violation of receiving water quality standards:

Table 4.2
Effluent Limitations as Bacteria Densities in MS4 Discharges to the Water Body

Constituent	Effluent Limitations: Single Sample Maximum[1,2]	Effluent Limitations: 30-Day Geometric Mean[2]
Total Coliform	10,000 MPN/100mL	1,000 MPN/100mL
Fecal Coliform	400 MPN/100mL	200 MPN/100mL
Enterococcus	104 MPN/100mL	35 MPN/100mL

Notes:
1. During wet weather days, only the single sample maximum effluent limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean effluent limitations are required to be achieved.

Interim effluent limitations expressed as pollutant loads are given in the compliance schedule under Specific Provision 5.c.

(3) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 5.0 fulfill the Bacteria Load Reduction Plan (BLRP) requirements in Resolution No. R9-2008-0027.

(b) The Responsible Copermittee must implement BMPs capable of achieving the WQBELs under Specific Provision 5.0 for the segments or areas of the water bodies listed in Table 5.0

c. COMPLIANCE SCHEDULE

(1) Baby Beach in Dana Point Harbor

(a) WLA Compliance Dates

The Responsible Copermittees for MS4 discharges to Baby Beach are required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 5.0, according to the following compliance schedule:

Table 4.3
Compliance Schedule Dates to Achieve Baby Beach WLAs

Constituent	Dry Weather WLA Compliance Date	Wet Weather WLA Compliance Date
Total Coliform	September 15, 2014	September 15, 2009
Fecal Coliform		September 15, 2009
Enterococcus		September 15, 2019

(b) Interim Compliance Requirements

The Responsible Copermittees for MS4 discharges to Baby Beach must comply with the following interim WQBELs by the interim compliance date:

Table 4.4
Interim Effluent Limitations as Loads in MS4 Discharges to Baby Beach

Constituent	Interim Compliance Date	Dry Weather Interim Effluent Limitation	Wet Weather Interim Effluent Limitation
Total Coliform	September 15, 2012	5.32×10^9 MPN/day	NA*
Fecal Coliform	September 15, 2012	0.59×10^9 MPN/day	NA*
Enterococcus	September 15, 2012	0.42×10^9 MPN/day	NA**
	September 15, 2016	NA*	207×10^9 MPN/30days

Notes:
* The WQBELs under Specific Provision 5.b must already be achieved by the given interim compliance date.
** There is no corresponding interim WQBEL for the given interim compliance date.

(2) Shelter Island Shoreline Park in San Diego Bay

The Responsible Copermittee for MS4 discharges to Shelter Island Shoreline Park is required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 5.0, by December 31, 2012.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or

(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or

(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

(1) Monitoring Stations and Procedures

The Responsible Copermittees must implement the monitoring requirements issued under Order No. R9-2008-0027.

(2) Assessment and Reporting Requirements

(a) The Responsible Copermittees must analyze the dry weather and wet weather monitoring data to assess whether the interim and final WQBELs have been achieved.

(b) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

5. Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)

a. APPLICABILITY

(1) TMDL Basin Plan Amendment: Resolution No. R9-2010-0001

(2) TMDL Adoption and Approval Dates:

San Diego Water Board Adoption Date:	February 10, 2010
State Water Board Approval Date:	December 14, 2010
Office of Administrative Law Approval Date:	April 4, 2011
US EPA Approval Date:	June 22, 2011

(3) TMDL Effective Date: April 4, 2011

(4) Watershed Management Areas: See Table 6.0

(5) Water Bodies: See Table 6.0

The water bodies identified in Table 6.0 are subject to the requirements of this Attachment E, except those water bodies listed in Table 6.0 that have been delisted from the 303(d) list for REC-1 bacteria impairments. These delisted water bodies are not subject to the requirements of this Attachment E so long as monitoring data continues to support compliance with water quality standards.

(6) Responsible Copermittees: See Table 6.0

Table 5.0
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County	Pacific Ocean Shoreline	Cameo Cove at Irvine Cove Drive – Riviera Way	-City of Laguna Beach -County of Orange -Orange County Flood Control District
		at Heisler Park - North	
	Pacific Ocean Shoreline	at Main Laguna Beach	-City of Aliso Viejo -City of Laguna Beach -City of Laguna Woods -County of Orange -Orange County Flood Control District
		Laguna Beach at Ocean Avenue	
		Laguna Beach at Cleo Street	
		Arch Cove at Bluebird Canyon Road	
		Laguna Beach at Dumond Drive	

Table 5.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County (cont'd)	Pacific Ocean Shoreline	Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach	-City of Aliso Viejo -City of Laguna Beach -City of Laguna Hills -City of Laguna Niguel -City of Laguna Woods -City of Lake Forest -City of Mission Viejo -County of Orange -Orange County Flood Control District
	Aliso Creek	Entire reach (7.2 miles) and associated tributaries: - Aliso Hills Channel - English Canyon Creek - Dairy Fork Creek - Sulfur Creek - Wood Canyon Creek	
	Aliso Creek Mouth	at mouth	
	Pacific Ocean Shoreline	Aliso Beach at West Street	-City of Dana Point -City of Laguna Beach -City of Laguna Niguel -County of Orange -Orange County Flood Control District
		Aliso Beach at Table Rock Drive	
		100 Steps Beach at Pacific Coast Hwy at hospital (9th Avenue)	
		at Salt Creek (large outlet)	
		Salt Creek Beach at Salt Creek service road	
		Salt Creek Beach at Strand Road	
	Pacific Ocean Shoreline	at San Juan Creek	-City of Dana Point -City of Laguna Hills -City of Laguna Niguel -City of Mission Viejo -City of Rancho Santa Margarita -City of San Juan Capistrano -County of Orange -Orange County Flood Control District
	San Juan Creek	lower 1 mile	
	San Juan Creek Mouth	at mouth	

Table 5.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I- Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
South Orange County (cont'd)	Pacific Ocean Shoreline	at Poche Beach	- City of Dana Point -City of San Clemente -County of Orange -Orange County Flood Control District
		Ole Hanson Beach Club Beach at Pico Drain	
		San Clemente City Beach at El Portal Street Stairs	
		San Clemente City Beach at Mariposa Street	
		San Clemente City Beach at Linda Lane	
		San Clemente City Beach at South Linda Lane	
		San Clemente City Beach at Lifeguard Headquarters	
		under San Clemente Municipal Pier	
		San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane)	
		San Clemente State Beach at Riviera Beach	
		Can Clemente State Beach at Cypress Shores	
San Luis Rey River	Pacific Ocean Shoreline	at San Luis Rey River mouth	-City of Oceanside -City of Vista -County of San Diego
Carlsbad	Pacific Ocean Shoreline	at Moonlight State Beach	-City of Carlsbad -City of Encinitas -City of Escondido -City of Oceanside -City of San Marcos -City of Solana Beach -County of San Diego
San Dieguito River	Pacific Ocean Shoreline	at San Dieguito Lagoon mouth	-City of Del Mar -City of Escondido -City of Poway -City of San Diego -City of Solana Beach -County of San Diego
Penasquitos (Miramar Reservior HA)	Pacific Ocean Shoreline	Torrey Pines State Beach at Del Mar (Anderson Canyon)	-City of Del Mar -City of Poway -City of San Diego -County of San Diego
Mission Bay	Pacific Ocean Shoreline	La Jolla Shores Beach at El Paseo Grande	-City of San Diego
		La Jolla Shores Beach at Caminito del Oro	
		La Jolla Shores Beach at Vallecitos	

Table 5.0 (Cont'd)
Applicability of Total Maximum Daily Loads for Indicator Bacteria
Project I- Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)

Watershed Management Area	Water Body	Segment or Area	Responsible Copermittees
Mission Bay (cont'd)	Pacific Ocean Shoreline	La Jolla Shores Beach at Avenida de la Playa	-City of San Diego
		at Casa Beach, Children's Pool	
		South Casa Beach at Coast Boulevard	
		Whispering Sands Beach at Ravina Street	
		Windansea Beach at Vista de la Playa	
		Windansea Beach at Bonair Street	
		Windansea Beach at Playa del Norte	
		Windansea Beach at Palomar Avenue	
		at Tourmaline Surf Park	
		Pacific Beach at Grand Avenue	
	Tecolote Creek	Entire reach and tributaries	-City of San Diego
San Diego River	Forrester Creek	lower 1 mile	City of El Cajon -City of Santee -County of San Diego
	San Diego River	lower 6 miles	-City of El Cajon -City of La Mesa -City of San Diego -City of Santee -County of San Diego
	Pacific Ocean Shoreline	at San Diego River mouth at Dog Beach	
San Diego Bay	Chollas Creek	lower 1.2 miles	-City of La Mesa -City of Lemon Grove -City of San Diego -County of San Diego -San Diego Unified Port District

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for segments or areas of the water bodies listed in Table 6.0 consist of the following:

(1) Receiving Water Limitations

(a) Discharges from the MS4s must not cause or contribute to the violation of the following receiving water limitations by the end of the compliance schedules under Specific Provision 6.c.(1):

Table 5.1
Receiving Water Limitations as Bacteria Densities and Allowable Exceedance Frequencies in the Water Body

Constituent	Receiving Water Limitations: Single Sample Maximum[1,2] (MPN/100mL)	Single Sample Maximum Allowable Exceedance Frequency[3]	30-Day Geometric Mean[2] (MPN/100mL)	30-Day Geometric Mean Allowable Exceedance Frequency
Total Coliform	10,000	22% / 0%	1,000	0%
Fecal Coliform	400	22% / 0%	200	0%
Enterococcus	104[4] / 61[5]	22% / 0%	35[4] / 33[5]	0%

Notes:
1. During wet weather days, only the single sample maximum receiving water limitations are required to be achieved.
2. During dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved.
3. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days. The 0% single sample maximum allowable exceedance frequency applies to dry weather days.
4. This *Enterococcus* receiving water limitation applies to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.
5. This *Enterococcus* receiving water limitations applies to segments or areas of creeks or creek mouths listed in Table 6.0.

Interim receiving water limitations expressed as allowable exceedance frequencies are given in the compliance schedule under Specific Provision 6.c.

(b) If the above receiving water limitations are not met in the receiving water, the Responsible Copermittees must demonstrate that the discharges from the MS4s are not causing or contributing to the violation of receiving water limitations. The Copermittee must provide data that demonstrate the discharges from the MS4s are meeting the effluent limitations under Specific Provision 6.b.

(2) Effluent Limitations

Discharges from the MS4s must not cause or contribute to a violation of receiving water limitations. The mass-based waste load allocations presented in Resolution No. R9-2010-0001 can be used to demonstrate that loading from the MS4 is such that it does not cause water quality objective exceedances, as described in bullet (4) under Specific Provision 6.d.

(3) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 6.0 will incorporate the Comprehensive Load Reduction Plans (CLRP) drafted pursuant to Resolution No. R9-2010-0001.

(b) The Responsible Copermittee may implement BMPs to support the achievement of WQBELs under Specific Provision 6.b for the segments or areas of the water bodies listed in Table 6.0.

(c) The Responsible Copermittees may implement BMPs to support the achievement of this TMDL with Caltrans and owners/operators of small MS4s, as possible.

c. COMPLIANCE SCHEDULE

(1) WLA Compliance Dates

The Responsible Copermittees for MS4 discharges to a segment or area of the water bodies listed in Table 6.0 are required to achieve the WLA, thus must be in compliance with the WQBELs under Specific Provision 6.b, according to the following compliance schedule:

ADMINISTRATIVE DRAFT

Table 5.2

Compliance Schedule Dates to Achieve Indicator Bacteria WLAs

Constituent	Dry Weather WLA Compliance Date	Wet Weather WLA Compliance Date
Total Coliform[1]	April 4, 2021	April 4, 2031
Fecal Coliform		
Enterococcus		

1 - Total coliform receiving water limitations apply only to segments of areas of Pacific Ocean Shoreline listed in Table 6.0.

(2) Interim Compliance Requirements

The Responsible Copermittees must comply with the interim WQBELs by the interim compliance dates provided as part of the CLRP and supported by Order No. R9-2010-0001.

(a) Interim Dry Weather WQBELs

Interim dry weather WQBELS are expressed as receiving water limitations. The Responsible Copermittee must calculate the "existing" exceedance frequencies of the 30-day geometric mean water quality objectives for each of the indicator bacteria by analyzing the monitoring data collected between January 1, 2002 and April 4, 2011. "Existing" exceedance frequencies may be calculated by segment or area of a water body, or by water body, and/or by Watershed Management Area listed in Table 6.0. Separate "existing" exceedance frequencies must be calculated for beaches and creeks/creek mouths.

The Responsible Copermittees must achieve a 50 percent reduction in the "existing" exceedance frequency of the 30-day geometric mean WQBELs for the segments or areas of the water bodies listed in Table 6.0. A 50 percent reduction in the "existing" exceedance frequency is equivalent to half of the "existing" exceedance frequency of the 30-day geometric mean WQBELs.

(3) Submittals to Support TMDL Basin Plan Amendment

The Responsible Copermittees are encouraged to submit data to support the TMDL reopener scheduled for April 2016 including but not limited to data related to reference watershed monitoring and beneficial use usage frequency.

d. COMPLIANCE DETERMINATION

Compliance with WQBELs or WLAs may be demonstrated via any one of the following methods:

(1) There is no discharge from the MS4, or
(2) Applicable effluent limitations are met, or
(3) Receiving waters meet the applicable receiving water limitations or water quality objective, or

(4) Loading from the MS4 is such that it does not cause water quality objective exceedances, or

(5) Implementation of a Water Quality Improvement Plan determined by the Regional Board Executive Officer to comply with Provision A as described in Provision A.4.

Furthermore, as stated in the TMDL:

The Phase I MS4s may demonstrate that their discharges are not causing the exceedances in the receiving waters by providing data from their discharge points to the receiving waters, by providing data collected at jurisdictional boundaries, and/or using other methods accepted by the San Diego Water Board. Otherwise, at the end of the [wet or] dry weather TMDL compliance schedule, the municipal Phase I MS4s will be held responsible and considered out of compliance unless other information or evidence indicates another controllable or uncontrollable source is responsible for the exceedances in the receiving waters. If controllable sources other than discharges from the municipal Phase I MS4s are identified before or after the end of the [wet or] dry weather TMDL Compliance Schedule as causing the exceedances, those controllable sources will be responsible for reducing their bacteria loads and/or demonstrating that discharges from those sources are not causing the exceedances. The San Diego Water Board shall implement additional actions (e.g., issue enforcement actions, amend existing NPDES requirements or conditional waivers), as needed, to bring all controllable sources into compliance with the [wet or] dry weather TMDLs.

e. Specific Monitoring and Assessment Requirements

The Bacteria Load Reduction Plans (BLRPs) and CLRPs to be submitted by the Copermittees and approved by the Regional Board Executive Officer contain monitoring programs. Implementation of those Regional Board-approved monitoring programs constitutes compliance with the Monitoring Station and Monitoring Procedure requirements, described below.

(1) Monitoring and Assessment Requirements for Beaches

(a) Monitoring Stations

For beaches addressed by these TMDLs, monitoring locations should consist of, at a minimum, the same locations used to collect data required under MS4 NPDES monitoring requirements and beach monitoring for Health and Safety Code section 115880.[75] If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters.

(b) Monitoring Procedures

(i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations at least monthly.

(ii)

(iii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations at least once within the first 24 hours of the end of a storm event[23] that occurs during the rainy season (i.e., October 1 through April 30).

(iv) Samples must be analyzed for total coliform, fecal coliform, and *Enterococcus* indicator bacteria.

(c) Assessment and Reporting Requirements

(i) The Responsible Copermittees must analyze the dry weather and wet weather monitoring data to assess whether the interim and final WQBELs for the Pacific Ocean Shoreline segments or areas listed in Table 6.0 have been achieved.

(ii) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

(2) Monitoring and Assessment Requirements for Creeks and Creek Mouths

(a) Monitoring Stations

For creeks addressed by these TMDLs, monitoring locations should consist of, at a minimum, a location at or near the mouth of the creek (e.g., Mass Loading Station or Mass Emission Station) and one or more locations upstream of the mouth (e.g., Watershed Assessment Stations). If exceedances of the receiving water limitations are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. The additional monitoring locations and/or other source identification methods must also be used to demonstrate that the bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters.

[23] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

(b) Monitoring Procedures

(i) The Responsible Copermittees must collect dry weather monitoring samples from the receiving water monitoring stations according to the WQIP.
(ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations within the first 24 hours of
(iii) the end of a storm event[24] that occurs during the rainy season (i.e., October 1 through April 30).
(iv)
(v) Samples collected from receiving water monitoring stations must be analyzed for fecal coliform and *Enterococcus* indicator bacteria.

(c) Assessment and Reporting Requirements

(i) The Responsible Copermittees must analyze the receiving water monitoring data to assess whether the interim and final receiving water WQBELs for the creeks and creek mouths listed in Table 6.0 have been achieved.

(ii) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

[24] Wet weather days are defined by the TMDL as storm events of 0.2 inches or greater and the following 72 hours. The Responsible Copermittees may choose to limit their wet weather sampling requirements to storm events of 0.2 inches or greater, or also include storm events of 0.1 inches or greater as defined by the federal regulations [40CFR122.26(d)(2)(iii)(A)(2)].

SEPTEMBER 14, 2012

COUNTY OF SAN DIEGO COPERMITTEES

Supporting Documentation and Rationale for Alternative Provision II.D Monitoring and Assessment Requirements

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INTRODUCTION

The purpose of this document is to provide rationale to support the monitoring alternative developed by the San Diego County Copermittees in collaboration with the County of Orange and the County of Riverside for the San Diego Region Municipal Separate Storm Sewer Systems (MS4) NPDES Permit. The permit was released as an administrative draft by the San Diego Regional Water Quality Control Board (Regional Water Board) as Tentative Order No. R9-2012-0011. The Tentative Order contains a Monitoring and Assessment component (Provision II.D) that describes the elements of a monitoring program intended to generate data to assess the following three fundamental programmatic management questions/objectives from the agenda for the July 25, 2012 Monitoring and Assessment Focus Meeting on the Tentative Order:

1. *Are the Copermittees' Jurisdictional runoff management programs effectively prohibiting non-storm water discharges to their MS4s?*

2. *Are the Copermittees' Jurisdictional runoff management programs reducing pollutants in storm water to the Maximum Extent Practicable (MEP)?*

3. *Are the physical, chemical, and biological conditions of receiving waters being improved by the Copermittees' Water Quality Improvement Plans (WQIPs) for receiving waters that don't adequately support designated beneficial uses?*

It is also the goal of the Copermittees to answer these programmatic questions and achieve the management goals as efficiently as possible.

To accommodate the adaptive management approach supported by the Water Board, Copermittees propose to coordinate Provision II.D requirements with Section II.B language to require a strategic Monitoring and Assessment Program to be tailored to the needs of each Watershed Management Area (WMA) to be prepared as part of the Water Quality Improvement Plans (WQIPs). To provide useful feedback to the overall program, the Monitoring and Assessment Program is proposed to be developed during the long range planning process of the WQIP during the first 12 months after Permit adoption. The monitoring program is one piece of the overall implementation and needs to be coordinated with the other programmatic elements of implementation to provide the most useful information.

Based on 15 to 20 years of monitoring experience, the Copermittees have an understanding of receiving water quality issues, and now want more of a focus on a) identifying and prioritizing sources, and b) designing special studies to determine how to best implement solutions to address water quality problems. The Copermittees believe that this is the nexus to effective implementation, because it supports adaptive management and can both guide and utilize other programmatic implementation efforts to improve water quality.

To accomplish this, a phased approach is included in Alternative Provision II.D, with a Pre-WQIP or transitional period and a Post-WQIP phase after the Monitoring and Assessment Programs are developed as part of the WQIPs. Depending upon the adoption date of the final Order, the transitional phasing of monitoring would be approximately two to three years to accommodate the public review, Water Board review and the lead time necessary for Copermittees' to plan and commit resources in the budgeting process. Transitional monitoring will build on the foundation of over 15 years of monitoring experience and the recommendations in the San Diego County Copermittees Report of Waste Discharge (ROWD) (San Diego County Copermittees, 2011). Additionally, the Copermittees have tailored the transitional monitoring to be responsive to the Water Board's three key questions. Transitional monitoring would only apply to the San Diego County Copermittees as Orange County and Riverside County Copermittees are scheduled to enroll at a later date. The transitional monitoring requirements will be reassessed as part of the development of the WQIP's Monitoring and Assessment Program and adjusted as necessary to support the highest priorities in each WMA.

The key changes proposed in Alternative Provision II.D are as follows:

1. **Question-Driven Approach: The** Copermittees support a Question-Driven Approach to design strategic and efficient monitoring plans that are responsive to Program Managers' needs to improve the implementation of effective stormwater programs. See the Question-Driven Monitoring Design section for further details.

2. **Adaptive Management:** Provide program managers with needed information to support changes to program priorities, monitoring locations, special studies, and BMPs. See the "Monitoring Designed to Support Adaptive Management" section of this document for additional details.

3. **Receiving Water and Watershed Monitoring (T.O. Provisions II.D.1.a(2), II.D.1.b, II.D.2.b, and II.D.2.c)**: Copermittees propose to integrate the numerous receiving waters programs at the WMA level. See the "Receiving Water Monitoring" section of this document for additional details.

4. **Jurisdictional Non-Stormwater monitoring (T.O. Provision II.D.1.a):** Instead of extensive MS4 outfall chemical field screening and analysis, Copermittees propose to conduct a targeted program to reduce persistent flows that impact receiving water quality. This will allow resources to prioritize persistent non-stormwater discharges and focus actions to improve water quality. Copermittees are also proposing a broad program to eliminate transient illicit connections /illegal discharges (IC/ID) through visual surveys to be conducted over a large spatial area with appropriate follow-up criteria. See the "Dry Weather Outfall Monitoring" and "Discussion of IDDE Program Efficiency and Effectiveness" sections of this document for additional details.

5. **Jurisdictional Stormwater monitoring (T.O. Provision II.D.1.b):** Instead of extensive MS4 outfall chemical monitoring, monitor homogeneous land uses or representative mixed-use land uses and extrapolate the results to other drainages. This wet weather runoff data will provide a local understanding of wet weather discharges for San Diego County, and will better inform the planning process by prioritizing drainages and land uses for implementation efforts. Selection of these representative outfalls can be coordinated and shared among Copermittees to provide the most efficient representation and characterization. Modeling currently being done for some watersheds as part of the bacteria TMDL implementation plan effort may also be built upon.

See the "Wet Weather Outfall Monitoring" section of this document for additional details.

6. **Jurisdictional Receiving Water Boundary Monitoring (T.O. Provision II.D.1.a(2)):** Jurisdictional receiving water boundary monitoring proposed in the Tentative Order does not support the three key goals. Monitoring conducted by the Copermittees' and others have shown jurisdictional boundary monitoring of the type proposed in the Tentative Order not to be effective in estimating water quality impacts and loading from MS4 discharges. This is due to a combination of factors, including typically high variability of the constituent concentrations in receiving waters and discharges, and typically small percentages of MS4 discharge flows and pollutant loads in the receiving waters. This combination of high variability and relatively small impacts or differences requires high numbers of samples to detect significant and programmatically relevant differences and would be unlikely to support any programmatic changes or guide improvements to water quality. See the "Discussion of Jurisdictional Boundary Monitoring" section of this document for additional details and rationale for an alternative approach.

7. **Source Identification Studies:** Prior to adoption of the WQIPs, the Copermittees will continue source identification studies pertaining to compliance with TMDLs and the development of the CLRP implemented under Order No. R9-2007-0001. Following adoption of the WQIPs, the Copermittees will conduct source and stressor identification studies based on Monitoring and Assessment Plans developed for the WQIPs. The plans for the studies will be submitted with the WQIP for approval by the Water Board. See the "Source/Stressor ID and Special Studies" section of this document for additional details.

8. **Special Studies and Pilot BMPs:** The Copermittees will conduct Special Studies to address information needs as identified by Source/Stressor Identification studies above, and otherwise as needed to support implementation of the WQIPs. Within the permit term, two Special Studies will be conducted within each WMA: one to address specific questions developed for each WMA, and two Regional special studies will be conducted to answer broader regional questions. See the "Source/Stressor ID and Special Studies" section of this document for additional details.

The Copermittees also recognize that the Water Board wants to see jurisdictional accountability. Jurisdictional accountability should focus on continuing implementation of the iterative stormwater management process, and will be supported by data collected at prioritized targeted MS4 outfalls and programmatic implementation activities to be included in the WQIPs.

APPROACH TO MONITORING AND ASSESSMENT

Question-Driven Monitoring Design

Consistent with the Copermittees' ROWD (San Diego County Copermittees, 2011), the transitional (Pre-WQIP) monitoring program proposed by the Copermittees was developed using a question-driven approach that is widely supported by local, state and federal regulatory agencies. This same question-driven approach will be used to develop the strategic Monitoring and Assessment Programs of the WQIPs that will be tailored to the needs of each WMA. As described in the Copermittees' Alternative Provision II.D, the Monitoring and Assessment Program is based on a logical hierarchy in which **1)** overall management objectives help define **2)** clear management questions which can be addressed by **3)** specific question and assessment frameworks that are then implemented with **4)** data produced by monitoring designs. Wide acceptance of this approach to monitoring design is illustrated by its recommended use in several recent statewide policy documents related to monitoring and assessment. A December 2008 report[1] of the California Water Quality Monitoring Council to the Secretaries of CalEPA and the Resources Agency lays out a basic approach to correcting widespread problems in water quality monitoring and assessment, and the Comprehensive Strategy of December 2010[2] provides additional detail on the Council's approach. The SWAMP Assessment Framework[3] is a companion document that provides more specific guidance to Regional Water boards on question-driven monitoring design as outlined in U.S. EPA's *Elements of a State Water Monitoring and Assessment Program*[4]. Relevant regional examples and implementations of this approach also include the Southern California Stormwater Monitoring Coalition's *Model Monitoring Program* (SMC, 2004), and The San Diego Regional Water Board's own *A Framework for Monitoring & Assessment in the San Diego Region* (SDRWQCB, 2012). At the June 2012 San Diego Regional Water Board meeting, Water Board staff presented this approach and it was well received by the Board. The Copermittees' process for developing the monitoring program aligns well with the condition assessment process proposed by Water Board staff at the June 2012 meeting, with an additional emphasis on setting priorities.

These referenced guidance documents stress the importance of basing monitoring on clear questions that support explicit decisions ensuring that data are gathered only when there is a validated assessment framework in place (i.e., data are collected only after it has been determined how they are going to be analyzed and evaluated). Clear motivating questions provide *"the functional link between broader concerns about beneficial uses and the technical specifications of monitoring designs" (SWAMP, 2010).* These technical monitoring specifications are designed to meet the data analysis and interpretation requirements of the assessment methods most appropriate to addressing the questions, including trend analysis and comparison to benchmarks. Additionally, all four of these documents follow in the footsteps of an earlier National

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[1] *Maximizing the Efficiency and Effectiveness of Water Quality Data Collection and Dissemination and Ensuring that Collected Data are Maintained and Available for Use by Decision-makers and the Public*. Recommendations of the California Water Quality Monitoring Council, State of California, December 2008.

[2] *A Comprehensive Monitoring Program Strategy for California*. Recommendations of the California Water Quality Monitoring Council, State of California, December 2010.

[3] *SWAMP Assessment Framework*. Prepared by Brock Bernstein for the Surface Water Ambient Monitoring Program, California Water Boards. December 2010.

[4] Elements of a State Water Monitoring and Assessment Program. EPA 841-B-03-003. Assessment and Watershed Protection Division, Office of Wetlands, Oceans and Watershed. U.S. Environmental Protection Agency. March 2003.

Research Council report on monitoring[5], which emphasized the importance of building on clear conceptual models and questions that are linked to management needs.

The use of conceptual models, questions, links to management decisions, and the need for defining analysis and assessment methods prior to developing a monitoring program are all key aspects of monitoring design that are now widely acknowledged. In addition, monitoring design and assessment are now commonly discussed in the context of the need to adapt monitoring targets, questions, and assessment methods as knowledge improves and more fundamental questions are answered. A short list of additional representative papers, books, and reports on this topic is provided with the references for this document.

Monitoring Designed to Support Adaptive Management

The purpose of monitoring is to provide the Copermittees' program managers with information needed to make management decisions to improve stormwater management programs and water quality. Although the monitoring proposed in Tentative Order Provision II.D is comprehensive in its scope, the extensive chemical analysis-based monitoring does not support an adaptive management approach and was not specifically designed to answer questions that support and guide effective management. Consequently, the Copermittees are proposing to replace Tentative Order Provision II.D with this Alternative Provision II.D, in order to better provide program managers with information needed to support effective adaptive management of water quality programs, and better support the development of tangible water quality solutions.

The Monitoring and Assessment Framework

The Copermittees' are proposing to implement a monitoring and assessment framework that provides the necessary feedback to Program Managers to improve implementation strategies. To facilitate this, a question-driven approach will be used, as illustrated in Figure 1. Broad management questions based on the SMC Model MS4 Stormwater Guidance are on the left side of Figure 1. The assessment questions listed on the right side of Figure 1 have been derived from the Tentative Order, with the addition of two additional questions related to source/stressor and BMP/special studies. The monitoring elements identified in the center column of **Figure 1** each are driven by a list of specific questions (not shown in this Figure) to aid in planning and design. For monitoring program design, the process starts at the top of the diagram, at the watershed scale, and proceeds down the diagram to the specific drainage scale. For assessment, data from the specific drainage scale is fed step-wise into the upper levels of the diagram. This assessment process is designed to provide feedback at the different levels so that ultimately Copermittees are addressing real problems in an efficient and effective manner using the adaptive management paradigm.

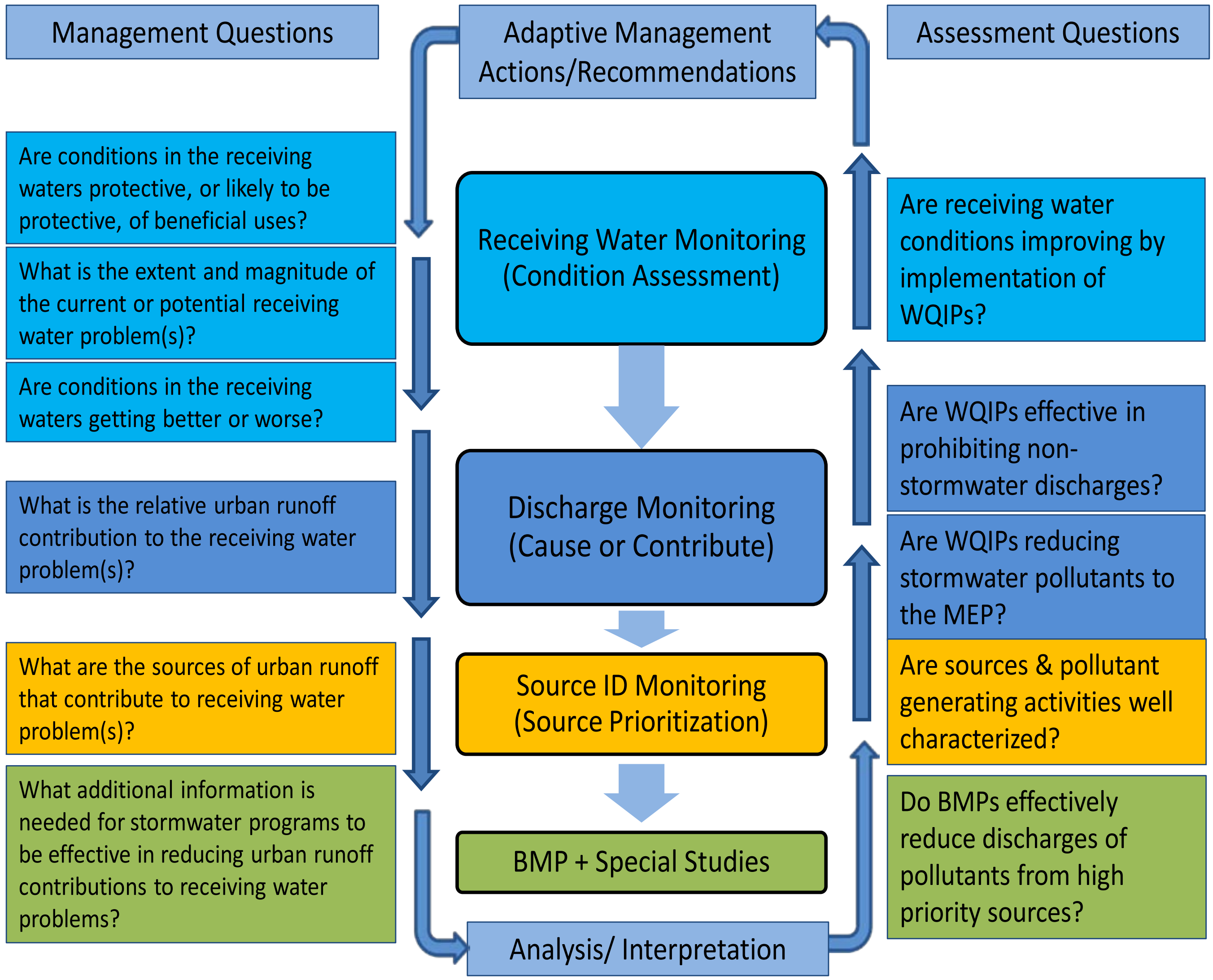
During the transitional, pre-WQIP phase, monitoring and assessment activities will be based on previously-identified information needs and management questions, as well as on ongoing monitoring and assessment activities. During the process of developing

[5] *Managing Troubled Waters: The Role of Marine Environmental Monitoring*. National Research Council. National Academies Press, Washington, DC. 1990.

the WQIP for each WMA, the monitoring and assessment activities will then be tailored to the needs of each WMA. Using the framework shown in Figure 1, the information generated by the monitoring and assessment activities will help inform stormwater program management and implementation, and contribute to development of solutions for the identified water quality issues.

The Copermittees recognize that the watersheds are at different stages of understanding with respect to each of the four monitoring activity components shown in Figure 1. Those with active TMDLs, such as Chollas Creek, have a more mature program and may be farther along in understanding where their programs should focus. The Chollas Creek program will emphasize source identification and follow up with special studies to develop effective implementation strategies. Other watersheds may be still be developing the linkage between identified receiving waters problems and the contributions from the Copermittees' MS4s. The goal of the Monitoring and Assessment Programs will be to strategically tailor the balance of monitoring for each of the four components to the prioritized needs of the specific WMA. The result will be efficient, coordinated monitoring with an enhanced watershed and TMDL focus.

Figure 1. Monitoring and Assessment Design Structure



The main purpose of receiving water monitoring is to assess attainment of designated beneficial uses. Watershed receiving water priorities (Watershed priorities) are well established through prior monitoring of receiving waters in San Diego County (see Attachment 2-1of ROWD (San Diego County Copermittees, 2011), as well as the LTEA report (San Diego County Copermittees, 2011)). With watershed priorities well established for the next permit cycle, monitoring should be reduced in receiving waters and those efforts and resources can be refocused to determine to what degree discharges from the MS4s contribute to the identified watershed priorities. Receiving water monitoring will still be necessary to help assess stormwater program effectiveness, as shown in the feedback loop on the Conceptual Framework diagram (Figure 1). In this same context, receiving water priorities also may be revised over time as water quality management efforts are successful, or understanding of water quality issues evolves. The Copermittees' participation in TMDLs also may involve receiving water monitoring to determine the effectiveness of TMDL implementation.

For constituents for which MS4 discharges are determined to contribute significantly to receiving water problems, source identification and prioritization studies may be performed on a constituent-specific basis. Such follow-up investigations may involve monitoring in the form of watershed-driven targeted studies. The results of the watershed-driven source investigations can then be used in the watershed planning process to develop strategies for reduction of the high priority sources of discharges of the subject constituent.

The Monitoring and Assessment Design framework includes the analysis of appropriate data to evaluate program effectiveness and identify data gaps, if any. This completes the monitoring information cycle to guide the alternate adaptive management approach.

Prioritization of Water Quality Issues to Foster Efficiency

There is a general consensus at focus meetings that identifying and focusing on water quality priorities (whether in constituents, sources, or effective outreach management practices) is the most efficient and effective way to manage the Copermittees' programs and resources for protecting and improving water quality. Prioritization developed within the WQIP and adaptive management of the programs over time are the primary strategies for achieving this while maintaining effective long-term monitoring efforts in all four monitoring categories (receiving water, MS4 discharges, source identification, and special studies). The Copermittees are committed to retaining monitoring that will continue to characterize and assess receiving water and outfall conditions, while placing increased focus on source identification and source control. This increased focus on information that supports decision about management of water quality will more effectively advance the Copermittees and the Water Board's common objective of improving receiving water and outfall water quality.

Adaptive Management, Jurisdictional Accountability, and Compliance

There has been general agreement at focus meetings with the Water Board staff and stakeholders that compliance with the WQIPs and the Jurisdictional Runoff Management Programs (JRMPs) is based on an adaptive management process, and that monitoring should be included within that context in the permit. The accountability provided by the JRMPs is based on actions implemented by the Copermittees and programmatic results, and may not depend on receiving water or outfall water quality. As an example, if a concentrated outreach effort has been implemented in a priority residential drainage area because of the frequency of broken or mismanaged sprinklers, and after a year there are fewer homes with irrigation issues, then that demonstrates jurisdictional accountability and effectiveness by reducing discharges to the MS4 and the receiving waters, even when changes in receiving water quality can't be immediately or easily demonstrated. Similarly, jurisdictional accountability and compliance with the monitoring requirements should be assessed based on the effectiveness of completed monitoring in answering the questions driving the need for monitoring.

Strategic Monitoring Approach

The Copermittees propose to include the following steps in developing the Monitoring and Assessment Programs for each WMA, as part of the development of the WQIPs:

1. Establish stormwater management priorities specific for each WMA ("Watershed Priorities") as part of WQIP development.
2. Compile existing monitoring data & assess available information for receiving waters, MS4 discharges, & sources or stressors within the watershed.
3. Identify regulatory & non-regulatory drivers that apply to water quality monitoring within the watershed, & list all associated monitoring responsibilities assigned to the Copermittees.
4. Evaluate the watershed priorities in context of available monitoring data & existing monitoring responsibilities, & develop specific management questions for each priority issue.
5. Establish metrics & identify assessments that should be performed to supply information needed to address the management questions.
6. Identify elements of a watershed-based monitoring program needed to address the watershed management questions & perform the necessary assessments.
7. Develop detailed monitoring plan to address the identified monitoring needs, coordinated with other ongoing monitoring in the watershed.

ALTERNATIVE PROVISION II.D - ELEMENTS AND RATIONALE

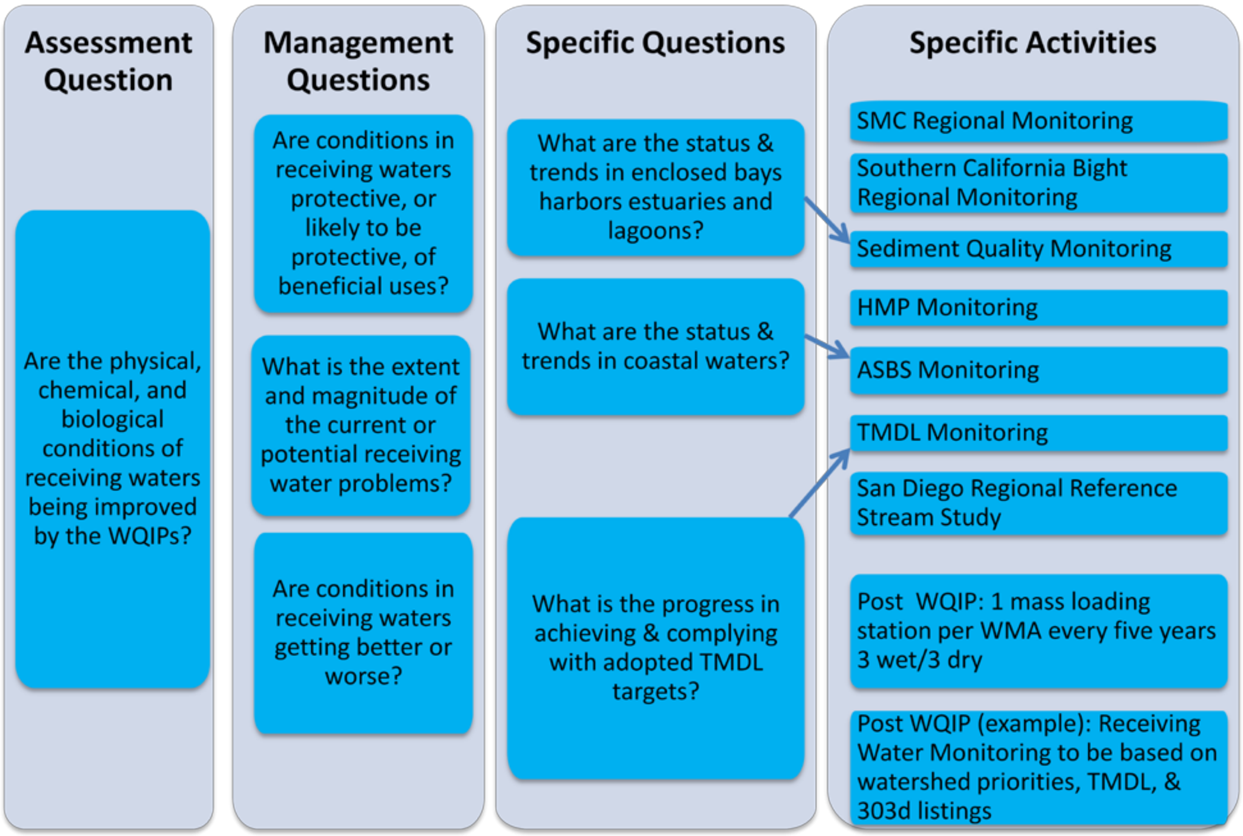
Receiving Water Monitoring

To address the need to assess receiving water conditions, the Copermittees propose to use a triad approach involving chemical, toxicity, and biological monitoring to evaluate the overall physical, chemical and biological conditions of receiving waters prior to the adoption of the WQIPs' Monitoring and Assessment Programs. This regionally coordinated and integrated approach will be implemented instead of the extensive chemical monitoring of receiving waters proposed in Sections II.D.1.a(2), II.D.1.b, II.D.2.b, and II.D.2.c, of the Tentative Order.

Figure 2 illustrates use of the question-driven approach in designing specific activities for receiving water monitoring and assessment. The process moves from left to right. Starting from the left hand side of the diagram, the assessment question derives from the current Provision II.D: Are there improvements in the conditions of receiving waters? The second column lists the relevant Stormwater Monitoring Coalition (SMC) management questions. These three SMC questions can be summarized as a status question, an extent and magnitude question, and a long-term trend question. The management questions are meant to provide context for the more specific, technical monitoring sub-questions and associated monitoring activities. Monitoring results from any given activity may only partially contribute to answers for the overarching "big picture" management questions. The Specific questions in the next column are the detailed study questions used to design the monitoring program. Several example study question are presented here and linked to the specific activity in the last column. Each activity responds to one or more study questions. When study questions are answered, then the specific activity is completed. The next prioritized study question can then begin as part of the adaptive process.

The Copermittees' proposed Regional monitoring and integrated assessments represent a cost-effective approach that avoids duplication of monitoring efforts, and provides a comprehensive evaluation of receiving waters conditions.

Figure 2. Receiving Water Monitoring and Assessment Planning Process, Showing Example Specific Questions



Pre-WQIP Monitoring

In the Alternative Provision II.D, the assessment of receiving water conditions and improvements in receiving water conditions is addressed by an approach that integrates and coordinates seven existing regional receiving water programs rather than focusing on watershed specific sites. The Copermittees also plan to leverage additional opportunities for regional coordination through the Southern California Bight 2013 Regional Monitoring Program, as well as make use of third party data where feasible. Specific elements of the Copermittees' receiving water approach are discussed in the following paragraphs.

a. SMC Regional Monitoring

Management Questions addressed: *Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?*

The Copermittees are committed to participate in the SMC Regional Monitoring Program through its planned completion, and to provide a statistically sound representative sampling of receiving water quality in the region's watersheds.

Copermittees currently sample 16 sites annually across the urbanized region of San Diego County. The SMC Regional Monitoring Program uses a probabilistic design to characterize coastal watersheds using bioassessment metrics and related analyses, including but not limited to: physical habitat characterization, Southern California Index of Biological Integrity scoring, macroinvertebrate and algal taxonomy, algal biomass, water chemistry, and toxicity. The study incorporates both reference and non-reference streams and is designed to identify potential additional biological and/or chemical stressors affecting stream health, such as channel alteration and presence of invasive species.

b. Southern California Bight Regional Monitoring

Management Questions addressed: *Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?*

The Copermittees will participate in the Southern California Bight Regional Monitoring program as a trade-off with other routine monitoring requirements to the extent allowable under the 2007 Permit. Planning begins in September 2012 and Copermittees plan to divert funds from the 2012-2013 Ambient Bay and Lagoon Program to the Summer 2013 Bight 13 Program. Additionally, Copermittees are willing to use these funds allocated for 2013-2014 to conduct additional Ambient Bay and Lagoon Monitoring in Summer of 2013, pending Water Board approval. Although the Bight Study design is not finalized, Copermittees anticipate focusing on addressing the Sediment Quality Objectives per State Water Resources Control Board Resolution No. 2008-0070, *Adoption of a Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality*.

The Bight program involves detailed characterization of coastal and offshore receiving waters, as well as targeted special studies. The Bight regional monitoring effort is designed to build upon the data collected during the Bight 08 regional program, to assess the extent of contamination in the Southern California Bight. Receiving water samples are collected in or near coastal areas, bays, estuaries, offshore islands, and open water/deep ocean within the Bight. Water quality and sediment samples may be collected to provide data for model input, to answer management questions developed by the stakeholders as part of the program. In addition, special studies such as influence of emerging contaminants and potential new technology implementation (i.e. bioanalytical screening and/or genetic coding) may be conducted as part of the Bight 13 Regional Monitoring. Copermittees will leverage as appropriate with these other programs to further scientific understanding of the potential affects of discharges from MS4s to the overall health of the receiving waters.

c. Sediment Quality Monitoring

Management Questions addressed: *Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?*

Specific Question: *What is the condition of sediments in enclosed bays and estuaries with respect to the statewide sediment quality objectives?*

The Copermittees anticipate performing monitoring of bay and lagoon sediments, as needed, as part of Bight 13 monitoring under the Copermittees' responsibility to conform to the requirements of the Statewide Sediment Quality Objectives regulatory program, per State Water Resources Control Board Resolution No. 2008-0070 – Adoption of a Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality.

d. Hydromodification Management Plan (HMP) Monitoring

Management Questions addressed: *Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?*

The Copermittees will perform receiving water monitoring as required per Section 8 of the approved 2010 Hydromodification Management Plan (HMP) Monitoring Plan, as Revised July 14, 2010, and California Regional Water Quality Control Board, San Diego Region, Resolution No. R9-2010-0066. Additionally, geomorphic assessments will be included in the long-term monitoring receiving water program to address long-term trends to evaluate the effects of hydromodification.

e. TMDL Monitoring

Management Questions addressed: *Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Are conditions in receiving waters getting better or worse?*

Specific question: *What is the progress in achieving and complying with adopted TMDL targets?*

The Copermittees shall perform water quality monitoring as required per the Implementation Plans or approved CLRPs of effective TMDLs, including compliance monitoring for the following TMDLs:

- TMDL for Diazinon in Chollas Creek Watershed Resolution No. R9-2002-0123; Effective as of September 11, 2003.
- TMDLs for Dissolved Copper in Shelter Island Yacht Basin Resolution No. R9-2005-0019; Effective as of December 2, 2005.
- TMDLs for Dissolved Copper, Lead, and Zinc in Chollas Creek Resolution No. R9-2007-0043; Effective as of October 22, 2008.
- TMDLs for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Resolution No. R9-2008-0027; Effective as of September 15, 2009.
- Revised TMDLs for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) Resolution No. R9-2010-0001; Effective as of April 4, 2011.

f. San Diego Regional Reference Stream Study

Management Questions addressed: *Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?*

The San Diego Regional Reference Stream Study is designed to characterize background concentrations of bacteria, nutrients, and trace metals in natural streams within the jurisdiction of the San Diego Water Board. The study includes sampling during wet and dry weather at up to 12 sites considered representative of natural conditions (a contributing drainage area at least 95 percent undeveloped) and that vary in regards to hydrology, catchment size, and geology. This Study started began in 2012 and is anticipated to be completed over the next three years.

WQIP Monitoring

The WQIP monitoring will build on the above benefits and support an assessment-driven, adaptive management approach in the WQIP Management and Assessment Plan to focus monitoring on the needs of the Program Managers to address focused receiving waters monitoring where needed.

As previously indicated, ongoing monitoring programs will be reassessed for the WQIP, and modified as necessary (with Water Board Executive Officer's approval) to support the highest priorities in each WMA. The Monitoring and Assessment Programs developed as part of the WQIPs will promote efficient use of resources and produce data meaningful for the management and improvement of receiving water quality. In the proposed Alternative Provision II.D, assessment of receiving water conditions and improvements in receiving water conditions is addressed by an approach that integrates seven existing regional receiving water programs rather than focusing on watershed specific sites. Following the question-driven approach of Figure 1, the minimum requirements to be addressed in the WQIP will include the seven specific monitoring elements summarized under the pre-WQIP monitoring as applicable to the WMA and the long-term receiving water monitoring element as described below and in Figure 2.

Long-Term Receiving Water Monitoring

Management Question addressed: Are conditions in receiving waters getting better or worse?

The Copermittees will conduct receiving water monitoring for assessment of long-term trends using receiving water stations selected from among the existing mass loading stations (MLS) and temporary watershed assessment stations (TWAS). These long-term receiving water stations will be selected to be representative of regional receiving water quality and must be approved by the Executive Officer prior to monitoring. The frequency of monitoring will be three wet weather events and three dry weather events every five years.

Discussion of Long-Term Monitoring

The rationale for changes to the Receiving Water and Watershed Monitoring as proposed in T.O. Provisions II.D.1.a (2), II.D.1.b, ii.D.2.b, and II.D.2.c is provided below.

Mass Loading Station Monitoring can be reduced to once every five years, based on the statistical simulations conducted for in the ROWD (2011 and included in Attachment 2-1). The analyses conducted for the ROWD shows that decreasing the sampling frequency to every five years will not affect the ability to detect long-term trends. This conclusion is further supported by the finding that priority constituents have not changed substantially for individual MLS receiving water sites in the past five years. The 5-year frequency for receiving water monitoring will continue to allow adequate detection of trends in the long-term, as needed to answer SMC management question 5. Consequently, because all mass loading stations have already been sampled in the 2011-2012 or 2012-2013 monitoring seasons, ongoing long-term monitoring will be addressed in the WQIP Monitoring and Assessment Programs, instead of implementing additional long-term trend monitoring during the Pre-WQIP period. This allows resources to be redirected from these receiving water monitoring efforts to monitoring efforts that better support solutions with increasing emphasis on MS4 outfall monitoring, source identification and source abatement activities. The Copermittees are committed to evaluating wet weather receiving water conditions at one MLS station per WMA to preserve long-term trends, assess receiving water quality and programmatic effectiveness, and evaluate WMAs comparatively.

Constituent priorities in receiving waters for 2010 are similar to those of the previous assessment in 2005. Additionally, the upstream TWAS and downstream MLS have similar constituent priorities. Based on this knowledge, the core SMC receiving water monitoring questions 1 and 2 (i.e., the questions addressing impacts to beneficial uses and the magnitude and extent of problems) have already been successfully addressed by the monitoring for the 2007 Permit. Because the constituent concentrations and patterns are generally similar at the TWAS and MLS (and especially within a watershed), there is no additional value to continuing the TWAS monitoring in its current form (*See Attachment 2-1 from the ROWD (San Diego County Copermittees, 2011)*). Additional focused receiving water monitoring to address key needs will be evaluated and addressed by Program Managers in the WQIP Monitoring and Assessment Programs.

Reference Site Monitoring: In Section II.D.2.a of the Tentative Order, the Regional Water Board included a requirement to monitor at least one reference watershed monitoring station for each WMA. The Copermittees propose to use the results of the San Diego Region Stream Reference Study in lieu of this requirement. Regional reference sites that are based on similar geology and watershed size will provide an appropriate measure of the expected receiving water conditions achievable in Copermittees' jurisdictions as a result of the future implementation of their WQIPs. Within the framework of the three compliance assessment areas, the intended purpose of monitoring reference sites for each WMA is to support assessments of whether *the physical, chemical, and biological conditions of receiving waters are being improved by the WQIPs.*

The specific assessments that receiving water monitoring programs are generally designed to support also include: *Are conditions in receiving waters protective or likely to be protective of beneficial uses? What is the extent and magnitude of the current or potential receiving water problems?* The proposed regional and reference condition monitoring will provide the needed information about the range of physical, chemical, and biological conditions that are natural in receiving waters of the San Diego region under both wet and dry conditions. This information will be incorporated into the Copermittees' Integrated Evaluation of Water Quality Improvement Strategies to support several related assessments:

- The conditions of receiving waters and status of receiving water beneficial uses,
- The extent to which MS4 discharges cause or contribute to receiving water problems during both dry weather and wet weather,
- Appropriateness of final dry weather and wet weather numeric goals that will restore the inadequately supported beneficial uses in the receiving waters;
- Characterizing non-storm water and storm water pollutant loads from receiving water flows within the authority of the Copermittee to control and from other non-anthropogenic sources;
- Progress of the water quality improvement strategies toward attaining non-storm water and storm water pollutant load reductions or improvements to water quality conditions;

Bacteria Compliance Monitoring: Copermittees propose to address the need for Bacteria Compliance Monitoring with the recently developed monitoring programs prepared to comply with bacteria TMDL implementation requirements (due to be submitted to the Water Board in October 2012). This monitoring will be conducted in place of the extensive bacteria compliance monitoring proposed in Attachment E of the Tentative Order to comply with the Bacteria TMDL that applies to 20 waterbodies. The current language proposed in Attachment E would replace the results of the recent stakeholder planning effort that has just been completed, and the monitoring proposed in the Tentative Order is so extensive that Copermittee resources for implementation would be redirected to monitoring that would not improve water quality.

Discussion of Jurisdictional Boundary Monitoring

In Section II.D.1.a(2)(a) of the Tentative Order, the Regional Water Board included a requirement to monitor at hydrologically connected receiving water monitoring stations in the lowest and upper most parts of the WMA near the boundary of its jurisdiction during dry weather. The monitoring described in the Tentative Order will not effectively address the three main programmatic objectives, and it will also not provide an effective means to assess jurisdictional accountability if that is the goal of the monitoring. An upstream-downstream monitoring approach in receiving waters has been shown to be a relatively ineffective method of detecting statistically and programmatically significant changes in the receiving waters from one location to the next or for the assessment of impacts of discharges on receiving waters.

There are a number of related reasons why receiving water monitoring is not an effective means of evaluating jurisdictional accountability or characterizing jurisdictional pollutant loads from dry weather MS4 discharges. The first reason is that receiving water monitoring is simply a less direct measure of jurisdictional performance and loads than the discharge monitoring that is already included in the program. A second related reason is that MS4 discharges typically comprise only a fraction of the receiving water flows and loads. A third factor is the typically high variability of the concentrations of analytes in receiving waters and discharges. This high variability in combination with the first two factors results in a low “signal to noise ratio” when the signal of interest is effects of discharges on receiving water concentrations.

The practical consequence of this combination of high variability and relatively small differences is that it requires high numbers of samples to detect statistically and programmatically significant differences expected between receiving water locations. Real differences expected between typical upstream/downstream receiving water sites are commonly less than 10%. Differences in concentrations that would be considered relevant to assessing jurisdictional accountability and impacts would be established by the Water Board and Copermittees, but are probably also in the range of 10% or less of average concentrations for any specific parameter.

Several of these challenges in using receiving water quality monitoring to distinguish differences of this magnitude are illustrated with a regionally relevant example of trace metals TMDL monitoring data for Ballona Creek (Los Angeles County). The Ballona Creek example is an appropriate comparison for the Copermittees' region based on similar geography, climate, hydrology, and a similarly high degree of urbanization in the watershed. The receiving water monitoring data for this program were collected over more than a 10-year period from 2001 to 2011 and include wet and dry season monitoring events. For this example, dry weather results (n>50 samples per site) are presented for copper for the four Ballona Creek locations (Figure 3). The variability of the data is illustrated by the range (between 1 and 2 orders of magnitude for dissolved copper and total copper) and coefficients of variance for untransformed data of 0.5 - 0.75 for most sites. Although there is an increasing percentage of urban influence from upstream to downstream for these sites (from left to right in Figure 3), there is no discernable trend in the receiving water quality. Using more rigorous analysis of variance methods (ANOVA) to evaluate the Ballona data, the differences in mean concentrations of total copper were not statistically significant from site to site, although the largest difference between site means was greater than 22%. Differences in mean concentrations of dissolved copper were statistically significant among sites, but the smallest significant difference detected was 36%, and the next smallest *non*-significant difference was 30%. Applying statistical power analysis to further evaluate the ability to distinguish "signal" from "noise" in the Ballona Creek dissolved copper data, it can be seen that reliably detecting differences as small as 20% between sites would require more than 100 sample events, and differences as small as 10% would require more than 700 events even at a lower statistical power of 80% (Table 2).

The analysis of the Ballona Creek TMDL data illustrate why jurisdictional boundary monitoring in receiving waters would be an inefficient and impractical means of assessing impacts from the Copermittees' discharges. The Ballona Creek system is reasonably representative of conditions expected in the Copermittees' receiving waters, and is based on a robust data set. The variability of the Ballona copper data is also typical or slightly lower than is common for relatively small urban receiving waters and is therefore a reasonable conservative surrogate for other systems and parameters. Some parameters would be expected to be slightly less variable (e.g., conductivity, hardness) and might require somewhat fewer samples to detect programmatically relevant differences. However, the majority of priority constituents are likely to be equally or more variable than total or dissolved copper (e.g., bacteria, strongly particulate associated pollutants such as legacy organochlorine pesticides and many other trace metals), and would require similar or more samples to detect meaningful differences between sites.

A similar analysis was performed on data from Chollas Creek in San Diego County, involving 60 or more samples for each site from the period 1994-2010, with very similar results.

Figure 3. Ballona Creek Dry Weather Copper Data

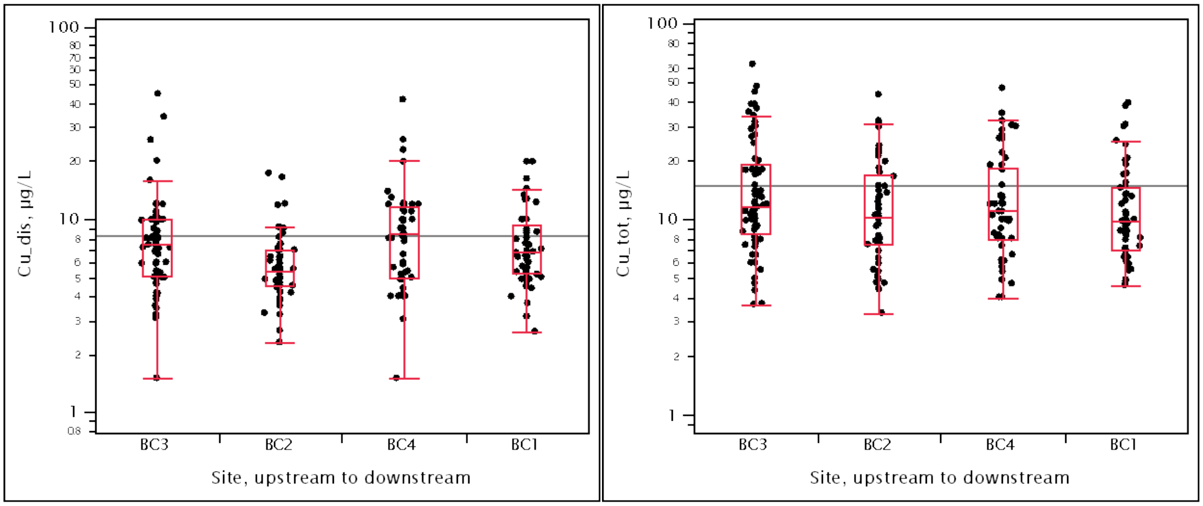


Table 1. Analysis Of Variance Results For Ballona Creek Copper Data

Dissolved copper						Total copper					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Ratio**	**p-value**	**Source**	**DF**	**Sum of Squares**	**Mean Square**	**F Ratio**	**p-value**
Model	3	331.6	110.52	3.65	0.0133*	Model	3	1.84	0.614	1.5574	0.2005
Error	228	6901.1	30.27			Error	228	89.91	0.394		
C. Total	231	7232.6				C. Total	231	91.75			

LSMeans Ordered Differences, Tukey HSD

Site			**Least Sq Mean**	**Median**	**Site**		**Least Sq Mean**	**Median**
BC4	A		9.4	8.5	BC3	A	13.2	11.6
BC3	A		8.8	7.5	BC4	A	11.7	11.0
BC1	A	B	8.3	6.8	BC2	A	10.9	10.3
BC2		B	6.1	5.4	BC1	A	10.6	9.7

Levels connected by same letter are *not* significantly different.

Table 2. Minimum Detectable Differences Between Sites

Power analysis results based on Ballona dissolved copper data, with a typical COV in log-scale of 0.2. Analysis is based on detection of differences between two sites, at a 95% confidence level, and a statistical power of 80% or 90% probability of detecting the difference.

	Minimum Detectible Significant Difference for stated sample size	
Sample size	**Power=0.8**	**Power = 0.9**
20	45%	53%
40	32%	37%
60	26%	30%
80	22%	26%
100	20%	23%
787	10%	12%

The jurisdictional boundary monitoring approach would also be ineffective at detecting differences in jurisdictional receiving water quality or impacts, since the relative differences in similar adjoining jurisdictions would be expected to be small (e.g., often less than a 10% difference in average pollutant concentrations). In each case, an upstream-downstream monitoring approach will be an ineffective method of assessing the impacts of dry weather discharges on the receiving water or differences between jurisdictional program effectiveness, as well as programmatic compliance with the management objective of eliminating dry weather MS4 discharges.

An additional unrelated challenge is that in many cases, the differences in flows and loads between upstream and downstream receiving water locations are not an adequately reliable measure of jurisdictional flow (and therefore loads and impacts). This is because of unmeasured losses or gains in flow due to the equilibrium between the surface water and groundwater. Interaction with groundwater is normal for most surface water streams, but is typically seasonally variable and difficult to accurately measure and characterize. The uncertainty due to the uncharacterized effect of these fluxes with groundwater is magnified in smaller and often ephemeral receiving water streams in the Copermittees' jurisdictions.

If the dry weather jurisdictional receiving water monitoring described in the Tentative Order is intended to support assessments of whether *the physical, chemical, and biological conditions of receiving waters are being improved by the WQIPs*, the Copermittees' proposed coordinated regional approach to receiving water monitoring provides a more effective means to accomplish this objective (as described in the following section).

Benefits of Proposed Receiving Water Monitoring Approach

The principal benefits of the Copermittees' Alternative Provision II.D approach to receiving water monitoring and assessment, as described above, can be summarized as follows:

- Supports broad spatial and temporal representation
- Integrates existing receiving water monitoring programs
- Builds on the existing receiving water data collected by Copermittees and others

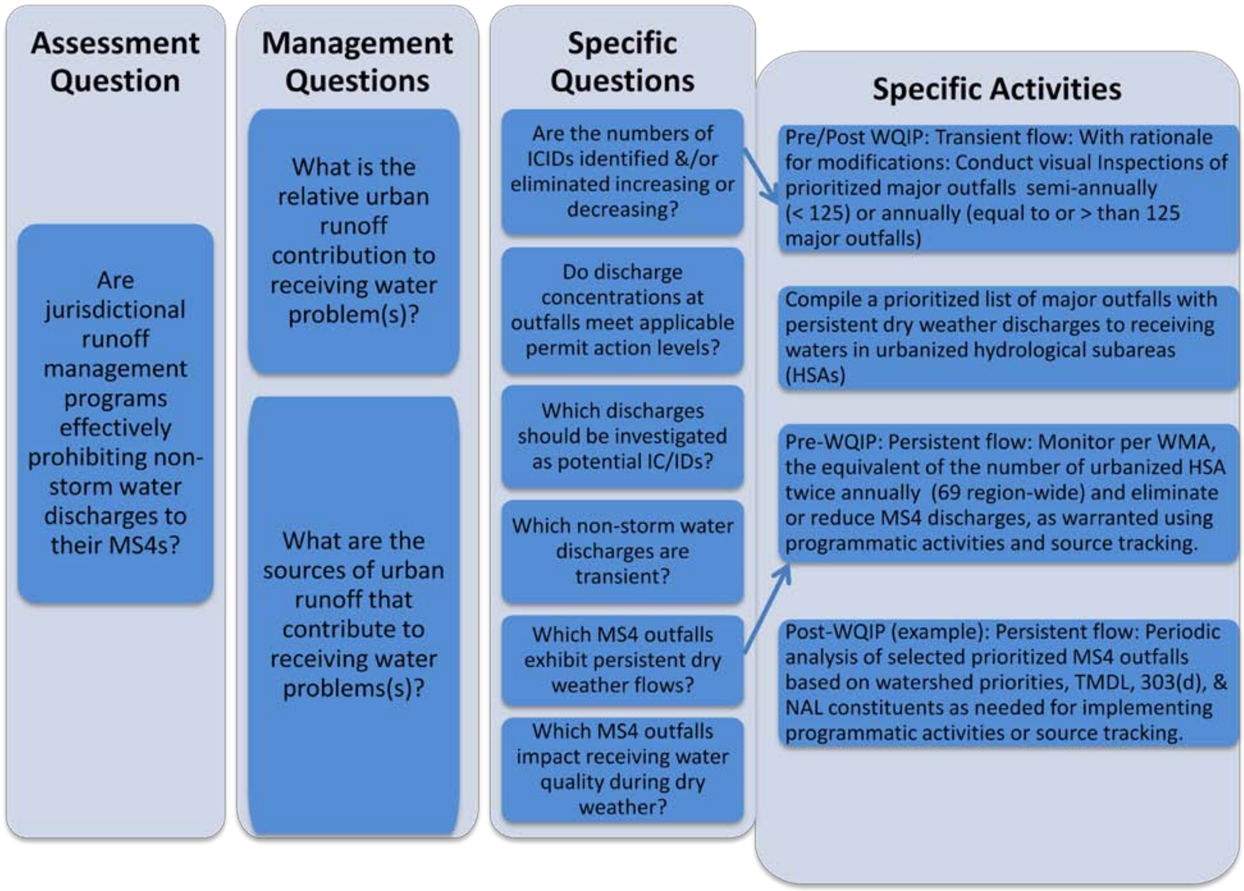
- Preserves long-term trend assessments based on scientifically sound, detailed statistical analyses of data collected over the last 10 to 15 years, and allows continued comparisons of WMAs
- Supports question/assessment-driven, adaptive management approach

Dry Weather Outfall Monitoring

Instead of the extensive chemical testing of MS4 outfalls proposed in the Tentative Order, Copermittees propose a more strategic approach based on knowledge from 15 to 20 years of dry weather monitoring. Follow up actions based on chemical action levels have not proven to be an efficient use of resources. As reported in the Copermittees' recent ROWD ((San Diego County Copermittees, 2011) See Attachment 1-1), follow-up investigations are rarely effective even when required within two business days after discovery. This is due largely to the intervening time between sampling the discharge and reporting the laboratory analytical results (typically more than a week). The resulting upstream investigations conducted over a week after the IC/ID was observed were rarely able to detect the source of the IC/ID and the two-day response requirement caused significant disruption of other higher priority efforts. The Copermittees found that the disruption to conduct the investigation was not an effective use of resources and rarely resulted in the elimination of more IC/IDs. The Copermittees will evaluate the alternative approach described in the Copermittees' proposed alternative Provision II.D during the Pre-WQIP monitoring phase. Based on its merits, the approach may be further refined in the Monitoring and Assessment Program developed as part of the WQIP with justifications.

Figure 4 illustrates use of the question-driven approach in designing specific activities for dry weather outfall monitoring and assessment.

Figure 4. Dry Weather Outfall Monitoring and Assessment Planning Process



Pre-WQIP Monitoring

In Section II.D.1.a of the Tentative Order, the Regional Water Board includes a requirement to monitor outfalls and inter-MS4 sites as part of each Copermittees' Dry Weather Jurisdictional Monitoring. Within the framework of the three compliance assessment areas, the intended purpose of monitoring dry weather MS4 outfalls is to support assessments of whether *jurisdictional runoff management programs effectively prohibit non-storm water discharges into their MS4s.*

As with the other proposed monitoring elements, the non-stormwater discharge monitoring in Alternative Provision II.D follows a question/assessment-driven approach. The primary assessment question driving this monitoring element is "*Are jurisdictional runoff management programs effectively prohibiting non-storm water discharges to their MS4s*?" To answer this overarching question, monitoring is focused on the following SMC management questions:

> *What is the relative urban runoff contribution to receiving water problem(s)?*
>
> *What are the sources of urban runoff that contribute to receiving water problems(s)?*

From these two management questions, specific monitoring questions have been developed to drive the design of an efficient and effective MS4 outfall monitoring program. Where possible, these questions are aligned directly with assessment questions in the draft Tentative Order. The specific monitoring questions developed to drive the initial monitoring design are:

Are the numbers of IC/IDs identified or eliminated increasing or decreasing?

Do pollutant concentrations at outfalls meet applicable permit action levels?

Which non-storm water discharges are transient?

Which MS4 outfalls exhibit persistent dry weather flows?

These questions have led the Copermittees to develop a two-pronged approach to effectively prohibit non-stormwater MS4 discharges. The first element targets transient discharges and is focused on IDDE, The second element is strategically designed to prioritize and address outfalls with persistent non-stormwater flows. These approaches are outlined below.

Transient flows: Prior to the completing the WQIP, transient flows will be addressed through visual inspection of major MS4 outfalls that discharge to a receiving water (in addition to other programmatic components such as construction, industrial/commercial, and municipal inspection programs, and responses to hot line complaints). All of the major MS4 outfall inspections will be conducted in dry weather as defined by the permit and will be conducted year round where possible. Obvious illicit discharges (e.g., those with unusual color, unusual odor, or high flows) shall be investigated immediately. The scope of the dry weather outfall inspection program will be adjusted based on the number of major MS4 outfalls that discharge to receiving waters:

- Copermittees with fewer than 125 major MS4 outfalls that discharge to a receiving water shall visually inspect 80% of these outfalls twice annually.
- Copermittees with 125-249 major MS4 outfalls that discharge to a receiving water shall visually inspect a prioritized list of these outfalls annually. .
- Copermittees with 250 or more major MS4 outfalls that discharge to a receiving water shall visually inspect a prioritized subset of these outfalls annually. The total number of annual inspections per Copermittee with 250 or more major MS4s will be a minimum of 250 and up to a maximum of 500 locations.

The major MS4 outfalls that are safe to access and avoid disturbances of critical habitat shall be prioritized based on threat to water quality and will consider factors including but not limited to:

- Proximity to a flowing receiving water
- Reported exceedances in water quality data
- Surrounding land use
- Presence of watershed priority constituents, TMDLs & CWA 303(d) list of impaired water bodies
- Flow rate

Persistent Flows: Prior to the completing the WQIP, the Copermittees' approach to effectively prohibit persistent non-stormwater discharges will focus on Major MS4 outfalls in the Urbanized Area (see Figure 5). Under this approach, Copermittees will:

- Identify persistent flows and develop a prioritized list of outfalls based on their threat to water quality. Prioritization will be based on visual surveys and historical knowledge. As in the SMC Model Monitoring Program, "persistent" is defined as observable flows in 3 consecutive site visits.
- Reduce dry weather flows through programmatic actions and source investigations
- Twice annually, Copermittees will monitor an average of one prioritized outfall in each urbanized hydrological subarea (there are 69 urbanized HSAs in San Diego County); However, WMAs will have the discretion to monitor the equivalent number of the highest priority outfalls and not necessarily in each of the HSAs. Samples will initially be analyzed for a broad list of constituents, and subsequent monitoring will focus on constituents of concern as needed to guide effective reduction & elimination.
- If persistent dry weather flows in a priority outfall are determined to be (a) conditionally allowed per Provision II.E.2.a, (b) anthropogenic and effectively eliminated, or (c) covered by another NPDES permit; then the outfall will be replaced in the monitoring program with the next highest priority outfall.
- Allow flexibility in location of persistent flows (guided by the prioritizations) for each WMA to maximize effectiveness of program. Specifically, within the constraints of the minimum required number of monitored outfalls, Copermittees may choose to monitor more than one high priority flow in some HSAs, and none in other HSAs with only low-priority persistent flows.

The Copermittees will evaluate the data produced by the dry weather outfall monitoring and inspections annually, rank outfalls according to potential threats to receiving water quality, exeedance of numeric action levels, and prioritize the outfalls. The prioritized list shall be submitted in the Annual Report to the Regional Board and used to update the WQIP, with the goal of eliminating or reducing flows and/or loads in order of the ranked priority list through targeted programmatic actions and source investigations. As part of the Annual Report, Copermittees shall also report the non-storm water discharges and pollutant loads from the Copermittee's MS4based on these data. Targeting the high priority outfalls allows elimination or reduction of the routine monitoring of inter-MS4 and non-major outfalls included in the TO Dry Weather Jurisdictional Monitoring without adversely affecting the ability of the Copermittees to make programmatic assessments about the effectiveness of their jurisdictional runoff management programs to prohibit non-storm water discharges to their MS4s. By targeting high priority outfalls, it also provides support for conservative assessment of whether dry weather discharges have the potential to impact receiving waters.

Figure 5. San Diego County MS4 System in Urban Areas

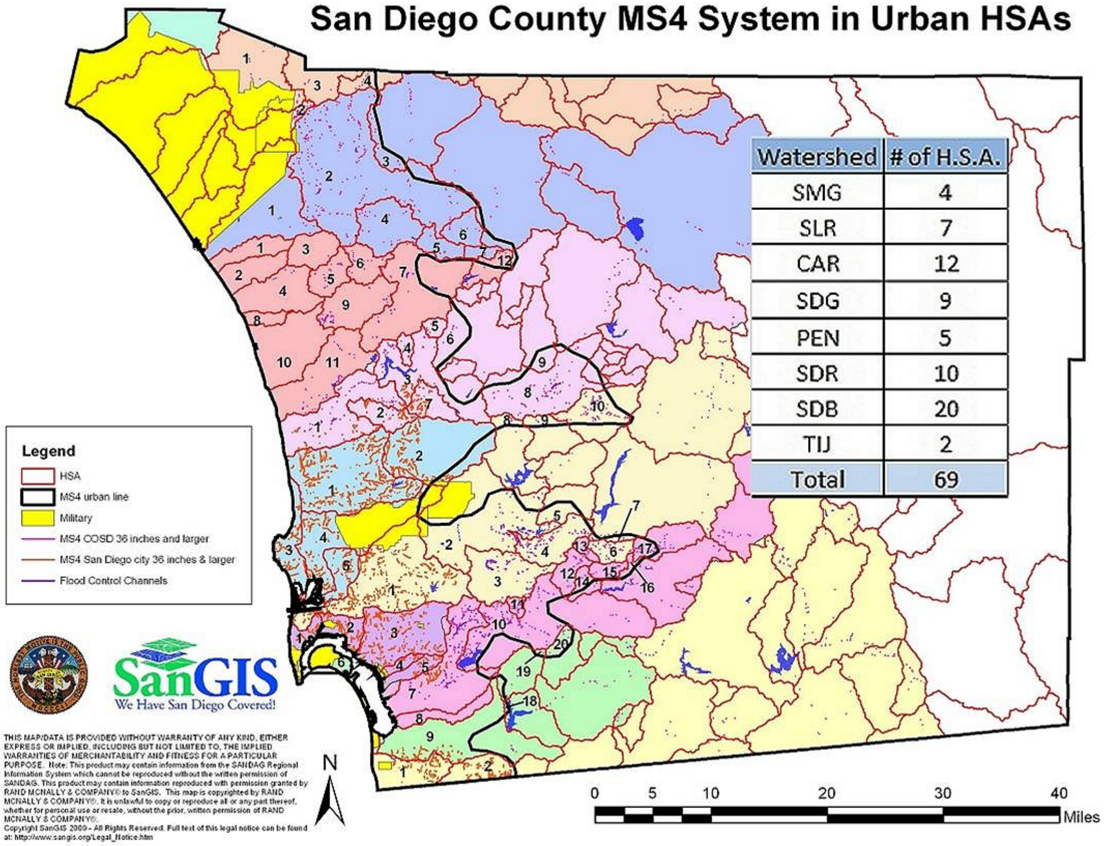


Table Notes: HSAs are numbered and outlined in red for each watershed. The inland extent of the approximate urban area is indicated by a solid black line.

Discussion of IDDE Program Efficiency and Effectiveness (Transient Flow)

The Copermittees' proposed approach to detect and eliminate non-storm water discharges and illicit connections/illegal discharges (IC/IDs) is directly focused on potential impacts to receiving waters. The proposed dry weather transient outfall monitoring targets all major outfalls that discharge directly to receiving waters within each jurisdiction. Each of these major outfalls will be visually inspected once or twice annually (up to 500 per jurisdiction) during dry weather conditions – once in dry season and once during wet season. Outfalls with persistent[6] dry weather flows will be addressed by the characterization and prioritization process described in the

[6] Persistent flow, as modified from the SMC Model Monitoring Program definition of persistent WQO exceedance, is defined as "the presence of flow, pooled, or ponded water more than 72 hours after a measureable rainfall event of 0.1 inch of precipitation during three consecutive monitoring and/or inspection events". All other flow is considered transient.

Copermittees' Alternative Provision II.D.2.b., as described above, and as applicable in the approved WQIP. Outfalls with transient dry weather flows will follow the procedures to be developed under Provision II.E.2.d. Where inspections indicate evidence of transient discharges through color, odor, unusual flow, etc – investigations will follow immediately. In cases where field test kits are deemed to be helpful, they will be used. Where inspections indicate persistent flow, outfalls will be included in the NSW discharge program to address persistent flows.

One aspect of the Tentative Order's Dry Weather Jurisdictional Monitoring is intended specifically to detect and eliminate non-storm water discharges and illicit discharges and connections (IC/IDs) to the Copermittees' MS4. As described in Section II.D.1.a of the TO, this would consist of monthly monitoring of all outfalls or MS4 segments in each quarter-mile section within the Copermittees' jurisdictions. This strategy would require sampling and field measurements at hundreds of sites in many of the jurisdictions, and analysis of thousands of samples per year for a variety of laboratory analytical parameters. Although the approach outlined in the Tentative Order would generate a great deal of water quality data for dry weather flows and IC/IDs, experience indicates that most of the flows sampled would be unlikely to have any impacts on receiving water. Additionally, since the purpose of the program is to eliminate dry weather flows and IC/IDs entirely, there is little value to collecting the dry weather water quality data for MS4 sites other than for outfalls. Most of the water quality data collected would not support assessment of the stated program management objective, which is to effectively prohibit non-storm water discharges to their MS4s. Consequently, this approach will be extremely resource intensive while also being relatively inefficient in eliminating the MS4 flows and IC/IDs with potential to adversely impact receiving waters.

As has been discussed and generally agreed to by the SDRWQCB and other TO stakeholders in focus meetings, the goal of the program is to eliminate dry weather flows entirely. If flows can be eliminated based on visual observations and IC/ID investigations, then there is little value to collecting water quality data and, according to the strategic monitoring frameworks available, this monitoring would not be necessary as it is not required to answer the management and assessment questions. Not only is water quality information not needed to get the desired results (i.e., liminating dry weather discharges), but the Copermittees' past monitoring results illustrate that this type of monitoring is relatively ineffective for this purpose. As an example, based on the number of samples collected between 2007 and 2009 through the current permit's monitoring program, only 3.7% of the samples collected resulted in a successful detection and elimination of an illicit discharge (County of San Diego Copermittees' 2011 ROWD Attachment 1-1).

In contrast, IDDE programs based on responding to complaints about dry weather flows have been demonstrated to have a much higher rate of detecting and eliminating dry weather flows (~41% of inspections by the County of San Diego, and an average of 58% of inspections by seven other Copermittees using this approach). Another approach used by the County of San Diego Copermittees, the Industrial/Commercial Inspection Program, demonstrated that these industrial and commercial facilities had a very high level of compliance, with no illicit discharges or connections detected in a total of 1351 inspections conducted in 2009-2011 (Table 3). The industrial/commercial, municipal, and construction inspections have a large spatial coverage. The Copermittees attribute the success and effectiveness of this program in preventing IC/IDs to their process of proactively engaging facility owners and operators through outreach and routine inspections.

Table 3. Illicit Discharge Detection and Elimination Programs, FY 2009-2011

Program	Total Site Visits	Total ICIDs Detected	Total ICIDs Eliminated	ICIDs eliminated per inspection
Total Industrial/Commercial Inspections Results	1351	0	0	0.0%
Total Complaint Responses	939	382	382	40.7%
Total Dry Weather Monitoring	174	0	0	0.0%

The proposed transient flow program is rooted in a three-pronged approach designed to provide broad spatial and increased temporal coverage. The focus is on three main areas: sources, the MS4, and outfalls discharging to receiving waters.

Experience shows that the main sources of NSW discharges are addressed via programs such as ICM inspections. Based on an analysis of recent data, this program appears effective in preventing illicit discharges through routine contact, OAE, and facility inspections. This program is broad in spatial coverage and occurs throughout the year.

The MS4 is continually monitored via jurisdictional programs such as complaint response, MS4 cleaning, and staff/citizen patrolling and reporting of illicit discharges. These programs have been shown to be effective in responding to and eliminating transient discharges. They also have a broad spatial element and are ongoing throughout the year.

One aspect of the Tentative Order's Dry Weather Jurisdictional Monitoring is intended specifically to detect and eliminate non-storm water discharges and illicit discharges and connections (IC/IDs) to the Copermittees' MS4. As described in Section II.D.1.a of the TO, this would consist of monthly monitoring of all outfalls or MS4 segments in each quarter-mile section within the Copermittees' jurisdictions. This strategy would require sampling and field measurements at hundreds of sites in many of the jurisdictions, and analysis of thousands of samples per year for a variety of laboratory analytical parameters. Although the approach outlined in the Tentative Order would generate a great deal of water quality data for dry weather flows and IC/IDs, experience indicates that most of the flows sampled would be unlikely to have any impacts on receiving water. Additionally, since the purpose of the program is to eliminate dry weather flows and IC/IDs entirely, there is little value to collecting the dry weather water quality data for MS4 sites other than for outfalls. Most of the water quality data collected would not support assessment of the stated program management objective, which is to effectively prohibit non-storm water discharges to their MS4s. Consequently, this approach will be extremely resource intensive while also being relatively inefficient in eliminating the MS4 flows and IC/IDs with potential to adversely impact receiving waters.

The third element of the proposed transient approach consists of visual monitoring at major MS4 outfalls. This requires the updating of inventories and periodic surveys of major outfalls, looking for flow indicative of illicit discharges. Where surveys indicate evidence of transient discharges through color, odor, unusual flow, etc – investigations will follow. In cases where test kits are deemed to be helpful, they will be used. Where inspections indicate persistent flow, outfalls will be included in the non-storm water discharge program to address persistent flows.

WQIP Monitoring

The pre-WQIP program to control transient and persistent dry weather discharges will continue after completion of the WQIP, with any Water Board approved modifications needed to be responsive to Program Managers and to focus on watershed priorities, TMDLs & 303d-listed water bodies.

Benefits of Proposed Dry Weather Outfall Monitoring Approach

The principal benefits of the Copermittees' Alternative Provision II.D dry weather outfall monitoring approach, as described above, can be summarized as follows:

- Broad spatial and temporal coverage
- Supports assessment-driven, adaptive management approach
- Distinction between persistent and transient flows focuses resources on eliminating and/or controlling high priority threats to receiving waters quality
- Utilizing other elements of the stormwater programs (inspections, complaint calls) and third party information will efficiently and effectively assist jurisdictions in eliminating non-storm water discharges

Wet Weather Outfall Monitoring

Within the framework of the three compliance assessment areas, the intended purpose of monitoring wet weather MS4 outfalls is to support assessments of whether *jurisdictional runoff management programs are reducing pollutants in storm water to the MEP.* The management questions related to this objective include: *What is the relative urban runoff contribution to receiving water problem(s)? What are the sources of urban runoff that contribute to receiving water problem(s)?* Additional related specific questions include: *Which MS4 outfalls impact receiving water quality during wet weather? Do discharge concentrations at MS4 outfalls meet applicable permit action levels? How do representative MS4 outlet discharge concentrations, loads, and flows change over time?* The Copermittees' approach to wet weather outfall monitoring is illustrated in Figure 6.

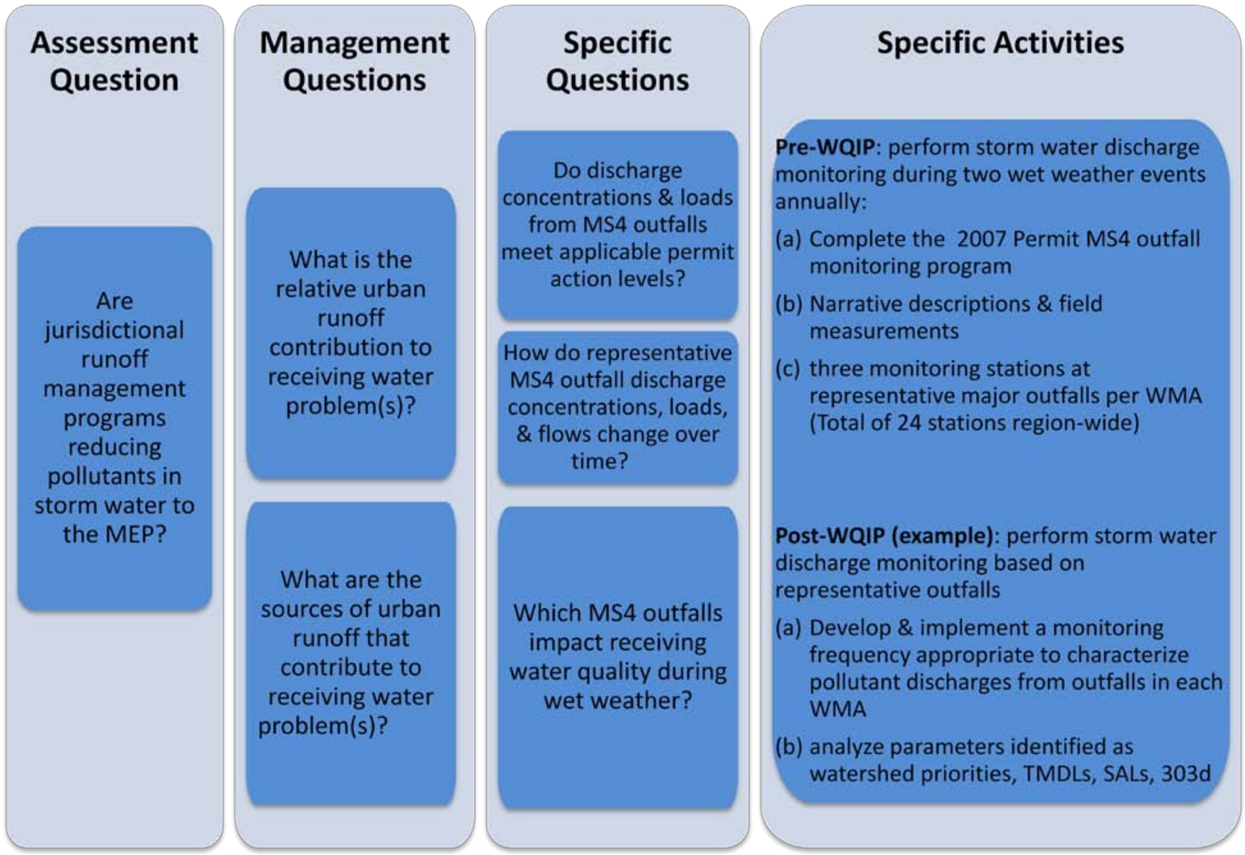
Pre-WQIP Monitoring

For the Jurisdictional Stormwater monitoring in Section II.D.1.b, instead of extensive MS4 outfall chemical monitoring, the Copermittees propose to monitor representative homogeneous land uses or mixed land uses.. These representative data will be extrapolated to better inform the planning process by prioritizing drainages for implementation efforts. Using the specific questions to guide design, the Copermittees commit to completing the current MS4 outfall program as part of the Pre-WQIP monitoring. Additionally, the Pre-WQIP outfall monitoring will consist of at least 3 monitoring stations per watershed management area. Selection of the representative outfalls with homogeneous land use types may be coordinated and shared among Copermittees to provide the most efficient representation and characterization of major land use categories. Representative typical mixed use sites also may be used as a cross check of the land-use-specific modeling results. Modeling currently being done for some watersheds as part of the bacteria implementation plan effort also may be built upon.

This proposed MS4 program will be more resource-intensive than the Copermittees' current MS4 program, and demonstrates the Copermittees' commitment to gathering useful data to target implementation activities. The post-WQIP program will continue a commitment to perform monitoring of outfalls to characterize pollutants from the MS4s. The design of the program will evolve depending on the specific questions and needs of the WMA. For example, if the question of trends is most important to demonstrate progress, then sampling representative MS4 outfalls with typical mixed use drainage areas may be preferred.

Figure 6 illustrates use of the question-driven approach in designing specific activities for wet weather outfall monitoring and assessment.

Figure 6. Wet Weather Outfall Monitoring and Assessment Planning Process



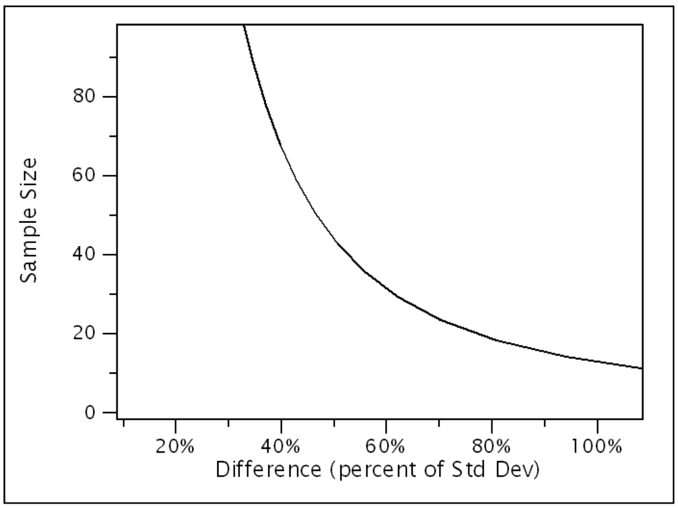
WQIP Monitoring

The outfall monitoring in the WQIPs will continue monitoring at representative major MS4 outfalls with homogenous land uses and/or typical mixed-use drainage areas. Selection of these representative outfall locations may be coordinated and shared among the Copermittees to provide the most efficient representation and characterization of major land use categories (residential, commercial, industrial). The number of sites, the frequency of sampling, and the analyte list may be modified in the WQIPs with Regional Board approval. An adaptive strategy, based on analysis of data collected is proposed and is further discussed in the following paragraphs. The data analysis is anticipated to occur once during the permit cycle.

This adaptive strategy for wet weather outfall monitoring provides a number of significant benefits relevant to program flexibility and effectiveness, and storm water runoff quality management.

An assessment of the wet weather outfall monitoring program allows identification of data gaps and priorities that can be addressed with the ongoing representative wet weather outfall monitoring. By employing statistical power analysis based on available runoff quality data to support the development of the wet weather monitoring, the Copermittees can gain an understanding of how many sites and events are needed to adequately address the management questions about potential impacts and trends for each land use and pollutant of interest. This becomes especially valuable in making informed decisions about allocating resources to continue or modify existing monitoring. For example, continued monitoring of an already well-characterized site or category will provide little additional useful information about differences from other categories or impacts on receiving water. This is illustrated in Figure 7 with a generic power curve showing that for sample sizes greater than 40, the ability to identify differences does not increase substantially, and the proportional value of additional data therefore decreases. In the context of making storm water runoff management decisions, this means that continuing to collect data to answer the same question will not provide a substantially better or more accurate answer after a certain number of samples. In the context of adaptive management, when that point is reached, resources should be shifted to answer different or new questions.

Figure 7. Power Curve For Difference Of Single Sample Mean, 95% Confidence Level And 90% Statistical Power



The monitoring design for wet weather monitoring also should consider available comparable runoff quality data from other programs in the region and statewide (e.g., Ventura County, Sacramento County, SCCWRP Urban Runoff Study, etc.). If the data from these programs indicate that runoff quality for specific land uses does not differ significantly between or within land uses, the monitoring design and level of monitoring effort can be adjusted accordingly. This evaluation will be performed later in the Permit Term.

Benefits of Proposed Wet Weather Outfall Monitoring Approach

The principal benefits of the Copermittees' Alternative Provision II.D wet weather outfall monitoring approach, as described above, can be summarized as follows:

- Broad spatial & temporal coverage
- Ability to extrapolate results across each WMA
- Supports assessment-driven, adaptive management approach

- Flexibility in site selection will focus resources on the highest watershed priorities, whether it be for representative drainage area data or homogeneous land-use based data.

Source/Stressor ID and Special Studies

The Copermittees recognize that the watersheds are at different stages of understanding with respect to each of the four monitoring components identified in Figure 1. The Copermittees anticipate an increased focus on Source/Stressor Identification and Special Studies (See Figure 8 and Figure 9) in the next permit cycle for watersheds with well-defined priorities such as adopted TMDLs. The Copermittees' approach to these elements is to continue implementation of already planned efforts, and to develop additional efforts with the long-term planning process for Monitoring and Assessment as part of the WQIP. The results of the watershed-driven source investigations can then be used in the watershed planning process to develop strategies for reduction of the high priority sources of discharges of the subject constituent.

Management Question: *What are the sources of urban runoff that contribute to receiving water problem(s)?*

The Copermittees will perform Source/Stressor Identification studies as needed to investigate sources of pollutants or stressors in cases where MS4 discharges are deemed to be causing or contributing to receiving water priorities, based on monitoring performed. Stressor/Source Identification studies will make use of relevant available water quality data and related information. The results of the Stressor/Source Identification studies will be shared regionally among the Copermittees to provide information useful for improving adaptive management of urban runoff through implementation of the WQIPs.

The principal role of Source/Stressor Identification is to identify and prioritize pollutant generating activities and source categories. Identification of high-priority sources is an important step in support of the WQIP process, primarily to inform the development of effective watershed-specific pollutant reduction strategies for particular priority constituents. Source identification will be conducted on a constituent-specific basis. The source identification efforts will focus on constituents identified as watershed priorities, and include a prioritization of sources based on magnitude, controllability, and other factors. For example, in the case that indicator bacteria was determined to be the highest priority constituent. If an analysis of potential sources of bacteria also indicated that human sources of bacteria have a higher risk of containing illness causing pathogens than non-human sources, the initial source ID efforts would emphasize using surveys and microbial source tracking or other methods to identify human sources of bacteria, so that these human sources can be prioritized and implementation of appropriate strategies developed.

Another role of Source/stressor identification is to identify and prioritize pollutant generating activities and source categories. Polluting generating activities (PGAs) are activities that can result in the release of pollutants. For example, restaurants are identified as a potential source of bacteria. Restaurant PGAs that could release bacteria include hosing out dumpsters and washing off floor mats in the parking lot. Once the PGAs are identified and prioritized, then behavioral changes can be targeted. Identification of high priority sources is an important step in support of the WQIP process, to help inform the development of effective pollutant control strategies for particular priority constituents on a watershed-specific basis.

Figure 8 illustrates use of the question-driven approach in designing specific activities for source identification monitoring and assessment.

Figure 9 illustrates use of the question-driven approach in designing specific activities for special studies monitoring and assessment.

Figure 8. Source and Stressor Identification Monitoring and Assessment Planning Process

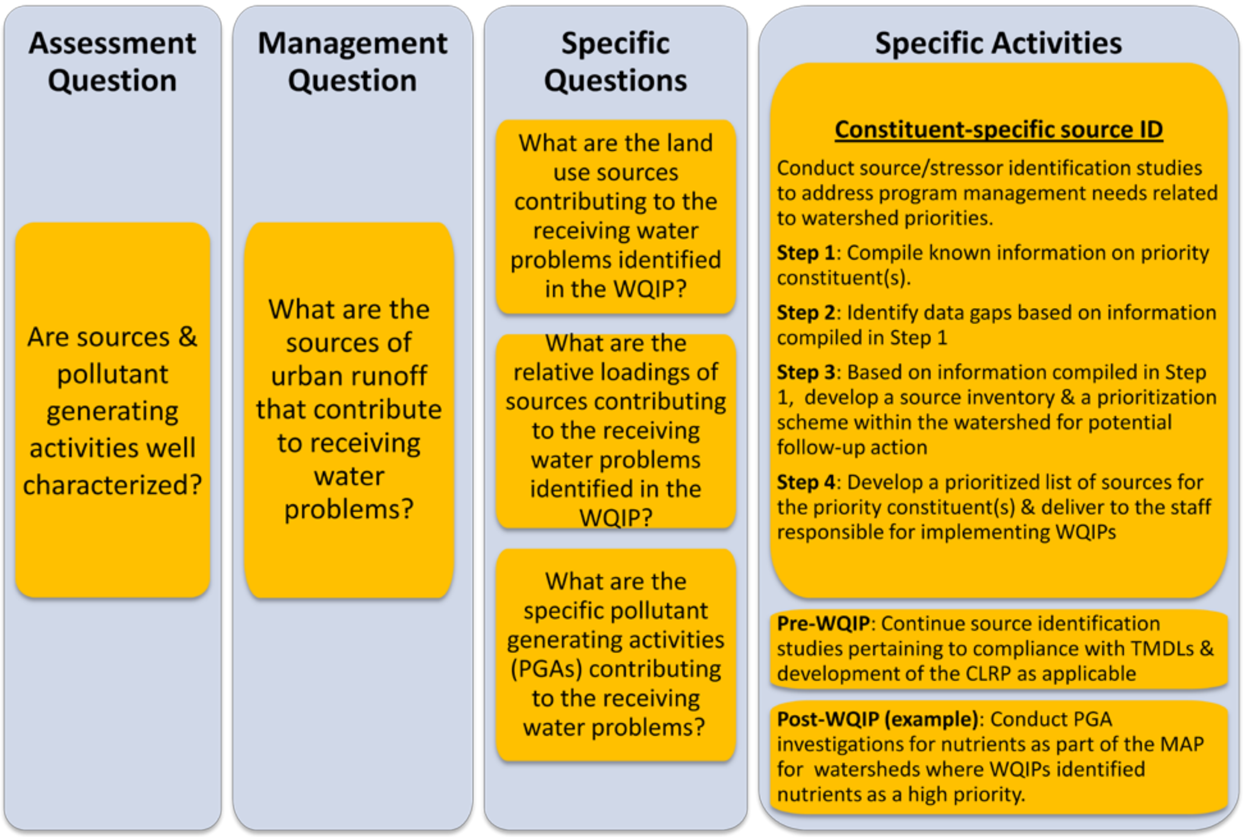
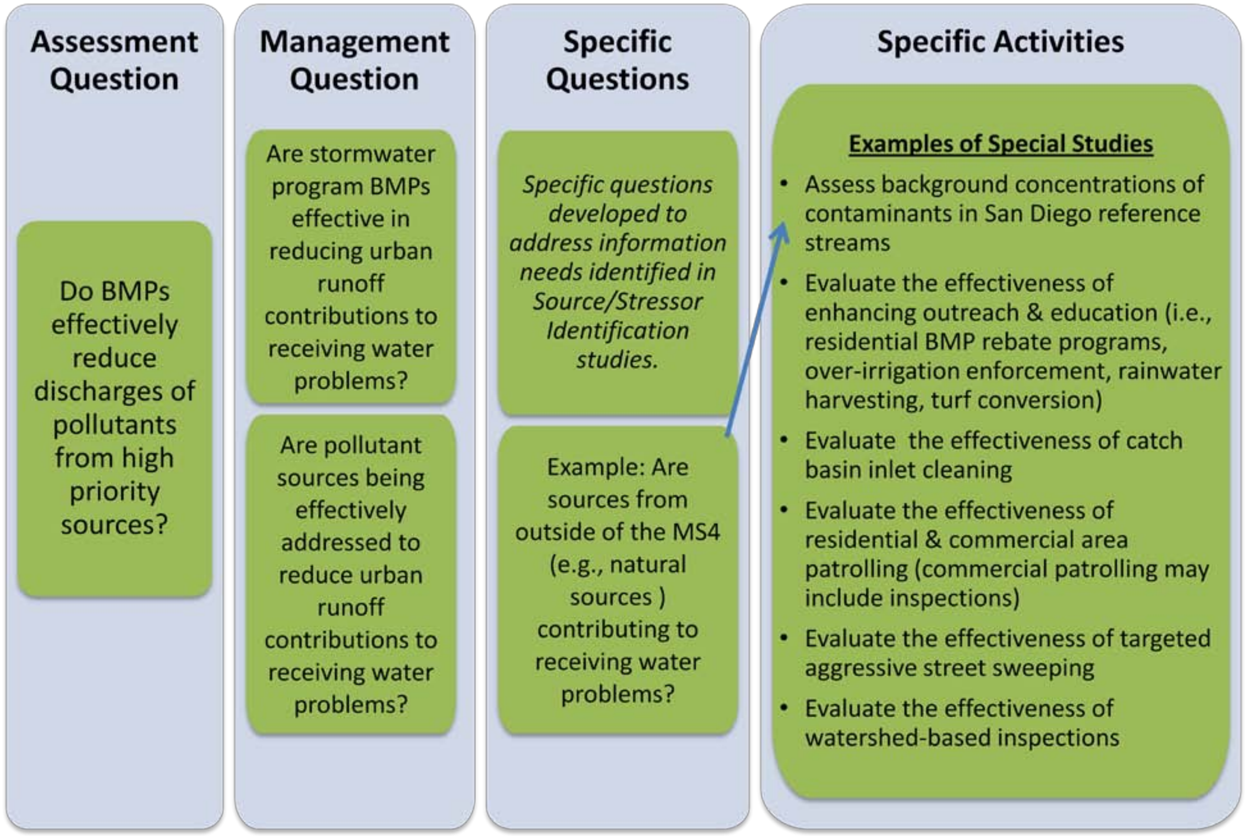


Figure 9. Special Studies Monitoring and Assessment Planning Process



Pre-WQIP Monitoring

Prior to adoption of the WQIP, the Copermittees will continue source identification and special studies pertaining to compliance with TMDLs and the development of the CLRP implemented under Order No. R9-2007-0001. As indicated previously in this report, the San Diego Region Stream Reference Study is a Regional Study to be implemented during the Pre-WQIP period. Additional Special Studies, such as BMP pilot studies or focused source identification studies will be implemented in some watersheds. Details of these studies will be included in the WQIP or Copermittees will provide criteria to guide when a special study is required as part of the WQIP planning process. This focus of the Copermittees' resources on the appropriate sources/activities will result in effective implementation strategies for water quality management.

WQIP Monitoring

Following adoption of the WQIPs, the Copermittees shall conduct source/stressor identification and special studies based on Monitoring and Assessment Plans developed for the WQIPs. The plans or the conditions for when special studies are appropriate will be submitted with the WQIPs.

Benefits of Proposed Source ID and Special Studies Monitoring Approach

The principal benefits of the Copermittees' Alternative Provision II.D Source Identification and Special Studies monitoring approach, as described above, can be summarized as follows:

- Responsive to Program Management needs
- Provides programs with information to verify, quantify, and prioritize sources
- Provides links between sources, activities & effects on runoff quantity & quality
- Answers questions related to program & BMP effectiveness
- Addresses data gaps to allow more effective program implementation
- Provides scientifically valid information related to regulatory principles

ADDITIONAL MONITORING DESIGN REFERENCES

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RECEIVING WATER ASSESSMENT OF MASS LOADING STATIONS/ TEMPORARY WATERSHED ASSESSMENT STATIONS

Wet and dry weather samples are collected at mass loading stations (MLS) and temporary watershed assessment stations (TWAS) within nine watershed management areas. Samples are collected per the requirements of Table 1 of the San Diego Regional Water Quality Control Board Order No. R9-2007-001 (Permit). The MLS stations have been consistently sampled for the last 10 to 15 years whereas the TWAS address specific questions beginning with the 2007 Permit and were not designed to be long term monitoring stations.

This monitoring is designed to answer core management questions 1, 2, and 5. The core monitoring management questions per the Permit are as follows:

1. *Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?*
2. *What is the extent and magnitude of the current or potential receiving water problems?*
3. *What is the relative urban runoff contribution to the receiving water problem(s)?*
4. *What are the sources of urban runoff that contribute to receiving water problem(s)?*
5. *Are conditions in receiving waters getting better or worse?*

Analysis of receiving water data was conducted to evaluate progress so far on questions 1, 2 and 5. Additionally, the following sub-questions were analyzed to guide the Copermittees' monitoring recommendations for the next permit:

1. Have priority constituents changed over this current Permit cycle compared to the previous?
2a. How have the TWAS contributed to the understanding of the spatial extent and magnitude of receiving water problems?
2b. How do the monitoring results of the upstream TWAS compare to the downstream MLS?
2c. Can wet weather priority constituents be linked to land uses in the watersheds?
3. What frequency of sampling at the MLS is necessary to maintain the detection of long-term trends of receiving water quality?

Statistical analysis of the water quality data from the MLs and TWAS concluded that:

- Receiving water constituent priorities in 2010 are similar to the previous assessment conducted in 2005 for wet weather. Dry weather ambient monitoring was added in the 2007 Permit to address seasonal variability. With few exceptions, priority constituents are the same in all watersheds. Wet weather priorities, in general, are bacteria and sediment. Dry weather priorities, in general, are bacteria, nutrients and total dissolved solids (TDS). Synthetic pyrethroids, not analyzed under the previous Permit, are an emerging regional issue beginning to be addressed at the state and national levels.
- With few exceptions, the constituent priorities at TWAS and MLS across the region are similar. Constituent concentrations and patterns of occurrence are similar at TWAS and MLS in the same watershed.

- Additional constituent priorities were identified in Chollas Creek Watershed (copper and zinc) and Tijuana River Watershed (e.g., ammonia, surfactants (MBAS), and biological chemical oxygen demand). Both of these watersheds have unique characteristics compared to the rest of the region. Tijuana River is subject to periodic sewage discharges from across the international border and Chollas Creek has a high density of industrial facilities and transportation corridors.
- Statistical analysis of 8 to 18 years of wet weather receiving water data indicate that sampling frequency may be reduced from alternate years to once every five years without increasing the amount of time necessary to detect long term trends. Because wet weather data has a higher variability than dry weather data, it is assumed that a reduced frequency for ambient dry monitoring will also be appropriate.
- Statistical analysis of the wet weather receiving water data also showed that if a significant increasing or decreasing trend is observed, a reduction of sampling frequency from alternate years to every five years will not increase the time necessary to detect a significant trend.

Conclusions

Constituent priorities in receiving water are similar in 2010 to the previous 2005 assessment. Additionally, the upstream TWAS and downstream MLS have similar constituent priorities. Therefore, core monitoring questions 1 and 2 (i.e., impact to beneficial uses and the magnitude and lateral extent of problem) have been successfully addressed by the monitoring of the 2007 Permit. Because the constituent concentrations and patterns are generally similar at the TWAS and MLS, especially within a watershed, there is no added value to continuing TWAS monitoring in its current form. The similarity of priority constituents across the region support reducing the number of receiving water stations from the 2007 Permit. Several stations (3 to 5 across the region) close to the mouth of the watershed will be adequate to monitor receiving water conditions in the region. The region has the wet weather constituent priorities of bacteria and sediment and the dry weather constituent priorities of bacteria, nutrients and TDS. Resources can be reduced from receiving water monitoring and redirected to working on how to fix the problems by increasing emphasis on MS4 outfall monitoring, source identification and source abatement activities.

Wet weather sampling at the MLS may be reduced to once every five years. The statistical simulation results show that decreasing the sampling frequency to every five years will not affect the ability to detect long-term trends. This finding is further supported by the finding that receiving water priority constituents have not changed substantially at individual MLS during the past five years. Therefore, reduced receiving water monitoring will still allow for detection of trends in the long-term, answering management question 5.

Supporting Documentation

A list of watershed management area and mass loading station (MLS) acronyms is presented in Table 1.

Table 1. Watershed Management Area and Watershed Acronym List

Watershed Management Area	Watershed Name	Mass Loading Station

Watershed Management Area	Watershed Name	Mass Loading Station
Santa Margarita	Santa Margarita River	SMR-MLS; SMR-MLS2
San Luis Rey River	San Luis Rey River	SLR-MLS
Carlsbad Watershed	Loma Alta Creek	LAC-TWAS-1
	Buena Vista Creek	BVC-TWAS-1
	Agua Hedionda Creek	AHC-MLS; AHC-TWAS-1
	Escondido Creek	ESC-MLS; ESC-TWAS-1
San Dieguito River	San Dieguito Creek	SDC-MLS; SDC-TWAS-1; SDC-TWAS-2
Los Peñasquitos River	Los Peñasquitos	LPC-MLS; LPC-TWAS-1; LPC-TWAS-2
Mission Bay and La Jolla	Tecolote Creek	TC-MLS
	Mission Bay	MB-TWAS-1; MB-TWAS-2
San Diego River	San Diego River	SDR-MLS; SDR-TWAS-1; SDR-TWAS-2; SDR-TWAS-3
San Diego Bay	Chollas Creek	CC-SD8(1)-MLS; CC-NF54
	Sweetwater River	SR-MLS; SR-TWAS-1
	Otay River	OR-TWAS-1
Tijuana River	Tijuana River	TJR-MLS; TJR-TWAS-1; TJR-TWAS-2

Sub-Question #1: *Have priority constituents changed over this current Permit cycle compared to the previous?*

Determination of whether or not receiving water priorities remained similar between the Baseline Long Term Effectiveness Assessment (BLTEA) and the current long term effectiveness assessment (LTEA) was made by comparing the two sets of results at the watershed level. The BLTEA analysis was conducted in 2005 and grouped wet and ambient data from the municipal separate storm sewer system (MS4) and the receiving waters, along with whether or not an constituent was included on the Section (§) 303(d) list. The LTEA analysis was conducted in 2010 and evaluated data from the MS4, receiving water (RW), wet, and ambient separately. In addition, inclusion of a constituent on the §303(d) list did not result in that constituent categorized as high priority. Constituent groups are used for the comparison of the BLTEA and the receiving waters LTEA. Priorities within watersheds were also evaluated. The purpose of this evaluation was to determine if the answer to management question #1 (conditions in receiving waters protective of beneficial uses) is the same in 2010 (LTEA) as the 2005 (BLTEA).

As shown in Table 2, wet weather priorities are similar between the BLTEA and the LTEA, as well as across the region. Cells highlighted orange are high priorities (greater than 50-percent exceedance of water quality benchmark (WQB)) and yellow cells are medium priorities (greater than 25-percent exceedance of WQBs, up to and including 50-percent exceedance of WQBs). A comparison of BLTEA and LTEA priority results at each MLS indicates that priorities remain similar between the two evaluations. Due to the dry weather ambient monitoring element initiated in the 2007 Permit, seasonal differences in priority constituents were identified in receiving water. Nutrients were not found to be a priority constituent during wet weather monitoring, but were a high priority constituent across many watersheds during dry weather conditions. These seasonal variations may in part be attributed to the differences in WQBs between seasons.

Since 2005, Copermittees participation in the Stormwater Monitoring Coalition (SMC) Regional Monitoring Program has provided additional ambient dry weather nutrient data. In general, during dry weather bacteria, nutrients, and TDS are constituent priorities found in watershed management areas across the region. In general, during wet weather, bacteria and sediments (total suspended sediments) are region-wide constituent priorities.

Table 2. Comparison of 2005 Baseline Long Term Effectiveness Assessment and 2010 Long Term Effectiveness Assessment Priority Results

Priority Group	BLTEA or LTEA	SMR-MLS	SLR-MLS	AHC-MLS	ESC-MLS	SDC-MLS	LPC-MLS	TC-MLS	SDR-MLS	CC-SD8(1)	SR-MLS	TJR-MLS
Baseline Long Term Effectiveness Assessment Priorities												
Bacteria	BLTEA											
Gross Pollutants	BLTEA											
Heavy Metals	BLTEA											
Nutrients	BLTEA											
Pesticides	BLTEA											
Sediment	BLTEA											
Total Dissolved Solids	BLTEA											
Toxicity	BLTEA											
Turbidity	BLTEA											
2010 Long Term Effectiveness Assessment Wet Weather Priorities												
Bacteria	LTEA-WET											
Gross Pollutants	LTEA-WET											
Heavy Metals	LTEA-WET											
Nutrients	LTEA-WET											
Pesticides	LTEA-WET											
Sediment	LTEA-WET											
Total Dissolved Solids	LTEA-WET											
Toxicity	LTEA-WET											
Turbidity	LTEA-WET											
2010 Long Term Effectiveness Assessment Dry Weather Priorities												
Bacteria	LTEA-DRY											
Gross Pollutants	LTEA-DRY											
Heavy Metals	LTEA-DRY											
Nutrients	LTEA-DRY											
Pesticides	LTEA-DRY											
Sediment	LTEA-DRY											
Total Dissolved Solids	LTEA-DRY											
Toxicity	LTEA-DRY											
Turbidity	LTEA-DRY											

BLTEA Priorities were based on Section 303(d) listing and combined wet and dry weather data
Orange highlights indicate high priorities (>50% exceedance of WQOs/WQBs), and yellow highlights indicate medium priorities (>25-50% exceedance of WQOs/WQBs)

Sub-Question #2a. How have the TWAS contributed to the understanding of the spatial extent and magnitude of receiving water problems?

and

Sub-Question #2b. How do the monitoring results of the upstream TWAS compare to the downstream MLS?

Priority constituents were also examined within watersheds to determine whether or not Priorities remained consistent throughout a watershed, and to help determine whether or not the TWAS have contributed to the understanding of the spatial extent and magnitude of receiving water quality problems. Three watersheds were examined in detail, and are presented in Table 3. The results demonstrate that Priorities remained consistent within the same watershed. Some differences in upstream and downstream relationships may be due to differences in the Basin Plan objectives in a specific hydrologic subarea (e.g. the TDS results for San Diego River stations).

Table 3. Agua Hedionda Creek, Escondido Creek, and San Diego River Mass Loading Station and Temporary Watershed Assessment Station Wet Weather Priority Constituent Comparison

Station	HSA	No. Samples	Assessment Scores - NPDES Monitoring - Wet Weather					
			Chemistry	Toxicity	IBI	Bacterio-logical	Nutrients	TDS
Agua Hedionda Hydrologic Area								
AHC-MLS	Los Monos (904.31)	9	TSS, Turbidity, Bifenthrin	*Hyalella azteca* acute	Very Poor	Fecal Coliforms		TDS
AHC-TWAS-1	Los Monos (904.31)	2	TSS, Turbidity, Chlorpyrifos, Bifenthrin	*Hyalella azteca* acute	Very Poor	Fecal Coliforms		TDS
Escondido Creek Hydrologic Area								
ESC-MLS	San Elijo (904.61)	9	Turbidity, Bifenthrin, TSS		NA	Fecal Coliforms		TDS
ESC-TWAS-1	Escondido (904.62)	2	Turbidity, Bifenthrin, TSS, Diazinon		Very Poor	Fecal Coliforms		TDS
San Diego River Hydrologic Area								
SDR-MLS	Mission San Diego (907.11)	9	Turbidity Bifenthrin		Very Poor	Fecal Coliforms		
SDR-TWAS-1	Mission San Diego (907.11)	2	Turbidity/Bifenthrin Surfactants (MBAS)	*Ceriodaphnia dubia* reproduction	Very Poor	Fecal Coliforms		TDS
SDR-TWAS-2	Santee (907.12)	2	TSS/Turbidity Bifenthrin/Permethrin pH/BOD	*Hyalella azteca* acute survival	Very Poor	Fecal Coliforms		

Station	HSA	No. Samples	Assessment Scores - NPDES Monitoring - Wet Weather					
			Chemistry	Toxicity	IBI	Bacterio-logical	Nutrients	TDS
SDR-TWAS-3	Santee (907.12)	2	Turbidity Bifenthrin		Very Poor	Fecal Coliforms		

-Orange highlights indicate high priorities (>50% exceedance of WQOs/WQBs), yellow highlights indicate medium priorities (>25-50% exceedance of WQOs/WQBs), blue indicates low priorities (≤25% exceedance of WQOs/WQBs). Only group scores of blue (low priority) are presented in the table.
-NA, not applicable no data collected

Sub-Question #2c.Can wet weather priority constituents be correlated to land uses in the watersheds?

A cluster evaluation was conducted to evaluate whether or not watersheds with similar land use also exhibited similar Priority constituent concentrations during wet conditions. The TWAS data were included to evaluate whether or not Priority constituent similarities between MLS and TWAS were found within watersheds.

Land use proportions upstream of each receiving water catchment (MLS or TWAS) were calculated using Geographic Information System (GIS), and compared using cluster analysis. The results of the analysis are presented in Figure 1. A map of the cluster results is presented in Figure 2. Several distinct land use group patterns were found, three of which are discussed here. Cluster "A" is defined by watersheds that contain relatively large proportions of industrial and agricultural land uses, and includes Agua Hedionda Creek (AHC-MLS and AHC-TWAS-1), San Dieguito Creek (SDC-MLS), Loma Alta Creek (LAC-TWAS-1), and Otay River (OR-TWAS-1). Cluster "C1" is defined by the highly urbanized watersheds, and includes relatively high proportions of public facilities, residential, transportation, and commercial land uses. This group includes Buena Vista Creek (BVC-TWAS-1), Sweetwater River (SR-MLS), Chollas Creek (CC-SD8(1)-MLS and CC-NF54-MLS), and portions of San Dieguito (SDC-TWAS-1). Finally, the most rural watersheds are characterized by Clusters "D1, D2, and E", which include relatively large proportions of vacant and undeveloped land, agriculture, and spaced rural residential land uses. Watersheds included in the cluster are portions of San Dieguito (SDC-TWAS-2), San Luis Rey (SLR-MLS and SLR-TWAS-1), Sweetwater River (SR-TWAS-1), Tijuana River (TJR-MLS, TJR-TWAS-1, TJR-TWAS-2), and Santa Margarita River (SMR-MLS and SMR-MLS2).

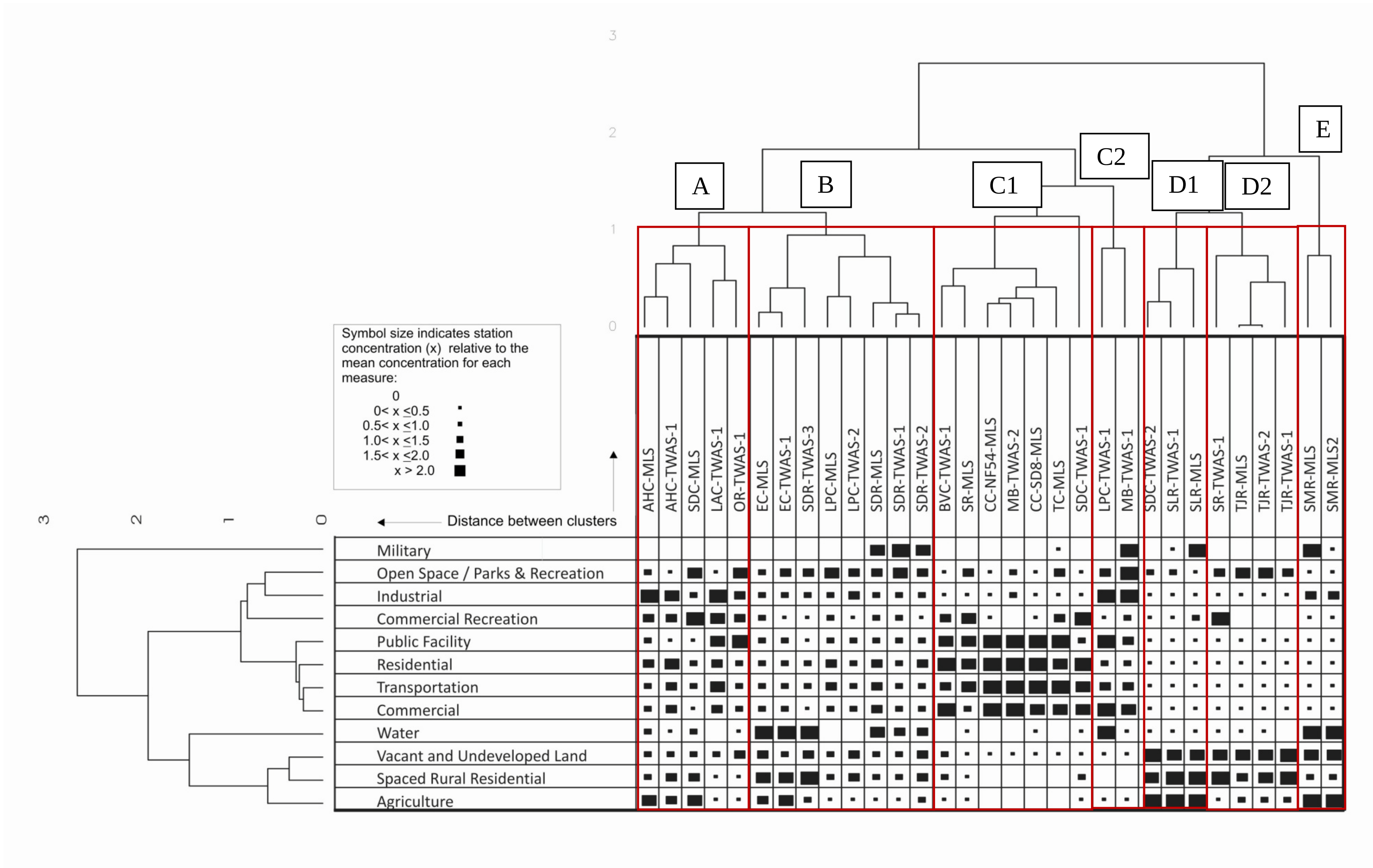


Figure 1. Land Use Cluster Analysis of the Mass Loading Station and Temporary Watershed Assessment Stations

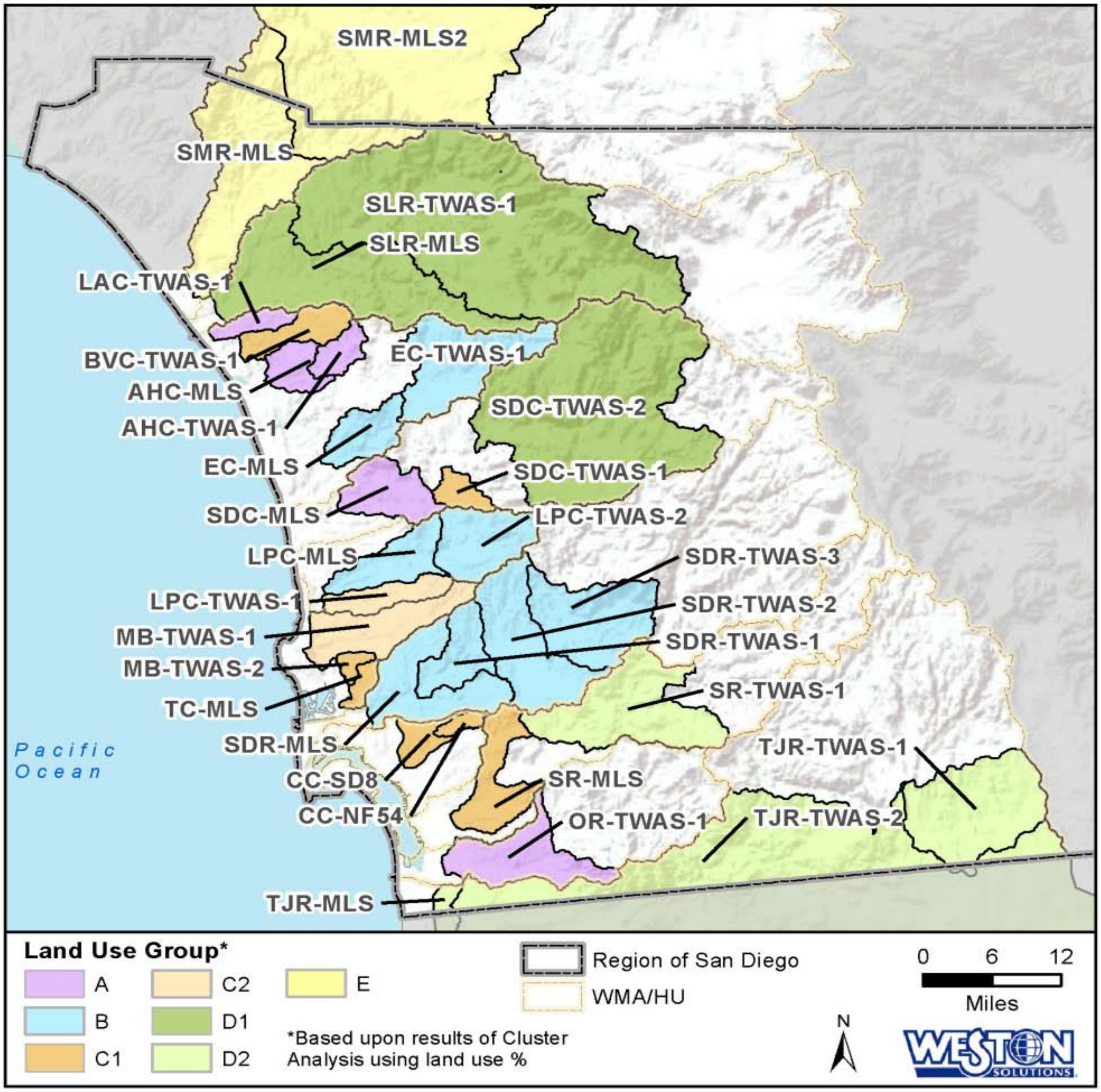


Figure 2. Land Use Cluster Analysis Results

The patterns of constituent concentrations at each MLS and TWAS were also evaluated using cluster analysis. The five-year LTEA dataset was used, and included wet weather data only, as receiving water constituent concentrations are expected to be more related to wash-off during wet events than during ambient conditions.

Results of the analysis are presented in Figure 3. In general, MLS and TWAS samples clustered together over time and a distinct sewage pattern was observed for Tijuana River (TJR-MLS and TJR-TWAS-2, highlighted blue) along with higher toxicity (highlighted orange). Chollas Creek (CC-SD8(1)-MLS) samples exhibited relatively higher concentrations of metals than other MLS and TWAS stations (highlighted purple). However, the groupings based on the water quality data do not directly correspond to the land use cluster analysis results. Therefore, based on constituent concentrations, there does not appear to be a strong correlation between land use and constituent concentrations (i.e., individual land uses do not relate directly to stormwater concentrations). The exceptions are Tijuana River and Chollas Creek, which have unique activities. Tijuana River is subject to sewage discharge and Chollas Creek has a high density of industrial facilities and transportation corridors. The SDC-TWAS-2 grouping with the Tijuana River (TJR-MLS) sites was due to the post-fire stormwater monitoring results which were highly impacted by the 2007 San Diego Wildfires.

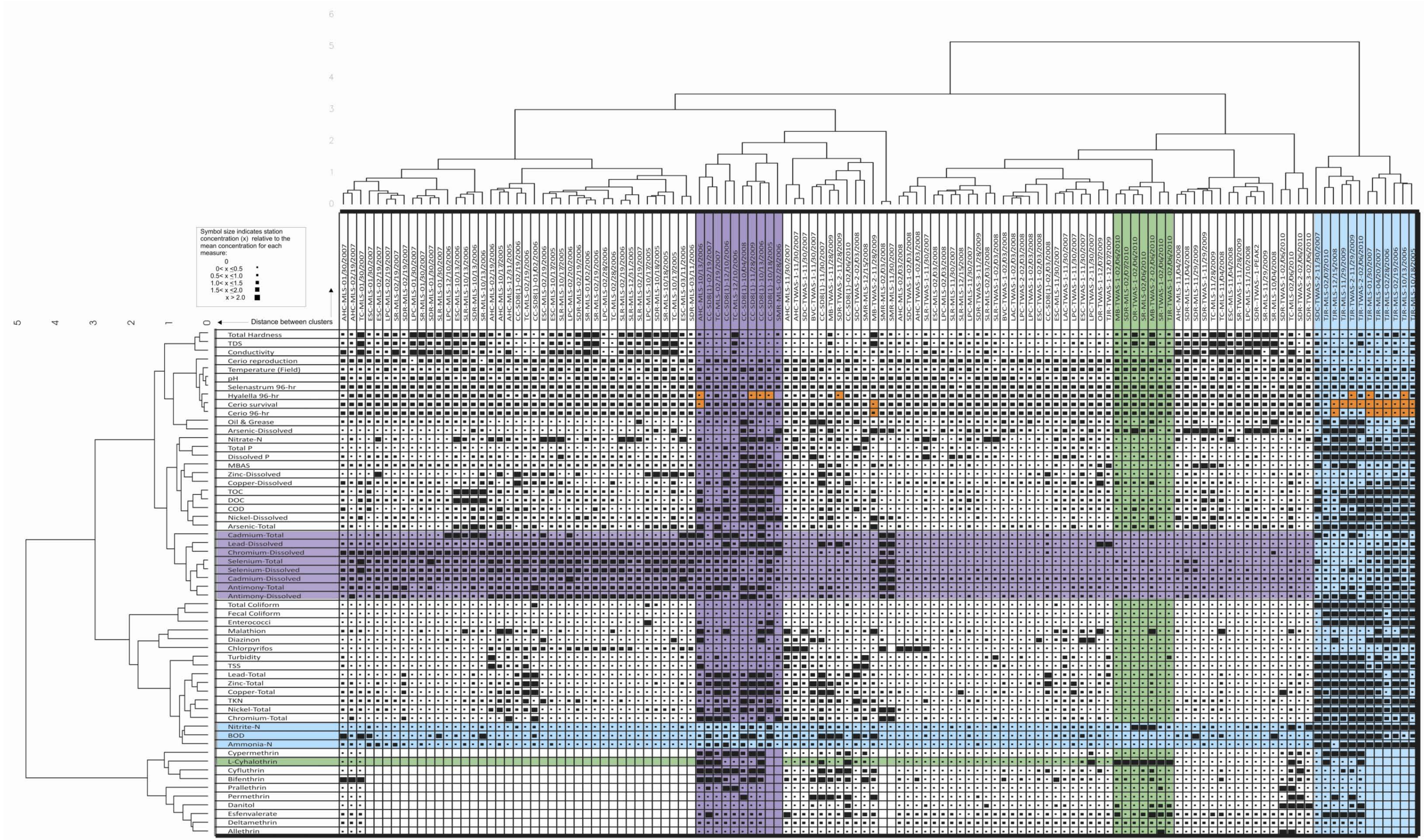


Figure 3. Cluster Analysis Results for Wet Weather Concentrations at Mass Loading Station and Temporary Watershed Assessment Stations during 2005-2010

Sub-Question #3: What frequency of sampling at the MLS is necessary to maintain the detection of long-term trends of receiving water quality?

A statistical analysis was conducted to determine whether or not a reduction in sample frequency from two wet weather events every other year to three wet weather events every five years at the MLS would decrease the Copermittees' ability to detect long-term receiving water trends. In particular, the question of whether a change in sampling frequency would affect Copermittees' ability to detect when the constituent concentrations fall below the WQB (or, for increasing trends, above the WQB) was evaluated.

The statistical analysis utilized the data from the existing program, between 8 and 18 years of data and 113 constituents at 10 MLS. The MLS and constituent combinations included all high priority constituents at each MLS, as well as constituents with greater than 50-percent detection frequency (more than half of the results were greater than the reporting limit). In addition, each MLS and constituent combination was tested for normality and log-normality (results in Attachment 1a). Only constituents that were found to be normal or log-normally distributed were included in the final statistical analysis dataset, because of the statistical method requirements. The final statistical analysis dataset included 66 analytes at 10 MLS. A full explanation of statistical tools utilized to assess the recommended monitoring program compared with the existing program is presented in Attachment 1a.

The existing data were used to evaluate trends (increasing, decreasing, or no trend), and the slope of the line was utilized to project future sampling results. Of the constituents included in the analysis, 2 were found to be significantly decreasing, 11 were found to be significantly increasing, and 53 did not exhibit a significant trend.

The statistical analysis included two scenarios, 1) the current program of two samples every other year and, 2) three samples every five years. The scenarios were compared to determine whether or not a reduction in monitoring frequency will increase the number of years it will take before the measured constituent of concern is observed below the WQO or WQB. Constituents that exhibited significant or non-significant decreasing or increasing trends were included in the analysis.

Comparison of the two scenarios found that, given the continuation of the existing trend line, decreasing the sampling frequency from two storm events every two years (n=5 per permit cycle) to three storm events every five years will not increase the amount of time necessary to detect when a decreasing or increasing trend crosses the WQO with 95-percent confidence. For MLS and constituent combinations that currently exhibit a significant increasing or decreasing trend, decreasing the sampling frequency will not decrease the ability to detect trends. For constituent and MLS combinations that do not exhibit significant trends, there is no difference between the two scenarios to detect when annual average concentrations first fall below or above the WQB or WQO with 95-percent confidence.

TSS was selected to illustrate the simulation results because it is often correlated to other constituents during storm events, including total phosphorus, bacteria, and total metals. Regionally, bacteria and TSS are Priority constituents during wet weather events. Therefore, evaluation to detect when these Priorities fall below WQOs is highlighted in the analysis. Results of the correlation analysis used to justify examination of TSS as a surrogate for other constituents is included in Attachment 1b. Statistically significant correlations are highlighted yellow in the table (alpha=0.10).

Significantly Decreasing Trends

Only two of the 66 constituent and MLS combinations included in the statistical analysis exhibited statistical decreasing trends. These included total suspended solids (TSS) at Tecolote Creek Mass Loading Station (TC-MLS) and TDS at SLR-MLS. Figure 4 below illustrates the statistical assessment results for TC-MLS. The upper and lower 95-percent confidence interval is shown as a green and light blue line, respectively. Currently, there is a significantly decreasing trend for TSS at this MLS. Observed data are shown as black diamonds, and simulated data are shown as light blue diamonds. The existing program of two wet weather events every other year is compared to three events every five years at TC-MLS. Given the steep decreasing trend at TC-MLS (Figure 4), changes to the frequency of monitoring will not increase the amount of time required to detect when the 95-percent confidence interval falls below the wet weather water quality benchmark of 100 mg/L for TSS (shown in red on the graphs). As shown in Figure 4, the anticipated date to detect TSS concentrations below the WQO is during 2010 for both scenarios (shown as a vertical fuchsia line).

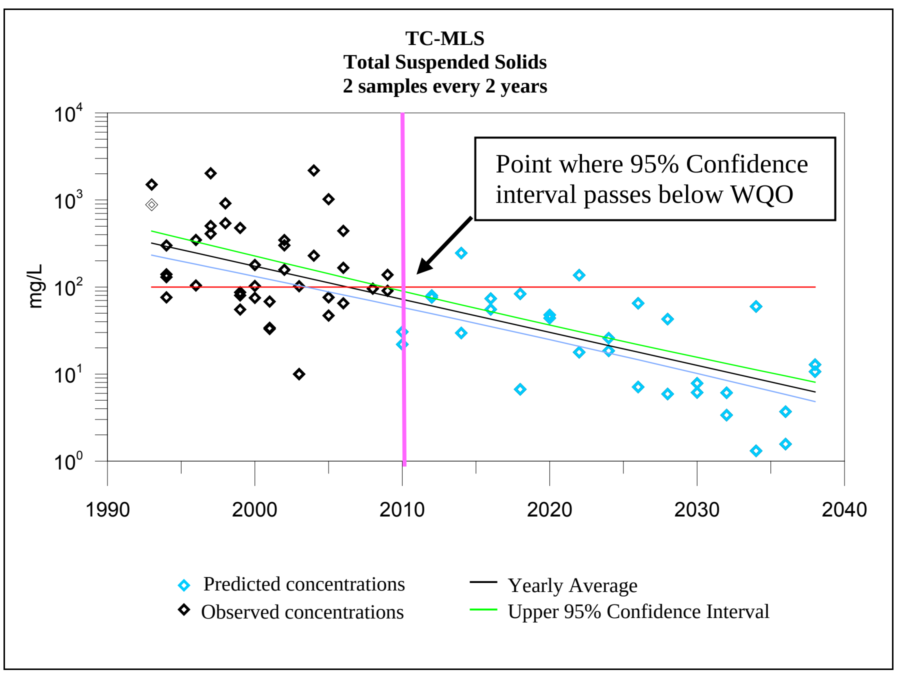
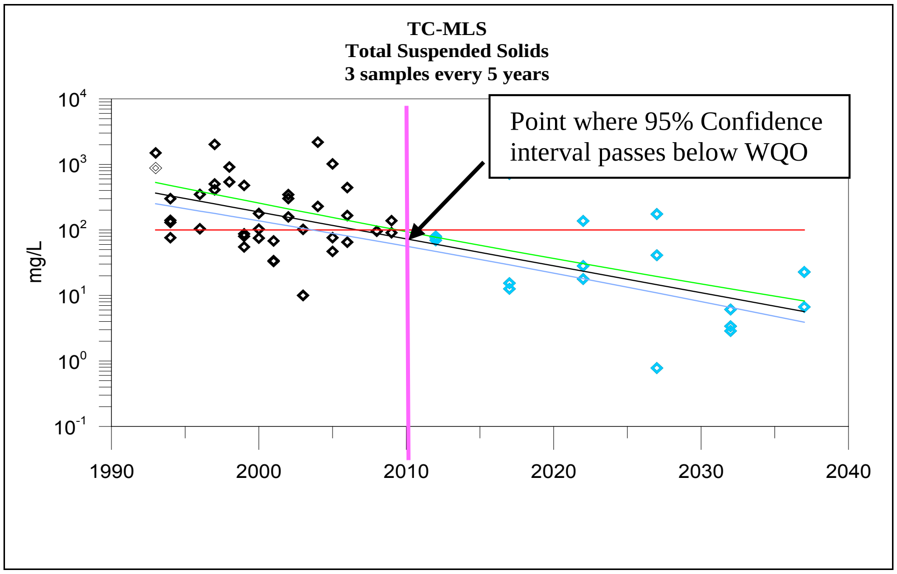


Figure 4. Analysis **Statistical Results**

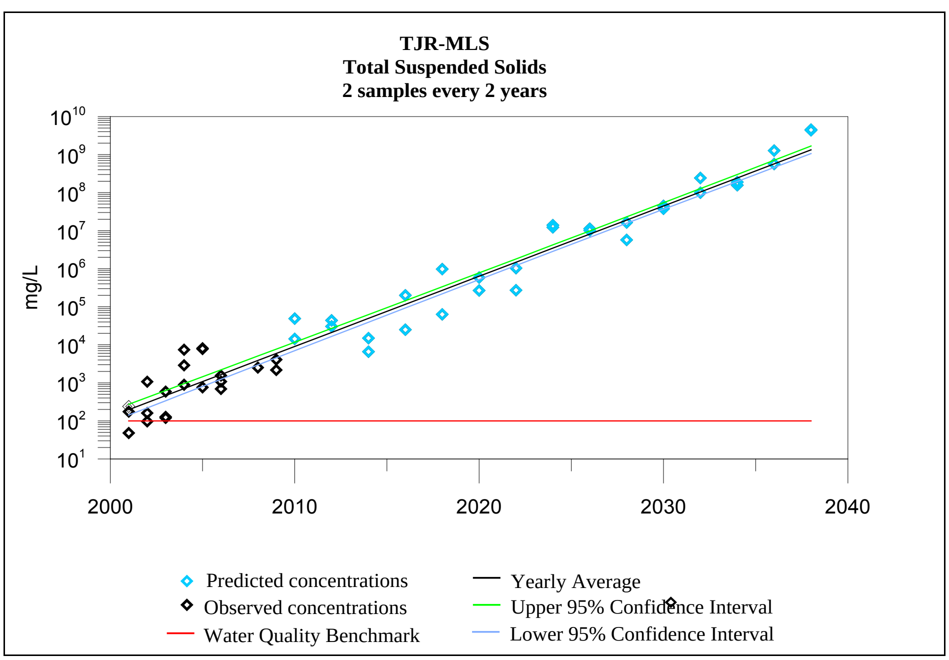


Comparison for Mass Loading Station with Significantly Decreasing Trend, Tecolote Creek Simulated Total Suspended Solids concentrations with Trend Line and 95-percent confidence interval bound

Significantly Increasing Trends

Eleven of the 66 constituent and MLS combinations included in the statistical analysis were found to be statistically increasing over time. Of these 11, four were turbidity, three were Total coliform, two were Fecal coliform, one was for TSS, and one was for total phosphorus.

The increasing trend shown in Figure 5 of TSS at Tijuana River MLS (TJR-MLS) (shown as the black line) illustrates the finding that if a significant increasing trend is observed, a reduction in sampling frequency will not affect the Copermittees' ability to detect it. Additional examples are provided in Attachment 1c that supports this conclusion.



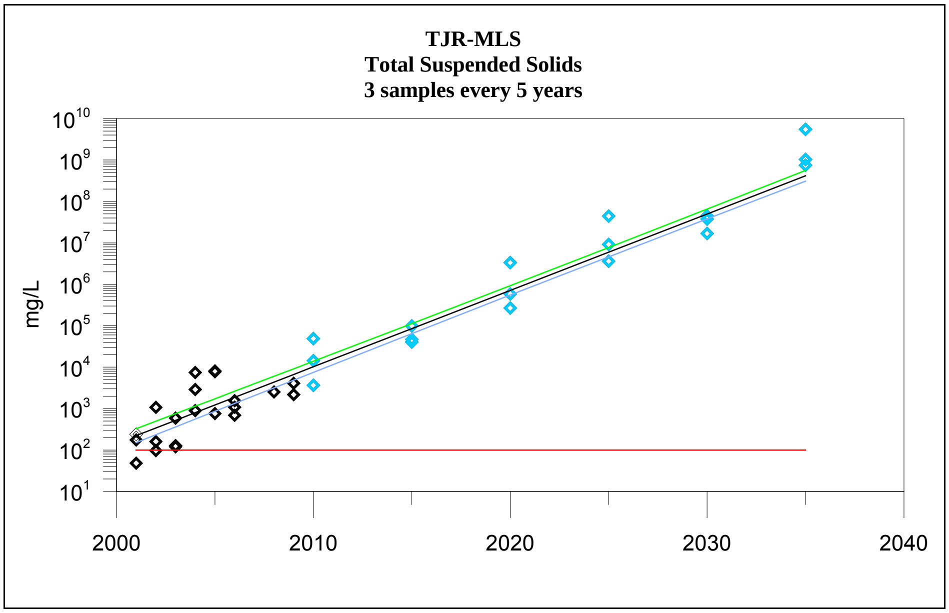


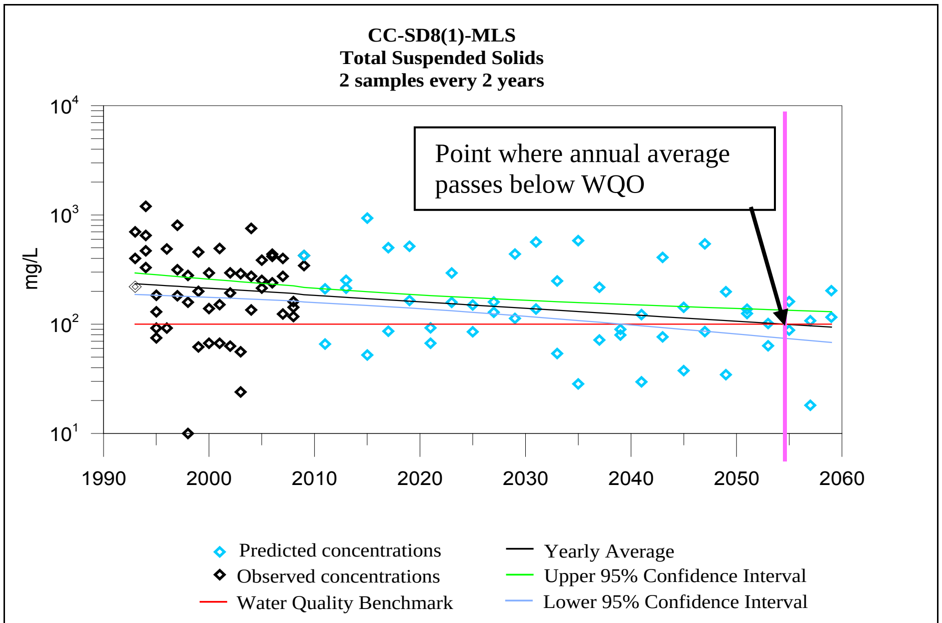
Figure 5. Statistical Analysis Results Comparison for Mass Loading Station with Significantly Increasing Trend, Tijuana River Simulated Total Suspended Solids concentrations with Trend Line and 95-percent confidence interval bound

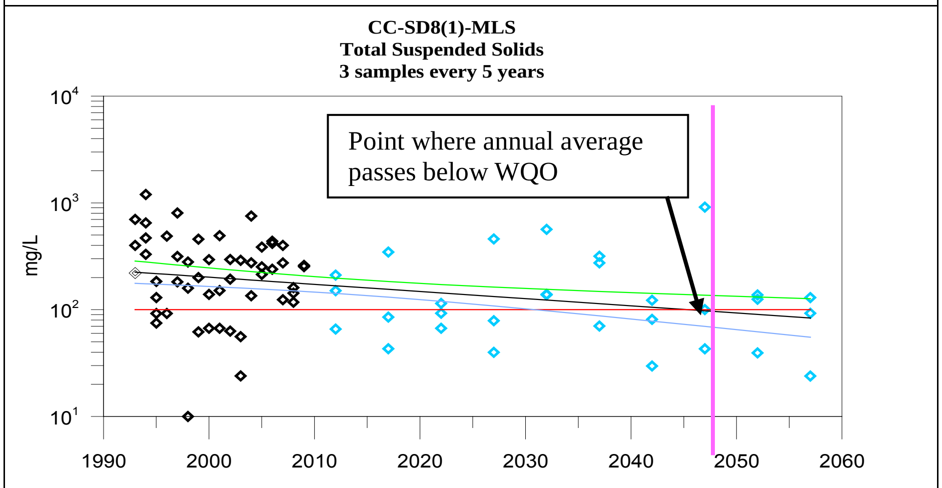
No Significant Trends

Constituent and MLS combinations for which no significant increasing or decreasing trend has been observed present the worst case scenario for sample frequency reduction (53 of the 66 constituent and MLS pairs analyzed). The two scenarios are compared for TSS at Chollas Creek Mass Loading Station (CC-SD8(1)-MLS) and TSS at San Dieguito River (SDC-MLS) in Figure 6. The trend is generally decreasing at CC-SD8(1) and generally increasing at SDC-MLS.

In the CC-SD8(1) example, because a significant trend is not currently observed, the existing trend line will take a considerable amount of time before the upper 95-percent confident interval passes the WQB. As noted in Figure 6, although the average result is expected to cross the WQB in 2054 at the two year sampling frequency, and 2047 for the five year frequency, the 95-percent confidence interval is not predicted to fall below the WQB before the next 50 years. This finding is based on the variability of the data. Because the data are highly variable, sampling every two years actually makes it more difficult to predict when the average annual TSS concentrations will fall below the WQB. Therefore, decreasing the sample frequency from every other year to every five years will not decrease the Copermittees' ability to detect a decreasing trend. If the existing slope of the line changes to decrease faster, this scenario would result in less time to detect a trend in either instance.

At SDC-MLS a generally increasing TSS trend is observed. This example is included here to illustrate that although the current TSS levels are below the WQB, it is possible to predict when TSS concentrations will meet or exceed the WQB using either the current monitoring program or the reduced sampling frequency to every five years. In this instance, the average annual TSS concentrations are not expected to exceed the WQB within the next 50 years. The lower 95-percent confidence interval does not pass the WQB in this example.


CC-SD8(1)-MLS
Total Suspended Solids
2 samples every 2 years
Point where annual average passes below WQO
mg/L
10^4
10^3
10^2
10^1
1990
2000
2010
2020
2030
2040
2050
2060
Predicted concentrations
Observed concentrations
Water Quality Benchmark
Yearly Average
Upper 95% Confidence Interval
Lower 95% Confidence Interval


CC-SD8(1)-MLS
Total Suspended Solids
3 samples every 5 years
Point where annual average passes below WQO
mg/L
10^4
10^3
10^2
10^1
1990
2000
2010
2020
2030
2040
2050
2060

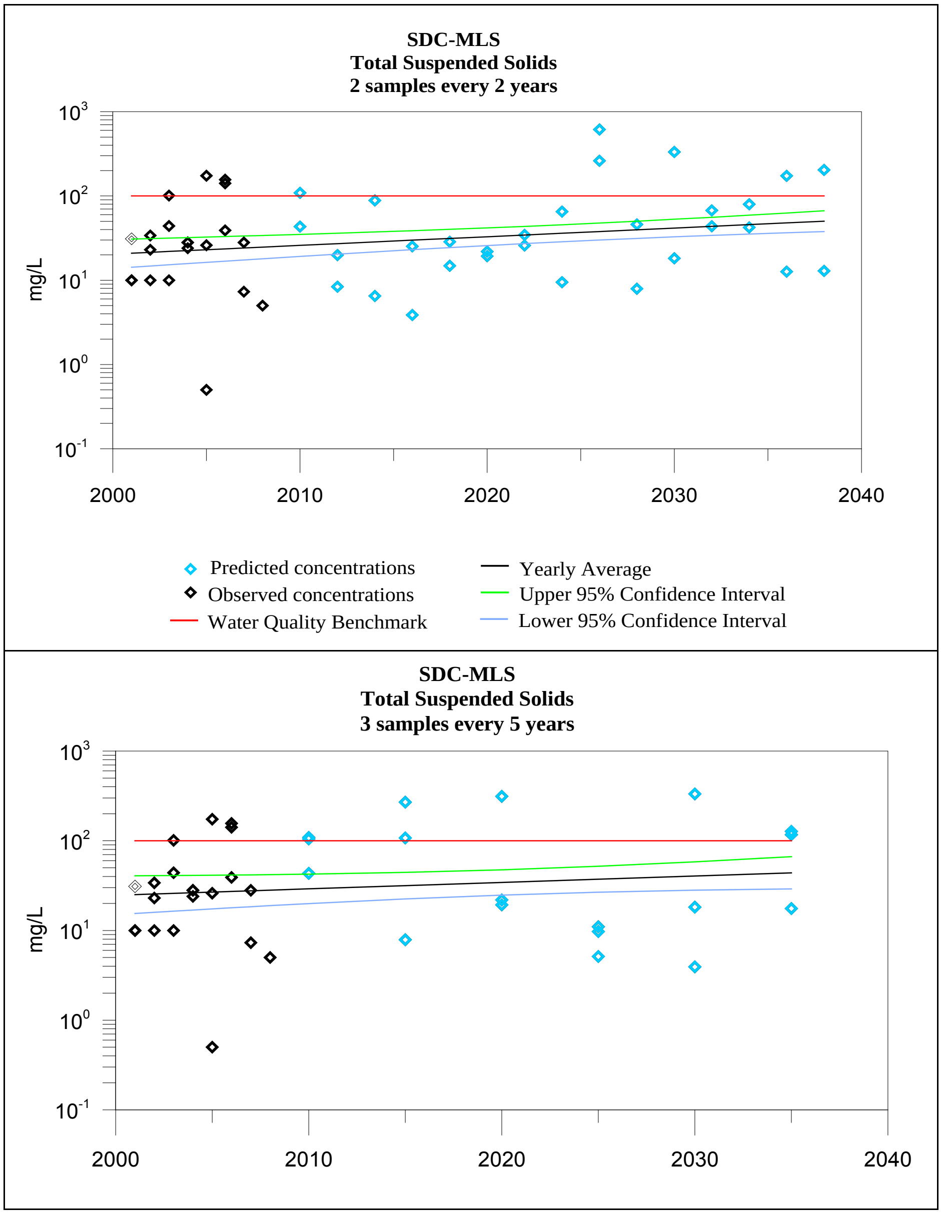


Figure 6. Tecolote Creek and Chollas Creek Simulated Total Suspended Solids concentrations with Trend Line and 95-percent confidence interval bound

MLS	Contituent	n	Normality Result	2009 and 2010 Trend Results
AHC-MLS	Bifenthrin by NCI	6	Normal	No Significant Trend
AHC-MLS	Dissolved Organic Carbon	9	Normal	No Significant Trend
AHC-MLS	Fecal Coliforms	31	Unknown	Significant Increasing Trend
AHC-MLS	Malathion	9	Log-Normal	No Significant Trend
AHC-MLS	MBAS	9	Unknown	No Significant Trend
AHC-MLS	Selenium,Total	9	Unknown	No Significant Trend
AHC-MLS	Total Coliforms	9	Normal	Significant Increasing Trend
AHC-MLS	Total Dissolved Solids	29	Unknown	No Significant Trend
AHC-MLS	Total Phosphorus-Low Range	9	Log-Normal	No Significant Trend
AHC-MLS	Total Suspended Solids	29	Unknown	Significant Increasing Trend
AHC-MLS	Turbidity	29	Log-Normal	Significant Increasing Trend
CC-SD8(1)	Bifenthrin by NCI	12	Log-Normal	No Significant Trend
CC-SD8(1)	Biochemical Oxygen Demand	48	Unknown	No Significant Trend
CC-SD8(1)	COD	47	Unknown	No Significant Trend
CC-SD8(1)	Copper,Dissolved	42	Log-Normal	No Significant Trend
CC-SD8(1)	Dissolved Organic Carbon	14	Log-Normal	No Significant Trend
CC-SD8(1)	Fecal Coliforms	50	Unknown	No Significant Trend
CC-SD8(1)	Lead,Dissolved	42	Unknown	No Significant Trend
CC-SD8(1)	Malathion	15	Unknown	No Significant Trend
CC-SD8(1)	MBAS	47	Unknown	Significant Decreasing Trend
CC-SD8(1)	Permethrin by NCI	12	Unknown	No Significant Trend
CC-SD8(1)	Selenium,Total	11	Unknown	No Significant Trend
CC-SD8(1)	Total Coliforms	15	Log-Normal	Significant Increasing Trend
CC-SD8(1)	Total Phosphorus-Low Range	11	Normal	No Significant Trend
CC-SD8(1)	Total Suspended Solids	51	Log-Normal	No Significant Trend
CC-SD8(1)	Turbidity	48	Log-Normal	Significant Increasing Trend
CC-SD8(1)	Zinc,Dissolved	42	Unknown	No Significant Trend
ESC-MLS	Bifenthrin by NCI	3	Normal	No Significant Trend
ESC-MLS	Dissolved Organic Carbon	9	Log-Normal	No Significant Trend
ESC-MLS	Fecal Coliforms	21	Log-Normal	No Significant Trend
ESC-MLS	Malathion	9	Unknown	No Significant Trend
ESC-MLS	MBAS	9	Unknown	No Significant Trend
ESC-MLS	Selenium,Total	9	Unknown	No Significant Trend
ESC-MLS	Total Coliforms	9	Log-Normal	No Significant Trend
ESC-MLS	Total Dissolved Solids	21	Normal	No Significant Trend
ESC-MLS	Total Phosphorus-Low Range	9	Normal	No Significant Trend
ESC-MLS	Total Suspended Solids	21	Log-Normal	No Significant Trend
ESC-MLS	Turbidity	21	Log-Normal	No Significant Trend
LPC-MLS	Bifenthrin by NCI	3	Normal	No Significant Trend
LPC-MLS	Dissolved Organic Carbon	9	Normal	No Significant Trend
LPC-MLS	Fecal Coliforms	21	Unknown	Significant Increasing Trend
LPC-MLS	Malathion	9	Unknown	No Significant Trend
LPC-MLS	MBAS	9	Unknown	No Significant Trend
LPC-MLS	Selenium,Total	9	Unknown	No Significant Trend
LPC-MLS	Total Coliforms	9	Log-Normal	No Significant Trend
LPC-MLS	Total Dissolved Solids	21	Unknown	No Significant Trend
LPC-MLS	Total Phosphorus-Low Range	9	Log-Normal	No Significant Trend
LPC-MLS	Turbidity	21	Log-Normal	No Significant Trend
SDC-MLS	Bifenthrin by NCI	3	Unknown	No Significant Trend
SDC-MLS	Dissolved Organic Carbon	9	Normal	No Significant Trend
SDC-MLS	Fecal Coliforms	21	Log-Normal	No Significant Trend
SDC-MLS	Malathion	9	Unknown	No Significant Trend
SDC-MLS	MBAS	9	Unknown	No Significant Trend

SDC-MLS	Selenium,Total	9	Log-Normal	No Significant Trend
SDC-MLS	Total Coliforms	9	Log-Normal	No Significant Trend
SDC-MLS	Total Dissolved Solids	21	Normal	No Significant Trend
SDC-MLS	Total Phosphorus-Low Range	9	Normal	Significant Increasing Trend
SDC-MLS	Total Suspended Solids	21	Log-Normal	No Significant Trend
SDC-MLS	Turbidity	21	Log-Normal	No Significant Trend
SDR-MLS	Bifenthrin by NCI	3	Unknown	No Significant Trend
SDR-MLS	Dissolved Organic Carbon	9	Unknown	Significant Increasing Trend
SDR-MLS	Fecal Coliforms	21	Log-Normal	No Significant Trend
SDR-MLS	Malathion	9	Unknown	No Significant Trend
SDR-MLS	MBAS	9	Unknown	No Significant Trend
SDR-MLS	Selenium,Total	9	Unknown	No Significant Trend
SDR-MLS	Total Coliforms	9	Log-Normal	No Significant Trend
SDR-MLS	Total Phosphorus-Low Range	9	Normal	No Significant Trend
SDR-MLS	Turbidity	21	Log-Normal	No Significant Trend
SLR-MLS	Bifenthrin by NCI	3	Normal	No Significant Trend
SLR-MLS	Dissolved Organic Carbon	9	Log-Normal	No Significant Trend
SLR-MLS	Fecal Coliforms	21	Log-Normal	Significant Increasing Trend
SLR-MLS	Malathion	9	Log-Normal	No Significant Trend
SLR-MLS	MBAS	9	Unknown	No Significant Trend
SLR-MLS	Selenium,Total	9	Unknown	No Significant Trend
SLR-MLS	Total Coliforms	9	Log-Normal	Significant Increasing Trend
SLR-MLS	Total Dissolved Solids	21	Normal	Significant Decreasing Trend
SLR-MLS	Total Phosphorus-Low Range	9	Normal	No Significant Trend
SLR-MLS	Turbidity	21	Log-Normal	Significant Increasing Trend
SR-MLS	Bifenthrin by NCI	3	Unknown	No Significant Trend
SR-MLS	Dissolved Organic Carbon	9	Unknown	No Significant Trend
SR-MLS	Fecal Coliforms	21	Log-Normal	No Significant Trend
SR-MLS	Malathion	9	Unknown	No Significant Trend
SR-MLS	MBAS	9	Unknown	No Significant Trend
SR-MLS	Selenium,Total	9	Unknown	No Significant Trend
SR-MLS	Total Coliforms	9	Log-Normal	No Significant Trend
SR-MLS	Total Dissolved Solids	21	Normal	No Significant Trend
SR-MLS	Total Phosphorus-Low Range	9	Normal	No Significant Trend
SR-MLS	Turbidity	21	Log-Normal	No Significant Trend
TC-MLS	Bifenthrin by NCI	6	Normal	No Significant Trend
TC-MLS	Dissolved Organic Carbon	9	Normal	No Significant Trend
TC-MLS	Fecal Coliforms	41	Unknown	No Significant Trend
TC-MLS	Malathion	9	Unknown	No Significant Trend
TC-MLS	MBAS	9	Unknown	No Significant Trend
TC-MLS	Selenium,Total	9	Normal	No Significant Trend
TC-MLS	Total Coliforms	9	Log-Normal	No Significant Trend
TC-MLS	Total Dissolved Solids	41	Unknown	No Significant Trend
TC-MLS	Total Phosphorus-Low Range	9	Normal	No Significant Trend
TC-MLS	Total Suspended Solids	40	Log-Normal	Significant Decreasing Trend
TC-MLS	Turbidity	40	Log-Normal	No Significant Trend
TJR-MLS	Bifenthrin by NCI	3	Normal	No Significant Trend
TJR-MLS	Biochemical Oxygen Demand	21	Unknown	No Significant Trend
TJR-MLS	COD	21	Log-Normal	No Significant Trend
TJR-MLS	Diazinon	21	Unknown	Significant Decreasing Trend
TJR-MLS	Dissolved Organic Carbon	9	Normal	No Significant Trend
TJR-MLS	Fecal Coliforms	21	Log-Normal	Significant Increasing Trend
TJR-MLS	Malathion	15	Unknown	No Significant Trend
TJR-MLS	MBAS	21	Log-Normal	No Significant Trend
TJR-MLS	Selenium,Total	9	Unknown	No Significant Trend

TJR-MLS	Total Coliforms	9	Unknown	Significant Increasing Trend
TJR-MLS	Total Phosphorus-Low Range	21	Log-Normal	No Significant Trend
TJR-MLS	Total Suspended Solids	21	Log-Normal	Significant Increasing Trend
TJR-MLS	Turbidity	21	Log-Normal	Significant Increasing Trend

Client Sample ID	AHC-MLS		CC-SD8(1)		ESC-MLS		LPC-MLS		SDC-MLS		SDR-MLS		SLR-MLS		SR-MLS		TC-MLS		TJR-MLS	
N=number of samples	N	TSS	N	TSS	N	TSS	N	TSS	N	TSS	N	TSS	N	TSS	N	TSS	N	TSS	N	TSS
Critical Value	31	0.236	50	0.184	21	0.292	21	0.292	21	0.292	21	0.292	21	0.292	21	0.292	41	0.309	21	0.292
	9	0.483	15	0.354	9	0.483	9	0.483	9	0.483	9	0.483	9	0.483	9	0.483	9	0.483	9	0.483
Fecal Coliforms	31	0.578	50	0.191	21	0.357	21	0.259	21	0.045	21	-0.667	21	0.468	21	0.606	41	-0.150	21	0.549
Enterococcus	9	0.469	15	-0.173	9	0.571	9	0.433	9	-0.402	9	-0.286	9	-0.009	9	0.000	9	0.477	9	-0.405
Total Coliforms	9	0.405	15	-0.008	9	0.261	9	0.102	9	-0.504	9	-0.595	9	0.525	9	0.300	9	0.185	9	0.137
Total Dissolved Phosphorus	9	0.803	11	0.191	9	0.418	9	0.567	9	-0.402	9	0.117	9	0.220	9	0.183	9	-0.126	9	-0.267
Total Phosphorus Low Range	9	0.778	11	0.145	9	0.879	9	0.433	9	0.226	9	0.450	9	0.407	9	-0.374	9	0.900	21	-0.227
Nitrate as N	9	0.567	14	-0.266	9	-0.150	9	0.460	9	-0.209	9	-0.300	9	0.220	9	-0.076	9	-0.025	9	-0.071
Nitrite as N	9	-0.277	14	-0.304	9	0.678	9	0.059	9	-0.406	9	-0.753	9	0.334	9	0.571	9	0.237	9	-0.323
Total Kjeldahl Nitrogen	9	0.254	14	-0.134	9	0.109	9	0.567	9	0.519	9	0.192	8	0.037	9	-0.070	9	0.650	9	-0.400
Antimony, Total	9	-0.274	11	0.110	9	0.420	9	0.726	9	-0.069	9	0.582	9	-0.053	9	0.609	9	-0.085	9	-0.109
Arsenic, Total	9	0.412	11	-0.055	9	0.252	9	0.429	9	-0.387	9	-0.267	9	0.838	9	-0.079	9	0.067	9	0.285
Cadmium, Total	9	0.366	11	0.258	9	0.034	9	0.257	9	0.707	9	0.502	9	0.279	9	0.286	9	0.722	9	0.752
Chromium, Total	9	-0.136	11	0.402	9	0.256	9	0.548	9	-0.183	9	-0.089	9	0.373	9	0.486	9	0.165	9	-0.393
Copper, Total	9	0.567	11	0.282	9	0.633	9	0.502	9	0.373	9	0.353	9	0.436	9	0.603	9	0.837	9	-0.100
Lead, Total	9	0.672	11	0.564	9	0.848	9	0.749	9	0.414	9	0.954	9	0.372	9	0.982	9	0.833	9	0.050
Nickel, Total	9	0.695	11	-0.036	9	0.470	9	-0.085	9	0.547	9	0.218	9	0.701	9	-0.288	9	0.603	9	0.133
Selenium, Total	9	0.279	11	0.019	9	0.139	9	0.000	9	0.341	9	0.366	9	-0.171	9	-0.383	9	-0.200	9	-0.248
Zinc, Total	9	0.883	15	0.178	9	0.617	9	-0.017	9	0.109	9	0.728	9	-0.019	9	0.579	9	0.817	9	0.183
Diazinon	9	0.638	15	0.422	9	0.096	9	0.112	9	-0.091	9	0.091	9	0.532	9	-0.715	9	-0.279	21	-0.720
Malathion	9	0.200	15	0.236	9	0.409	9	0.493	9	-0.075	9	0.018	9	0.231	9	-0.063	9	-0.042	15	-0.587

A longer record for fecal coliforms was included here, but in general five years of data were assessed (n=9) for all stations and analytes

Results highlighted yellow are statistically significant, alpha =0.1

Attachment 2-1c: Statistical Analysis Methods

Statistical Analysis Methods

The focus of the statistical analysis was to determine whether or not proposed changes to the receiving water monitoring frequency will impact the Copermittees' ability to answer management question #5:

Are conditions in receiving waters getting better or worse?

In particular, the frequency of monitoring to determine whether or not constituent concentrations are improving or worsening over time must be assessed before changes to the monitoring program can occur. This question was addressed by evaluating how changes to monitoring frequency will affect how many more years will be necessary to detect when constituent concentrations are improving (i.e., falling below the water quality objective (WQO) with 95-percent confidence) or worsening (i.e., rising above the WQO with 95-percent confidence).

The approach employed to evaluate the effects of reducing the receiving water monitoring frequency from two wet events every two years to three wet events every five years was based on a Monte Carlo simulation approach. This approach is often used to predict or simulate future outcomes based on existing knowledge.

The Monte Carlo simulations, referred to as statistical analysis in the text, utilized empirical data from the existing program to predict or model the future data sets and estimate when water quality objectives (WQOs) will be reached assuming the current trends continue. The same methodology was followed as that used during the 2005 ROWD report development, summarized below, whereby an exponential decay model was used to estimate the future average yearly concentrations (based on the current rate of change). Simulated samples were randomly drawn from a log-normal distribution centered on each future average annual concentration. The intra-year variability of the existing dataset was used when defining log-normal distributions from which to make the random draws. Three criteria were necessary to include constituents within the analysis, 1) constituent results must have been detected (above the reporting limit) in at least half of the samples at an individual mass loading station (MLS), and 2) constituents must exhibit normal or log-normal distributions at individual MLS, 3) constituents must be high priority consitituents. The Shapiro-Wilk test for normality and visual inspection of the data were used to identify constituents that met the normality requirements of this analysis (Technical Memo, Attachment 1a).

A major consideration for redesigning a monitoring program is an evaluation of the impacts the changes may have on the analysis and interpretation of the results. The recommendation to change the frequency of monitoring from two wet events every other year to three events every five years necessitated a thorough examination of the potential impacts on how the sampling frequency will affect the ability to detect trends in the data. Both the effect on existing trends and non-significant trends were evaluated.

The statistical analysis utilized the data from the existing program, between 8 and 18 years of data and 113 constituents at 10 MLS. The MLS and constituent combinations included all high priority constituents at each MLS, as well as constituents with greater than 50-percent detection frequency (more than half of the results were greater than the reporting limit). In addition, each MLS and constituent combination was tested for normality and log-normality (results in Technical Memo, Attachment 1a). Only constituents that were found to be normal or log-normally distributed were included in the final statistical analysis dataset, because of the statistical method requirements. The final statistical analysis dataset included 66 analytes at 10 MLS (58-percent of the original constituents included in the evaluation).

The existing data were used to evaluate trends (increasing, decreasing, or no trend), and the slope of the line was utilized to project future sampling results. Of the constituents included in the analysis, 2 (3-percent) were found to be significantly decreasing, 11 (17-percent) were found to be significantly increasing, and 53 (80-percent) did not exhibit a significant trend.

The analysis uses either the $\log_{10}$ transformed data or original results (based on the distribution of the data) regressed with year to determine the equation of the regression line drawn through the data. The regression equation was used to compute the predicted mean value in future years based on the standard deviation from the regression analysis. Data were generated for each future year that have a mean equal to the predicted mean and were randomly distributed within the bounds of the standard deviation. Using these simulated data with the existing data, the regression was rerun and the point in time when the upper 95% confidence bound crossed below the WQO was determined. Because this was just one random simulation that may have been anomalous, the process was repeated with 100 sets of randomly simulated data based on the original equation. The entire set of 100 regressions was then evaluated to determine when the upper confidence bound would be below the WQO 95 out of 100 times. This is the number of years of sampling that must occur to be extremely confident that the concentration meets the objective; whereas in determining compliance the actual results are compared to the relevant WQO. The process started with the addition of one more year of sampling and evaluated whether the confidence bound met the criteria, if not, sequential years were added until the upper bound was below the WQO for 95 of the 100 datasets.

This whole process was performed for sampling a) two wet events every year into the future, b) three wet events every five years. Examples of this analysis for constituents with significant and non-significant decreasing and increasing trends are discussed in this document.

Decreasing Trends

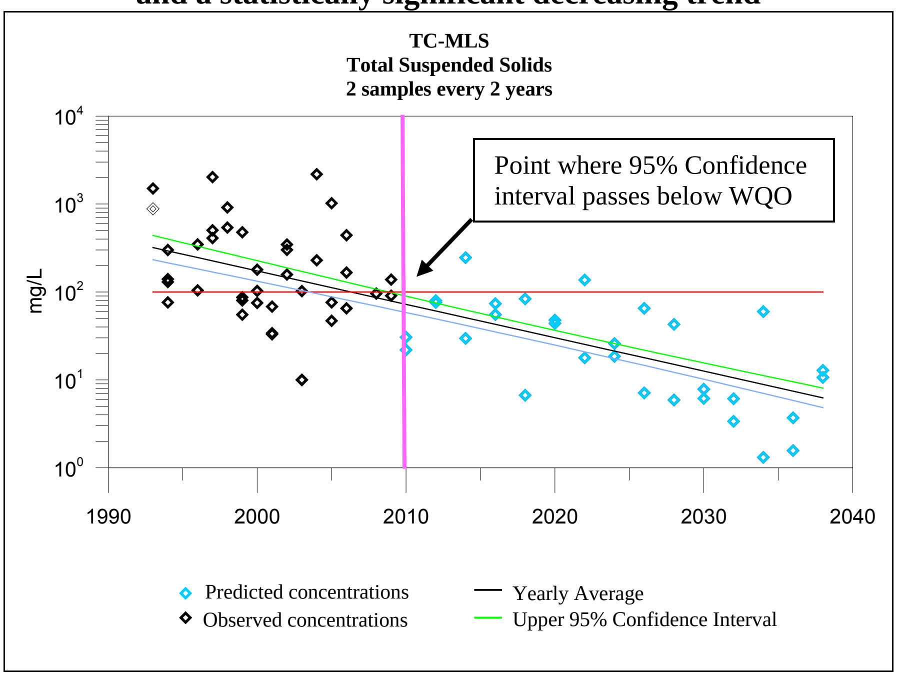
Two constituents with significant decreasing trends (TSS at TC-MLS and TDS at SLR-TDS), along with TSS at CC-SD8(1)-MLS were selected as examples because they have established WQOs that are below the current concentrations and provide cases with differing numbers of existing data points as well as a variety of slopes with decreasing concentrations through time.

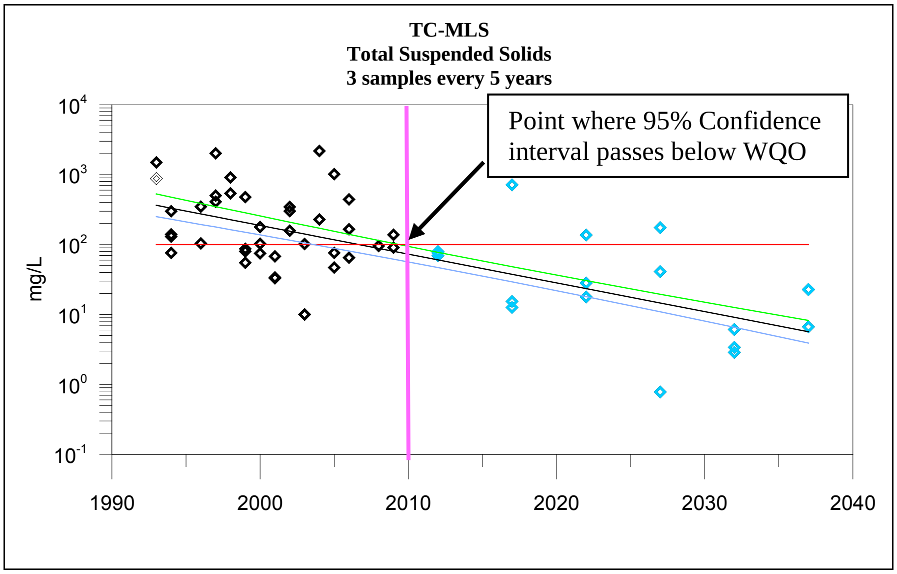
Example constituents include:

1. TSS data from TC-MLS with eight years of existing data and a statistically significant decreasing trend;
2. TDS data from SLR-MLS, with eight years of data and a statistically significant decreasing trend;
3. TSS data from CC-SD8(1)-MLS, with 18 years of existing data and a non-significant decreasing trend.

The plots shown below for each example constituent and frequency of sampling represent one of the randomly generated datasets for which the upper confidence bound crosses the WQO at the point where 95 of the 100 regression lines would be below this line. Vertical lines on the plots indicate the years in which the mean and upper bound cross below the WQO (horizontal line).

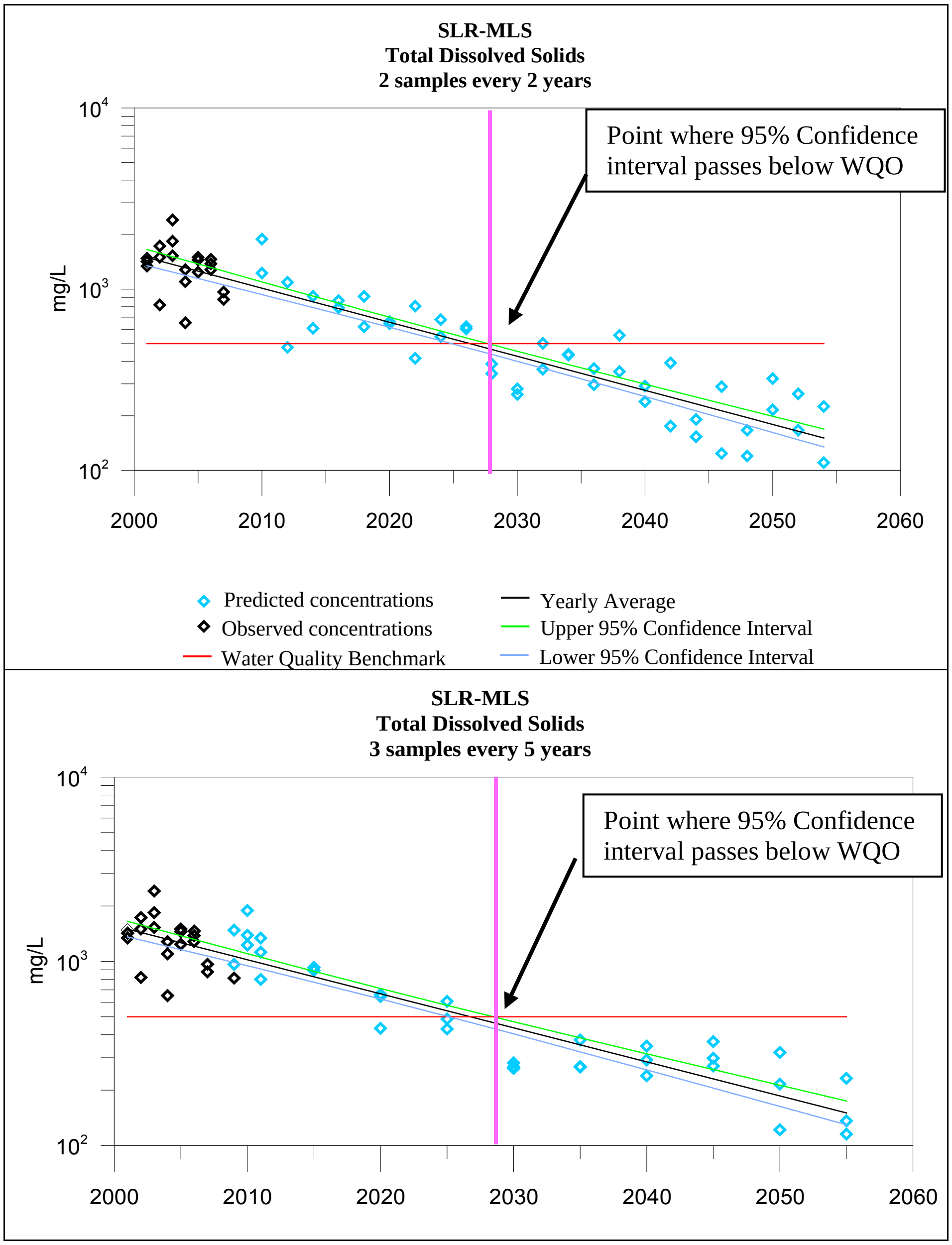
Example 1. Total Suspended Solids data from TC-MLS with eight years of existing data and a statistically significant decreasing trend





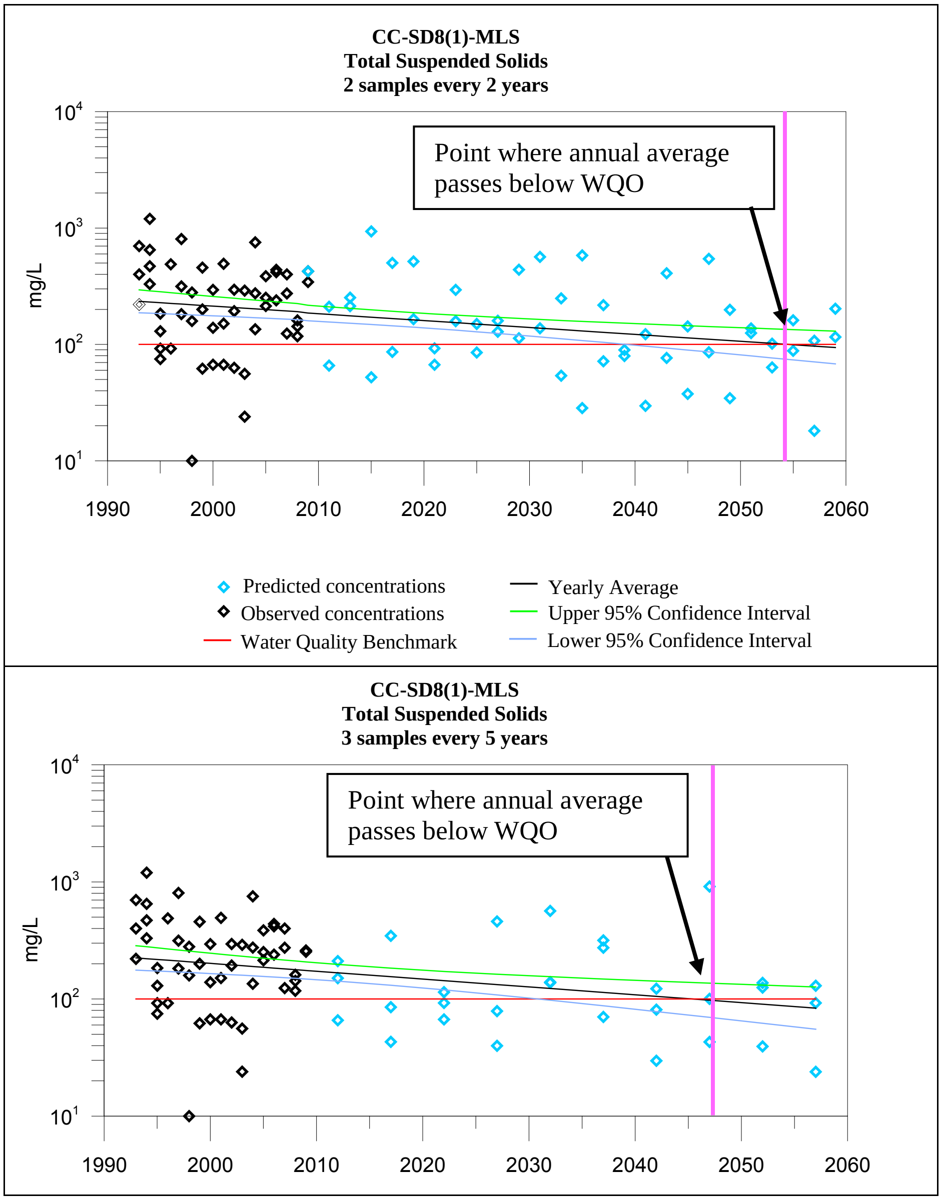
The WQO for TSS is 100 mg/L (shown by horizontal red line). As shown above in Example 1, if sampling during wet weather were to continue at two events every other year, the mean value for TSS would be below the WQO in 2007 and the upper confidence bound would drop below in 2010. The second plot in Example 1 shows the change if sampling was to occur every five years: the mean would also go below the WQO in 2007 and the upper confidence bound would still cross in 2010. In this example, reduction of sampling frequency results in no increase in the number of years necessary to observe when the TSS concentrations will fall below the WQB.

Example 2. Total Dissolved Solids data from SLR-MLS with eight years of existing data and a significant decreasing trend



The WQO for TDS varies dependent on the hydrologic unit, as stated in the San Diego Basin Plan. In San Luis Rey the WQO is 500 mg/L. The trend at SLR-MLS is significantly decreasing, but at a slower rate than TC-MLS. As shown above in Example 2, if sampling during wet weather were to continue at two events every other year, the mean value for TDS would be below the WQO in 2025 and the upper confidence bound would drop below in 2028. The second plot in Example 2 shows the change if sampling was to occur every five years: the mean would go below the WQO in 2026 and the upper confidence bound would cross in 2029. In this example, reduction of sampling frequency results in an approximate one year increase in the number of years necessary to observe when the TDS concentrations will fall below the WQB.

Example 3. Total Suspended Solids data from CC-SD8(1)-MLS with 18 years of existing data and a non-significant decreasing trend



In the CC-SD8(1) example the WQO is 100 mg/L, and because a significant trend is not currently observed, the existing trend line will take a considerable amount of time before the upper 95-percent confident interval passes the WQO. As shown in Example 3, above, although the average result is expected to cross the WQO in 2054 at the two year sampling frequency, and 2047 for the five year frequency, the 95-percent confidence interval is not predicted to fall below the WQO before the next 50 years. This finding is based on the variability of the data. Because the data are highly variable, sampling every two years actually makes it more difficult to predict when the average annual TSS concentrations will fall below the WQO. Therefore, decreasing the sample frequency from every other year to every five years will not decrease the Copermittees' ability to detect a decreasing trend. If the existing slope of the line changes to decrease faster, this scenario would result in less time to detect a trend in either instance.

Increasing Trends

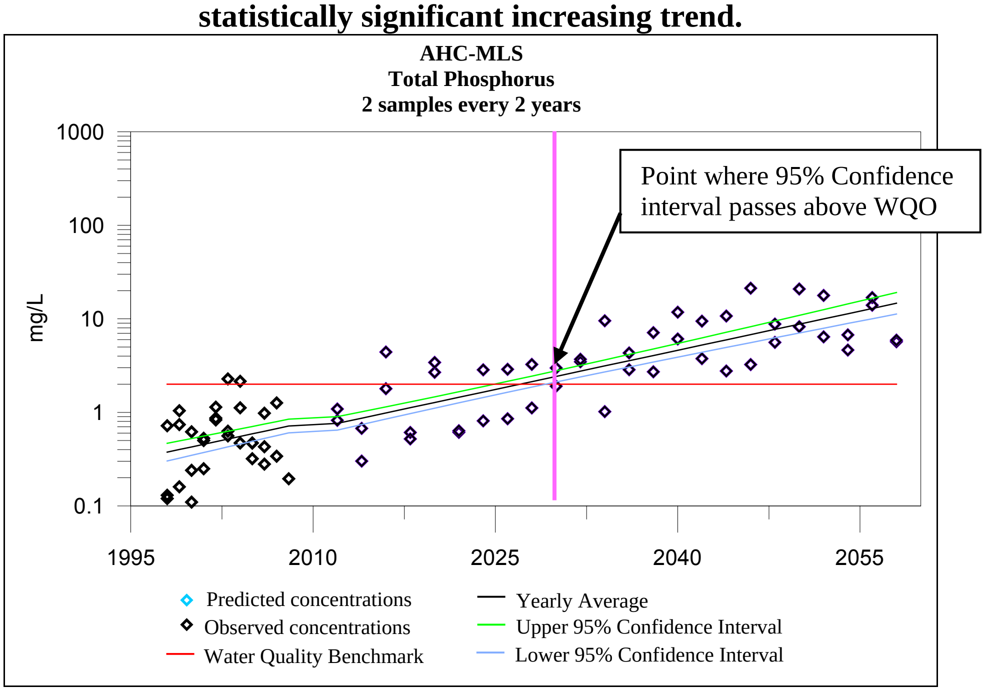
Two constituents with significant increasing trends and one constituent with a non-significant increasing trend were evaluated to determine whether or not a reduction in sampling frequency from two wet events every other year to three wet events every five years would increase the number of years necessary to determine when constituent concentrations will exceed WQOs. As above, both significant and non-significant trends were considered.

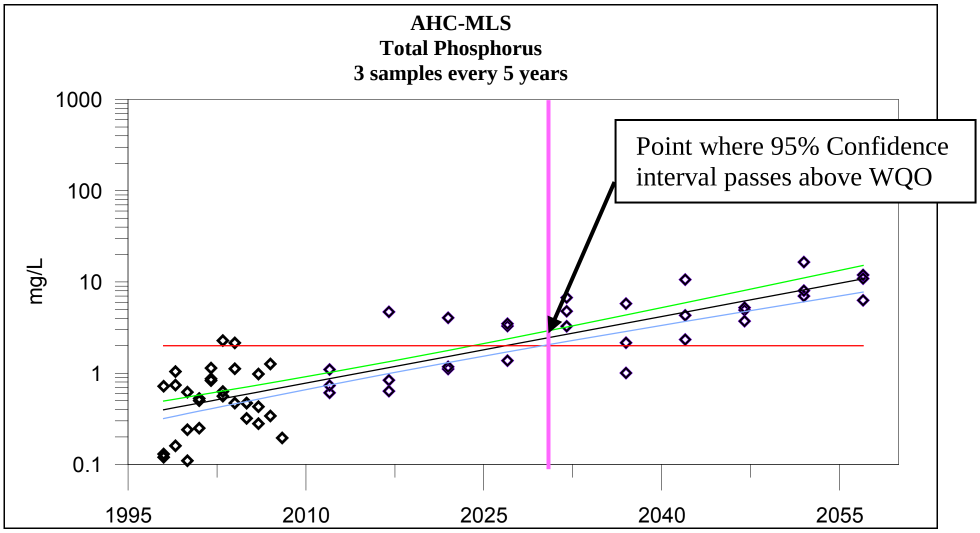
Example constituents include:

4. Total phosphorus data from AHC-MLS with 13 years of existing data and a statistically significant increasing trend;
5. TSS data from TJR-MLS, with eight years of data and a statistically significant increasing trend;
6. TSS data from SDC-MLS, with 8 years of existing data and a non-significant increasing trend.

The plots shown below for each example constituent and frequency of sampling represent one of the randomly generated datasets for which the lower confidence bound crosses the WQO at the point where 95 of the 100 regression lines would be above this line. Vertical lines on the plots indicate the years in which the mean and upper bound cross above the WQO (horizontal line).

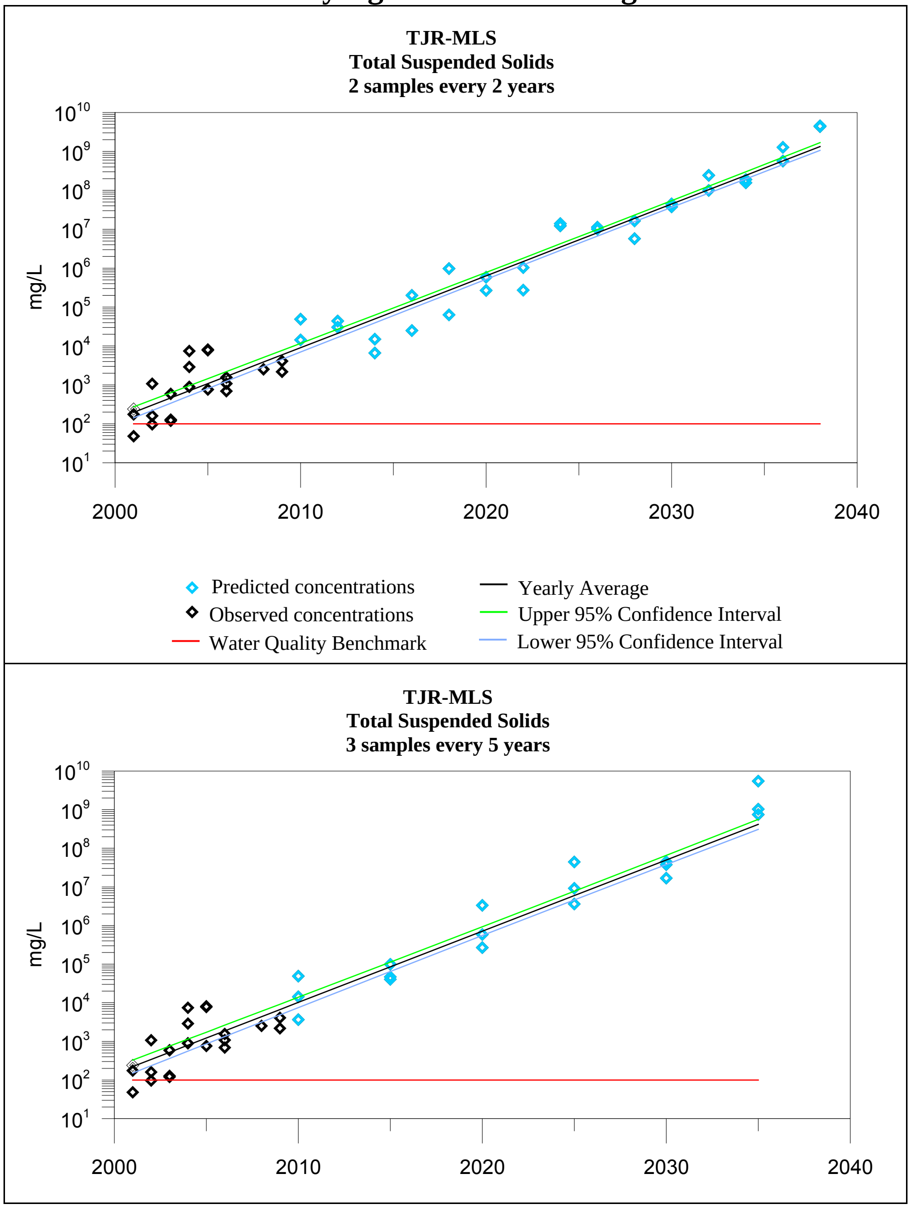
Example 4. Total phosphorus data from AHC-MLS with 13 years of existing data and a statistically significant increasing trend.





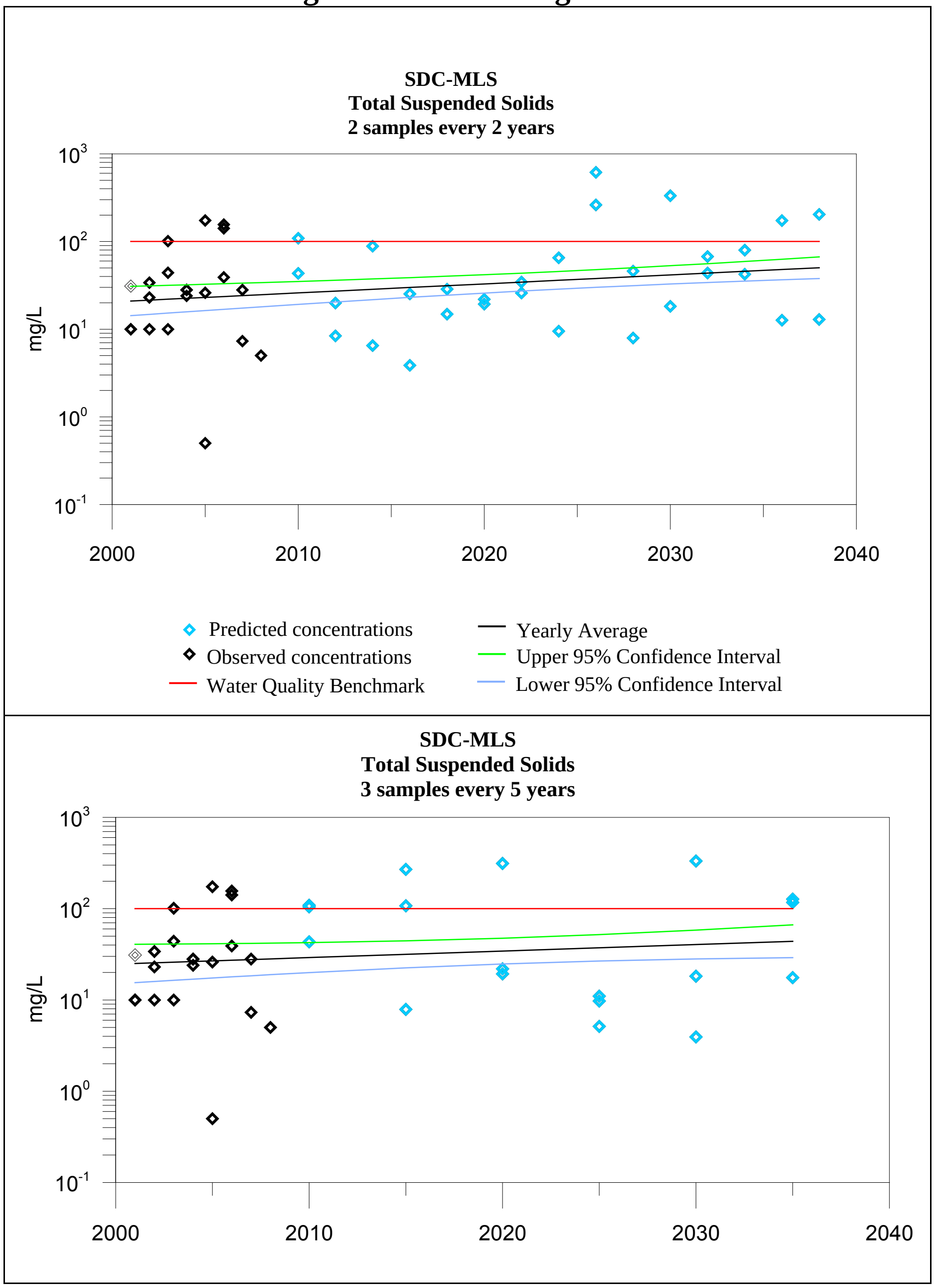
Total phosphorus concentrations at AHC-MLS are currently below WQOs, but are increasing at a slow rate. In Example 4, the simulation results show that a reduction in sample frequency from two wet events every two years to three wet events every five years will not decrease the ability to detect when the total phosphorus concentrations will exceed the WQO. The first plot in Example 4 shows that the year the 95-percent confidence limit will pass the WQO is approximately 2028. In the second plot in Example 4 (3 samples every 5 years) the year that the 95-percent confidence limit for total phosphorus exceeds the WQO is also approximately 2028. Therefore, a reduction in sample frequency from two wet events every two years to three wet events every five years will not decrease the chance of detecting when the total phosphorus concentrations will exceed the WQO.

Example 5. Total suspended solids data from TJR-MLS with 8 years of data and a statistically significant increasing trend.



The steep increasing trend for TSS at TJR-MLS illustrates the finding that if a significant increasing trend is observed, a reduction in sampling frequency will not decrease the ability to detect it. In Example 5, the constituent concentrations are above the WQO and increasing at a rapid pace. Therefore, the reduction in sampling frequency from two wet events every two years to three wet events every five years will not decrease the statistical ability to detect significant trends.

Example 6. Total suspended solids data from SDC-MLS with 8 years of data and a non-significant increasing trend



At SDC-MLS a generally increasing TSS trend is observed (Example 6). This example is included here to illustrate how a reduction in sample frequency will affect the Copermittees' ability to detect significant trends and to determine when TSS concentrations meet or exceed the WQO. Although the current TSS levels are below the WQB, it is possible to predict when TSS concentrations will meet or exceed the WQO using either the current monitoring program (two wet events every two years) or the reduced sampling frequency to three wet events every five years. In this instance, the average annual TSS concentrations are not expected to exceed the WQO within the next 30 years. The lower 95-percent confidence interval does not pass the WQO in this example.

San Diego County Water Authority
4677 Overland Avenue • San Diego, California 92123-1233
(858) 522-6600 FAX (858) 522-6568 www.sdcwa.org

September 13, 2012

Ms. Lori Walsh
San Diego Regional Water Quality Control Board
9174 Sky Park Court
San Diego, CA 92123

RE: Comments on Revised Administrative Draft of Regional MS4 permit

Dear Ms. Walsh:

Thank you for the opportunity to provide comments on the San Diego Water Board's revised administrative draft of the Regional Municipal Separate Storm Sewer System (MS4) permit, Tentative Order No. R9-2012-0011. The San Diego County Water Authority is a regional wholesale water agency within San Diego County, with twenty-four member retail agencies. The Water Authority's mission is to provide a safe and reliable water supply to our member agencies. While our primary mission is the delivery of potable water supplies, recycled water is also an important component of our region's current and projected water supply resources mix. Therefore, the potential impact of the storm water permit requirements on both potable and recycled water supplies is of interest to us. We appreciate your efforts to recognize existing NPDES permits and minimize duplication of effort by regulatory agencies.

We do have the following comments on the permit provisions in E. 2. a.(2), page 55 :

1. The language on illicit discharges of non-storm water from line breaks and water main breaks lacks clarity. Therefore, we are recommending revised wording that will make it clear that any discharge under the NPDES Permit No. CAG 679001 (Order No. R9-2010-003) is exempt from regulation under the storm water permit.

2. We recommend that recycled water or potable water discharges not covered under a separate NPDES permit are illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a source of pollutants to receiving waters. This will avoid the need for regulatory action in response to a recycled water main break or leak which may have no real impact to receiving waters.

Our proposed modifications are shown in the attachment to this letter. Thank you for the opportunity to comment. If you have any questions regarding this letter, please contact Lesley Dobalian at (858) 522-6747.

Sincerely,

Ken Weinberg
Director of Water Resources

Attachment

Attachment

Suggested revisions to Tentative Order No. R9-2012-0011

Section II. E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
a. Non-Storm Water Discharges

Each Copermittee must address all non-storm water discharges as illicit discharges, unless ~~a non-storm water discharge~~it is ~~either identified as a discharge~~ authorized by a separate NPDES permit. Illict~~, or identified as a category of non-storm water~~ discharges or flows are identified ~~that must be addressed~~ pursuant to the following requirements:

(1) Discharges of non-storm water to the MS4 from the following categories must be addressed as illicit discharges unless the discharge has coverage under NPDES Permit No. CAG919001 (Order No. R9-2007-0034, or subsequent order) for discharges to San Diego Bay, or NPDES Permit No. CAG919002 (Order No. R9-2008-0002, or subsequent order) for discharges to surface waters other than San Diego Bay:

(a) Uncontaminated pumped ground water;

(b) Discharges from foundation drains; 3

(c) Water from crawl space pumps; and

(d) Water from footing drains.

~~(2) Discharges of non-storm water from water line flushing and water main breaks to the MS4 must be addressed as illicit discharges unless the discharge has coverage under NPDES Permit No. CAG 679001 (Order No. R9-2010-0003, or subsequent order). This includes water line flushing and water main break discharges from water purveyors issued a water supply permit by the California Department of Public Health or federal military installations. Discharges from recycled or reclaimed water lines to the MS4 must be addressed as illicit discharges, unless the discharges have coverage under a separate NPDES permit.~~

(~~3~~2) Discharges of non-storm water to the MS4 from the following categories must be addressed by the Copermittee as illicit discharges only if the Copermittee or the San Diego Water Board identifies the discharge as a source of pollutants to receiving waters:

(a) Diverted stream flows;

(b) Rising ground waters;

(c) Uncontaminated ground water infiltration to MS4s;

(d) Springs;

(e) Flows from riparian habitats and wetlands;

(f) Discharges from potable water sources

(g) Discharges from water line flushing and water main breaks to the MS4, that are not covered under NPDES Permit No. CAG 679001 (Order No. R9-2010-0003, or subsequent order).

(h) Discharges from recycled or reclaimed water lines to the MS4 that are not covered under a separate NPDES permit.

SAN DIEGO NORTH
Economic Development Council
PROSPERITY ON PURPOSE

San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA. 92123-4340

September 14, 2012

Dear Sir:

We have recently become aware that the SDRWQCB is proposing new regulations related to storm water discharges. Several of the organizations affiliated with the San Diego North Economic Development Council are concerned about the magnitude of the proposed changes. We contacted other potentially affected parties including a culvert manufacturer, a water district, a property developer, and the office of an elected county official. All those contacted did not even know about the proposed regulations.

We believe the effort to publicize the regulations was inadequate and the response period was too short. It is requested that you extend the period for public comment and make additional efforts to publicize the proposed regulations.

As we understand the changes, they involve additional measurement and reporting. We believe that the sources are generally known and additional efforts should be devoted to steps that improve water quality. We appreciate that your efforts may be somewhat controversial and potentially costly, and that is all the more reason to be careful in making these changes.

Sincerely,

Rick Gittings
Interim CEO
San Diego North EDC

Walsh, Laurie@Waterboards

From:	Doug Kot <doug@usgbc-sd.org>
Sent:	Friday, September 14, 2012 4:55 PM
To:	Walsh, Laurie@Waterboards
Cc:	Chiu, Wayne@Waterboards
Subject:	Re: Word document of MS4 permit?
Attachments:	2012-09-14_Regional_MS4_Admin_Draft_Permit_Comment_from_SDGBC_v1.pdf

Laurie,

Please see the attached comments from the U.S Green Building Council - San Diego (dba the San Diego Green Building Council). We are grateful for the opportunity to submit our comments and look forward to participating in the next stages of the process.

Thanks,
Doug

Douglas Kot, AIA, LEED Faculty
Executive Director
San Diego Green Building Council
5010 Shoreham Place
San Diego, CA 92122

doug@usgbc-sd.org
619-944-8607

Our buildings and communities will regenerate and sustain the health and vitality of all life within a generation.

Support Green Building in San Diego

On Tue, Sep 4, 2012 at 12:15 PM, Chiu, Wayne@Waterboards <Wayne.Chiu@waterboards.ca.gov> wrote:

Here you go. Looking forward to seeing your comments.

From: Jill Witkowski [mailto:jill@sdcoastkeeper.org]
Sent: Tuesday, September 04, 2012 11:47 AM
To: Chiu, Wayne@Waterboards; Walsh, Laurie@Waterboards
Cc: Doug Kot; Colin Kelly
Subject: Word document of MS4 permit?

Hi Wayne and Laurie,

Could you please send me a word document of the MS4 permit so we can ideally prepare a redline/strikeout to include with our comments?

Thanks,

Jill

Jill Witkowski

Waterkeeper

San Diego Coastkeeper®

www.sdcoastkeeper.org
2825 Dewey Rd, Suite 200

San Diego, CA 92106
619.758.7743 x119

SAN DIEGO GREEN BUILDING COUNCIL

September 14, 2012

Via e-mail to lwalsh@waterboards.ca.gov
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

RE: Comments from the San Diego Green Building Council on Tentative Order Number: R9-2012-0011

Dear Ms. Walsh,

U.S. Green Building Council San Diego[1] respectfully submits the following comments on the administrative draft of the San Diego Regional Municipal Separate Storm Sewer System permit, Revised Tentative Order No. R9-2012-0011 ("Administrative Draft Permit").

BACKGROUND

The U.S. Green Building Council San Diego is a 501(c)(3) California non-profit corporation with the mission *to inspire, educate and collaborate within our communities to transform our built environment toward true sustainability*. Our support comes from the development, design, construction, facility management and other professional industries related to the built environment. We advocate for development that has reduced environmental impact, which is economically viable and socially responsible.

Water quality is critical to regional sustainability. Stormwater runoff is widely considered to be one of the world's most significant environmental problems. In the San Diego Region, storm drains discharge stormwater directly to our beaches without any treatment. Pollutants in runoff discharges impair receiving waters, threaten or harm the health of humans or aquatic organisms, and impair designated beneficial uses such as swimming at our local beaches. We encourage a science-based 'all-in' approach that incorporates site-based Low Impact Development (LID) strategies, urban infrastructure LID strategies and effective hydromodification management strategies. Our overall response to stormwater strategies in the administrative draft MS-4 can be summarized as: first *avoid*, then *reduce*, and only *delay* as a last resort (from the SUDS Sustainable Urban Drainage Systems program in the UK).

[1] *These comments were prepared with support from our volunteer community, including Rosalind Haselbeck, Ph.D. principal of Building Green Futures.*

COMMENTS

I. The Final Permit should require copermittees to engage stakeholders in developing Water Quality Improvement Plans.

The Administrative Draft Permit provides for public participation in Water Quality Improvement Plans to a single 30 day public review and comment period. The Final Permit should require copermittees to involve stakeholders throughout the Water Quality Improvement Plan development process. The Final permit should include opportunity for additional review periods. The Final Permit should ensure that the public review periods are staggered to encourage greater participation from a variety of stakeholders. The Final Permit should require that copermittees engage interested parties in establishing water quality priorities through the solicitation of water quality monitoring data as well as the establishment of a priority pollutant list. The Final Permit should require a public hearing for the Proposed Water Quality Improvement Plans.

Ongoing Adaptive Management Process should formalize the public participation process and the updates should occur more frequently than every three years.

II. The Final Permit should recognize the EPA's findings that Low Impact Development Best Management Practices are a cost-effective approach to improving water quality and enhancing community.

Implementation of Low Impact Development (LID) strategies provide environmental and economic benefits and reduce negative downstream water quality impacts. In addition other public benefits are associated with LID strategies, such as cleaner air, reduced urban temperatures, increased energy efficiency, and landscape amenities. The Final Permit should include similar language to clarify the environmental and economic benefits of LID Best Management Practices (BMPs) that form the basis of the Regional Board's policy decisions relating to development planning.

The Administrative Draft Permit should clearly define the best in class BMPs and create a system to catalogue the implementation strategies used by the various copermittees. The database should include the measured water quality impacts from each site to be used as a resource for future projects and development.

III. The Final Permit should define "Infeasible" and require developers to investigate a range of feasible projects to determine the greatest water quality benefits.

Allowing Copermittees to develop their own criteria as to what is "technically infeasible" runs the risk of Copermittees bowing to political pressure from special interest and can result in unfair completion for development between copermittees. The intent of the system approach to watershed management must require that all jurisdictions within that watershed have the same criteria for feasible; the Final Permit is the only way to ensure that there is uniform definition of "feasible" and "infeasible".

IV. The Final Permit should consider combining innovative with traditional stormwater mitigation strategies.

Low Impact Development (LID) techniques are typically viewed as small scale interventions that complement traditional detention basins but may not be able to fully meet the hydromodification requirements (peak flow and duration) of Priority Development Projects. Creative use of LID techniques can expand their capacity and effectiveness. For example: rainwater cisterns can provide a dual function with water conservation and stormwater mitigation. The design storm volume can be released from the cistern in response to a weather station at a rate determined by when the storm is expected, or manually by slow release of the pre-determined volume. The cistern can be sized to provide a sizable portion of the irrigation requirements. The design storm volume can be released into a bioretention cell or other landscaped area. Detention basins can serve as the final overflow for underdrains from bioretention cells or bioswales to reduce the peak flow of stormwater runoff. The discharge from the detention basin in this case will have a reduced flow and reduced pollutant load due to pre-treatment.

Air Conditioning (AC) condensate is a great water source for irrigation and can be combined with the LID/stormwater mitigation practice of rainwater capture. The combination of AC condensate and rainwater provides a nearly year-round alternative water source for irrigation or indoor non-potable use. Vehicle wash water should not be discharged except into a landscaped area. Depending on product selection, vehicle wash water may also be diverted into a greywater surge tank for landscape irrigation.

V. The Final Permit should emphasize green municipal infrastructure practices that can mitigate stormwater impacts.

The strategy of “green streets” OR “green infrastructure practice” includes street-side, in-street (traffic circles, median strips), and parking lots. All of these green infrastructure practices share common themes of curb cuts to bioretention cells at a lower elevation than the street. Stormwater is typically infiltrated on site with engineered soil or gravel. Overflow during peak storm events is either directed to the storm drain via an underdrain or infiltrated at a second site nearby.

All of these approaches produce “green swathes” in urban areas which mitigate stormwater and provide aesthetic and community benefits. Finally, the local residents have the opportunity to become “stewards of their watershed”. There are great examples of green streets: Elmer Avenue in Los Angeles (see: http://www.treepeople.org/sun-valley-watershed#Elmer) as well as many examples in the city of Tucson (see: http://www.watershedmg.org/sites/default/files/greenstreets/WMG_GISWNH_1.0.pdf).

Note that doing projects with existing development that are transparent, such as curb cuts that produce green streets, provide an important opportunity for education. Ultimately visible solutions that are aesthetically pleasing can influence individuals and communities toward patterns of more responsible consumption and use of water due to their increased knowledge and experience.

VI. The Final Permit should be applicable to all projects, without regard to minimum size.

The EPA’s construction general permit outlines the provisions necessary to comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program. Currently the permit only applies to construction sites greater than 1 acre (0.4 hectare), we recommend that the requirements are applied to all projects, regardless of size. Information on the EPA construction general permit is available at http://cfpub.epa.gov/npdes/stormwater/cgp.cfm.

CONCLUSION

In conclusion, the U.S. Green Building Council – San Diego appreciates the approach and effort the Regional Board and its staff have put towards developing an MS4 permit for the San Diego Region. We believe that this watershed system approach will better improve the environmental, economic and social impacts associated with current water quality in our region. We look forward to a constructive relationship with the Regional Board.

Respectfully submitted,

Douglas Kot
Executive Director
U.S. Green Building Council - San Diego

SDGE
A Sempra Energy utility®

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September 14, 2012

California Regional Water Quality Control Board
San Diego Region
Ms. Laurie Walsh
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

VIA E-Mail: lwalsh@waterboards.ca.gov

RE: **Comments and Recommendations Regarding the National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region (Tentative Order No. R9-2012-0011, NPDES No. CAS0109266)**

Dear Ms. Walsh and Board Members:

The San Diego Gas & Electric Company (SDG&E) provides transmission and distribution of natural gas and electricity throughout San Diego County and southern Orange County. Delivery of these essential public services requires routine and emergency construction, operation and maintenance of its linear utility infrastructure. A primary mandate to utilities and other entities with linear facilities regulated by the California Public Utilities Commission and/ or other state and federal regulatory agencies is to provide safe and reliable service. The above-referenced draft MS4 permit (draft Permit) would impact SDG&E facilities in our service territory, which is located primarily within Region 9.

Our primary concern with the draft Permit is that in certain respects it contains language that is not consistent with the General Construction Permit (NPDES NO. CAS000002 ORDER NO. 2009-0009-DWQ), EPA regulations nor the State Water Board's March 2012 "Exceptions to the Ocean Plan for Discharges to Areas of Biological Significance" findings. As written, the draft Permit would detrimentally impact the construction, maintenance and operations of our linear facilities. Our comments and recommended revisions to the draft Permit on specific issues are provided below.

Illicit Discharges vs. Non-Storm Water Discharges

The draft Permit appears to use the terms "illicit discharges" and "non-storm water discharges" interchangeably throughout the draft Permit. These terms have different meanings and cannot be used interchangeably. The draft Permit's definition of illicit discharges excludes discharges subject to NPDES permits and discharges resulting from firefighting activities. That is, non-storm water discharges made pursuant to NPDES permits and discharges resulting from firefighting activities are **not** illicit discharges.

However, Finding 7 of the draft Permit states:

> The federal regulations [40 CFR 122.26(d)(2)(iv)(B)] require the Copermittees to have a program to prevent all types of non-storm water discharges, ***or illicit discharges***, from entering the MS4. [***emphasis added.***]

This finding appears to equate non-storm water discharges and illicit discharges and, as such, it is inconsistent with federal regulations [40cfr122.26(d)(2)(iv)(b)], which requires that the Copermittees have a program to:

> "...detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) ***illicit discharges*** and improper disposal into the storm sewer." [***emphasis added.***]

So under federal regulation, the Copermittees's program must address illicit discharges (which do not include discharges made pursuant to NPDES permits and discharges resulting from firefighting activities) as opposed to "all types of non-storm water discharges" as stated in Finding 7.

This confusion is exacerbated by the draft Permit's definition of "non-stormwater discharges," which states:

> All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges ***and NPDES permitted discharges***. [***emphasis added.***]

Including "NPDES permitted discharges" in the definition of "non-stormwater" leads to the incorrect conclusion that, because the draft Permit prohibits discharges of non-stormwater to MS4s, NPDES permitted discharges are also prohibited. **We urge the RWQCB to revise the draft Permit to eliminate this confusion.**

<u>"Source of Pollutants" vs. "Significant Source of Pollutants"</u>

The draft Permit is inconsistent with EPA regulations regarding the standard for when certain categories of illicit discharges need to be addressed. Finding 7 of the draft Permit states:

> The federal regulations [40 CFR 122.26(d)(2)(iv)(B)] require the Copermittees to have a program to prevent all types of non-storm water discharges, or illicit discharges, from entering the MS4. The federal regulations, however, allow for specific categories of non-storm water discharges or flows to be addressed as illicit discharges only where such discharges are identified as ***sources of pollutants*** to waters of the U.S. [***emphasis added.***]

The quoted federal regulation requires the Copermittees to address the listed illicit discharges when they are found to be a "significant source" of pollutants; however the draft Permit finding states this is required when the MS4 finds the discharge to be a "source" of pollutants. **We urge the RWQCB to revise this language (and Section E.2.a.3, E.2.a.6 and any other section based on 40 CFR 122.26(d)(2)(iv)(B)) to be consistent with the federal regulations.**

<u>Discharges to Areas of Special Biological Significance</u>

The draft Permit should clarify that non-storm water discharges (e.g., potable hydrotest dewatering, groundwater dewatering discharges, etc.) made pursuant to NPDES permits to MS4 systems that discharge to Areas of Special Biological Significance (ASBS) are authorized. These types of discharges are critical to on-going infrastructure development, maintenance and operation and the State Water Board's March 2012 "Exceptions to the Ocean Plan for Discharges to Areas of Biological Significance" provides that the NPDES permitting authority can authorize these discharges to ASBS by making an appropriate finding in the applicable MS4 permit. **We urge the RWQCB to include the following language as part of Finding 30:**

> "The ASBS exception authorizes the discharge of non-stormwater to a MS4 when an NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS. Since NPDES permits for non-stormwater discharges contain conditions and requirements to protect water quality and many of these permits are for short-term and/ or intermittent discharges

(e.g., discharges from underground utility substructures, construction groundwater dewatering, and hydrostatic test water), the RWQCB authorizes their discharge to MS4 systems that discharge to ASBS."

Further, Section 2.I.A.1.e. in Attachment A (non-storm water discharges to MS4s that discharge to ASBS) is missing language that was included in the adopted exception. **We urge the RWQCB to revise Section 2.I.A.1.e. in Attachment A (non-storm water discharges to MS4s that discharge to ASBS) to be consistent with the language adopted into the ASBS exception, as follows:**

e. Non-storm water discharges are prohibited except as provided below:

(1) The term "non-storm water discharges" means any waste discharges from a Municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.

(2)(i) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:

(a) Discharges associated with emergency fire fighting operations.
(b) Foundation and footing drains.
(c) Water from crawl space or basement pumps.
(d) Hillside dewatering.
(e) Naturally occurring groundwater seepage via a storm drain.
(f) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(ii) An NPDES permitting authority may authorize non-storm water discharges to an MS4 with a direct discharge to an ASBS only to the extent the NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

<u>Non-stormwater Action Levels</u>

The draft Permit should not subject non-stormwater discharges made pursuant to NPDES permits to action levels. Section II.C.1. would subject non-stormwater discharges to action levels. However, non-stormwater discharges that have NPDES permits are subject to their own discharge requirements. Setting additional, perhaps conflicting, requirements on these discharges is unnecessary and may lead to confusion. **We therefore urge the RWQCB to revise the draft Permit to clarify that the proposed non-stormwater action levels are not applicable to non-stormwater discharges that have NPDES permits.**

<u>Development Planning</u>

The draft Permit should not subject linear underground/ overhead (utility) projects (or LUPs) to permanent post-construction requirements. Section E.3. requires permanent BMP for all development projects. Construction of LUPs are regulated pursuant to the State Water Board's Stormwater Construction General Permit (CGP). Finding 76 in the CGP specifically excludes LUPs from permanent post-construction requirements due the nature of their construction. For consistency with the CGP, this draft Permit needs to be revised to clarify that Section E.3. is not applicable to LUPs (including associated unpaved roads) as defined in the CGP. **We urge the RWQCB to make this revision.**

BMP Operation and Maintenance for Roads

Section E.5.c.4.b. requires the Copermittees to "…implement procedures during the operation and maintenance of public streets, unpaved roads, paved roads, and paved highways and freeways…". In order to be consistent with 40 CFR 122.26.d.iv.2.A.3., this section needs to clarify that these requirements are not applicable to private roads. This same issue was addressed during the adoption process for the MS4 permit for southern Riverside County (Order R9-2010-0016) and the language was revised to clarify that these requirements were applicable only to Copermittee maintained roads. **We urge the RWQCB to revise this language to be consistent with Order R9-2010-0016 and 40 CFR 122.26.d.iv.2.A.3., and state that the requirements are applicable only to public Copermittee maintained roads.**

Please call Fred Jacobsen at 858-637-3723 if you have any questions regarding our comments.

Thank you for this opportunity to provide you with our comments.

Sincerely,

Susan M Hector

Susan M. Hector
Environmental Programs Manager

Walsh, Laurie@Waterboards

From:	Yancey-York, Crystal <CYancey-York@semprautilities.com>
Sent:	Friday, September 14, 2012 1:41 PM
To:	Walsh, Laurie@Waterboards
Cc:	Franks, Dianne; Kwan, Karen W.
Subject:	Comments and Recommendations on Tentative Order No. R9-2012-0011, NPDES No. CAS0109266
Attachments:	SCG Comments 9-2012.pdf

Ms. Walsh,

Attached please find the Southern California Gas Company's comments and recommendations regarding Tentative Order No. R9-2012-0011, NPDES No. CAS0109266. If you have any questions please feel free to contact me.

Thank you,

Crystal Yancey-York
Southern California Gas Co.
Env. Programs Manager
213-244-5819
Cell: 714-222-9642

Southern California Gas Company

A Sempra Energy utility®

Southern California Gas Company
555 W. Fifth Street, ML GT17E2
Los Angeles, CA 90013-1036

September 14, 2012

California Regional Water Quality Control Board
San Diego Region
Ms. Laurie Walsh
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

VIA E-Mail: lwalsh@waterboards.ca.gov

RE: Comments and Recommendations Regarding the National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region (Tentative Order No. R9-2012-0011, NPDES NO. CAS0109266)

Dear Ms. Walsh and Board Members:

Southern California Gas Company (SoCalGas) provides essential public services to over 20 million consumers and utility rate payers in a total service area of over 20,000 square miles. We also provide these services to governmental agencies and other entities, which in turn, provide fire protection, law enforcement, and emergency care (e.g., hospitals) to communities.

The above-referenced draft MS4 permit (draft Permit) would impact SoCalGas facilities in our service territory, which includes areas of Region 9. Our primary concern with the draft Permit is that in certain respects it contains language that is not consistent with the General Construction Permit (NPDES NO. CAS000002 ORDER NO. 2009-0009-DWQ), Environmental Protection Agency (EPA) regulations nor the State Water Resources Control Board's March 2012 "Exceptions to the Ocean Plan for Discharges to Areas of Biological Significance" findings. As written, the draft Permit would detrimentally impact the construction, maintenance and operations of our linear facilities. Our comments and recommended revisions to the draft Permit on specific issues are provided below.

<u>Illicit Discharges vs. Non-Storm Water Discharges</u>

The draft Permit appears to use the terms "illicit discharges" and "non-storm water discharges" interchangeably throughout the draft Permit. These terms have different meanings and cannot be used interchangeably.

The draft Permit's definition of illicit discharges excludes discharges subject to NPDES permits and discharges resulting from firefighting activities. That is, non-storm water discharges made pursuant to NPDES permits and discharges resulting from firefighting activities are <u>not</u> illicit discharges.

However, Finding 7 of the draft Permit states:

> The federal regulations [40 CFR 122.26(d)(2)(iv)(B)] require the Copermittees to have a program to prevent all types of non-storm water discharges, ***or illicit discharges***, from entering the MS4. [***Emphasis added.***]

This finding appears to equate non-storm water discharges and illicit discharges and, as such, it is inconsistent with federal regulations [40 CFR 122.26(d)(2)(iv)(b)], which requires that the Copermittees have a program to:

> "...detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) ***illicit discharges*** and improper disposal into the storm sewer." [***Emphasis added.***]

So under federal regulation, the Copermittees's program must address illicit discharges (which do not include discharges made pursuant to NPDES permits and discharges resulting from firefighting activities) as opposed to "all types of non-storm water discharges" as stated in Finding 7.

This confusion is exacerbated by the draft Permit's definition of "non-stormwater discharges," as:

> All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges *and NPDES permitted discharges*. [*Emphasis added.*]

Including "NPDES permitted discharges" in the definition of "non-stormwater" leads to the incorrect conclusion that, because the draft Permit prohibits discharges of non-stormwater to MS4s, NPDES permitted discharges are also prohibited.

We urge the Regional Water Quality Control Board (RWQCB) to revise the draft Permit to eliminate this confusion.

"Source of Pollutants" vs. "Significant Source of Pollutants"

The draft Permit is inconsistent with EPA regulations regarding the standard for when certain categories of illicit discharges need to be addressed.

Finding 7 of the draft Permit states:

> The federal regulations [40 CFR 122.26(d)(2)(iv)(B)] require the Copermittees to have a program to prevent all types of non-storm water discharges, or illicit discharges, from entering the MS4. The federal regulations, however, allow for specific categories of non-storm water discharges or flows to be addressed as illicit discharges only where such discharges are identified as ***sources of pollutants*** to waters of the U.S. [***Emphasis added.***]

The quoted federal regulation requires the Copermittees to address the listed illicit discharges when they are found to be a "significant source" of pollutants; however the draft Permit finding states this is required when the MS4 finds the discharge to be a "source" of pollutants.

We urge the RWQCB to revise this language (and Section E.2.a.3, E.2.a.6 and any other section based on 40 CFR 122.26(d)(2)(iv)(B)) to be consistent with the federal regulations.

Discharges to Areas of Special Biological Significance

The draft Permit should clarify that non-storm water discharges (e.g., potable hydrotest dewatering, groundwater dewatering discharges, etc.) made pursuant to NPDES permits to MS4 systems that discharge to Areas of Special Biological Significance (ASBS) are authorized. These types of discharges are critical to on-going infrastructure development, maintenance and operation and the State Water Resources Control Board's March 2012 "Exceptions to the Ocean Plan for Discharges to Areas of Biological Significance" provides that the NPDES permitting authority can authorize these discharges to ASBS by making an appropriate finding in the applicable MS4 permit.

We urge the RWQCB to include the following language as part of Finding 30:

> "The ASBS exception authorizes the discharge of non-stormwater to a MS4 when an NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS. Since NPDES permits for non-stormwater discharges contain conditions and requirements to protect water quality and many of these permits are for short-term and/ or intermittent discharges (e.g., discharges from underground utility substructures, construction groundwater dewatering, and hydrostatic test water), the RWQCB authorizes their discharge to MS4 systems that discharge to ASBS."

Further, Section 2.I.A.1.e. in Attachment A (non-storm water discharges to MS4s that discharge to ASBS) is missing language that was included in the adopted exception.

We urge the RWQCB to revise Section 2.I.A.1.e. in Attachment A (non-storm water discharges to MS4s that discharge to ASBS) to be consistent with the language adopted into the ASBS exception, as follows:

e. Non-storm water discharges are prohibited except as provided below:

(1) The term "non-storm water discharges" means any waste discharges from a Municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.

(2)(i) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:

(a) Discharges associated with emergency fire fighting operations.
(b) Foundation and footing drains.
(c) Water from crawl space or basement pumps.
(d) Hillside dewatering.
(e) Naturally occurring groundwater seepage via a storm drain.
(f) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(ii) An NPDES permitting authority may authorize non-storm water discharges to an MS4 with a direct discharge to an ASBS only to the extent the NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

<u>Non-stormwater Action Levels</u>

The draft Permit should not subject non-stormwater discharges made pursuant to NPDES permits to action levels. Section II.C.1. would subject non-stormwater discharges to action levels. However, non-stormwater discharges that have NPDES permits are subject to their own discharge requirements. Setting additional, perhaps conflicting, requirements on these discharges is unnecessary and may lead to confusion.

We therefore urge the RWQCB to revise the draft Permit to clarify that the proposed non-stormwater action levels are not applicable to non-stormwater discharges that have NPDES permits.

Development Planning

The draft Permit should not subject linear underground/ overhead (utility) projects (or LUPs) to permanent post-construction requirements. Section E.3. requires permanent BMP for all development projects. Construction of LUPs are regulated pursuant to the State Water Board's Stormwater Construction General Permit (CGP). Finding 76 in the CGP specifically excludes LUPs from permanent post-construction requirements due the nature of their construction. For consistency with the CGP, this draft Permit needs to be revised to clarify that Section E.3. is not applicable to LUPs (including associated unpaved roads) as defined in the CGP.

We urge the RWQCB to make this revision.

BMP Operation and Maintenance for Roads

Section E.5.c.4.b. requires the Copermittees to implement procedures during the operation and maintenance of public streets, unpaved roads, paved roads, and paved highways and freeways...". In order to be consistent with 40 CFR 122.26.d.iv.2.A.3., this section needs to clarify that these requirements are not applicable to private roads. This same issue was addressed during the adoption process for the MS4 permit for southern Riverside County (Order R9-2010-0016) and the language was revised to clarify that these requirements were applicable only to Copermittee maintained roads.

We urge the RWQCB to revise this language to be consistent with Order R9-2010-0016 and 40 CFR 122.26.d.iv.2.A.3., and state that the requirements are applicable only to public Copermittee maintained roads.

Thank you for this opportunity to provide you with our comments.

Sincerely,

Crystal Yancey-York

Crystal Yancey-York
Southern California Gas Company
Environmental Manager

Walsh, Laurie@Waterboards

From: michael beanan <conxtns@hotmail.com>
Sent: Friday, September 14, 2012 10:49 AM
To: Walsh, Laurie@Waterboards
Subject: MS4 Focus Comments
Attachments: MS4 Focused Mtg Comments.docx

Laurie,

Please find attached Supplemental Comments to the Draft MS4 Permit. The South Laguna Civic Association is a co-signatory to Coastkeeper's extensive comment letter. My supplemental comments are in addition to highlight specific issues in the Aliso Watershed and, due to time constraints, are presented as my personal input since the SLCA Board did not have an opportunity to review these remarks for revisions.

SDRWQCB routinely encourages open dialogue and promote a variety of opportunities to provide feedback and recommendations. I appreciate this willingness to understand different perspectives and allow input from NGOs as well as individuals.

We will look forward to your efforts to integrate our comments into the next Draft MS4 Permit.

Mike

September 13, 2012

Laurie Walsh
San Diego Regional Water Quality Control Board

RE: Supplemental Comments
Administrative Draft of Tentative Order No. R9-2012-0011, NPDES No. CAS0109266
Municipal Separate Storm Sewer Systems (MS4s)
Draining the Watersheds within the San Diego Region

Thank you for your staff efforts to incorporate input from key stakeholder groups in drafting a new regional MS4 Permit. As follow-up to the series of MS4 Focused Meetings, please review supplemental comments consistent with the format of "Concept Summaries" as discussed at the Wednesday, September 5, 2012 Workshop.

1. Public Review / Transparency

   All Co-permitees must recognize the San Diego Region is a coastal ecosystem with each member sharing equally in the water quality impacts to coastal receiving waters. Co-permitees should indicate how each project reduces impacts to specifically improve coastal receiving waters. California has established the highest protection for shellfish habitat and a clear appreciation for impacts to fisheries and public health along the coast must be acknowledged by Co-permitees. Public review is contingent upon access to useful information. Intricate mathematical models for pollutant loads, duplicating monitoring reports buried among websites and technical data do little to inform the public discussion.

   More useful will be urban runoff maps color coded to identify known point sources culminating in coastal plume maps. Correlating thermal maps, chlorophyll maps, algae blooms and water column data will reveal the size and migratory behavior of urban runoff plumes impacting coastal receiving waters. Integrating coastal currents, counter currents and ocean upwelling dynamics can educate while evaluating progress in reducing these contaminated plumes. Scripps, SCCRP, UC Irvine and other research agencies have the capacity to develop and manage plume maps. How does the coastal plume interact with established whale migration routes and foraging grounds protected by various State and Federal regulations?

Whale migrating route only 300 yards off of South Laguna at Thousand Steps Beach

To encourage public participation, a picture can be worth more than a thousand words (or charts).

2. Adaptive Management Approach

   Adaptive management requires greater clarification. Some apply the concept to justify last minute changes or random adjustments to the operations of a project. Within this context, "adaptive management" spawns chaos and confusion to defeat coordinated progress. Any measure to adapt a given plan should occur in a well scheduled fashion following careful consideration to avoid erratic project management. When an adaptive measure is required, public transparency requires an opportunity to comment to support, challenge or provide an alternative to the new proposed management decision.

3. Prohibition Provision A

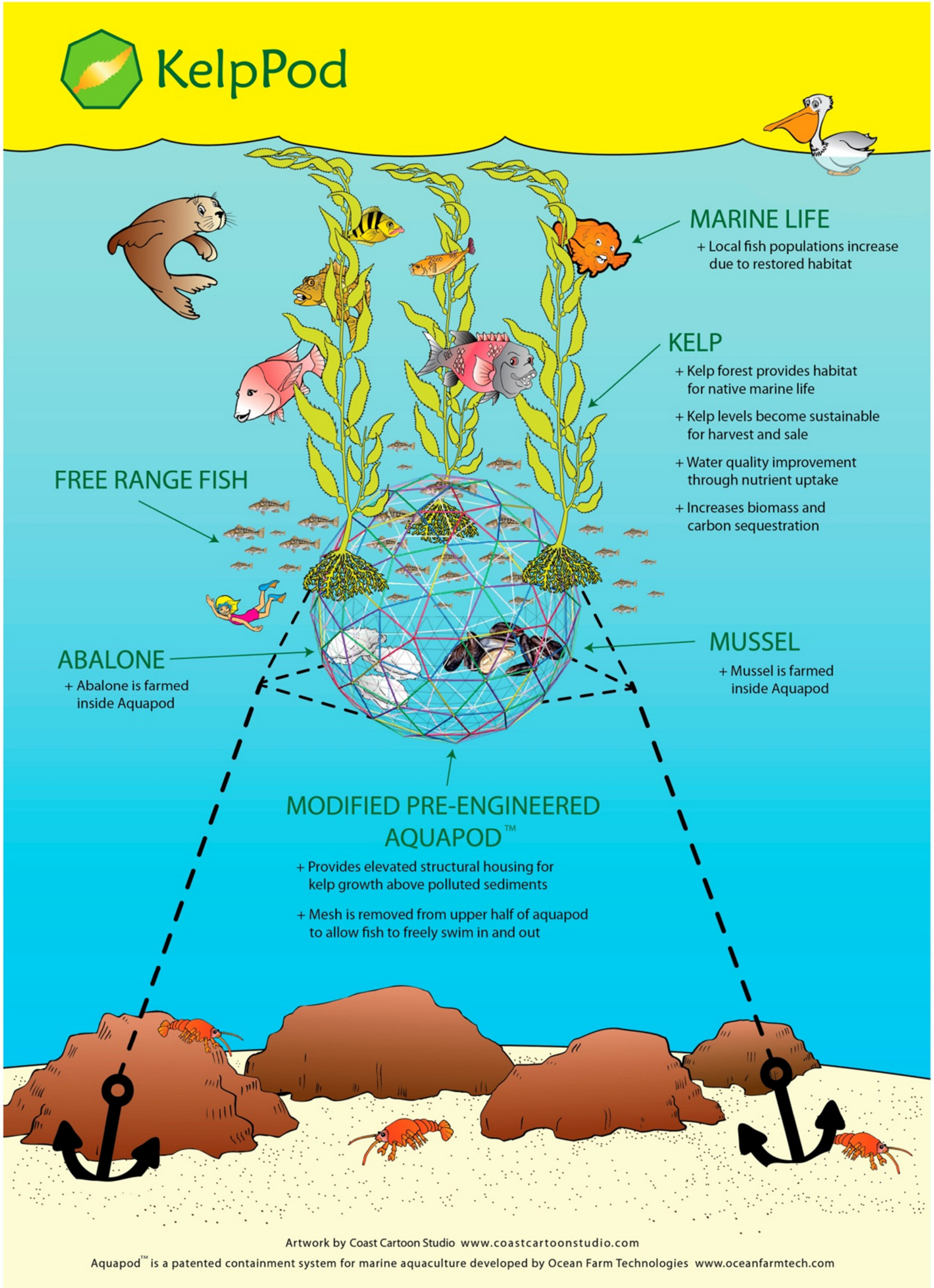
   The Clean Water Act did not contemplate the irresponsible waste of recycled water carelessly discharged into creek and coastal receiving waters. Clean Water Act, Section 402: National Pollutant Discharge Elimination System, Section (O) Anti-backsliding provisions prohibit the sequential increases of non-storm urban runoff accompanying developments over the past 20 years. Shifting baselines away from natural creek flow rates in a semi-arid ecology mask the incremental degradation of watersheds and coastal receiving waters. The absence of effective enforcement actions over the previous permit period allows known inland storm drain point sources among Co-permitees to continue illicit discharges. Without effective enforcement and Clean-up and Abatement Orders, Co-permitees have little incentive to allocate resources for complete, effective prohibition measures to eliminate non-storm water discharges into protected coastal receiving waters.

4. NALs and SALs
   No comment

5. Monitoring (and Mitigation)

   Please see comments above in Item 1. Monitoring should produce useful data and timely enforcement action to abate non-storm water discharges. Clear graphics and maps charting point sources and impact areas can improve public education and increase awareness among all Co-permitees as to their cumulative impacts. Third party information provides photographic evidence and data to highlight success and shortcomings.

   Monitoring can also include Fish Aggregation Devices (FADs) such as modified “Aquapods” anchored offshore to metabolize excess nutrients discharged from impaired creeks into coastal receiving waters. While full abatement of non-storm water flows is the goal, FADs can function as underwater wetland recovery systems to reduce the accumulation of targeted constituents in coastal waters.


KelpPod
MARINE LIFE
+ Local fish populations increase due to restored habitat
KELP
+ Kelp forest provides habitat for native marine life
+ Kelp levels become sustainable for harvest and sale
+ Water quality improvement through nutrient uptake
+ Increases biomass and carbon sequestration
FREE RANGE FISH
ABALONE
+ Abalone is farmed inside Aquapod
MUSSEL
+ Mussel is farmed inside Aquapod
MODIFIED PRE-ENGINEERED AQUAPOD™
+ Provides elevated structural housing for kelp growth above polluted sediments
+ Mesh is removed from upper half of aquapod to allow fish to freely swim in and out
Artwork by Coast Cartoon Studio www.coastcartoonstudio.com
Aquapod™ is a patented containment system for marine aquaculture developed by Ocean Farm Technologies www.oceanfarmtech.com

6. LID/Hydromod Design Requirements

   Low Impact Development and Re-Development/Hydro Mod Requirements seem to suffer from a lack of imagination and familiarity with alternatives among developers and Co-permitees. One potential consideration is an aggressive stormwater capture program converting playing fields, parking lots, streets and canyons along the urban interface to capture stormwater and non-stormwater flows for multiple beneficial reuse opportunities. Street cisterns can effectively capture and retain millions of gallons for irrigation and other purposes. The San Diego Region is routinely threatened with wildfires where storm water capture systems and lined wells can retain water for fire suppression or other emergency purposes while protecting downstream creek and coastal ecosystems.

   Monetizing storm water capture volumes and other “new water” resources over a 30 year facility life cycle can yield revenues capable of covering construction and maintenance costs while effectively protecting ecosystems. An accounting of local natural water resources and its monetized equivalency over time against the cost of imported water will motivate innovations to responsibly manage this precious resource. The value of captured water in a regional disaster is priceless and some project costs might be eligible for FEMA disaster preparedness grants.

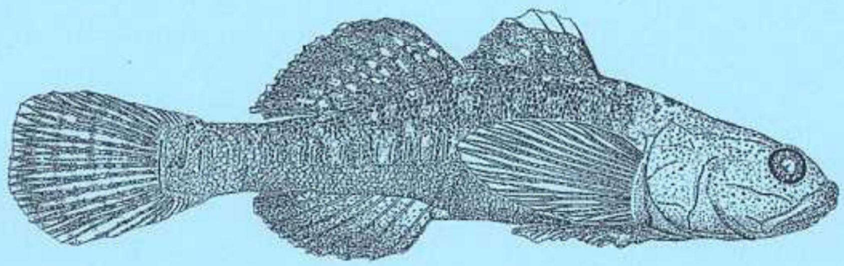
7. Existing Development Requirements

   Existing developments continue to violate current MS4 requirements. Non-storm water flows flood the Aliso Estuary and Aliso Beach on a daily basis to breach the beach sand berm – a naturally occurring coastal landform functioning to protect coastal water quality. Monthly monitoring reports reveal creek flow rates during January’s winter to be the same as summer flows in July.

U.S. Fish & Wildlife Service

Draft Recovery Plan for the Tidewater Goby

(Eucyclogobius newberryi)



Estuarine restoration for Tidewater Goby at Aliso Beach (a Federal, State, County and local priority) cannot proceed with elevated non storm water flows flooding the coast. Inspections without effective enforcement allow the Co-permitees to continue to pollute without significant consequences or fines. However, inspections followed by prompt enforcement motivate Co-permitees to direct financial resources in achieving compliance while avoiding fines.

8. Timing of Deliverables

   Due to the vast distances in the San Diego Region, consider webcast participation in workshops as modeled during the recent Marine Life Protection Act public participation process. Clear graphics, maps and charts displayed on-line can facilitate communication and focus discussion on known problem areas.

The health of our community and visitors to the coast depend upon responsible action by Co-permitees to effectively prohibit non-storm water discharges and mitigate elevated flows from poorly engineered developments. All Co-permitees as well as major developers promote their proximity to beach and coastal recreational opportunities. Their residents frequent the local beaches where their health and well-being remain imperiled by non-storm water urban runoff contaminates. As time goes on, many will wonder why we have allowed water to become a problem rather than a resource.

Clear regulations and prompt enforcement effectively prohibit a variety of behaviors from cell phone use while driving to smoking in public places in an effort to protect public health and safety. As an impacted community, the South Laguna Civic Association appreciates the efforts of staff to design and implement MS4 regulations yielding measurable improvements to regional water quality.

Michael Beanan
South Laguna

mike@southlaguna.org

Walsh, Laurie@Waterboards

From: Arne Anselm <Arne.Anselm@ventura.org>
Sent: Monday, September 17, 2012 2:36 PM
To: Walsh, Laurie@Waterboards
Subject: Draft San Diego Stormwater Permit
Attachments: San Diego Reg Permit_Admin Draft 9.17.12_1.pdf

Please find attached comments from Ventura County Watershed Protection District on the Draft San Diego Stormwater Permit.

Arne Anselm
Water Quality Manager
Ventura County Watershed Protection District
805.654.3942
www.vcstormwater.org

Ventura County Watershed Protection District

PUBLIC WORKS AGENCY
JEFF PRATT
Agency Director

Tully Clifford, Director
Watershed Protection District

Gerhardt Hubner
Water/Environmental Resources

Karl Novak
Operations/Maintenance

Peter Sheydayi
Design/Construction

Sergio Vargas
Planning/Regulatory

September 17, 2012

Laurie Walsh
California Regional Water Quality Control Board (via email)
9174 Sky Park Court, Suite 100
San Diego, CA 92123

SUBJECT: ADMINISTRATIVE DRAFT, SAN DIEGO REGIONAL MS4 PERMIT, TENTATIVE ORDER 2012-0011

Ms. Walsh:

As the Principal Permittee of the Ventura Countywide Stormwater Quality Management Program responsible for stormwater monitoring, we have concerns regarding the draft San Diego Region Municipal Separate Storm Sewer Systems (MS4) NPDES Permit, released as an administrative draft by the San Diego Regional Water Quality Control Board (Regional Water Board) as Tentative Order No. R9-2012-0011 (NPDES NO. CAS0109266). We share the same concerns of the San Diego County Stormwater Copermittees that the monitoring and assessment program, as contained in the administrative draft order, would require excessive expenditures of monitoring funds without clear benefits to the implementation of the stormwater management program.

In particular, we support the concept of the draft Monitoring and Assessment component (permit Provision II.D) provided by the San Diego Copermittees which is highly compatible with the SMC's Model Monitoring Program and the state's SWAMP Assessment Framework. This alternative provides several strong advantages, including:

- An emphasis on monitoring, based upon a question-driven approach
- A framework for designing monitoring programs to effectively support adaptive management within watershed management areas
- A clear and important role for source identification studies to address priority constituents
- A defined process to focus monitoring and assessment resources on activities most likely to provide useful information that will result in reduction of pollutants from MS4s

The Copermittees' alternative represents an important step in the evolution of stormwater monitoring to better address high-priority water quality problems, and provide stormwater managers with more useful information to improve stormwater management program effectiveness. We strongly encourage the Regional Water Board to adopt the concepts presented in San Diego Copermittees' Alternative Provision D.

Sincerely,

Gerhardt Hubner
Deputy Director

C: Tully Clifford, Director, Ventura County Watershed Protection District
Jeff Pratt, Director, Ventura County Public Works Agency
Ventura County Stormwater Quality Management Program