ORANGE COUNTY
OC Public Works
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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

January 11, 2013

By E-Mail and Delivery

Wayne Chiu, P.E.
California Regional Water Quality Control Board, San Diego region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Subject: Comment – Tentative Order No. R9-2013-0001, Regional MS4 Permit, Place ID: 786088Wchiu.

Dear Mr. Chiu:

The County of Orange, as Principal Permittee of the Orange County Stormwater Program (Program), appreciates the opportunity to provide comments on *Tentative Order No. R9-2013-0001, NPDES No. CAS0109266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region (Tentative Order)* issued on October 31, 2012. The south Orange County Permittees (Permittees) were involved in the development of these comments and the Cities of Aliso Viejo, Dana Point, Laguna Hills, Laguna Niguel, Lake Forest, Mission Viejo, Rancho Santa Margarita, San Clemente, and San Juan Capistrano have directed that they be recognized as concurring entities on this letter. We have also coordinated our review with permittees in Riverside and San Diego Counties, who have identified many of the same issues with the Tentative Order. We support their comments except where noted otherwise in the attachments to this letter.

The Permittees have been actively engaged in discussions of the prior Administrative Draft of Tentative Order No. R9-2012-0011 (and subsequently on Tentative Order R9-2013-0001). Since April 9, 2012 the Permittees have participated with Board staff in two Orange County-specific meetings, 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). We also conveyed in writing our concerns regarding the scheduling and appropriateness of this effort (see prior correspondence dated May 10, 2012, May 17, 2012 and July 3, 2012) and submitted extensive comments on the Administrative Draft on September 14, 2012 (all of which are incorporated by reference).

We recognize the significant efforts of Regional Board staff to engage the Permittees and key stakeholders in the development of a regional permit in a collaborative manner. We also recognize that Tentative Order No. R9-2013-0001 reflects a number of changes directly in response to Permittee comments. The Tentative Order, however, still contains many issues of significant concern and does not, in our view, achieve at this time what Board staff laid out as its intended purpose and approach during the workshop process. Our extensive comments on the Tentative Order are organized and submitted as follows:

- A summary of our overarching concerns with the Tentative Order are included below in this letter
- Attachment A presents detailed comments on the entire permit
- Attachment B presents a redline/strikeout version of recommended changes to the Tentative Order.

The County is aware that Regional Board staff has held a number of meetings and discussions with San Diego Permittees since the release of the Tentative Order R9-2013-0001 on changes they are proposing. The Orange County Permittees would similarly request the opportunity to meet with you and other Regional Board staff to review in detail the changes requested in this comment submittal.

Overarching Issues of Concern with the Tentative Order

I. Failure to Consider Orange County Permittee Programs and Accomplishments

The Orange County Stormwater Program has been regulated under municipal NPDES stormwater permits since the first permit was issued in 1990. Subsequent permits were issued in 1996, 2002, and 2009. Since the inception of the Program the County of Orange and the other 12 Permittees have developed a comprehensive Drainage Area Management Plan (DAMP) that serves as the principal policy and guidance document for the entire Program, Local Implementation Plans (LIPs) that are developed by each Permittee to identify how the program is implemented on a city/jurisdiction basis, and through a series of watershed workplans for each watershed in the San Diego Region. These workplans detail the Permittee efforts to prevent and control pollutants on a watershed level.

The Orange County Stormwater Program is one of the few programs to date to have actively defined a series of performance metrics (headline measures) and use an assessment framework to define the relationships between compliance actions and, ultimately, positive changes in water quality. This assessment process is important because, in the end, the goal of the Program is to reduce urban pollutants and assist in attaining water quality standards.

Looking at the achievements that the Program has had since 1990, several major themes emerge:

- The Orange County Stormwater Program is proactive and a leader within the State
- The Permittees are engaged in the Program and provide valuable input into the process
- The Program uses several separate, but highly inter-related water quality planning processes to address urban sources of pollutants

- The Program recognizes the benefits of watershed-based planning and regional controls and has an increased emphasis to support this as foundational to the success of the Stormwater Program
- The Permittees adaptively manage the Program - the iterative process is actively employed and necessary modifications are proposed, reviewed and incorporated into the Program. Collaborative research is a key tool to understand and characterize sources of pollutants
- The existing framework and implementation of the Program meets or exceeds the permit requirements
- The Program receives significant funding and resources to ensure that it is successful
- Improvements in water quality have been realized including delistings from the 303(d) list

Specific successes include:

- With the 2010 303(d) List, Dana Point Harbor was delisted for indicator bacteria and several shoreline segments were delisted for *Enterococcus*, Fecal Coliform and/or Total Coliform
- In 2012, water quality in Orange County was excellent with 89% A grades and 94% B or better grades as reported by Heal the Bay in their annual beach water quality report card. Wet weather grades were fair (69% A or B grades) but bested the five-year average by 15%. Furthermore, for almost ten months (June 21, 2011 to April 6, 2012) Orange County did not have any beach closures, which is unprecedented. This is the longest stretch of time the county has gone without a single beach closure.
- The Permittees' public education program has changed public awareness as shown by surveys and is clearly promoting behaviors in our residents that are protective of water quality. In 2006 this effort – Project Pollution Prevention – was formally recognized for its excellence on a statewide basis by CASQA. In 2012, the American Public Works Association recognized our Project Pollution Prevention Public Education website as a "model practice." Results from the 2012 Public Awareness Survey of Orange County Residents indicate increased overall knowledge of stormwater issues and willingness to participate in stormwater pollution preventative behaviors in some key areas.
- With respect to land development, in 2012 the OC Engineering Council awarded the County with an Engineering Project Achievement Award for the Technical Guidance Document, which is the companion document to the Model Water Quality Improvement Plan.

There is concern that these achievements and the significant local engagement in the Program are not considered and approaches developed by the Permittees are sometimes overridden by the Tentative Order without support. For example, provisions dealing with land development, Low Impact Development (LID) and hydromodification control are significantly ratcheted up while award-winning permit programs are only just being implemented and/or pending approval and the programmatic successes as demonstrated with the annual effectiveness assessments are not recognized.

II. Lack of Authority to Include the Orange County Permittees in a Regional Permit

The Regional Board lacks the authority to include Orange County Permittees in a Regional Permit because there is no system-wide, jurisdiction-wide, watershed or other basis to do so. Orange County's MS4 does not interconnect with Riverside and San Diego Counties. There is no shared jurisdiction or other regional stormwater management authority that is applying for one permit. Orange County does not drain into a shared watershed, and the County is not adjacent to either county due to large federal lands that isolate Orange County from Riverside and San Diego. In addition, the quantity and nature of pollutants are different between the three counties. Therefore, the Regional Board cannot under federal and state regulations impose a Regional Permit without the Permittees expressly consenting to the Board's jurisdiction, as was done in the San Francisco Bay Area Regional Permit.

When preparing for the next iteration of each permit, the Permittees spend a significant amount of time and energy developing a Report of Waste Discharge (ROWD). The ROWD discusses the Permittee's compliance activities and includes a description of accomplishments, an assessment of program effectiveness using the California Stormwater Quality Program Effectiveness Assessment (CASQA) guidance in conjunction with the iterative process, the necessary programmatic changes that are evident as a result of the assessment, and, finally, a proposed new management program in the form of a draft updated DAMP. In the case of the current Tentative Order, new requirements are being proposed and will be adopted for south Orange County in the absence of a ROWD, since the Permittees are still covered by an existing permit and have not been required to submit one. As noted in previous correspondence, inclusion of south Orange County in a regional permit and in the absence of a ROWD is inappropriate.

III. Consistency in 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 Regional Board. This commitment represented recognition of the Little Hoover Commission's conclusions on the lack of consistency in MS4 permits as a critical area of concern and USEPA's interest in seeing greater permitting consistency. Nonetheless, while Regional Board staff has stated that the Tentative 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. The Fact Sheet (Attachment F) points to two similarities between the current Santa Ana Regional Board MS4 permit and the Tentative Order, but fails to identify the numerous other areas of inconsistency.

To the extent that the Tentative Order may ease the regulatory burden for your staff, there will be a commensurate increase in the burden for the County other Permittees that are dealing with multiple Regional Board jurisdictions if permitting in California continues to be defined by divergent rather than convergent approaches. We have therefore proposed many changes to the Tentative Order 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 Tentative 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. Fundamentally different requirements between our two permits, particularly within the same city, damage the credibility of the regulatory framework and confound the ability of local government to cost effectively address key environmental mandates.

IV. Prohibitions and Limitations

The Prohibitions and Limitations language in MS4 permits statewide was recently the subject of a State Water Resources Control Board workshop on November 20, 2012. The County provided testimony at this workshop expressing concern that the new iteration of permit language could expose the Permittees to State and federal enforcement actions, as well as to third party actions under the federal Clean Water Act's citizen suit provisions. This was the case with the recent Ninth Circuit Court of Appeals decision in the case of *Los Angeles County Flood Control District v. Natural Resources Defense Council*, No. 11-460, slip op. (Jan. 8, 2013). The proposed Prohibitions and Limitations provisions in the Tentative Order, as written, could be construed as standalone provisions that could expose the Permittees to Clean Water Act liabilities for discharges that cause or contribute to an exceedance of a water quality standard. Receiving water limitations must provide a compliance mechanism for exceedances of effluent limitations, water quality standards or TMDLs if the Permittees are diligently following an iterative process and implementing BMPs to the MEP standard

The Tentative Order should then reaffirm the iterative process in that compliance is to be achieved over time using improved BMPs. 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. The County supports this approach and believes that the Regional Board has discretion on the receiving water limitations language beyond what is required to be included per Water Board Order 99-05.

The Permittees envision Water Quality Improvement Plans (WQIPs) as the foundation for an iterative BMP-based compliance approach for the discharge prohibitions and limitations and have provided detailed comments and recommended redline permit language in Attachment A.

V. New Requirements for Land Development

The evolution 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 with a new emphasis on LID, and hydromodification. Currently, while there is 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 comments and proposed redline permit language in Attachments A and B 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 an equal 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.

Additionally, the County has continued concern that the provisions dealing with land development, LID and hydromodification controls are significantly ratcheted up in the Tentative Order while existing Fourth Term Permit programs are only just being implemented and/or pending approval. The fact sheet and findings provide no foundation for the changes being proposed.

VI. TMDL Incorporation

The Regional Board has adopted two Basin Plan Amendments to establish Total Maximum Daily Loads (TMDLs) where the Permittees are assigned wasteload allocations: (1) Indicator Bacteria in Baby Beach in Dana Point Harbor and (2) Indicator Bacteria, Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek).

There are several fundamental and substantive discrepancies between the adopted TMDL Basin Plan Amendments and the provisions of the Tentative Order. These inconsistencies negate the Basin Plan Amendment process that occurred to establish the TMDLs and clearly contradict the Board's intent for how the TMDLs would be incorporated into the MS4 Permit. The Tentative Order should be revised to ensure that the TMDLs are properly incorporated as mass-based WLAs and not as concentration-based limits and that BMP-based compliance is established for the TMDL provisions. The Tentative Order should also provide an explicit re-opener provision to ensure that any revision to the TMDL is included in the adopted Order.

VII. Complimentary Watershed and Jurisdictional Planning

The WQIP approach represents a significant advance in the development and implementation of stormwater programs. The WQIP framework allows for the identification and development of a program built around the highest priority water quality conditions within a specific watershed. The WQIP also allows for the integration of all program elements and focuses the efforts on the highest priorities for each watershed through the customization of actions and strategies. If positioned correctly, the WQIP can be a significant advance in making the

Tentative Order and corresponding compliance programs truly strategic, adaptive, and synergistic.

The County believes the Tentative Order provisions, especially Provision E, JRMP, deviate from the strategic and adaptive approach to the anachronistic "one-size fits all" approach. For example, the Existing Development provisions dictate that specific BMPs that must be implemented, regardless of the high priority water quality concerns within a watershed. These provisions become "additive" instead of "prioritized" and are not supportive of the overarching WQIP. The Tentative Order should be modified so that the WQIPs and related Jurisdictional Runoff Management Plans can be streamlined and focus on the highest priorities within each watershed.

Thank you for your attention to our comments. Please contact the undersigned directly if you have any questions. For technical questions, please contact Chris Crompton at (714) 955-0630 or Richard Boon at (714) 955-0670.

Very truly yours,

Mary Anne Skorpanich, Manager
OC Watersheds

Ryan M. F. Baron
Senior Deputy County Counsel
Office of County Counsel

Attachments: A – Detailed Comments
B – Redline Version of the Tentative Order

Cc: (Electronic copies only)
David Gibson, San Diego Regional Board
Tony Felix, San Diego Regional Board
South Orange County Permittees
Orange County Technical Advisory Committee
Tony Olmos, Orange County Public Works
Todd Snyder, County of San Diego
Jason Uhley, Riverside County Flood Control and Water Conservation District
Andrew Kleis, City of San Diego

ATTACHMENT A

ORANGE COUNTY DETAILED COMMENTS ON CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN DIEGO REGION TENTATIVE ORDER No. R9-2013-0001 NPDES NO. CAS0109266

This document, Attachment A, contains the detailed legal and technical comments of the County of Orange and the Orange County Flood Control District (collectively, the "**County**") on Tentative Order No. R9-2013-0001 dated October 31, 2012 ("**Tentative Order**"). These comments are divided into three sections (*General*, *Findings*, and *Permit Provisions*) and address issues relating to specific parts of the Tentative Order. At times, the issues and concerns raised will pertain to more than one section of the Tentative Order. In addition to the recommended language changes identified below, Attachment B (the recommended changes to the Tentative Order) also includes some minor edits in order to provide additional clarification where necessary.

The County of Orange, as the Principal Permittee, and the cities of Aliso Viejo, Dana Point, Laguna Beach, Laguna Hills, Laguna Niguel, Laguna Woods, Lake Forest, Mission Viejo, Rancho Santa Margarita, San Clemente, and San Juan Capistrano collectively refer to themselves as "San Diego Region Permittees" or "Permittees." The Tentative Order refers to the County and incorporated cities of South Orange County as the "Copermittees." As such, the comments below use the term "Copermittees" to be consistent with the terminology of the Tentative Order.

GENERAL

1. Permitting Consistency Is Critical Since Several Copermittees Are Regulated Under Multiple Regional Boards

Although the County of Orange is very supportive of the overall approach that the San Diego Regional Water Quality Control Board (Regional Board) is proposing with the development of the Water Quality Improvement Plans (WQIPs) to guide the Copermittees' jurisdictional runoff management programs (JRMPs) towards the high priority water quality conditions within a watershed to achieve improvements, it is critical that consistency be maintained between Regional Boards, where feasible.

The Orange County stormwater program operates a unified countywide program of 36 Permittees, with five (5) Copermittees split between two (2) Regional Boards. Consequently, a number of our comments are aimed at creating greater uniformity and implementability between the two permits that we operate under. Fundamentally different requirements between our two permits, particularly within the same city, damage the credibility of the regulatory framework and confound the ability of local government to cost effectively address key environmental mandates. To this end, the County of Orange (County) has provided some recommended language changes within this document and Attachment B in order to try to preserve that consistency.

2. Many of the New or Modified Requirements within the Tentative Order Do Not Have Adequate Findings of Fact and/or Technical Justification

In many instances the Findings and/or Fact Sheet provide little or no justification of the need for the new requirement. Although Finding 35 states that the Fact Sheet "contains background information, regulatory and legal citations, references and additional explanatory information and data in support of the requirements of this Order", many of the new or modified requirements within the Tentative Order do not have adequate findings of fact and/or technical justification. In addition, they do not identify the "program deficiency" that warrants the modification. The comments provided herein identify many of the areas where new or modified provisions of the Tentative Order lack factual or technical support in the Findings and/or Fact Sheet. Examples of this include, but are not limited to, the following:

- Basis for including Orange County in the regional municipal stormwater permit;
- Basis for the 10 year timeline to achieve the final numeric goals identified within the Water Quality Improvement Plans (WQIPs);
- Basis for requiring uncontaminated pumped ground water, foundation drains, water from crawl space pumps, and footing drains to obtain coverage under the San Diego Region groundwater extraction permits;
- Basis for including single family residential projects as a category requiring coverage as a Priority Development Project;
- Basis for including U.S. Green Building Council (USGCB) Leadership in Energy and Environmental Design (LEED) as exemption criteria for single family residential projects and for alternative compliance for hydromodification management;
- Basis for requiring conventional BMPs onsite in addition to alternative compliance;
- Basis for hydromodification requirements not considering existing Hydromodification Management Plans and being a one size fits all approach;
- Basis for biofiltration BMPs required to be sized at 1.5 times the design capture volume;
- Basis for biofiltration BMPs not being an effective LID and treatment measure per the requirement to size them at 1.5 times the design capture volume and also require conventional BMPs when they are used.
- Basis for offsite regional BMPs required to be sized at 1.1 times the design capture volume;
- Basis for verification of coverage under all related permits for construction sites;
- Basis for evaluation and retrofit/rehabilitation of stream channel systems;
- Basis for including residential driveways as a category requiring coverage as a Priority Development Project;
- Basis for not incorporating the Total Maximum Daily Load (TMDL) waste load allocations (WLAs) into the Tentative Order; and
- Basis for establishing Water Quality Based Effluent Limits (WQBELs) expressed as numeric effluent limitations, in lieu of WQBELs expressed as BMPs, for the TMDL provisions.

3. The Numbering in the Tentative Order Should Explicitly Identify the Major Sections to Help Guide the Reader

The County is recommending that the Regional Board explicitly identify the numbering system within the Tentative Order subsections in order to assist and orient the reader. For example, within the Provisions (Section II of the Tentative Order):

- The sub-sections within Provision A should be listed as:
  - *A.1 Discharge Prohibitions* instead of *1. Discharge Prohibitions*
  - *A.2 Receiving Water Limitations* instead of *2. Receiving Water Limitations*

- The sub-sections within Provision B should be listed as:
  - *B.1 Watershed Management Areas* instead of *1. Watershed Management Areas*
  - *B.2 Priority Water Quality Conditions* instead of *2. Priority Water Quality Conditions*

Given the styles and formatting currently used within the Tentative Order, these edits were not made within Attachment B.

FINDINGS

4. Finding 2 (Page 1 of 120) – A Regional Permit Cannot Be Issued to Orange County Because There Is No System-wide, Jurisdiction-wide, Watershed or Other Basis to Do So

The Tentative Order is intended to cover Copermittees in three large metropolitan counties – Orange, Riverside and San Diego. In May 2012, Orange and Riverside Counties ("**Counties**") sent letters to Staff Counsel for the Regional Board requesting the legal authority to issue a regional permit to the three counties.[1] The Counties contended that, in accordance with federal regulations, there was no system-wide, jurisdiction-wide or watershed basis to issue a regional permit. The Counties also asserted that the lack of a Report of Waste Discharge (ROWD) process for either county prior to the initial adoption of the Tentative Order prevented the issuance of a regional permit on the grounds that there was a conflict with both federal and state law. On September 7, 2012, Staff Counsel responded to the Counties stating that there was a jurisdiction-wide and watershed basis to impose a regional permit on the Counties, and cited legal authority and examples in the Bay Area and an Alaskan borough where regional permits had been issued.[2]

For the following reasons, the County continues to believe that the Regional Board lacks authority to issue a regional permit to Orange County:

1. Orange County's MS4 system does not interconnect with Riverside and San Diego Counties,
2. There is no jurisdictional basis to issue a regional permit to Orange County,

[1] Letter from Ryan M. F. Baron, Office of County Counsel, County of Orange, to Catherine Hagan, Office of Chief Counsel, State Water Resources Control Board, San Diego Region (May 10, 2012); Letter from David H. K. Huff, Office of County Counsel, County of Riverside, to Catherine Hagan, Office of Chief Counsel, State Water Resources Control Board, San Diego Region (May 21, 2012).

[2] Letter from Jessica Jahr, California Regional Water Quality Control Board, San Diego Region, to Ryan M. F. Baron, Office of County Counsel, County of Orange, and David H. K. Huff, Office of County Counsel, County of Riverside (Sept. 7, 2012).

3. Orange County's MS4 does not drain into a shared watershed, and
4. Orange County's MS4 is not adjacent to Riverside or San Diego's MS4, and the quantity and nature of pollutants differ between the three counties.

Therefore, the Regional Board cannot under federal and state regulations impose a Regional Permit without the Permittees expressly consenting to the Board's jurisdiction.

A. There Is No System-wide, Jurisdiction-Wide, Watershed or Other Basis by Which to Legally Impose a Regional Permit on Orange County

Finding 2 in the Tentative Order states that the legal and regulatory authority for implementing a regional MS4 permit stems from Section 402(p)(3)(B) and 40 CFR 122.26(a)(1)(v). The Tentative Order also cites EPA's Final Rule regarding stormwater discharge permit application procedures that there is flexibility to establish system-wide or region-wide permits.[3] During Focused Meeting Workshops conducted on June 27, 2012 and July 11, 2012, Regional Board staff stated that the reason for a regional permit was to consolidate all three permits into one to lessen the amount of permit writing time for three separate permits and reduce internal costs for writing and issuing permits. The justification at Finding 2 is largely the same although it adds that the "regional nature of this Order will ensure consistency of regulation within watersheds and is expected to result in overall costs savings for the Copermittees and San Diego Water Board."[4]

First, although Orange County geographical boundaries abut San Diego and Riverside Counties, Orange County's MS4 does not interconnect with the counties regulated under the regional permit (see map in **Appendix A-1**). There is substantial undeveloped area between the developed jurisdictions of Orange County and Riverside Counties. The Santa Ana Mountains and the Cleveland National Forest separate Orange and Riverside Counties encompassing tens of thousands of acres of total land separating the two counties. Camp Pendleton military base separates Orange and San Diego Counties totaling over 122,000 acres with no adjacent cities or interconnected MS4s. Clean Water Act (CWA) regulations expressly state that a permit can be issued on a system-wide basis covering all discharges from MS4s within a large or medium municipal storm sewer system. One of the primary considerations in defining a "large or medium municipal separate storm sewer system" is one that has physical interconnections with other municipal separate storm sewers.[5] In this case, there are no physical interconnections.

Secondly, there is no jurisdiction-wide basis to issue a regional permit. 40 CFR 122.26(a)(3)(ii) states that one system-wide permit can cover all discharges from MS4s within a large or medium municipal storm sewer system located within the same jurisdiction. Orange, Riverside and San Diego Counties are separate counties with distinct political and geographical boundaries that do not drain into a common watershed and do not share physical interconnections. The three counties are not within the same political jurisdiction. While Region 9 can be considered one jurisdiction for Regional Water Board purposes, federal regulations state that there has to be one stormwater management regional authority in which to issue a permit, and the Regional Board is not such an authority.[6] Regardless, such a permit can only be issued to a multi-jurisdictional entity upon a permit application and upon there being an

[3] 55 Fed. Reg. 47990, 48039-48042.
[4] Part I.2.
[5] 40 CFR 122.26(b)(4) (defining large systems); 40 CFR 122.26(b)(7) (defining medium systems)
[6] 40 CFR § 122.26(a)(3)(iii)(C).

interconnected MS4 or adjacent MS4. There is no tri-county stormwater management authority, there is no system-wide interconnection and Orange County is not adjacent to San Diego and Riverside Counties due to the large federal lands that separate the County.

Third, Orange County does not drain into a shared watershed with Riverside and San Diego Counties. The Orange County Copermittees drain into various watersheds that drain into the Pacific Ocean. The Riverside County Copermittees drain into the Santa Margarita watershed. San Diego County drains into various watersheds. Orange County's MS4 does not drain into or share one common watershed with either county, and therefore cannot be regulated on this basis.

There is no other basis by which to regulate Orange County in the same permit with Riverside and San Diego Counties. Although it is true that Orange County political boundaries abut the two counties, there are hundreds of thousands of acres of federal land that separate Orange County, and thus, the County's MS4 does not interconnect with and is not adjacent to its neighbors like Orange County is with Los Angeles County. Based on differing permit requirements for the three counties, such as TMDLs, and data filed in annual reports and past ROWDs, the quantity and nature of pollutants are different between the three counties, and do not serve as a basis or determination by which to lump all three counties into a one-size fits all permit (e.g., hydromodification). In addition, federal regulations look to interconnection and similarities between jurisdictions as the basis by which to issue one permit.[7] Federal regulations do not authorize and the EPA Final Rule does not contemplate regional permit issuance based on overall reduced cost savings, and overall cost savings have not been demonstrated in the Tentative Order.[8] And although it may be convenient to ensure consistency of regulation, EPA Final Rule contemplates such consistency within a watershed and not throughout a geographical area the size of the three counties. In fact, the EPA Final Rule does indeed use the term "regional" throughout its analysis in the Response to Comments. A careful examination of the term "regional," however, shows that EPA was analyzing whether individual permits should be issued to individual cities, a county and its incorporated cities, a set of Copermittees with interconnected sewer systems and other infrastructure, one state entity or a regional stormwater management authority. The largest area by which one permit could be issued under the Final Rule was essentially to a state entity or one county and its incorporated cities. There is no factual or technical basis in the Tentative Order that meets this criteria or establishes other bases to regulate Orange County under one unified permit. There is also no statistical basis by which to issue a regional permit as Orange County is comprised of over three million people and is the sixth largest county by population in the U.S. In fact, the U.S. Bureau of Census designates Orange County in a different Metropolitan Statistical Area than San Diego County, and is designated in a Combined Statistical Area with Los Angeles, Ventura and San Bernardino Counties.

Lastly, the letter from Staff Counsel cites examples in the Bay Area and in Alaska where regional permits have been issued. In the Bay Area, various cities and counties under that permit interconnect in some fashion and drain into the San Francisco Bay. The Bay Area is also represented by a joint powers organization or regional watershed management program comprised of 8 municipal stormwater programs that voluntarily agreed to end their existing permits early and enroll in a regional permit. In the case of the Alaska example, a "regional" permit was issued to the Fairbanks North Star Borough, City of Fairbanks, City of the North

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[7] 33 USC 1342(p)(3)(B)(i); 40 CFR 122.26(a)(1)(v).
[8] 55 Fed. Reg. 47990-01.

Pole, the Alaska Department of Transportation and the University of Alaska Fairbanks. Further examination of that permit and the stormwater program maps demonstrate, though, that the region regulated is a borough, the Alaskan equivalent of a county. All of the regulated Copermittees are physically interconnected through its storm drain system and roadways, and most drain into one watershed. In short, neither the Bay Area nor the Fairbanks Borough permits provide sufficient examples of a regional permit comparable to the one being issued to Orange County.

B. There Is No Technical Basis to Regulate Orange County Due to the Lack of a Report of Waste Discharge Application.

The ROWD is a federally required application that is the technical basis to draft a new permit for a permittee. The information contained in the ROWD is used to determine prospective provisions of the new permit, including but not limited to monitoring, program strengths and other tools that are assessed in the new permit. In other words, the ROWD is the technical basis or substantial evidence for determining what will be required in the new permit. In the case of the Tentative Order, permit conditions that will apply to Orange County upon the expiration of its current permit in December 2014 or upon early enrollment are not based on any ROWD filed by the County. Thus, there is no technical basis or substantial evidence to regulate Orange County under a regional permit, and therefore, the regional permit terms and conditions are arbitrary and capricious. The initial draft of the Tentative Order did not contain a ROWD requirement for Orange County. The Order was subsequently revised to include a ROWD requirement to determine whether modification to the Order upon enrollment by Orange County is necessary, but the Tentative Order will still be adopted by the Regional Board with terms and conditions that apply to Orange County that are not based on any federally required application or report. Orange County's current Fourth Term permit has been in existence for only two years with programs that have just started, or like hydromodification, have not yet started or are in interim phases. Therefore, the current programs do not provide any meaningful benchmark by which to draft new regional permit terms that apply to the County. And, in addition, the ROWD requirement that is now in the Tentative Order is essentially an after the fact application.

In short, the Tentative Order is drafted and will be initially adopted by the Regional Board with provisions that will generally regulate Orange County Copermittees, along with specific numeric and other requirements that will only apply to Orange County that are not based on an application process or other documented technical basis. There is no substantial evidence or CWA basis by which to impose certain regulations on the County. Thus, the lack of a ROWD requirement prior to initial adoption of a regional permit is in conflict with the CWA, Porter Cologne and the California Administrative Procedure Act.

The County recommends the following language changes:

I. Findings
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).

~~*The San Diego Water Board has the legal authority to issue a regional MS4 permit pursuant to its authority under CWA section 402(p)(3)(B) and 40 CFR 122.26(a)(1)(v). The USEPA also made it clear that the permitting authority, in this case the San Diego Water Board, has the flexibility to establish system- or region-wide permits (55 Federal Register [FR] 47990, 48039-48042). The regional nature of this Order will ensure consistency of regulation within watersheds and is expected to result in overall cost savings for the Copermittees and San Diego Water Board.*~~

The federal regulations make it clear that the Copermittees need only comply with permit conditions relating to discharges from the MS4s for which they are operators (40 CFR 122.26(a)(3)(vi)). This Order does not require the Copermittees to manage storm water outside of their jurisdictional boundaries, but rather to work collectively to improve storm water management within watersheds.

I. Findings
26. Report of Waste Discharge Process
…..The San Diego Water Board understands that each municipality is unique ~~although the Counties share watersheds and geographical boundaries~~. The Order will continue to use the Report of Waste Discharge process prior to initially making Orange County or Riverside County Copermittees subject to the requirements of this Order.

5. Finding 8 (Page 3 of 120) – It Should Not Be Presumed That Discharges From MS4s Always Contain Waste or Pollutants

Discharges may contain waste or pollutants, but it should not be presumed that they necessarily <u>always</u> contain waste or pollutants.

Under current law, the State Board's issuance of the Small MS4 Permit is a quasi-judicial decision.[9] As a quasi-judicial decision, the State Board's action must be supported by legally adequate findings, and those findings must be supported by evidence in the record.[10]

Pursuant to the Supreme Court's decision in *Topanga Association for a Scenic Community v. County of Los Angeles* (1974) 11 Cal.3d 506, findings are intended to "facilitate orderly analysis and ***minimize the likelihood that the agency will randomly leap from evidence to conclusions***."[11] Here, there is no cited evidence that stormwater itself is a pollutant or that in every instance it contains pollutants or waste as those terms are defined by the CWA and Porter Cologne respectively. Absent evidence demonstrating that this is the case, in all cases, the Regional Board cannot make this finding.

Moreover, as a matter of law, the Regional Board lacks the authority to regulate pure stormwater as a pollutant. The CWA and its implementing regulations define the term "pollutant" to mean:

> dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials

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[9] *City of Rancho Cucamonga v. Regional Water Quality Control Board* (2006) 135 Cal.App.4th 1377, 1385.
[10] T*opanga Association for a Scenic Community v. County of Los Angeles* (1974) 11 Cal.3d 506.
[11] *Id*., at 514 [emphasis added].

> (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water[12].

Federal regulations further define the term “stormwater” to mean: “storm water runoff, snow melt runoff, and surface runoff and drainage.”[13] Notably, the definition of the term “Pollutant” does not include “Stormwater.” Moreover, the text of the CWA requires the discharges of *pollutants* to be reduced to the Maximum Extent Practicable (MEP).[14] There is no prohibition on or comparable authority to regulate the discharge of pure *stormwater.*

This rationale was recently adopted by the Eastern District of Virginia, when it held that the EPA has no authority under the Clean Water Act to regulate non-pollutants.[15] Specifically, the Court stated:

> Pollutant is statutorily defined. (33 U.S.C. § 1362(6).) The Court sees no ambiguity in the wording of this statute. EPA is charged with establishing TMDLs for the appropriate pollutants; that does not give them the authority to regulate nonpollutants. The parties agree that sediment is a pollutant under 33 U.S.C. § 1362(6), and stormwater is not. Then how does EPA claim jurisdiction over setting TMDLs for stormwater.[16]

Likewise, Porter Cologne defines the term “Waste” to mean:

> 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.[17]

While the definition is certainly different and potentially broader than the definition of *Pollutant* under the CWA, the definition of waste does not include stormwater or any other discharge that is not created by human activity. As a matter of law, the Regional Board is therefore without authority to regulate all discharges of stormwater as pollutants or waste.

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[12] 33 U.S.C. § 1362(6); 40 C.F.R. § 122.2.
[13] 40 C.F.R. § 122.26(b)(13).
[14] 33 U.S.C. § 1342(p).
[15] Virginia Dept. of Transportation v. EPA, No. 1:12-CV-775, slip op. (E.D. Va. Jan. 3, 2013).
[16] Id., at 5.

[17] Cal Water Code § 13050(d).

The County recommends the following language changes:

I. Findings

8. 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…..

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16. Best Management Practices. Waste and pollutants which are deposited and accumulate in MS4 drainage structures may ~~will~~ be discharged from these structures to waters of the U.S. unless they are removed…..

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17. BMP Implementation. …..Retrofitting areas of existing development with storm water pollutant control and hydromodification management BMPs ~~is~~ may, in many cases be necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards.

6. Finding 11 (Page 4 of 120) – Natural Waters Cannot Legally Be Classified as Part of the MS4, and Cannot Be Classified as Both a MS4 and Receiving Water

The Tentative Order states that development often makes use of natural drainage patterns and features as conveyances for runoff. Finding 11 goes on to state that rivers, streams and creeks in developed areas are part of the Copermittees' MS4 whether the river, stream or creek is natural, anthropogenic or partially modified. It further states that these natural water bodies are both an MS4 and a receiving water.

Finding 11 is expressly contradicted by federal regulations and a recent opinion by the U.S. Supreme Court. Natural creeks cannot legally be classified as part of the MS4, and the MS4 and a water of the U.S. cannot be comingled. The flow of water from an improved portion of a navigable waterway into an unimproved portion of the same waterway does not qualify as a "discharge of a pollutant" under the CWA.[18]

In addition, the definition of a *municipal separate storm sewer* means "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) ... including special districts under state law such as a sewer district sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States;

[18] *L.A. County Flood Control District v. NRDC*, slip op. (Jan. 8, 2013); *South. Fla. Water Management Dist. V. Miccosukee Tribe*, 541 U.S. 95, 109-112 (holding that the transfer of a polluted water between two parts of the same waterbody does not cause a discharge of pollutants under the CWA).

ii. Designed or used for collecting or conveying stormwater;

iii. Which is not a combined sewer; and

iv. Which is not part of a publicly owned treatment works (POTW) as defined at 40 CFR 122.2."[19]

This definition only includes man-made channels and systems and does not encompass natural water bodies simply because an outfall discharges to a receiving water. Any water quality improvement to a natural river, stream or creek does not mean it is a MS4, but an improved water of the U.S. Moreover, U.S. EPA itself, in the Preamble to its proposed MS4 regulations[20] expressly determined that "streams, wetlands and other water bodies that are waters of the United States are not storm sewers for the purposes of this rule" and that "stream channelization, and stream bed stabilization, which occur in waters of the United States" were not subject to NPDES permits under Section 402 of the CWA[21].

Lastly, municipalities do not own, control or operate natural rivers, streams and creeks. Such water bodies are often administrated by the State of California in the public trust for the right of the people to use such waters for certain purposes or are privately owned.[22] The Legislature, acting within the confines of the common law public trust doctrine, is the ultimate administrator of the trust and may often be the final arbiter of permissible uses of trust lands. Moreover, a municipality obviously cannot "operate" a natural creek or stream.

The County recommends the following language changes:

I. Findings
11. Runoff Discharges to Receiving Waters
….Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. ~~Rivers, streams and creeks in developed areas used in this manner are part of the Copermittees' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the rivers, streams and creeks in the developed areas of the Copermittees' jurisdictions are both an MS4 and receiving water.~~ 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).

7. Finding 12 (Page 4 of 120) – Copermittees Do Not Accept Free and Open Access to MS4s, and Are Not Responsible for All Discharges not Prohibited

The Tentative Order states that MS4s willingly provide free and open access and convey discharges to waters of the U.S., and that MS4 operators then accept all responsibility for such discharges not prohibited or otherwise controlled. This is simply not the case and is legally unsupportable. An MS4 is designed to accept stormwater for flood control purposes and prevent damage to life and property. Although it is true that the Copermittees have an obligation to effectively prohibit non-stormwater discharges, namely illicit connections and unlawful dumping, it is also true that the discharger into the MS4 is ultimately responsible for a condition of pollution or violation of a water quality standard. And, in accordance with California

[19] 40 CFR 122.26(b)(8).
[20] 53 Fed. Reg. 49416 (Dec. 7, 1988)
[21] 53 Fed. Reg. at 49442.
[22] *Marks v. Whitney* (1971) 6 Cal. 3d 251, 259, 260.

state law, MS4s downstream of upstream flows must accept those flows and cannot attempt to block or divert such flows.[23] Finding 12 attempts to shift all legal responsibility to the MS4s, which is unsupported by federal and State law.

The County recommends the following language changes:

I. Findings
12. Pollutants in Runoff
…. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. ~~By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control.~~ These discharges may cause or contribute to a condition of pollution or a violation of water quality standards.

8. Finding 15 (Page 5 of 120) – The Tentative Order Must Recognize that the Discharge of All Pollutants From the MS4 is Subject to the MEP Standard

Section 402(p)(3)(B)(ii) requires the Copermittees to effectively prohibit non-stormwater discharges into the MS4, namely pollutants generated from illicit connections and unlawful dumping.

The Tentative Order at Finding 15, however, states that non-stormwater discharges are not subject to the MEP standard. This finding is not supported by federal law. While federal law regulates “non-stormwater discharges” into the MS4, Section 402(p)(3)(B)(iii) expressly states that the “discharge of pollutants” shall be reduced to MEP. In drafting this section of the CWA, Congress expressly intended all discharges from MS4s to be subject to MEP as it used the term “pollutant” and did not differentiate between stormwater and nonstormwater, as the Tentative Order attempts to do. Therefore, the duty of the Copermittees to reduce the discharge of pollutants from the MS4 to MEP applies to both stormwater and nonstormwater pollutants.

Furthermore, the focus of the CWA and federal regulations is on a management program that includes a comprehensive planning process to reduce the discharge of pollutants to MEP.[24] One of the elements of the management program is the illicit discharge prevention program.[25] The control and limitation of illicit discharges into the MS4 is intended to achieve the overall MEP standard for discharges from the MS4. This is confirmed by the preamble to EPA regulations that discuss the required elements of the management program. According to EPA:

> [Copermittees are required] to develop management programs for four types of pollutant sources which discharge to large and medium municipal storm sewer systems. Discharges from large and medium municipal storm sewer 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 [Copermittees] the opportunity to propose **MEP control measures for each of these components of the discharge**. 55 Fed Reg at 48052 (emphasis added). *See also* 55 Fed Reg at 48045 (stating “Part 2 of the proposed permit application [which includes the illicit discharge prevention requirement] is designed to . . . provide municipalities with

[23] *Keyes v. Romley* (1966) 64 Cal.2d 396; *Locklin v. City of Lafayette*, (1994) 7 Cal. 4th 327.
[24] 40 CFR 122.26(d)(2)(iv).
[25] 40 CFR 122.26(d)(2)(iv)(B)(1).

> the opportunity of proposing a comprehensive program of structural and non-structural control measures that will **control the discharge of pollutants, to the maximum extent practicable, from municipal storm sewers**.") (Emphasis added).

EPA's position is consistent with existing State Water Resources Control Board policy which states that discharges into the MS4 are to be controlled through an iterative, BMP based approach that is *less* stringent than the MEP standard.[26] 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.[27]

The State Board's decision in the Building Industry Association (BIA) matter makes clear that the CWA does not include a blanket prohibition on discharges of non-stormwater into the MS4. To the extent the Tentative Order would hold the dischargers liable in the event that any discharge into the MS4 occurs, the Tentative Order exceeds the requirements of the CWA and violates existing State Board policy.

It is also technically infeasible in some cases to differentiate between non-stormwater or stormwater pollutants discharged from the MS4. Thus, just as the discharge of non-stormwater into the MS4 is subject to the effective prohibition standard, the discharge of pollutants in non-stormwater from the MS4 is subject to the MEP standard. There are several instances where the specific provisions in the Tentative Order need to be modified in order to reflect this approach.

The County recommends the following language changes:

I. Findings
3. CWA NPDES Permit Conditions
….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~~ <u>into</u> the MS4s, and require controls to reduce the discharge of pollutants in storm water from the MS4s to the MEP.

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[26] Specifically in 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).
[27] Id., at 9-10.

I. Findings
15. Non-Storm Water and Storm Water Discharges
The discharge of pollutants from the MS4 is subject to the MEP standard notwithstanding whether the pollutants are transported by stormwater or non-stormwater. ~~Non-storm water discharges from the MS4s are not considered storm water discharges and therefore are not subject to the MEP standard of CWA section 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,namely identified illicit discharges and pollutants from unlawful dumping, must be effectively prohibited.

II. Provisions
A. Prohibitions and Limitations
The purpose of this provision is to describe the conditions under which storm water from and non-storm water discharges into ~~and from~~ the MS4s are effectively prohibited or limited.

E. Jurisdictional Runoff Management Programs [Intro]
The purpose of this provision is for each Copermittee to implement a program to control non-stormwater ~~the~~ discharges ~~contribution of pollutants~~ into and ~~the~~ stormwater discharges from the MS4 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……

E. Jurisdictional Runoff Management Programs
1. Legal Authority Establishment and Enforcement
a.(1) Effectively prohibit and eliminate all illicit discharges and illicit connections into its MS4;
a.(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

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E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
a. Non-stormwater Discharges
(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…..

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
b. Prevent and Detect Illicit Discharges and Connections
(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, including the following methods for public reporting

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E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
e. Investigate and Eliminate Illicit Discharges and Connections
(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

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
e. Investigate and Eliminate Illicit Discharges and Connections
(2)(c) Each Copermittee must investigate and seek to identify the source(s) of ~~discharges of non-stormwater where flows are~~ illicit discharges or illicit connections observed into and from the MS4 during the…

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
e. Investigate and Eliminate Illicit Discharges and Connections
(3)(e) If the Copermittee is unable to identify and document the source of a recurring ~~non-stormwater discharge~~ illicit discharges or connections into or from the MS4, then the….

E. Jurisdictional Runoff Management Programs
5. Existing Development Management
c. Existing Development Inspections
(1)(ii) The frequency of inspections must be appropriate to confirm that BMPs are being implemented to reduce the discharge of pollutants in storm water from the MS4 to the MEP and effectively prohibit non-storm water discharges into the MS4;

9. Finding 28 (Page 9 of 120) – The Requirements in the Tentative Order Are More Stringent Than Federal Law, Requiring An Economic Analysis. In Addition, the Current Economic Analysis Is Insufficient

Finding 28 states that pollutant restrictions are not more stringent than federal law, yet an economic analysis is still conducted pursuant to CWC 13241. Despite the finding that the Tentative Order does not exceed federal law requirements, there are a number of requirements that are more stringent.

However, when you evaluate the economic analysis presented in the Fact Sheet[1] the Regional Water Board staff did not, in fact, fully consider the 13241 factors when they make the finding that the "requirements in this Order are reasonably necessary to protect beneficial uses." There has not been a full consideration of the section 13241 factors, which would include an analysis of the economic impacts that would result from compliance with the existing stormwater permit compared to the costs of complying with the proposed stormwater permit (thereby the costs of complying with the new requirements). Instead, the Order's analysis begins by stating, and without any quantification, that it would more expensive to not fully implement programs. Section 13241 is not satisfied by this inverse analysis.

Additionally, the Tentative Order states that Copermittees have a significant amount of flexibility to choose how to implement BMPs and that "least expensive measures" can be chosen.[28] This

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[28] F-17.

statement, however, conflicts with the Order's definition of MEP at C-6 which expressly acknowledges Chief Counsel's 1993 MEP memo that only the Regional and State Boards determine whether BMPs meet MEP, and that selection of the least expensive BMPs will likely not result in meeting the MEP standard.

The Fact Sheet also fails to cite any recent cost benefit numbers but relies on inapplicable cost data such as a 1999 EPA study on household costs.

The analysis of costs contained in the Fact Sheet is deficient in two additional ways. First, the approach to compliance costs is fundamentally deficient because it tells the public nothing at all about the relationship between the cost of any particular control and the pollution control benefits to be achieved by implementing that control. Under this "generalized" approach, extremely costly requirements that bear little or even no relationship (or even a negative relationship) to the pollution control benefits to be achieved could be "justified" as long as the "overall" program costs are within what the Regional Board deems to be an acceptable range. This is not a proper way to determine whether a control reduces the discharge of pollutants from the MS4 to the MEP. A more individualized assessment of cost is required. Otherwise, dischargers may be required to implement very costly controls that have no relationship to pollution control benefits, a result inconsistent with MEP.

This analytical flaw in the Fact Sheet is compounded by the approach taken to assess the benefits of the Tentative Order. Here again, the assessment approach misses the mark because it tells the public nothing about the pollution control benefits to be achieved by implementation of the controls in the Tentative Order. All the Fact Sheet says, in essence, is that people like clean water and in theory may be willing to pay for it, that urban storm water may contribute to beach closures and that such beach closures have an economic impact. This analysis sheds no light on the relationship between a BMP's costs and the pollution control benefits to be achieved by implementing that BMP.

Second, the Fact Sheet contains faulty assumptions and relies upon outdated or inapplicable data. The California State University, Sacramento (CSUS) Cost Survey assessed program costs for Phase I cities. Nothing in the Fact Sheet links any of the actual conditions of the Phase I permits of the Phase I cities studied by CSUS with any of the requirements of the Tentative Order. Therefore, the study tells the public nothing about the costs to implement the Tentative Order. The data included in the Fact Sheet is also from seven years to more than a decade old. In short, the Fact Sheet uses old data from Phase I programs that have no linkage to any conditions of the Tentative Order. The full costs of implementing the entire program required by the Tentative Order in 2013 dollars must be assessed.

Lastly, stormwater agencies cannot readily establish or raise fees to help pay for the BMPs necessary to comply with either the California Toxics Rule (CTR) criteria or proposed Site Specific Objectives (SSOs) due to the requirements of Proposition 218, Proposition 26 and the Mitigation Fee Act. For instance, Proposition 218 requires that property-related fees be put to a vote, so cities cannot assess fees without the consent of a majority (two-thirds) of the property owners. Therefore, the costs associated with the implementation and maintenance of the BMPs are more likely to be covered through the stormwater agency General Funds.

The County recommends the following language changes:

I. Findings

28. Economic Considerations
As noted in the following finding, the San Diego Water Board finds that the requirements in this permit are ~~not~~ more stringent than the minimum federal requirements. Therefore, a CWC section 13241 analysis is ~~not~~ required for permit requirements that implement the effective prohibition on the discharge of non-storm water into the MS4 or for controls to reduce the discharge of pollutants in storm water to the MEP, or other provisions that the San Diego Water Board has determined appropriate to control such pollutants, as those requirements are mandated by federal law. ~~Not withstanding the above, the San Diego Water Board has developed an economic analysis of the requirements in this Order.~~ The economic analysis is provided in the Fact Sheet.

10. Finding 29 (Page 9 of 120) – The Regional Board has no Legal Ability to Determine Whether a Particular Mandate is Unfunded

The Tentative Order finds that none of the requirements therein constitute an unfunded local mandate. This finding, however, should be stricken as the Regional Board has no legal ability to determine whether a particular mandate is unfunded. The Commission on State Mandates is the only State agency that has the jurisdiction and ability to make that determination.

The Fact Sheet's discussion of unfunded state mandates is not consistent with applicable legal authority or the Tentative Order, as discussed below.

Article XIII B, Section 6(a) of the California Constitution ("Section 6") provides that whenever "any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse that local government for the costs of the program or increased level of service . . . ." Section 6 applies to storm water permits issued by the State Board and the Regional Boards.[29] Thus, Section 6 applies to the Tentative Order.

Section 6 was added to the California Constitution by voter approval in 1979, as part of a larger effort that had as its goal both limiting state and local spending and restricting the ability of local entities to raise revenue. Section 6 must be viewed as a "safety valve" designed to protect local governments from being placed in the untenable position of being required by the state, on the one hand, to implement certain state mandated programs while also, on the other hand, being prohibited from raising the money needed to pay for those state mandated programs.[30] Recognizing that such a situation was neither a fair nor a wise approach to governing, the voters enacted Section 6 to prevent state government from shifting financial responsibility for carrying out governmental functions to local agencies without the state paying for them.

[29] *County of Los Angeles v. Commission on State Mandates* (2007) 150 Cal.App.4th 898, 920.
[30] *Department of Finance v. Commission on State Mandates* (2003) 30 Cal.4th 727, 735; *County of San Diego v. State of California* (1997) 15 Cal.4th 68, 81.

To implement Section 6, the Legislature created the Commission on State Mandates ("Commission"). The Commission has sole and exclusive jurisdiction to determine whether a state law or order of a state agency is an unfunded state mandate.[31] In accordance with Section 6, Government Code section 17500 et seq., and case law, the Commission on State Mandates has determined that an unfunded state mandate exists when: (a) the state imposes a new program or higher level of service that is; (b) mandated by state law, not federal law; and (c) when the local government lacks adequate fee authority to pay for the new program or higher level of service.

Whether and how individual storm water permit conditions constitute unfunded state mandates is currently the subject of pending litigation. In 2009 and 2010, the Commission on State Mandates determined that parts of the Los Angeles Phase I Permit and major components of the San Diego Phase I Permit constituted unfunded state mandates. The State challenged these two decisions in court, and, in the San Diego matter, the court confirmed that only the Commission on State Mandates could make the ultimate determination of whether a permit condition constituted an unfunded state mandate. Specifically, the court in the San Diego case held that the "Commission has exclusive authority to determine whether the Regional Board has imposed a state mandate." The court in the San Diego case further concluded that the Commission on State Mandates should reconsider its decision to assess whether each of the individual permit conditions were required to achieve the MEP standard. Specifically, the court held that "the Commission must determine whether any of the permit conditions exceed the 'maximum extent practicable' standard." (Emphasis added.) Therefore, contrary to the discussion in the Fact Sheet, each permit condition (control) must be assessed to determine whether it is consistent with MEP.

The San Diego Copermittees have appealed the trial court's decision that the Commission on State Mandates revisit its decision. Regardless of the outcome of that appeal, however, the Commission on State Mandates is the entity that must determine whether a condition in the Tentative Order constitutes an unfunded state mandate.

I. Findings
~~29. 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 section 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~~

[31] Government Code §§ 17551 and 17552; *Kinlaw v. State of California* (1991) 54 Cal.3d 326, 331-334.

~~*301(a) (33 USC section 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 section 1313(d)). Once the USEPA or a state develops a TMDL, federal law requires that permits must contain water quality based effluent limitations consistent with the assumptions and requirements of any applicable wasteload allocation (40 CFR 122.44(d)(1)(vii)(B)).*~~

~~*See the Fact Sheet for further discussion of unfunded mandates.*~~

PERMIT PROVISIONS

General

11. The Tentative Order Includes Language That Provides An Overly Broad Interpretation Of The Stormwater Regulations By Requiring MS4s To "Enhance" and/or "Restore" Beneficial Uses Or Habitat

The Tentative Order recognizes that the overarching objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" and that, in order to carry out this objective, the CWA utilizes a number permitting programs and regulatory tools to regulate the discharge of pollutants and other materials to Waters of the United States (Waters of the U.S.).

However, CWA Section 402(p), that section which governs that permitting for municipal and industrial stormwater discharges, is only one regulatory tool within the CWA. Moreover, it requires the MS4s to focus on the quality and impact of their non-stormwater and stormwater discharges, not on the active enhancement and/or restoration of beneficial uses or habitat.

While the Fact Sheet recognizes that the development and implementation of a WQIP will identify the highest priority water quality conditions and that "addressing these threats and/or adverse impacts should restore the physical, chemical, and biological integrity of receiving waters, and result in the restoration and protection of the beneficial uses of the receiving waters in the Watershed Management Area",[32] the Tentative Order should not explicitly require the enhancement or restoration of beneficial uses as the CWA only requires that the Copermittees protect beneficial uses and prevent nuisance.[33]

[32] Fact Sheet, Page F-45
[33] 40 CFR 131.12()(1); CWC 13263(a) and 13050.

This is important from a prioritization and resource allocation perspective because while the Copermittees must control the discharge of pollutants in order to, ultimately, protect the beneficial uses of the receiving waters, they are not required to actively “enhance” or “restore” the beneficial uses and habitat of the receiving waters. It must be recognized that the actions and resources necessary to “protect” the beneficial uses may, in fact, be different than those that would be required to “enhance” or “restore” the beneficial uses of a particular receiving water.

The County recommends the following language changes:

B. Water Quality Improvement Plans
The purpose of this provision is to develop Water Quality Improvement Plans that guide the Copermittees’ jurisdictional runoff management programs towards achieving the outcome of improved water quality in MS4 discharges and receiving waters. The goal of the Water Quality Improvement Plans is to <u>address the impacts of MS4 discharges so that such discharges do not impair</u> ~~protect, preserve, enhance, and restore the~~ water quality and designated beneficial uses of waters of the state…….

B. Water Quality Improvement Plans
2. Priority Water Quality Conditions
e. Numeric Goals and Schedules
(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 water quality conditions which will be capable of demonstrating the ~~achievement of the restoration and/or~~ protection of water quality standards in receiving waters;

B. Water Quality Improvement Plans
3. Water Quality Improvement Strategies and Schedules
The Copermittees must develop specific water quality improvement strategies to address the highest priority water quality conditions identified within a Watershed Management Area. The water quality improvement strategies must address the highest priority water quality conditions 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.

D. Monitoring and Assessment Program Requirements
4. Assessment Requirements
a. Receiving Waters Assessment
(2)(b) Identify the most critical beneficial uses that must be protected ~~or restored~~ to ensure overall health of the receiving water;
(2)(c) Determine whether or not those critical beneficial uses are being protected ~~and where those beneficial used must be restored~~;

D. Monitoring and Assessment Program Requirements
4. Assessment Requirements
d. Integrated Assessment of Water Quality Improvement Plan
(1)(d) Identify beneficial uses of the receiving waters that are protected ~~or must be restored~~ in accordance with Provision D.4.a;

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(1)(e) Evaluate the progress toward achieving the interim and final numeric goals for ~~restoring impacted~~ protecting beneficial uses in the receiving waters.
(2)(b) Identify the 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 interim and final numeric goals for ~~restoring impacted~~ protecting beneficial uses in the receiving waters;
(2)(d) Evaluate the progress of the water quality improvement strategies toward achieving the interim and final numeric goals for ~~restoring impacted~~ protecting beneficial uses in the receiving waters.

E. Jurisdictional Runoff Management Program
5. Existing Development Management
e. Strategies to Address the Highest Priority Water Quality Conditions
(3)(b) Candidates for stream, channel, and/or habitat rehabilitation projects may be utilized to address storm water runoff flows and durations from areas of existing development that cause or contribute to hydromodification in receiving waters, rehabilitate channelized or hydromodified streams, restore wetland and riparian habitat, restore watershed functions, and/or ~~restore~~ protect beneficial uses of receiving waters;

E. Jurisdictional Runoff Management Program
7. Public Education and Participation
b. Public Participation
(3) Opportunities for members of the public to participate in programs and/or activities that can result in the prevention or elimination of non-storm water discharges to the MS4, reduction of pollutants in storm water discharges from the MS4, and/or ~~restoration and~~ protection of the quality of receiving waters.

F. Reporting
3. Progress Reporting
c. Regional Monitoring and Assessment Report
(1)(a) The beneficial uses of the receiving waters within the San Diego Region that are protected ~~or must be restored~~;
(1)(b) The progress toward protecting the ~~restoring~~ impacted beneficial uses in the receiving waters within the San Diego Region; and

12. The Tentative Order Includes Language That Provides An Overly Broad Use Of The Term "Prohibit"

Although some changes were made in the Tentative Order language, the Tentative Order should be reviewed for the correct use of the terminology "effectively prohibit" since it appears that there are a couple of cases where this language was not modified.

The term "prohibit" is broader than the CWA 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 Tentative Order 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.[34]

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 air condition condensate, individual car washing, and non-emergency fire-fighting flows or non-anthropogenic sources before instituting a prohibition.

The County recommends the following language changes:

Finding 12. Pollutants in Runoff
....By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not effectively prohibit or otherwise control…..

A. Prohibitions and Limitations
The purpose of this provision is to describe the conditions under which storm water from and non-storm water discharges into ~~and from~~ the MS4s are effectively prohibited or limited. The goal of the prohibitions and limitations……

D. Monitoring and Assessment Program Requirements
4. Assessment Requirements
b. MS4 Outfall Discharges Assessments
(1)(a) Each Copermittee must assess and report the progress of its illicit discharge detection and elimination program, required to be implemented pursuant to Provision E.2, toward ~~reducing and~~ effectively prohibiting non-storm water and illicit discharges into the MS4 within its jurisdiction as follows:

E. Jurisdictional Runoff Management Programs
1. Legal authority Establishment and Enforcement
(1) Effectively ~~P~~prohibit and eliminate all illicit discharges and illicit connections into its MS4

COVER PAGE – PERMIT ENROLLMENT

13. Cover Page (Page 1 of 120) – The Tentative Order Should Recognize That The Enrollment Of The Orange County and/or Riverside County Copermittees Must Necessitate Changes To The Order Based On The Report Of Waste Discharge Submittals

The Tentative Order does not account for Orange County's current Fourth Term permit as there is no process for a ROWD prior to initial adoption of the permit by the Regional Board, and thus

[34] Per 402(p)(3)(B)(ii)

there is no technical basis by which to adopt many of the permit terms that apply to Orange County. Instead, the Tentative Order states that the Orange County Copermittees will submit a ROWD and will become subject to the waste discharge requirements set forth within the Tentative Order:

1) After the expiration of their current Permits (Order No. R9-2009-0002 and Order No. R9-2010-0016, respectively); or
2) At a date earlier than the expiration of their current Permits subject to the conditions described in Provision F.6 of the Tentative Order.

Although the cover page of the Tentative Order states "After the San Diego Water Board receives and considers the Orange County Copermittees' Report of Waste Discharge and makes any necessary changes to the Order….", Provision F.6 and Provision H, do not similarly recognize that changes to the Order must be made prior to the enrollment of the Orange County and/or Riverside County Copermittees.

In addition, the Findings and Fact Sheet would need to consider the thorough program analysis that the Copermittees conduct as a part of their preparation of the ROWD and the deficiencies and program modifications that Copermittees themselves identify as necessary for the program.

The County recommends the following language changes:

F. Reporting
6. Application for Early Coverage
a. The Orange County Copermittees, collectively, or Riverside County Copermittees, collectively, may apply for early coverage under this Order by submitting a Report of Waste Discharge Form 200, with a written request for early coverage under this Order <u>and identification of the necessary changes to this Order, if any, that the Copermittees are recommending based on the ROWD submittal</u>.

b. The San Diego Water Board will review the application for early coverage <u>and will make any necessary changes to this Order</u>. A notification of coverage under this Order will be issued to the Copermittees in the respective county by the San Diego Water Board upon completion of the early coverage application requirements <u>and consideration of any necessary changes to this Order</u>. The effective coverage…..

<u>c. The timelines specified within this Order will be initiated based on the effective coverage date (as specified within the notification of coverage)</u>.

H. Modification of Programs
<u>5. The San Diego Water Board will review any applications received for early coverage under this Order (Provision F.6) as well as any general applications received for coverage under this Order and will consider any necessary changes to this Order based on the newly-obtained information and/or reports received as a part of the application process. Within the applications for coverage under this Order, the Copermittees shall identify the changes that are proposed to this Order.</u>

PROVISION A – PROHIBITIONS AND LIMITATIONS

14. Provision A (Entire Provision; Begins Page 13 of 120) – A Clear Linkage Between The Compliance Provisions And Prohibitions, Receiving Water Limitations, And Effluent Limitations Must Be Established

The proposed Prohibitions and Limitations 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 the violation 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. This was the subject of a State Water Resources Control Board workshop on November 20, 2012; however the State Board did not make any determinations or provide further direction after a day of testimony.

In addition, compliance with Provisions A.1, A.2 and A.3 should be linked to Provision A.4, Provision B, and Attachment E so that it is clear that the compliance mechanism for A.4 is the WQIP (Provision B) and/or the TMDL (Attachment E), as applicable.

The County recommends the following language changes:

A. Prohibitions and Limitations (Introduction)
[at the end of the introductory paragraph insert this sentence]
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.

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1. Discharge Prohibitions
a. Except as provided for in Provisions A.1.e or A.4, ~~D~~discharges 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.

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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 the list below to the extent that 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 (Provision A.4 and Attachment E). Where a TMDL has been developed and its terms have been incorporated into this Order (in a manner that is consistent with the waste load allocations set forth in the TMDL), a Permittee shall also be considered in compliance with such TMDL-related requirements provided in this Order, if it is timely and in good faith implementing the MEP-compliant control measures otherwise established by this Order.

15. Provision A (Entire Provision; Begins Page 13 of 120) – The Discharge Prohibitions Must Establish A Linkage With The Approved Compliance Schedules For TMDLs That Have Been Incorporated Into The Basin Plan

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 Copermittees the time necessary to develop and implement a plan to achieve water quality standards in impaired waters. The compliance schedules for adopted TMDLs have been incorporated into Attachment E and language is recommended in the Receiving Water Limitations provisions (A.2.c.) and the Effluent Limitations provisions (A.3.b.) pointing to the TMDL compliance schedules.

The Receiving Water Limitations language in the Tentative Order conflicts with TMDL compliance schedules. Language should be included to clarify that in instances where a TMDL is in effect, the Copermittees shall achieve compliance with these provisions as outlined in Attachment E (Specific provisions for TMDLs). Without this change, the Receiving Water Limitations language puts Copermittees in immediate and ongoing non-compliance with the permit, as opposed to incorporating TMDL implementation schedules.

In addition, the 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).

The County recommends the following language changes:

1. Discharge Prohibitions
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.

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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 the list below to the extent that 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 (Provision A.4 and Attachment E). Where a TMDL has been developed and its terms have been incorporated into this Order (in a manner that is consistent with the waste load allocations set forth in the TMDL), a Permittee shall also be considered in compliance with such TMDL-related requirements provided in this Order, if it is timely and in good faith implementing the MEP-compliant control measures otherwise established by this Order.

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2. Receiving Water Limitations
c. For receiving water limitations associated with water body pollutant combination addressed in a TMDL in Attachment E of this Order, the affected Copermittees shall achieve compliance as outlined in Attachment E.

Footnote #4 to Provision A.2.a.(4)(b)

[1] 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.

16. Provision A (Entire Provision; Begins Page 13 of 120) – The Receiving Water Limitations Language Is Discretionary And Should Be Revised To Provide A Clear Compliance Mechanism

The Copermittees envision WQIPs as the foundation for a BMP-based compliance approach for the Discharge Prohibitions and Receiving Water Limitations language. 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 Receiving Water Limitations language should be revised to expressly state that if exceedances of a water quality objective, water quality standard or any effluent limitation persist, or a discharge prohibition stated as an effluent limitation is not complied with, notwithstanding implementation of control measures, BMPs or compliance with the other water quality control program requirements of the Order, the Copermittee shall take actions to further reduce its discharges of such pollutants over time by complying with the iterative process, and that diligent implementation of the iterative process (i.e., WQIP) constitutes compliance to MEP.

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 Copermittees should demonstrate compliance. The WQIPs now provide a mechanism to provide the detail and quantitative analyses used to identify pollutant sources and implement BMPs to address those sources.

Language in Provision A.4 should be consistent with the California Stormwater Quality Association (CASQA) proposed receiving water limitation language (see **Attachment B**).

(See the recommended language changes in Provision A.4 of the Attachment B, Tentative Order redline)

PROVISION B – WATER QUALITY IMPROVEMENT PLANS

17. Provision B (Entire Provision; Begins Page 17 of 120) – The Water Quality Improvement Plans Should Be The Foundation For A BMP-Based Compliance Approach [35]

The County strongly supports the Watershed approach as described in the Tentative Order and Fact Sheet, with modifications as discussed below and in Provision E. A watershed-based approach is ideal for the implementation of stormwater programs in the San Diego Region as it allows for the integration of all program elements, focuses efforts on the highest priorities for each watershed through the customization of actions and strategies, and allows for streamlined reporting. This approach also supports the implementation of TMDLs, which are developed and implemented at the watershed scale.

Although the language for the WQIP recognizes the need for the consideration of provisions A.1, A.2, and A.3 as a part of the assessments and identification of water quality priorities, consistent with the intent described in the Fact Sheet, the language within the Tentative Order should explicitly identify that compliance with those provisions is achieved through the development and implementation of the WQIPs and or TMDLs (Attachment E).

In particular, the Fact Sheet states[36]:

> **Provision B includes requirements for the Copermittees to develop and implement Water Quality Improvement Plans to ultimately comply with the prohibitions and limitations under Provision A**. The Water Quality Improvement Plans will provide the Copermittees a comprehensive program that can achieve the requirements of the CWA.

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[35] Orange County notes that in the recently adopted LA MS4 permit a Reasonable Assurance Analysis (RAA) is required in order for a Copermittee to receive approval of a Watershed Management Program (essentially the same concept as the WQIP) and then utilize the Watershed Management Program as a method of compliance with Receiving Water Limitation provision requirements. Orange County believes that the WQIP process described in the Tentative Order, subject to the County's comments herein, is robust and does not necessitate the addition of a RAA. The WQIPs will provide enforceable, objective, and measurable requirements for the Copermittees, without having to implement an RAA.

To the extent that future proceedings on the Tentative Order contemplate a RAA requirement, Orange County strongly disagrees with such an approach. RAA would impose unnecessary and costly modeling requirements on the Copermittees. Orange County is not covered by TMDLs to the extent that Los Angeles and other counties are, where such models have already been developed and where such modeling efforts have previously been conducted for many pollutant-waterbody combinations. RAA is essentially a "TMDL-lite" process that would shift regulatory obligations from the Regional Board to the Copermittees. Although the Copermittees may choose to work with the Regional Board, as deemed appropriate and necessary in the future, to develop TMDLs collaboratively, the Copermittees object to the obligation to fully assume the Regional Board's regulatory responsibilities. Federal law is clear as to how a TMDL should be established, and RAA would "backdoor" the TMDL process into the WQIP approach without the Regional Board going through the necessary steps to formulate a TMDL. This would be a violation of federal law. There is also no federal or state authority by which a RAA could be required by the Regional Board. Even assuming such authority, a RAA is unnecessary and goes beyond MEP.

[36] Fact Sheet, Page F-42

> Implementation of the Water Quality Improvement Plans will also improve the quality of the receiving waters in the San Diego Region…..
>
> The Water Quality Improvement Plan also incorporates a program to monitor and assess the progress of the Copermittees' jurisdictional runoff management programs toward improving the quality of discharges from the MS4s, as well as tracking improvements to the quality of receiving waters. **A process to adapt and improve the effectiveness of the Water Quality Improvement Plans has also been incorporated into the requirements of Provision B to be consistent with the "iterative approach" required to achieve compliance with discharge prohibitions of Provisions A.1.a and A.1.c and receiving water limitations of Provision A.2.a, pursuant to the requirements of Provision A.4.**
>
> [Emphasis added]

In other words, the Water Quality Improvement Plan framework, as outlined within the Tentative Order, is established as the compliance mechanism for Provision A.4. In fact, this would complement the existing language in Provision A.4, which states (as modified below):

> Each Copermittee must achieve compliance with Provisions A.1, A.2, and A.3 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. The Water Quality Improvement Plans required under Provision B must be designed and adapted to ultimately achieve compliance with Provisions A.1, A2, and A.3.

In addition, the WQIP should identify the high priority water quality issues and conditions and provide direction for the development and implementation of the JRMPs. The goals for the WQIPs should be clearly identified and directly linked to the JURMPs (and the corresponding flexibility provided within the development of the JURMPs) (See also Provision E).

Lastly, although Regional Water Board staff have indicated that the WQIPs, once developed and approved, will functionally replace the CLRPs and BLRPs, the Tentative Order does not formally recognize this. The County recommends that a footnote be added to clarify that this is the case.

The County recommends the following language changes:

B. Water Quality Improvement Plans[1]
The purpose of this provision is to develop Water Quality Improvement Plans that guide the Copermittees' jurisdictional runoff management programs towards achieving the outcome of improved water quality in MS4 discharges and receiving waters. The goal of the Water Quality Improvement Plans 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. 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. This goal will be accomplished through an adaptive planning and management process that identifies the highest priority water quality conditions within a watershed and implements strategies through the jurisdictional runoff management programs 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 WQIP priorities for the applicable Watershed Management Area, if appropriate justification is provided.

[1] *– Once developed and approved, the Water Quality Improvement Plan and corresponding Jurisdictional Runoff Management Plan will functionally replace the Load Reduction Plans.*

18. Provision B (Entire Provision; Begins Page 17 of 120) – The WQIP Numeric Goals Are Used To Support The WQIP Implementation And Measure Progress, They Are Not Enforceable Compliance Standards

Similar to the footnotes in Provisions C.1.a and C.2.a, Provision B.2.e should explicitly state that the action levels, interim goals and final goals are not enforceable limitations.

The County recommends the following language changes:

B. Water Quality Improvement Plans
2. Priority Water Quality Conditions
e. Numeric Goals
The Copermittees must develop and incorporate action levels, interim and final numeric goals and schedules into the Water Quality Improvement Plan. Numeric goals must be used to support Water Quality Improvement Plan implementation and measure progress towards addressing the highest priority water quality conditions identified under B.2.c. Actions levels and numeric goals, themselves, are not enforceable compliance standards, effluent limitations, or receiving water limitations. When establishing numeric goals…..

19. Provision B.2 (Page 19 of 120) – The Schedule For The Achievement Of The Final WQIP Numeric Goals Should Be Based On The Results Of The Assessment Conducted As A Part Of The Development Of The WQIP Priority Water Quality Conditions

Provision B.2.e.(3)(e) states that the "final dates for achieving the final numeric goals must not initially extend more than 10 years beyond the effective date of this Order, unless a longer period of time is authorized by the San Diego Water Board Executive Officer or the schedule includes an applicable TMDL…."

In addition, the Fact Sheet notes that this provision is consistent with 40 CFR 122.47(a)(1), which states:

> (1) Time for compliance. Any schedules of compliance under this section shall require compliance as soon as possible, but not later than the applicable statutory deadline under the CWA.

The Fact Sheet provision citing 122.47 is inapplicable, however, and this provision should be deleted, as there are no federal or state statutory deadlines for achieving WQIP final numeric goals. Provision B.2.e(3)(e) expressly states that the Copermittees must develop and incorporate schedules for numeric goals into the WQIP, and compliance schedules for such goals are determined by the Copermittees with certain approvals by the Regional Board or the Executive Officer.

Furthermore, the requirement that the final dates for achieving the final numeric targets must not extend more than 10 years unless authorized by the Executive Officer is one of the most disconcerting requirements in the Tentative Order for several reasons:

- There is no factual or technical basis or other evidence for why a 10 year time period is the timeframe for all of the listed numeric goal, and therefore 10 year is arbitrary;
- Although the assessments that will be conducted pursuant to Provision E.2 will be thorough, they will not take the place of the type(s) of assessments that should be conducted when developing a TMDL and establishing waste load allocations and the timeframes necessary for achieving the allocations;
- Many TMDLs that are developed have longer timeframes than 10 years. There are many implementation schedules that extend out 15 or 20 years depending upon the constituent, sources, and potential compliance options available to the responsible parties.

Instead of a ‘one size fits all’ timeline of 10 years, the final date for achieving the final goals should be determined by the Copermittees during the development of the WQIP, which undergoes a thorough public review process. It should also be recognized that this date may need to be modified based on additional data and information that is received during the implementation of the WQIP.

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 does not cause confusion and is not mis-interpreted by third parties, language should be added to clarify this.

The County recommends the following language changes:

B. Water Quality Improvement Plans
2. Priority Water Quality Conditions
e. Numeric Goals
~~(3)(e) Final dates for achieving the final numeric goals must not initially extend more than 10 years beyond the effective date of this Order, unless a longer period of time is authorized by the San Diego Water Board Executive Officer or the schedule includes an applicable TMDL in Attachment E to this Order.~~

(4) The schedules for achieving the interim and final goals will be evaluated with each annual report [F.3.b.(1)(d)] and/or as a part of the ROWD development [B.5.a] to determine if they should be modified.

PROVISION C – ACTION LEVELS

20. Provision C (Entire Provision; Begins Page 28 of 120) – The Tentative Order Should Clarify The Use Of The Action Levels Within The WQIP And IDDE Program and the Copermittees Should Develop The NALs/SALs Based On The Priorities Of The WQIP and/or the IDDE Program

Although the modifications in this provision have improved from the Administrative Draft, there are a number of outstanding issues related to the proposed language that need to be addressed in order for the Action Levels to be effective and assist with the overall management and assessment of the Stormwater Program. These issues include:

- The differentiation for the Non-stormwater Action Levels (NALs) between the WQIP and Illicit Discharge Detection and Elimination (IDDE) program element; and
- The Copermittees should be allowed to develop or use previously established NALs/Stormwater Action Levels (SALs) instead of the values identified within this provision.

These outstanding issues are discussed in additional detail below.

<u>A. The Tentative Order Needs to Differentiate and Provide a Clear Linkage Between Provisions B and C and Provisions E.2 and C.</u>

Provision C.1 indicates that the NALs will be incorporated into the WQIPs and used to:

a) Support the development and prioritization of water quality improvement strategies for addressing non-stormwater discharges to and from the MS4s;

b) Assess the effectiveness of the water quality improvement strategies toward addressing MS4 non-storm water discharges; and

c) Support the detection and elimination of non-stormwater and illicit discharges to and from the MS4.

Similarly, Provision C.2 indicates that the SALs will be incorporated into the WQIPs and used to:

a) Support the development and prioritization of water quality improvement strategies for reducing pollutants in stormwater discharges from the MS4s;

b) Assess the effectiveness of the water quality improvement strategies toward reducing pollutants in stormwater discharges….

Although the NALs and SALs have these stated objectives, the Tentative Order must provide a clearer linkage and differentiate between

- Provision B (WQIPs) and Provision C (Action Levels) and
- Provision E.2 (Illicit Discharge Detection and Elimination Program [IDDE]) and Provision C.

Examples of what clarification is necessary include the following:

- Provision B does not include any mention of the NALs or SALs even though they are supposed to be incorporated into the WQIPs.
- It should be recognized 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 NALs and SALs developed and incorporated into the WQIP should address the high priority water quality conditions identified. (see comment below)

<u>B. The Copermittees Need to Have the Flexibility to Develop or Use Previously Established Action Levels</u>

Although the Tentative Order states that the Copermittees are to <u>develop and incorporate</u> numeric non-stormwater and numeric stormwater action levels into the Water Quality Improvement Plans (C.1 and C.2, respectively), the Tentative Order then contradicts this approach and mandates that the Copermittees include all of the numeric actions levels as identified in tables C-1, C-2, C-3, C-4 and C-5.

The mandated action levels are problematic for the following reasons:

1) The NALs for the WQIPs will likely include different constituents and/or values than those values that would be used for the IDDE program.
2) The NALs and SALs will likely include different constituents and/or values between WQIPs depending upon the identified high priority water quality conditions.
3) The NALs set for the IDDE program should not be based on water quality objectives at the 'end of pipe'. Instead, these values should be based on upset values.
4) In Provision B.2.d the Copermittees 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. If the mandated values have to be used as action levels within the WQIP, they may not correspond to the highest priority water quality conditions or the metrics that are being used to measure progress. Thus, the chemically based NALs/SALs may direct resources away from the watershed priorities.

As a part of the IDDE program, the County had developed and implemented an innovative Dry Weather Reconnaissance Program, based upon statistically derived benchmarks to identify illegal discharges and illicit connections during the typically dry summer months of May through September using a suite of water quality analyses conducted in the field at designated random and targeted drains. The 2010-11 reporting period marked the ninth season of dry weather monitoring in the San Diego Region. Monitoring in the San Diego Region under the Dry Weather Reconnaissance Program was replaced in August 2011 with the NALs Monitoring Program (pursuant to Order No. R9-2009-0002).

After the implementation of the NAL-based program for a year, some clear differences between the previously established Dry Weather Reconnaissance Program and the NAL-based program have been evident (see the table below).

- Of the 236 site visits conducted in the Dry Weather Reconnaissance Program, there were 77 exceedances that required follow up actions;
- For the Dry Weather Reconnaissance Program, this represented 32% of the discharges samples being prioritized for follow up actions and/or investigations;
- Of the 68 site visits conducted in the NAL program, there were 167 exceedances that required follow up actions (almost 2 x the number of site visits); and
- For the NAL program, there was limited ability to prioritize discharges for follow up since some of the constituents exceeded the NALs 33-91% of the time.

Comparison of NAL Program and Previous Dry Weather Reconnaissance Program

	NAL Exceedances 2011 - 12		DW Reconn Pgm Action Level* Exceedances May-Sep 2010	
Constituent	**Number**	**%**	**Number**	**%**
pH	1	1.5	12	5.1
MBAS	1	1.5	2	0.8
Turbidity	5	11	3	1.3
Dissolved Oxygen	1	1.5	2	0.8
Fecal Coliform	19	42	0	0
Enterococcus	41	91	1	0.4
Total P / Ortho PO4	37	82	6	2.5
Total N / Nitrate	41	91	22	9.3
Nickel	6	13	18	7.6
Cadmium	15	33	11	4.7
Total # of Site Visits	**68**		**236**	

The conclusions from the implementation of the Orange County NAL-based program to date are:

- The NAL program replaced an previously existing and effective program;
- The NAL program has required increased resources and has resulted in everything being a priority;
- There have been many exceedances that have been due to non-IDDE factors such as local geology (especially for nickel and cadmium);
- It has been very difficult to determine the endpoints, the sources, of the various non-stormwater discharges since the discharges are so co-mingled; and
- There is a strong need for a regionally-based prioritization so that there is not a mis-direction of limited resources

The Regional Water Board would be well served to review the results of the Orange County NAL-based program to date and consider the revisions as proposed in order to assist with the prioritization of resources and water quality issues. The Tentative Order should establish the purpose(s) of the action levels and then allow the Copermittees to develop the numeric action levels. The mandated NALs and SALs should only be considered “default” values if the Copermittees do not develop their own NALs/SALs or use previously established values. Previously developed action levels should serve as interim action levels until the WQIPs are completed.

The County recommends the following language changes:

B. Water Quality Improvement Plans
2. Priority Water Quality Conditions
e. Numeric Goals and Schedules
The Copermittees must develop and incorporate action levels, interim and final numeric goals[37] and schedules into the Water Quality Improvement Plan. Numeric goals must be used to support Water Quality Improvement Plan implementation and measure progress towards addressing the highest priority water quality conditions identified under Provision B.2.c. Action levels and 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:

C. Action Levels
The purpose of this provision is for the Copermittees to incorporate numeric non-stormwater action levels (NALs) and stormwater action levels (SALs) in the Water Quality Improvement Plans (WQIP) and numeric non-stormwater action levels (NALs) in the Illicit Discharge Detection and Elimination (IDDE) Program.

- *For the purposes of the WQIPs, ~~Water Quality Improvement Plan~~ the goal of the action levels is to guide the implementation efforts and measure progress towards the protection of the high priority water quality conditions and designated beneficial uses of waters of the state from adverse impacts caused or contributed to by MS4 discharges. This goal will be accomplished through monitoring and assessing the quality of the MS4 discharges during the implementation of the Water Quality Improvement Plans.*

- *For the purposes of the IDDE program, the goal of the action levels is to assist in the effective prohibition of non-stormwater discharges into the MS4.*

Action levels will be developed and incorporated into the WQIP (Provision B) and the IDDE Program (Provision E). 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-stormwater and stormwater MS4 discharges using an approach approved by the Regional Board or use the default non-stormwater and stormwater action levels prescribed in C.1 and C.2 below.

The Copermittees will submit the action levels as a part of the WQIP and JURMP submittals. The action levels currently established will serve as the interim action levels until revised action levels are completed and approved. Exceedances of the action levels are not subject to enforcement or non-compliance actions under this Order.

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[37] Interim and final numeric goals may take a variety of forms such as TMDL established WQBELs, 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. Except for TMDL established WQBELs, interim and final numeric goals and corresponding schedules may be revised through the adaptive management process under Provision B.5.

1. *Default Non-Storm Water Action Levels*[38]

~~*The Copermittees must develop and incorporate numeric non-storm water action levels (NALs) into the Water Quality Improvement Plan to: 1) support the development and prioritization of water quality improvement strategies for addressing non-storm water discharges to and from the MS4s, 2) assess the effectiveness of the water quality improvement strategies toward addressing MS4 non-storm water discharges, required pursuant to Provision D.4.b.(1), and 3) support the detection and elimination of non-storm water and illicit discharges to and from the MS4, required pursuant to Provision E.2.*~~[39]*The following non-stormwater action levels (NALs) must be incorporated in the WQIPs and IDDE program if the Copermittees have not developed their own NALs for the identified high priority constituents using an approach approved by the Regional Board EO.*

~~C.1.c For the NALs incorporated into the Water Quality Improvement Plan, the Copermittees may develop and incorporate secondary NALs specific to the Watershed Management Area at levels greater than the NALs required by Provisions C.1.a and C.1.b which can be utilized to further refine the prioritization and assessment of water quality improvement strategies for addressing non-storm water discharges to and from the MS4s, as well as the detection and elimination of non-storm water and illicit discharges to and from the MS4. The secondary NALs may be developed using an approach acceptable to the San Diego Water Board.~~

2. *Default Storm Water Action Levels*[40]

The Copermittees must develop and incorporate numeric storm water action levels (SALs) in the Water Quality Improvement Plans to: 1) support the development and prioritization of water quality improvement strategies for reducing pollutants in storm water discharges from the MS4s, and 2) assess the effectiveness of the water quality improvement strategies toward reducing pollutants in storm water discharges, required pursuant to Provision D.4.b.(2)[41].

The following stormwater action levels (SALs) must be incorporated in the WQIPs if the Copermittees have not developed their own SALs for the identified high priority constituents using an approach approved by the Regional Board EO.

~~*C.2.c For the SALs incorporated into the Water Quality Improvement Plan, the Copermittees may develop and incorporate secondary SALs specific to the Watershed Management Area at levels greater than the SALs required by Provisions C.2.a and C.2.b which can be utilized to further refine the prioritization and assessment of water quality improvement strategies for reducing pollutants in storm water discharges from the MS4s. The secondary SALs may be developed based on the approaches recommended by the State Water Board's Storm Water Panel*[42] *or using an approach acceptable to the San Diego Water Board.*~~

[38] NALs are not considered by the San Diego Water Board to be enforceable limitations.

[40] SALs are not considered by the Regional Water Board to be enforceable limitations.
[41] The Copermittees may utilize SALs or other benchmarks currently established by the Copermittees as interim SALs until the WQIPs are accepted by the San Diego Water Board Executive Officer.

PROVISION D – MONITORING AND ASSESSMENT PROGRAM REQUIREMENTS

21. Provision D (Entire Provision; Begins Page 33 of 120) – The Prescribed Receiving Water Program Does Not Incorporate A Question Driven Approach Nor Does The Tentative Order Recognize That The Phase I Municipal NPDES Copermittees Are Not The Sole Dischargers To Receiving Water

Provision D.1.f provides for alternative watershed monitoring requirements that may be fulfilled in addition to or in lieu of the receiving water monitoring program detailed in Provision D.1.b to D.1.d

The Tentative Order contains a modified approach to receiving waters monitoring that has not been implemented in previous Tentative Orders. While this approach provides a welcomed opportunity for the Copermittees to shift their resources towards assessing MS4 contributions, the conceptual basis of the receiving waters programs needs additional consideration. The prescribed receiving water program does not appear to be a question driven approach nor does the Tentative Order recognize that the Phase I municipal NPDES Copermittees are not the sole dischargers to receiving waters and that the contributions from many other regulated and unregulated entities contribute to the overall receiving water conditions.

The Tentative Order should establish an integrated and collaborative receiving water program that is consistent with watershed management area priorities in lieu of individual and uncoordinated efforts. The Regional Board should:

1. Establish a water-body oriented monitoring and assessment workgroup for each Watershed Management Area as outlined in the staff report titled "A Framework for Monitoring and Assessment in the San Diego Region" that establishes a question-driven monitoring program;
2. Establish language that provides an opportunity for all regulated discharges to create pooled resources so that monitoring efforts are singularly focused on receiving waters during both dry and wet weather conditions; and
3. Establish language that provides for an alternate compliance option for the Monitoring and Reporting program in lieu of the prescribed receiving waters monitoring program as previously adopted in R9-2009-0002 that lead to the development of the Orange County Regional Shoreline Monitoring Program.

The County recommends the following changes

D. Monitoring and Assessment Program Requirements
1. Receiving Water Monitoring Requirements
f. Alternate Watershed Monitoring Requirements

The San Diego Water Board may direct the Copermittees to participate in an effort to develop alternative watershed monitoring with other regulated entities, other interested parties, and the San Diego Water Board to refine, coordinate, and implement 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.

<u>In lieu of the Receiving Water Monitoring Program requirements specified in 1.a to 1.d, the Copermittees may participate in the development and implementation of monitoring for the</u>

collaborative receiving waters monitoring program. It is expected that a regional monitoring will allow for a more effective and efficient receiving waters monitoring program. The regional monitoring plan must be submitted to the Executive Officer for review and approval. Documentation of participation and monitoring shall be included in the annual report.

22. Provision D (Entire Provision; Begins Page 33 of 120) – The Prescribed MS4 Outfall Discharge Monitoring Needs Additional Refinement In Order To Support The Development Of Effective Water Quality Improvement Plans

A. Transitional Wet Weather MS4 Outfall Discharge Monitoring Program

In order to fulfill the jurisdictional and land use requirements for the monitoring and assessment provisions of the Tentative Order, the coordination of the wet weather MS4 program should be scheduled to start at a later date. The rescheduling of the commencement of wet weather MS4 monitoring will provide adequate time to complete the required geo-location and land use analysis of the major MS4 drainage areas.

The County recommends the following changes

2. MS4 Outfall Discharge Monitoring
a. Transitional MS4 Outfall Discharge Monitoring
(3) Transitional Wet Weather MS4 Outfall Discharge Monitoring
(b) Transitional Wet Weather MS4 Outfall Discharge Monitoring Frequency

Each wet weather MS4 outfall discharge monitoring station selected pursuant to Provision D.2.a.(3)(a) must be monitored twice during the wet season (October 1 – April 30). One wet weather monitoring event must be conducted during the first wet weather event of the wet season, and one wet weather monitoring event at least a month after the first wet weather event of the wet season.

Transitional wet weather MS4 outfall discharge monitoring may begin in year 2 of the transitional period once the MS4 outfall discharge monitoring stations have been inventoried and evaluated pursuant to Provision D.2.a.(1)

B. Transitional MS4 Outfall Discharge Analytical Monitoring

The Copermittees need the flexibility to retain consistent monitoring methods between permit cycles in order to maintain the long term trend baselines.

The County recommends the following changes

2. MS4 Outfall Discharge Monitoring
a. Transitional MS4 Outfall Discharge Monitoring
(3) Transitional Wet Weather MS4 Outfall Discharge Monitoring
(e) Transitional Wet Weather MS4 Outfall Discharge Analytical Monitoring

(iv) For all other constituents, composite samples must be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques:

- *[a] Time-weighted composites collected over the length of the storm event or the first 24 hour period, whichever is shorter, composed of ~~24~~ discrete ~~hourly~~ samples, which may be collected through the use of automated equipment, or*
- *[b] Flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter, which may be collected through the use of automated equipment, or*
- *[c] 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;*

Additionally in Provision D:

2. MS4 Outfall Discharge Monitoring
c. Wet Weather MS4 Outfall Discharge Monitoring
(5) Wet Weather MS4 Outfall Discharge Analytical Monitoring
(d) composite sample requirements

- (i) *Time-weighted composites collected over the length of the storm event or the first 24 hour period, whichever is shorter, composed of discrete samples, which may be collected through the use of automated equipment ~~Time weighted composites composed of 24 discrete hourly samples, which may be collected through the use of automated equipment~~, or,*
- (ii) Flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter, which may be collected through the use of automated equipment, or
- (iii) 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.

23. Provision D (Entire Provision; Begins Page 33 of 120) – The Copermittees Need To Have The Flexibility To Develop Or Use Analytical Monitoring Requirements In The Water Quality Improvement Plans Based On Assessments Of Current Sources That May Contribute To The Section 303(d) Water Body Impairments

The Regional Board should recognize the inherent difficulties associated with monitoring 303(d) constituents such as the legacy pesticides or the monitoring of aquatic toxicity. Many existing developments were never subjected to the application of legacy pesticides such as DDT and, as such, these constituents are highly unlikely to be found in modern communities. The Regional Board should also recognize that laboratory toxicity tests provide a cumulative perspective of pollutant effects that may or may not be sampled as part of a monitoring program.

The Copermittees should be relieved of analytical monitoring requirements if supporting information can be provided to document the current pollutant concentrations or may provide historic information to support the absence of usage of these constituents in the MS4 drainage area. Additionally, the Copermittees should be allowed to develop an alternate approach for monitoring that allows the Copermittees to evaluate and identify the cause of toxicity currently affecting receiving waters and to iteratively adapt the monitoring program to address these chemical stressors in their MS4 outfall discharges through the WQIPs.

The County recommends the following changes

2. MS4 Outfall Discharge Monitoring
a. Transitional MS4 Outfall Discharge Monitoring
(3) Transitional Wet Weather MS4 Outfall Discharge Monitoring
(e) Transitional Wet Weather MS4 Outfall Discharge Analytical Monitoring
(iv) *The samples must be analyzed for the following constituents:*

- *[a] Constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA section 303(d) List <u>with the exception of toxicity</u>[1]*
- *[b] Constituents for implementation plans or load reduction plans (e.g. Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for watersheds where the Copermittees are listed responsible parties under the TMDLs in <u>Attachment E</u> to this Order, and*
- *[c] Constituents listed in in Table D-7.*
- *[e] <u>The Copermittee may be relieved of analytical monitoring requirements [a] to [c] if supporting information can be provided or has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary</u>.*

Footnote to [a]
<u>[1]Copermittees may provide an alternate approach to evaluate and identify the cause of toxicity currently affecting receiving waters and to iteratively adapt the monitoring program to address these chemical stressors in their MS4 outfall discharges in the monitoring plan which is subject to Regional Board approval.</u>

Additionally in Provision D

2. MS4 Outfall Discharge Monitoring
b. Dry Weather MS4 Outfall Discharge Monitoring
(2) Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring
(e) Non-Storm Water Persistent Flow MS4 Outfall Discharge Analytical Monitoring
(iii) Collect grab or composite samples to be analyzed for the following constituents:

- *[a] Constituents contributing to the highest priority water quality conditions identified in the Water Quality Improvement Plan,*
- *[b] Constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA section 303(d) List <u>with the exception of toxicity</u>[1],*
- *[c] Constituents for implementation plans or load reduction plans (e.g. Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for watersheds where the Copermittees are listed responsible parties under the TMDLs in <u>Attachment E</u> to this Order,*
- *[d] Applicable NAL constituents, and*
- *[e] Constituents listed in Table D-8, unless the Copermittee has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary.*
- *[f] <u>The Copermittee may be relieved of analytical monitoring requirements if supporting information can be provided or has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary.</u>*

Footnote to [b]

[1]*Copermittees may provide an alternate approach to evaluate and identify the cause of toxicity currently affecting receiving waters and to iteratively adapt the monitoring program to address these chemical stressors in their MS4 outfall discharges in the monitoring plan which is subject to Regional Board approval.*

Additionally in Provision D

2. MS4 Outfall Discharge Monitoring
c. Wet Weather MS4 Outfall Discharge Monitoring
(5) Wet Weather MS4 Outfall Discharge Analytical Monitoring
(f) *Analysis for the following constituents is required:*

(i) *Constituents contributing to the highest priority water quality conditions identified in the Water Quality Improvement Plan,*

(ii) *Constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA section 303(d) List, with the exception of toxicity[1],*

(iii) *Constituents for implementation plans or load reduction plans (e.g. Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for watersheds where the Copermittees are listed responsible parties under the TMDLs in Attachment E to this Order, and*

(iv) *Applicable SAL constituents.*

(v) *The Copermittee may be relieved of analytical monitoring requirements if supporting information can be provided or has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary.*

Footnote to [ii]
[1]*Copermittees may provide an alternate approach to evaluate and identify the cause of toxicity currently affecting receiving waters and to iteratively adapt the monitoring program to address these chemical stressors in their MS4 outfall discharges in the monitoring plan which is subject to Regional Board approval*

Additionally in Provision D

Footnotes Table D-3.
1. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
2. E. Coli may be substituted for Total ~~Fecal~~ Coliform at inland receiving water monitoring stations.

Footnotes Table D-7.
1. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
2. E. Coli may be substituted for Total ~~Fecal~~ Coliform for discharges to inland surface waters.

Footnotes Table D-8.
1. Nitrite and nitrate may be combined and reported as nitrite+nitrate.
2. E. Coli may be substituted for Total ~~Fecal~~ Coliform for discharges to inland surface waters

PROVISION E – JURISDICTIONAL RUNOFF MANAGEMENT PROGRAMS

24. Provision E (Entire Provision; Begins Page 64 of 120) – The JRMP Provisions Must Be Modified So As Not To Negate The Very Intent And Purpose Of The Watershed Approach And The Focus On The Highest Priorities Within Each Watershed Management Area

The Tentative Order states that the purpose of the WQIPs is to guide the Copermittees' jurisdictional runoff management programs towards achieving improved water quality by identifying the highest priority water quality conditions within a watershed and implementing strategies through the jurisdictional runoff management programs (Provision B).

Provision E goes on to state that the jurisdictional runoff management programs will be implemented in accordance with the strategies identified in the WQIPs. In addition, the Fact Sheet states:

> "Where the Water Quality Improvement Plan is the '*comprehensive planning process'* on a Watershed Management Area scale, requiring '*intergovernmental coordination'*, the jurisdictional runoff management program document is the '*comprehensive planning process'* on a jurisdictional scale that should be coordinated with the other Copermittees in the Watershed Management Area to achieve the goals of the Water Quality Improvement Plan."[43]

The Fact Sheet also supports this when it states:

> "Based on the economic considerations below, the San Diego Water Board has provided the Copermittees a significant amount of flexibility to choose how to implement the requirements of the Order. This Order also allows the Copermittees to customize their plans, programs, and monitoring requirements. In the end, it is up to the Copermittees to determine the effective BMPs and measures necessary to comply with this Order. The Copermittees can choose to implement the least expensive measures that are effective in meeting the requirements of this Order."[44]

Although the Fact Sheet states that "Implementation of the components of each Copermittee's jurisdictional runoff management program must be consistent with the water quality improvement strategies identified within the Water Quality Improvement Plan,"[45] the Tentative Order then requires the Copermittees to incorporate <u>all</u> of the requirements identified within Provision E regardless of the high priority water quality conditions that have been identified within the WQIP. If the Copermittees are required to implement <u>all</u> of the requirements in Provision E instead of prioritizing and implementing those requirements that directly address the highest priority water quality conditions and support the watershed strategies, then the program becomes additive instead of prioritized and focused. The net result is that the approach in Provision E negates the prioritized and strategic approach outlined in Provision B.

The Tentative Order should provide a clear linkage between Provision B and Provision E and state that the WQIP should guide the customization of the JRMP to meet the highest water quality priorities and strategies in a given watershed.

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[43] Fact Sheet, Page F-71
[44] Fact Sheet, Page F-17
[45] Fact Sheet, Page F-71

(See also the corresponding comments under Provision E.2, E.3. E.4, E.5, and E.7)
The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs [Intro]
The purpose of this provision is for each Copermittee to implement a program to control non-stormwater ~~the~~ discharges ~~contribution~~ ~~of pollutants~~ into and ~~the~~ stormwater discharges from the MS4 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 goal of the jurisdictional runoff management programs is to implement strategies and actions that effectively prohibit non-storm water discharges into the MS4 and reduce the discharge of pollutants in storm water to the MEP. This goal will be accomplished through implementing the jurisdictional runoff management programs in accordance with the water quality priorities and strategies identified in the Water Quality Improvement Plans.

Each Copermittee must update its jurisdictional runoff management program document, in accordance with Provision F.2.a, to incorporate ~~all~~ the requirements of Provision E consistent with the highest water quality priorities as identified in the corresponding Water Quality Improvement Plan. 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.

Similarly, the County recommends the following language changes be incorporated into each of the program elements within Provision E as identified below:
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 as identified in the corresponding Water Quality improvement Plan.

LEGAL AUTHORITY

25. Provision E.1 (Page 64 of 120) – The Copermittees Are Only Responsible For Administering and Enforcing the Codes and Ordinances Applicable To Their Jurisdictions

Provision E.1.a(2) requires the Copermittees to establish the legal authority to control the contribution of pollutants in discharges of runoff associated with industrial and construction activity within their jurisdictions. Since the Copermittees can only administer and enforce their local codes and ordinances, it is unnecessary and confusing to include the language regarding the Statewide Industrial and Construction General Permits. The sites subject to the Statewide Permits (which are administered and enforced by the State and Regional Boards) are already inspected by state staff and are included within the Copermittee inventories, inspection, and enforcement programs.

In addition, language that acknowledges that the local codes and ordinances will include the legal authorities identified within the Tentative Order to the extent permitted by the Constitution should be included.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
1. Legal Authority Establishment and Enforcement

a.(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[1] ~~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~~

[1] - The Copermittees 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).

E. Jurisdictional Runoff Management Programs
1. Legal Authority Establishment and Enforcement
a.(10) 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.

26. Provision E (Entire Provision; Begins Page 64 of 120) – The Requirement For Third Party BMP Effectiveness Documentation Is Duplicative

The Tentative Order includes a provision that requires the Copermittees to demonstrate that they have the legal authority to require documentation on the effectiveness of BMPs. The County has concerns about this provision for the following reasons:

As it is currently written, this provision broadly applies to any aspect of the stormwater program where BMPs have been implemented – the result is that this provision sets up a process for the establishment of multiple third party monitoring programs and expenditure of a significant amount of funds to monitor the effectiveness of BMPs. If the desire is to document the effectiveness of certain types of BMPs, it would be much more effective and scientifically sound to establish special studies by entities qualified to conduct such sampling instead of requiring potentially hundreds of third parties to conduct a monitoring program for every BMP that is implemented.

This provision is redundant with other requirements in the Tentative Order in that it ignores the fact that the New Development/Significant Redevelopment section of the Drainage Area Management Plan (DAMP) (Section 7.0) establishes a process for the selection, design, and long-term maintenance of permanent BMPs for new development and significant redevelopment projects and requires developers to select BMPs that have been demonstrated as effective for their project category. By going through a thorough process, the Copermittees have determined what BMPs would be effective for a particular project – thus eliminating the need to establish a monitoring program for every BMP implemented.

This provision ignores the fact that the Copermittees have already established legal authority for their development standards so that project proponents have to incorporate and implement the required BMPs.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
1. Legal Authority Establishment and Enforcement
~~a.(8) 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;~~

<u>ILLICIT DISCHARGE DETECTION AND ELIMINATION</u>

27. Provision E.2 (Page 65 of 120) – The Illicit Discharge Detection And Elimination Program Provisions Must Be Modified So As Not To Negate The Very Intent And Purpose Of The Watershed Approach And The Focus On The Highest Priorities Within Each Watershed Management Area

(See the corresponding comments under Provision E – Jurisdictional Runoff Management Programs)

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination [Intro]
….The illicit discharge detection and elimination program must be implemented in accordance with the strategies identified in the Water Quality Improvement Plan ~~and include, at a minimum, the following requirements.~~ <u>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 and strategies as identified in the corresponding Water Quality improvement Plan(s).</u>

Move Provision 2e, "Strategies to Address the Highest Priority Water Quality Conditions" to just after the Introduction to the section. This should become the new Provision 2.a.

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
a. Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented as part of the illicit discharge detection and elimination program to address ~~non-stormwater and~~ illicit discharges and connections that the Copermittee has identified as potential sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:

(1) *Provide specific details about how the strategies and/or activities will be implemented (e.g. designate ~~additional~~ BMPs, focus education, and/or increase/decrease frequency of inspections in specific areas); and*

(2) *The strategies and/or activities must be consistent with the requirements of Provisions E.2.a-d and the strategies identified in the Water Quality Improvement Plan.*

28. Provision E.2 (Page 65 of 120) – The Copermittees Should Be Allowed The Flexibility To Prioritize Their IDDE Program To Focus On Those Non-Stormwater Discharges That Are Likely To Be A Source Of Pollutants

Provision E.2.a identifies several categories of discharges that are to be considered "non-stormwater discharges." The categories that are considered to be non-stormwater discharges (do not need to be addressed as an illicit discharge) generally include the following:

- E.2.a.(1) - Those discharges which have coverage under a separate NPDES Permit;
- E.2.a.(2) - Those discharges which have coverage under a separate NPDES Permit
- E.2.a.(3) - Those discharges which are recognized within the federal regulations as acceptable unless they are identified as a source of pollutants to the receiving waters;
- E.2.a.(4) - Those discharges that are addressed by a set of requirements/BMPs; and
- E.2.a.(5) - Firefighting related discharges that are addressed by a set of requirements/BMPs.

In comparison, the Code of Federal Regulations [40CFR122.26(d)(2)(iv)(B)(1)] states that, as a part of an illicit discharge program, that the Copermittees shall incorporate a series of items including the following:

> A description of a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; this program description shall address all types of illicit discharges, <u>however the following category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States</u>: [Emphasis added and items re-ordered based on Tentative Order (TO) structure]
>
> - landscape irrigation, [not included in TO]
> - irrigation water, [not included in TO]
> - lawn watering, [not included in TO]
> - street wash water [not included in TO]
> - *uncontaminated pumped ground water, [E.2.a.(1)]*
> - *foundation drains, [E.2.a.(3)]; [E.2.a.(1)]*
> - *water from crawl space pumps, [E.2.a.(1)]*
> - *footing drains, [E.2.a.(3)]; [E.2.a.(1)]*
> - water line flushing, [E.2.a.(2)]
> - diverted stream flows, [E.2.a.(3)]
> - rising ground waters, [E.2.a.(3)]
> - springs, [E.2.a.(3)]
> - uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)) to separate storm sewers, [E.2.a.(3)]
> - flows from riparian habitats and wetlands, [E.2.a.(3)]
> - discharges from potable water sources, [E.2.a.(3)]
> - air conditioning condensation, [E.2.a.(4)]
> - individual residential car washing, [E.2.a.(4)]
> - dechlorinated swimming pool discharges, and [E.2.a.(4)]
>
> (program descriptions shall address discharges or flows from fire fighting [E.2.a.(5)] only where such discharges or flows are identified as significant sources of pollutants to waters of the United States);

Although the discharges listed within the Federal Regulations are generally considered to be "conditionally exempt" from the illicit discharge program (unless they are found to be sources of pollutants), the Regional Water Board has determined that the following categories of non-stormwater discharges

- uncontaminated pumped ground water, [E.2.a.(1)]
- foundation drains, [E.2.a.(3)]; [E.2.a.(1)]
- water from crawl space pumps, [E.2.a.(1)]
- footing drains, [E.2.a.(3)]; [E.2.a.(1)]

will be considered to be illicit discharges unless the discharge has coverage under the following two NPDES Permits:

1) NPDES Permit No. CAG919001 (Order No. R9-2007-0034)
General Waste Discharge Requirements for Discharges from Temporary Groundwater Extraction and Similar Waste Discharges to San Diego Bay, Tributaries Thereto Under Tidal Influence, and Storm Drains or Other Conveyance Systems and Tributary Thereto

- Groundwater Extraction defined as (I.A): Existing and proposed discharges of groundwater extraction waste to San Diego Bay from construction groundwater extraction, foundation groundwater extraction, and groundwater extraction related to groundwater remediation cleanup projects (collectively groundwater extraction):

  1. Result from similar operations (all involve extraction and discharge of groundwater);

  2. Are the same type of wastes (<u>all are groundwater containing or potentially containing petroleum hydrocarbons, solvents, or other pollutants</u>);

  3. Require similar effluent limitations for the protection of the beneficial uses of San Diego Bay;

  4. Require similar monitoring; <u>and</u>

  5. Are more appropriately regulated under a WDR rather than individual permits.

- Eligibility Criteria (I.C): This WDR is intended to cover <u>temporary discharges</u> of groundwater extraction wastes to San Diego Bay, and its tributaries under tidal influence, from groundwater extraction <u>due to construction and other groundwater extraction activities</u>.

2) NPDES Permit No. CAG919002 (Order No. R9-2008-002)
General Waste Discharge Requirements for Discharges from Groundwater Extraction and Similar Discharges to Surface Waters Within the San Diego Region Except for San Diego Bay

- Groundwater Extraction defined as (I.A): Existing and proposed discharges of groundwater extraction waste to surface waters within the San Diego Region from construction groundwater extraction, foundation groundwater extraction, and groundwater extraction related to groundwater remediation cleanup projects (collectively groundwater extraction):

  1. Result from similar operations (all involve extraction and discharge of groundwater);

  2. Are the same type of wastes (<u>all are groundwater containing or potentially containing petroleum hydrocarbons, solvents, or other pollutants</u>);

3. Require similar effluent limitations for the protection of the beneficial uses of San Diego Bay;

4. Require similar monitoring; and

5. Are more appropriately regulated under a general permit rather than individual permits.

- Eligibility Criteria (I.C): This WDR is intended to cover all discharges of groundwater extraction wastes to surface waters within the San Diego Region Except San Diego Bay from groundwater extraction due to construction and other groundwater extraction activities, regardless of volume.

However, the County would submit that it is unnecessary to move these discharges (uncontaminated pumped groundwater, foundation drains, water from crawl space pumps, and footing drains) from the E.2.a.(3) category to the E.2.a.(1) category and require them to obtain coverage under one of these two permits for the following reasons:

- There is no technical basis or demonstrated water quality concern that justifies the need for these discharges to obtain coverage under these permits;
- The two permits are clearly defined for groundwater extraction activities where there is groundwater containing or potentially containing petroleum hydrocarbons, solvents, or other pollutants (in fact, one of the categories of discharges required to obtain coverage is 'uncontaminated pumped groundwater');
- One of the permits is clearly defined for temporary discharges, not permanent discharges; and
- The categories of discharges are non-stormwater discharges that are generally not expected to be a source of pollutants to receiving waters.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
a. 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 the ~~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:

Delete Provision 2.a.(1)

Add the following categories from Provision 2.a.(1) to the list of allowable non-stormwater discharges listed in Provision 2.a.(3):

- *Uncontaminated pumped ground water*
- *Discharges from foundation drains*
- *Water from crawl space pumps*
- *Water from footing drains*

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
a.(4) Discharges of non-storm water <u>in</u>to the MS4 from the following categories must be controlled by the requirements given below through statute, ordinance, permit, contract, order, or similar means<u>, where there is evidence that those discharges are a source of pollutants to waters of the state</u>. Discharges of non-storm water <u>in</u>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.

29. Provision E.2.a (Page 65 of 120) – The Fire Fighting BMP Provisions Should Reflect The Language Included In The Current Orange County Permit

Provision E.2.a includes a requirement for the Copermittees to establish BMPs for both emergency and non-emergency firefighting activities. While the Copermittees already have established guidelines for non-emergency firefighting activities, it is unclear why the approach and language in the Tentative Order regarding the emergency firefighting activities has been modified from Order R9-2009-0002. In fact, the language in the Tentative Order is actually inconsistent with the Phase I Final Rule (55 FR 48037), which stated

"In the case of fire fighting <u>it is not the intention of these rules to prohibit in any circumstances</u> the protection of life and public and private property through the use of water or other fire retardants that flow into separate storm sewers." [Emphasis added]

Thus, as stated above, there should <u>not</u> be a circumstance in which the Copermittees or San Diego Water Board would identify emergency firefighting discharges as illicit discharges or a significant source of pollutants to receiving waters. The language previously adopted by the San Diego Regional Board in Order R9-2009-0002 regarding emergency firefighting discharges is recommended.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
a. Non-Storm Water Discharges
(5) Firefighting discharges to the MS4 must <u>continue to</u> be addressed by the Copermittee<u>s</u> ~~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, <u>in conjunction with the local Fire Authority/District,</u> to reduce or eliminate pollutants in such discharges from entering the MS4.*

(b) Emergency firefighting discharges (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

~~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 should not interfere with immediate emergency response operations or impact public health and safety.~~

30. Provision E (Entire Provision; Begins Page 64 of 120) – The Tentative Order Should Not Require the Reduction Or Elimination Of All Non-Stormwater Discharges As A Part Of The IDDE Program

Provision E.2.a and E.2.a.(7) require the Copermittees to, as a part of their IDDE program, to address all non-stormwater discharges as illicit discharges, and thus Copermittees must "reduce or eliminate non-stormwater discharges" whether or not the discharges have been identified as illicit discharges.

The rationale within the Fact Sheet states that "Provision E.2.a.(7) is consistent with the requirements of the CWA section 402(p)(3)(B)(ii) and 40CFR 122.26(d)(1)(v)(B)." That, in fact, is not the case. Clean Water Act Section 402(p)(3)(B)(ii) states that the MS4 stormwater permits "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers" (emphasis added). Federal regulations include two provisions designed to begin implementation of the "effective prohibition."[46] The first provision requires Copermittees to perform a screening analysis, intended to provide sufficient information to develop priorities for a program to detect and remove illicit discharges[47]. The second provision requires Copermittees to develop a recommended site-specific management plan to detect and remove illicit discharges (or ensure they are covered by an NPDES permit) and to control improper disposal to MS4s.[48] Therefore, Provision E.2.a and E.2.a(7) misapply federal regulations in that Copermittees are required to identify the non-stormwater discharge as an illicit discharge prior to having an obligation to effectively prohibit it. There is not a presumption to reduce or eliminate it otherwise.

> The Code of Federal Regulations 122.26(d)(1)(v)(B) states "A description of the existing program to identify illicit connections to the municipal storm sewer system. The description should include inspection procedures and methods for detecting and preventing illicit discharges, and describe areas where this program has been implemented."

The provision and rationale within the Fact Sheet blur the lines between the need of the Copermittees to "effectively" prohibit non-stormwater discharges and detect and eliminate illicit discharges.

- The requirement is "effectively prohibit" non-stormwater discharges, not "reduce or eliminate" non-stormwater discharges (this is already addressed in Provision A).
- Although the Copermittees are required to have a program to prevent illicit discharges to the MS4, non-stormwater discharges should only be addressed as illicit discharges

[46] 55 Fed. Reg. 47989, 48037 (Nov. 16, 1990).
[47] 40 CFR 122.26(d)(1)(iv)(D).
[48] 40 CFR 122.26(d)(1)(iv)(D) and 122.26(d)(2)(B).

where such discharges are identified as sources of pollutants that may cause or contribute to an exceedance of a water quality objective.

- The IDDE program is established to detect and eliminate "illicit discharges", not non-stormwater discharges in general.

In order to clarify the requirements the following modifications to Provision E.2, which expressly address the Illicit Discharge Detection and Elimination Program are requested.

The County recommends the following language changes:

A. Prohibitions and Limitations
1. Discharge Prohibitions
b. Non-storm water discharges into MS4s are to be 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.

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
b. Non-Stormwater 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 the ~~a non-stormwater~~ 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:

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
a. Non-Storm Water Discharges
~~(7) Each Copermittee must, where feasible, reduce or eliminate non-storm water discharges listed under Provisions E.2.a.(1)-(4) into its MS4 whether or not the non-storm water discharge has been identified as an illicit discharge, unless a non-storm water discharge is identified as a discharge authorized by a separate NPDES permit.~~

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
c. Field Screening
Each Copermittee must conduct field screening (i.e. visual observations, field testing, and/or analytical testing) of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect ~~non-stormwater and~~ illicit discharges and connections to the MS4 in accordance with the dry weather MS4 outfall discharge monitoring requirements in Provisions D.2.a.(2) and D.2.b.(1).

E. Jurisdictional Runoff Management Programs
2. Illicit Discharge Detection and Elimination
d. Investigate and Eliminate Illicit Discharges and Connections
[Various – see the suggested changes in the redline of the Tentative Order]

DEVELOPMENT PLANNING

The Tentative Order's land development requirements are some of the most onerous requirements in the Tentative Order, and in many cases lack the necessary technical and legal foundation for adoption. Many of the land development requirements, particularly hydromodification controls, pose federal constitutional issues as well as conflict with the CWA, the State Administrative Procedure Act, California Environmental Quality Act (CEQA), the Mitigation Fee Act and federal court decisions such as the recent U.S. District Court case, *Virginia Dept. of Transportation v. EPA*[49] (holding that EPA has no authority to regulate non-pollutants).

The following discussion examines the overarching legal concerns with the land development requirements, and is followed by specific technical analyses for individual requirements.

A. Land Development Requirements Expose the Copermittees to Significant Litigation Risk And Will Be Largely Unenforceable

Many of the land development requirements, such as hydromodification, pose constitutional issues either exposing municipalities to litigation and/or will result in municipalities being unable and unwilling to implement such requirements. Specifically, but not limited to, Orange County is most concerned with the provisions: 1) requiring Copermittees to compel development projects that have no impact on hydromodification to implement on-site or alternative compliance hydromodification mitigation measures, 2) using pre-development (naturally occurring) runoff reference condition as applied to sites that are, in fact, developed, and 3) stream, channel, and habitat restoration.

Orange County is concerned that implementing these types of requirements would subject the Copermittees to liability under the takings clauses of the U.S. and California Constitutions and the Mitigation Fee Act because of the questionable nexus between a project's impacts on hydromodification and the hydromodification management measures in the Tentative Order. When imposing a condition on a development permit, a local government is required under federal and state constitutions to establish that the condition bears a reasonable relationship to the impacts of the project. This rule applies evenly to legislatively enacted requirements and impact fees or exactions.[50] Moreover, fees imposed on a discretionary ad-hoc basis are subject to heightened scrutiny under a two-part test. First, local governments must show that there is a substantial relationship between the burden created by the impact of development and any fee or exaction[51]. Second, a project's impacts must bear a rough proportionality to any development fee or exaction.[52] Under California law, the *Nollan/Dolan* heightened scrutiny test also applies to in-lieu fees.[53]

The Legislature has memorialized these requirements in the Mitigation Fee Act, which establishes procedures that local governments must follow to impose impact fees.[54] Irrespective of whether the hydromodification management requirements are implemented by

[49] Virginia Dept. of Transportation v. EPA, No. 1:12-CV-775, slip op. (E.D. Va. Jan. 3, 2013).
[50] *Building Ass'n Industry v. City of Patterson*, 171 Cal. App. 4th 886, 898 (2009).
[51] *Nollan v. Calif. Coastal Comm'n*, 483 U.S. 825, 837 (1987).
[52] *Dolan v. City of Tigard*, 512 U.S. 374, 391 (1994).
[53] *Ehrlich v. City of Culver City*, 12 Cal. 4th 854, 876 (1996).
[54] Gov't Code secs. 66000-66025.

legislative act or on an ad-hoc basis, the Copermittees attempt to enforce them as proposed in the Tentative Order will likely result in claims alleging unconstitutional takings of private property and violations of the Mitigation Fee Act. This is because a developer could argue that limiting hydromodification impacts of already developed property to its naturally occurring state, or requiring hydromodification mitigation measures for impacts not imposed by the project, would not have a legally sufficient nexus to the impact of the development project.

Additionally, CEQA does not allow a local government discretionary approval to require over-mitigation of a project. The CEQA Guidelines provide that “a lead agency for a project has the authority to require feasible changes in any or all activities involved in the project in order to substantially lessen or avoid significant effects on the environment, consistent with applicable constitutional requirements such as the ‘nexus’ and ‘rough proportionality’ standards established by case law.”[55] Thus, Copermittees would most assuredly be exposed to CEQA challenges, which are the most prevalent lawsuits against projects.

In all likelihood, municipalities will not risk constitutional challenges and the high litigation costs of such challenges, but will instead exempt projects from certain requirements or limit their applicability based on documented technical and legal reasons. Such actions then would only be addressed through a Regional Board audit years after a project has been approved and developed. Therefore, predevelopment runoff reference conditions and stream, channel and habitat restoration requirements should be eliminated in their entirety.

B. <u>Stream, Channel and Habitat Restoration Cannot Be Required Due to Conflicts with Federal and State Laws</u>

The Tentative Order requires stream, channel and habitat restoration and/or retrofitting depending on certain land development projects. The prior analysis above discussed the litigation risk to which municipalities will be exposed. The following discussion focuses on the direct conflicts with federal and state laws that also prohibit such requirements.

The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.[56] In carrying out this objective, Section 402(p) requires municipalities to reduce the discharge of pollutants from the MS4 to the MEP standard. The Tentative Order, however, goes well beyond the Congressional intent of the CWA to only address pollutants by requiring both Copermittees and the property owners to restore and/or retrofit streams, channels and habitat, with no technical evidence as to how this will reduce the discharge of pollutants to MEP or under what legal authority these requirements can be imposed.

Not only do such requirements go beyond MEP, but go beyond the scope of the CWA’s focus on pollutant reduction. First, there is no evidence in the Order for how restoration requirements reduce pollutants from leaving the MS4. Second, in a recent decision in the Eastern District of Virginia, a federal court has held that the EPA has no authority under the Clean Water Act to regulate non-pollutants.[57] Restoration as described in the Tentative Order does not regulate pollutants directly, but requires costly over-mitigation by project proponents to do more than address pollutants by restoring streams, channels and habitat to a subjective, predevelopment

[55] Cal. Code Regs. Tit. 14, sec. 15041 (citing *Nollan/Dolan*).
[56] CWA 101(a).
[57] *Virginia Dept. of Transportation v. EPA*, No. 1:12-CV-775, slip op. (E.D. Va. Jan. 3, 2013).

standard. Essentially, the Tentative Order uses restoration as a surrogate for pollutants, and tries to unlawfully regulate the flow of water and not pollutants themselves.

Under state law, the Orange County Flood Control District has been delegated authority by the Legislature to construct lengthy networks of channels and infrastructure for flood control purposes. Under this authority, the Flood Control District has exclusive authority to control the flow of water in these channels. Although the State and Regional Boards may have some ability to impose conditions that impact volumetric flows (which is now called into question by the 4th District court case), this authority does not extend to NPDES permits.[58] Returning channels to natural conditions impinges on municipal flood control authority as removing concrete and performing other restoration efforts would alter the flow of water in those channels.

Engineered channels serve the public health and safety through flood control protection. A significant portion of Orange County lies in a flood plain whereby property owners are required to carry flood insurance. Concrete channels are used to better control the flow of water and minimize flooding and reduce insurance premiums. State courts have long recognized that residents living near flood control improvements have a right to rely on the current standards of a particular channel to protect against flooding.[59] Restoring a stream or channel to a natural state would not ensure against flooding as engineering is used to ensure that stormwater is controlled to certain patterns. Many developments are built up to flood control channels, and thus, restoration would expose residents to threats of flood, potential property damage and loss of life and expose municipalities to claims of inverse condemnation and other torts based on relied upon flood control protections by the public. Restoration in some cases would also require use of eminent domain authority, which the State cannot require municipalities to exercise.

31. Provision E.3 (Page 73 of 120) – The Development Planning Provisions Must Be Modified So As Not To Negate The Very Intent And Purpose Of The Watershed Approach And The Focus On The Highest Priorities Within Each Watershed Management Area

(See the corresponding comments under Provision E – Jurisdictional Runoff Management Programs)

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning [Intro]
Each Copermittee must use their land use and planning authorities to implement a development planning program in accordance with the strategies identified in the Water Quality Improvement Plan ~~and include, at a minimum, the following requirements.~~ 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 and strategies as identified in the corresponding Water Quality improvement Plan(s).

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[58] *S.D. Warren Co. v. Me. Bd. of Envtl. Prot.*, 547 U.S. 370 (2006); *PUD No.1 v. Washington Dep't of Ecology*, 511 U.S. 700 (1994).
[59] *Arreola v. County of Monterey*, 99 Cal.App.4th 722 (2002).

Move Provision 3g, "Strategies to Address the Highest Priority Water Quality Conditions" to just after the Introduction to the section and before Provision 3.a.

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(1) *Provide specific details about how the strategies and/or activities will be implemented (e.g. designate ~~additional~~ BMPs, focus education, increase frequency of verifications and/or inspections, alternative compliance options);*

32. Provision E.3 (Page 73 of 120) – Clarifying Language For Applying The PDP Requirements For A New Development Project Feature Is Confusing And Should Be Removed

In E.3.b.(1)(a) the Regional Board staff attempts to provide clarifying language which we believe actually makes for more confusion. The purpose of this provision is to state that Priority Development Projects are defined in E.3.b(2). In E.3.b(2) further clarification is provided regarding what is parts of a project are subject to the new development standards. The language provided in E.3.b(1)(a) starting with "where a new …. Requirement" does not add clarification and instead may be construed to be in conflict with E.3.b(2).

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
b. Priority Development Projects
(1) Definition of Priority Development Project
(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

33. Provision E.3 (Page 73 of 120) – Portions Of Redevelopment Projects That Already Have Water Quality Treatment BMPs Should Not Be Subject To The New PDP Requirements

Some redevelopment projects already have portions of the project that were subject to previous permit PDP requirements. These portions of redevelopment that were subject to prior PDP requirements should not be subject to the new PDP requirements as these projects already have water quality treatment. Such an approach is consistent with the Los Angeles and Ventura MS4 permits.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
b. Priority Development Projects
(1) Definition of Priority Development Project
(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 requirements of Provisions E.3.c.(1) and E.3.c.(2) 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 requirements of Provisions E.3.c.(1) and E.3.c.(2) apply to the entire development.

34. Provision E.3.b.2 (Page 76 of 120) – Residential Driveways Should Not Be Subject To The PDP Requirements

Section E.3.b.2.g triggers 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 Tentative Order and will require additional Copermittee effort for treatment control and structural Low Impact Development (LID) BMP inventory, inspections, and maintenance verification and may have potential enforcement issues. The Regional Board has not provided sound technical basis for this provision as there is no evidence provided in the fact sheet that the cumulative impact of residential driveways would be significant and that residential driveways are a significant source of pollutants. Additionally vehicles should be defined as internal combustion vehicles since internal combustion vehicles are the source of pollutants this section is developed for.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
b. Priority Development Projects
(2) Priority Development Project Categories
(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.

35. Provision E.3 (Page 73 of 120) – All Municipal Roadway Projects Should Only Be Subject To The USEPA Guidance Regarding Managing Wet Weather With Green Infrastructure: Green Streets

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 provide that streets, roads, and highways follow US EPA guidance regarding *Managing Wet Weather with Green Infrastructure: Green Streets to the maximum extent practicable*. This document is recognized nationwide as the standard for incorporation of LID techniques into roadway projects, which is why it was it is specified in the permits identified above. In April of 2007 the US EPA, National Association of Clean Water Agencies; Natural Resources Defense Council; the Low Impact Development Center; and the Association of State and Interstate Water Pollution Control Administrators signed the Green Infrastructure Statement of Intent. This statement of intent recognized the benefits of green infrastructure and laid the ground work for the development of the USEPA Green Infrastructure Action Strategy. One of the areas of study was the municipal roadways and the result of the study is the US EPA Green Streets Municipal Handbook. The Handbook provides guidance on green street design, different types of LID BMPs that are appropriate for municipal roadways, and implementation hurdles. The Handbook

was specifically developed for incorporating LID techniques into roadway projects as roadways are very different from traditional land development projects.
Roadways are different than other development projects as there are significant constraints to implementation of BMPs that need to be considered such as limited right-of-way, utilities, geotechnical and structural concerns, street trees, parking, and fire truck access among others. The US EPA guidance considers these constraints where the PDP requirements do not. Even in new roadways implementing hydromodification requirements can disturb a significant area of land which has its own environmental impacts including changing the natural hydrology which is antithetical to the LID approach.

In addition, retrofitting of existing alleys is infeasible. In accordance with the Streets & Highways Code, State Controller Gas Tax Expenditure Guidelines and several California Attorney General opinions, alleys are not considered "city streets" or "county highways," and are not certified to the State Controller for gas tax purposes as they do not serve as thoroughfares for the general public. Therefore, section 2150 of the Streets & Highways Code and other State laws prohibit municipalities from expending Road Funds on alleyway rehabilitation, and retrofitting of an alleyway would be an unlawful expenditure. In the case of private development where there is a clear nexus to alleyway improvement, a landowner adjacent to an alley could only be conditioned to retrofit that portion of alleyway in front of the property and could not be conditioned to retrofit an entire alleyway.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
b. Priority Development Projects
(3) Priority Development Project Exemptions
(b) <u>Any 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.</u>

<u>[1]:http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm</u>

~~Retrofitting of existing paved alleys, streets or roads that meet the following criteria:~~
~~(i) Must be two lanes or less; AND~~
~~(ii) Must be a retrofitting project implemented as part of an alternative compliance project option under Provision E.3.c.(3)(b)(v) to achieve the performance requirements of Provisions E.3.c.(1) and/or E.3.c.(2) for a Priority Development Project; AND~~
~~(iii) Designed and constructed in accordance with the USEPA Green Streets guidance.23~~

36. Provision E.3 (Page 73 of 120) – Exemptions From The Development Planning Requirements Should Be Provided For Certain Types Of Projects

An exemption for PDPs should be provided for driveways and parking lots constructed with permeable surfaces. This exemption is provided to sidewalks, bicycle lanes and trails and should also be provided to driveways and parking lots. The fact sheet identifies that "The exemptions have been provided as an incentive for the Copermittees to encourage and promote the implementation of LID design concepts and green infrastructure and building principles." Permeable surfaces qualify as an LID design concept, which should be recognized in the Tentative Order provisions for driveways and parking lots. The use of permeable surfaces

should be encouraged, which will be accomplished by providing an exemption for driveways and parking lots constructed with permeable surfaces.
The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
b. Priority Development Projects
(3) Priority Development Project Exemptions
(a) ~~New paved~~ Sidewalks, bicycle lanes, driveways, parking lots, or trails that meet the following criteria:
(i) Designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas; OR
(ii) Designed and constructed to be hydraulically disconnected from paved streets or roads; OR
(iii) Designed and constructed with permeable pavements or surfaces in accordance with USEPA Green Streets guidance.22

An exemption should also be provided to single family residential projects as 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. There is no technical justification or proof that single family residences are a significant source of pollutants identified in the fact sheet and thus should be provided an exemption. Furthermore the inclusion of the U.S. Green Building Council (USGCB) Leadership in Energy and Environmental Design (LEED) for Homes green building certification program in the Tentative Order is not appropriate as this program encompasses other environmental considerations besides surface water management which are outside the scope of a stormwater permit and outside the authority of the Regional Board. Since the Regional Board has not met the burden of proof that single family residential projects are a significant source of pollutants the exemption should be provided to all single family residential projects and not just in meeting the LEED certification which is inappropriate for the Regional Board to specify.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
b. Priority Development Projects
(3) Priority Development Project Exemptions
(c) Single-family residential projects that are not part of a larger development or proposed subdivision.

~~New single family residences that meet the following criteria:~~
~~(i) Must not be constructed as part of a larger development or proposed subdivision; AND~~
~~(ii) Designed and constructed to be certified under the U.S. Green Building Council (USGCB) Leadership in Energy and Environmental Design (LEED) for Homes green building certification program, receiving at least four (4) Surface Water Management credits under the Sustainable Sites category;24 OR~~
~~(iii) Designed and constructed with structural BMPs that will achieve the performance requirements of Provisions E.3.c.(1) and E.3.c.(2) onsite.~~
~~(d) Redevelopment of existing single family residences that meet the following criteria:~~

~~*(i) Designed and constructed to be certified under the USGCB LEED for Homes green building certification program, receiving at least four (4) Surface Water Management credits under the Sustainable Sites category; 25 OR*~~
~~*(ii) Designed and constructed with structural BMPs that will achieve the performance requirements of Provisions E.3.c.(1) and E.3.c.(2) onsite.*~~

An exemption should 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. Stream restoration projects are also projects that should not be subject to the PDP requirements as they are projects intended to restore beneficial uses of receiving waters.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
b. Priority Development Projects
(3) Priority Development Project Exemptions
(d)Flood control and stream restoration projects.

An exemption for emergency public safety projects where a delay due to a Standard Stormwater Mitigation Plan (SSMP) would compromise public safety, public health and/or the environment is needed in the permit. Copermittees need an exemption where if public health or safety or environmental protection is threatened the project can proceed without a SSMP. Emergency projects are provided exempt status in many other MS4 permits including the recently adopted LA MS4 permit.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
b. Priority Development Projects
(3) Priority Development Project Exemptions
(e) *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*

37. Provision E.3.c (Page 78 of 120) – Flexibility Should Be Provided To The Structural BMP Performance Standards If Watershed-Specific Performance Standards Are Developed In The Water Quality Improvement Plans

Based on the watershed approach it is conceivable that the Water Quality Improvement Plans may identify that an alternate performance standard than the provisions in E.3.c. may be appropriate for certain watersheds. To fully realize the watershed approach the Copermittees should be given the opportunity to develop alternative BMP performance standards consistent with the goals and objectives developed in the Water Quality Improvement Plans.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance 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 requirements below. <u>If watershed-specific performance requirements are developed as part of a Water Quality Improvement Plan; these requirements would take precedence over the general performance requirements below. The watershed-specific requirement must provide at least equal protection as the general performance requirements below.</u>

38. Provision E.3 (Page 73 of 120) – Terminology Is Inconsistent Especially With The Use Of Low Impact Development BMPs And Should Be Modified

In Provision E.3.c. the Tentative Order specifies the requirements for structural BMPs. Furthermore in Provision E.3.c.(1) the concepts of onsite structural BMPs and LID BMPs are introduced. The County recommends that the Tentative Order be modified to provide more consistency in terminology. The County views LID as a strategy of BMPs that is used to mimic predevelopment water balance. (see Provision E.3.a(3)). Furthermore there is no single definition for LID BMPs that has gained widespread recognition. Although Attachment C includes a definition for LID BMPs, this definition is not widely accepted. LID is rather a concept (the attachment C definition does adequately capture this concept) made up of various non-structural and structural BMPs. While the onsite BMP requirements should be defined (e.g. retention of the 85% storm) the Tentative Order could be greatly simplified by avoiding multiple terms and uses. The County has provided suggested edits throughout the Development Planning provision to provide better consistency.

39. Provision E.3.c (Page 78 of 120) – The Retention Performance Standard Needs Clarification

Clarification is needed regarding both Section E.3.c.(1)(a)(i) and (ii). In Section E.3.c.(1)(a)(i) the section states "The volume of storm water produced…" where it should state "The volume of storm water <u>runoff</u> produced". The Fact Sheet identifies that this design standard is consistent with the Fourth Term Permits for Orange County and Riverside County however in both of these permits the standard is identified "the volume of runoff produced from a from a 24-hour 85th percentile storm event". The word "runoff" needs to be added to the Tentative Order. In Section E.3.c.(1)(a)(ii) the newly added language that provides an alternative method for calculating the design capture volume does not specify a storm threshold or range of storms for the alternative method for calculating the design capture volume. Clarification is needed to identify the threshold to be used and the County believes that the average annual volume of stormwater runoff is appropriate. Additionally flexibility should be provided as far as the technique to calculate this volume so that other methods besides continuous simulation should be accepted.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(1) Storm Water Pollutant Control BMP Requirements
(a) Each Priority Development Project must be required to implement LID BMPs that are designed to retain (i.e. intercept, store, infiltrate, evaporate, and evapotranspire) onsite the pollutants contained in the design capture volume. The design capture volume is equivalent to:
(i) The volume of storm water runoff produced from a 24-hour 85th percentile storm event; OR
(ii) The average annual volume of storm water runoff that would be retained onsite if the site was fully undeveloped and naturally vegetated, as determined using continuous simulation modeling or other techniques based on site-specific soil conditions and typical native vegetative cover.

40. Provision E.3.c (Page 78 of 120) – If Projects Use Alternative Compliance Conventional BMPs Should Not Be Also Required Onsite

Section E.3.c.(1)(c) requires that if projects use alternative compliance that conventional BMPs must also be implemented onsite. Although the Fact Sheet identifies that the intent of this provision is to reduce the pollutants onsite to the MEP there is not adequate technical justification for effectively requiring additional mitigation. This provision requires additional mitigation for projects and in effect requires double mitigation which goes well beyond the MEP standard that is referenced in the Fact Sheet. Providing mitigation offsite for the PDP requirements offsite in itself is adequate to meet the MEP standard.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(1) On-site Storm Water Pollutant Control Structural BMP Requirements
(c) If a Priority Development project is allowed to utilize alternative compliance pursuant to Provisions E.3.c.(1)(b), ~~flow-thru conventional treatment control BMPs must be implemented to treat the portion of the design capture volume that is not retained onsite. Additionally,~~ project applicants must mitigate for the portion of the pollutant load in the design capture volume that is not retained onsite through one or more alternative compliance options under Provision E.3.c.(3). If alternative compliance involves the use of ~~C~~conventional treatment control BMPs, those BMPs must be sized and designed to:

41. Provision E (Entire Provision; Begins Page 64 of 120) – The Hydromodification Management Requirements Should Be Based On A Watershed Management Approach, Be Consistent With The WQIPs, And Consider The Current Copermittee HMPs

Hydromodification management should be based on the conditions of receiving waters and on the impacts and potential impacts from development projects. The basis to make hydromodification management decisions needs to be an understanding of the watershed and receiving waters within a watershed. This understanding of a watershed is achieved through watershed analysis and analysis of the susceptibility of the receiving waters to hydromodification impacts. This approach of watershed analysis is identified in the Southern California Coastal Water Research Project (SCCWRP) Technical Report 667 – Hydromodification Assessment and Management in California **(Appendix A-2).** The SCCWRP report identifies that watershed analysis is the first step and most critical step in the development of watershed hydromodification management. The SCCWRP report, the authors of the SCCWRP report at the Hydromodification Management Meeting in August of 2012, and even State Water Resource Control Board (SWRCB) staff at the recent California Stormwater Quality Association (CASQA) General Meeting in San Francisco on January 10, 2012 identified that hydromodification management is not a one size fits all approach and needs to consider watershed analysis. The Tentative Order hydromodification requirements are however a one size fits all approach as the requirements do not allow consideration of watershed analysis or receiving water information.

The County believes the best way to implement the vision of the SCCWRP Report for development of effective hydromodification management is to develop clear hydromodification management objectives that are watershed specific and developed through a stakeholder process, which is consistent with the approach in the SCCWRP report. The intent of the WQIPs is to improve water quality in the WMAs based on the highest priorities for water quality in the watershed, however unless more is known about the watersheds and their receiving waters including their susceptibility to hydromodification then the appropriate standards and performance criteria cannot be identified to reach the goal of improving water quality. The WQIPs can build on the current Hydromodification Management Plans (HMPs) that have been developed and can use additional watershed and receiving water information to develop appropriate watershed specific hydromodification standards and where they should apply in a specific watershed. Instead of hydromodification requirements that do not consider specific watershed analysis and conditions of receiving waters and that were developed unilaterally by Regional Board staff the County suggests that watershed specific requirements be developed as part of the WQIPs as part of a watershed stakeholder process.

Matching pre-development (naturally occurring) flow rates and duration is identified as the performance standard for hydromodification management. Although it is not stated anywhere in the Tentative Order, it is assumed that the purpose of such a standard is to address the overall objective of the CWA (§101) - to restore the chemical, physical, and biological integrity of the Nation’s waters in the Tentative Order’s jurisdiction. However, the CWA does not imply or state that its objective is to restore waters to pre-Columbian (pre-development) conditions. Rather the objective must be taken in context of § 402(p) and reflect the stormwater compliance standard to reduce pollutants to the maximum extent practicable. When read in total the hydromodification standard should reflect the developed urban environment. To do otherwise would negate the engineering efforts done to date to protect life and property from floods and create an impractical solution for municipalities. Furthermore the current hydromodification standard as provided for in numerous municipal permits in California is to match post development with “pre-project” conditions. It is unclear to us how the San Diego Regional Board staff has redefined the MEP standard for hydromodification.

Hydromodification effects may also be caused from other sources that are not in the Copermittees' jurisdiction. Initial implementation of the pre-development (naturally occurring) hydromodification performance standard has identified that BMPs to comply with the standard are of significant size even for smaller projects. Implementing the hydromodification requirements can disturb a significant area of land which has its own environmental impacts including changing the natural hydrology which is antithetical to the LID concept. This can also cause a decrease in open space which may be of issue with the Orange County General Plan which requires certain thresholds of open space for developments. For the smaller redevelopment projects and infill projects it may just not be feasible, either physically or due to cost, to build these projects which will represent a lost opportunity to improve water quality through the implementation of the LID requirements.

Furthermore identifying "naturally occurring" conditions for redevelopment sites is difficult and entirely subjective, as in most cases there are no historical records of the natural condition of the site, and begs a technical question as to how far back does one go historically in determining the proper predevelopment timeframe. In cases where natural conditions of a site are not known the best approach is to use an undeveloped natural site in proximity to the re-development site as a reference site. The vegetative cover, soil type, and slope will most affect the hydrology of a site and so approximating these conditions for a re-development site using a natural reference site where these parameters can be measured is a way to approximate the natural conditions of a redevelopment site, however, locating a natural reference site in proximity to a redevelopment site is difficult, as the entire sub-watershed or watershed may be developed. Additionally the conditions of the natural reference site maybe totally different than the "naturally occurring" conditions of the re-development site as vegetative cover, soil type, and slope may have been very different and without historical records there is no way of knowing the actual ""naturally occurring" conditions of a re-development site. The subjectivity of the pre-development approach not only puts municipalities in a position to violate the U.S. and California Constitutions on unlawful takings, but it also conflicts with the Mitigation Fee Act, CEQA and the State Administrative Procedure Act in that the Tentative Order does not contain an adequate record justifying the reasonableness of this standard.

The County is therefore suggesting an approach to hydromodification management that is not a one size fits all approach, is consistent with the watershed approach and the intent of the WQIPs, considers the current Copermittee HMPs, and provides an opportunity to develop watershed specific requirements as part of a watershed stakeholder process that have the best chance of improving water quality.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements

(2) <u>On-site</u> Hydromodification Management <u>Structural</u> BMP Requirements

Each Copermittee must require each Priority Development Project to implement onsite structural BMPs to manage hydromodification <u>to ensure</u> that ~~may be caused by~~ storm water runoff discharged from a project <u>does not cause adverse hydromodification impacts in the downstream receiving waters.</u> ~~as follows:~~

<u>The Copermittees in each Watershed Management Area may establish, as part of the WQIP, watershed specific requirements that will apply to priority development projects based on the susceptibility of the receiving waters to hydromodification impacts and historic receiving water changes from development. If watershed specific requirements are developed they will supersede requirements in the HMP. The watershed specific requirements must include the following:</u>

(a) Post-project runoff flow rates and durations must not exceed ~~pre-development (naturally occurring)~~ <u>the performance standard for</u> runoff flow rates and durations <u>to be determined as part of the development of the WQIPs for each Watershed Management Area</u> by more than 10 percent (for the range of flows that result in increased potential for erosion, or degraded instream habitat 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)~~(ii) The Copermittees may use monitoring results collected pursuant to Provision D.1.a.(2) to re-define the range of flows resulting in increased potential for erosion, or degraded instream habitat 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) A Priority Development Project may be allowed to utilize alternative compliance under Provision E.3.c.(3) to comply with the performance requirements of Provisions E.3.c.(2)(a)-(b).

(d) Exemptions

Each Copermittee has the discretion to exempt a Priority Development Project from the hydromodification management BMP performance requirements of Provisions E.3.c.(2)(a)-(b) where the project:

(i) Discharges storm water runoff into existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean;

<u>(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 all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.</u>

(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 updates to the Copermittees' HMPs.

(v) Flood control and stream restoration projects.

~~(ii)~~(vi) Is a redevelopment Priority Development Project that meets the alternative compliance requirements of Provision E.3.c.(3)(b)(ii); or

~~(iii)~~(vii) Discharges storm water runoff into other areas identified by the San Diego Water Board as exempt from the requirements of Provisions E.3.c.(2)(a)-(b).

If the Copermittees in a Watershed Management Area select not to develop watershed specific requirements, development projects will be subject to the current Copermittee HMPs inclusive of the exemptions identified in Section E.3.c.(d)(2) that will integrated into updated Copermittee HMPs.

42. Provision E.3.c (Page 78 of 120) – Exemptions For Hydromodification Management Should Include Discharges To Certain Types Of Receiving Waters And Certain Types Of Projects

PDPs that discharge to 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 should be exempt from the hydromodification management requirements. This exemption is similar to the hardened conveyance system exemption, provided in the San Diego HMP and identified in Section D.1.g.(3) of the current San Diego MS4 Permit. Hydromodification requirements are not appropriate for discharges to channels that are designed to accept increased flows from upstream development, as the potential for erosion is non-existent. Studies[60] 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. The Permittees in Orange, Riverside and San Diego Counties hosted a workshop on hydromodification management on August 30, 2012. A panel of experts was convened to answer key questions regarding hydromodification to provide the Regional Board Permit team, Copermittee storm water program managers, non-governmental environmental organizations, and the development/business community with a greater understanding of the practice of hydromodification management in the urban watershed. One of the panel expert,s Chris Bowles, PhD, PE, whose qualifications include:

> Chris Bowles, PhD, PE is a registered civil engineer (CA P.E. C76898) specializing in hydraulics, hydrology, geomorphology, water resources, water quality and environmental

[60] *See* Leopold, L.B., M.G. Wolman, J.P. Miller. 1964. Fluvial Processes in Geomorphology. San Francisco, W.H. Freeman and Company. 522 pp. *and* MacRae, C.R. 1993. An Alternate Design Approach for the Control of Instream Erosion Potential in Urbanizing Watersheds. Sixth International Conference on Urban Storm Drainage, Niagara Falls, Ontario.

> restoration. He has over seventeen years of project management experience on a wide variety of large multi-disciplinary, multi-stakeholder projects such as floodplain restoration, sediment studies, watershed hydrology, water quality, river and wetland restoration in California, Nevada, Washington, Oregon, and Florida, and oversees, including projects in the UK and Central America. Thirteen of these years have been spent in practice in the US. His technical expertise spans the range of hydraulic and hydrologic modeling (HEC software and a wide variety of 1D, 2D and 3D hydraulic models), geomorphology, GIS and field data collection (topographic and bathymetric surveying, water quality monitoring, flow gauging and sediment transport measurements). Prior to specializing in environmental hydrology, Dr. Bowles worked initially as a land surveyor and latterly as a site construction supervisor. Dr. Bowles has a doctorate in computational fluid dynamics in the application of fluvial hydraulics and has constructed numerous 1-, 2-, and 3-dimensional hydrodynamic models over his 17 years of experience in environmental engineering.

stated that having to build a storage facility on site to retain stormwater when the site drains into a resilient channel is a “huge waste of money.” Dr. Bowles stated that different approaches are needed for different situations (a copy of the video is available at the following link and is incorporated by reference: http://granicus.sandiego.gov/MediaPlayer.php?publish_id=1427 Dr. Bowles statement is at 4:06:24).[61]

Flood control channels cannot be removed as they serve the important and mandated service of flood control. It is also cost prohibitive 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. In many cases the historic path of the channel went right through where existing development is now and therefore there is no hope of restoration of the channel to its natural state. 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. Although this comment here applies to the hydromodification requirement the County would like to point out that LID concepts will be implemented consistent with the Tentative Order requirements and will have a mitigating effect on hydromodification impacts. Thus between the fact that implementing hydromodification controls on discharges to engineered channel will have no effect on the channel and that LID concepts will be implemented to address the smaller storms there is justification for creating an exemption for discharges to engineered channels.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(2) Hydromodification Management BMP Requirements
(d) Exemptions

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[61] Video Presentation of August 30, 2012 Hydromodification Management Workshop: http://granicus.sandiego.gov/MediaPlayer.php?publish_id=1427

(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 all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean;"*

Based on this proposed exemption the County recommends deleting section E.3.c.(2)(a)(ii):

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(2) Hydromodification Management BMP Requirements
(a)
~~(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.~~

The San Diego and South Orange County HMPs identified 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 cubic feet per second (cfs). An exemption for those reaches that meet these criteria should be included in the exemption provisions of the Tentative Order.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(2) Hydromodification Management BMP Requirements
(d) Exemptions
(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.*

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. Over time, 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 Copermittees as part of updates to their HMPs.

An exemption for infill redevelopment projects comports with a current EPA study that demonstrates the significant environmental benefits that can be attained from infill. *Residential Construction Trends in America's Metropolitan Regions: 2012 Edition*.[62] The lack of an exemption and rigid infill requirements would then be contrary to EPA's support for such projects.

Additionally, the lack of an infill exemption conflicts with State housing element law,[63] guidelines set forth by the California Department of Housing and Community Development and achievement with Regional Housing Needs Assessment (RHNA) numbers issued by the Southern California Area of Governments (SCAG), which require municipalities to quantify and meet their low income housing needs. Infill development is the only means by which affordable housing projects are built. Affordable units cannot be offered at market rates and are heavily subsidized. The lack of an exemption will make it increasingly difficult to construct affordable units due to increased costs, and will likely inhibit municipalities from meeting their RHNA obligations for low income housing. This will have the further effect of making local zoning actions inconsistent with municipal general plans, which may subject municipalities to lawsuits preventing the issuance of building permits.[64]

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(2) Hydromodification Management BMP Requirements
(d) Exemptions
<u>(iv) *Discharges from infill redevelopment projects that meet criteria to be established in updates to the Copermittees' HMPs.*</u>

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 would increase the risk of hydromodification impacts to 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 stream restoration project.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements

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[62] EPA Study Available at: http://www.epa.gov/smartgrowth/construction_trends.htm
[63] Gov't Code §§ 65580 et seq.
[64] *Urban Habitat Program v. City of Pleasonton*, No. RG06—293831, Alameda Sup. Ct. (March 12, 2010) (unpublished trial court decision ordering city to cease issuing building permits due to non-compliance with housing element law); *see generally Garat v. City of Riverside*, 2 Cal. App. 4th 259, 286 (1991); *Citizens of Goleta Valley v Board of Supervisors*, 52 Cal. 3d 553, 570 (1990).

(2) Hydromodification Management BMP Requirements
(d) Exemptions
<u>(v) *Flood control and stream restoration projects.*</u>

43. Provision E.3.c (Page 78 of 120) – Biofiltration BMPs Should Be Sized For The Design Capture Volume And If Used For Alternative Compliance Conventional BMPs Should Not Also Be Required

Section E.3.c.(3)(b)(i)[c] requires that if biofiltration is used as an alternative compliance method the biofiltration BMP is required to be sized to 1.5 times the design capture volume, which is an increase from the existing Orange County permit. The Fact Sheet provides no technical justification for the 1.5 factor.

Studies based on work conducted within Orange County by Geosyntec Consultants provide contrary information to the unsupported subjective inclusion of a 1.5 factor. The following documents are submitted for the record [**Appendix A-3 & Appendix A-4**].

Storage and Reuse Systems for Stormwater Management – Preliminary Cost and Performance Estimates for Residential Use in Irvine, CA, Eric Strecker (2009 presentation to Santa Ana Regional Board). Assessed the costs and modeled the performance of harvest and use retention BMPs and compared average annual total suspended solids (TSS) load removed and annual TSS concentrations with BMPs. In both scenarios presented, biofiltration provided superior TSS results to harvest and use.

The Water Report Issue #65: Stormwater Retention on Site, An Analysis of Feasibility and Desirability,[65] The paper identified significant limitations with all retention BMPs and states that "There needs to be a more technical vetting of "retain on site" and stormwater harvest and use before these approaches are made mandatory." The authors also caution that a "one size fits all" approach requiring retention may not be desirable and "in many cases would lead to undesirable results."

Based on the above information, the requirement to oversize biofiltration BMPs should be deleted from the Tentative Order. Biofiltration should be considered equivalent to other retention BMPs and should remain a full part of the LID toolbox without penalization.

Section E.3.c.(3)(b)(i)[d] requires that PDPs that use biofiltration as an alternative compliance option must also implement conventional BMPs. This provision requires additional mitigation for projects and in effect requires double mitigation when it is not needed. Biofiltration BMPs are more effective than conventional BMPs and requiring both does not make any technical sense and this goes well beyond the MEP standard. Furthermore the Fact Sheet provides no technical justification for requiring conventional treatment in addition to biofiltration and this is not the standard in the current Orange County and Riverside permits nor any other permits in California.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning

[65] Strecker and Poresky (2009) (reproduced with permission of The Water Report).

c. Priority Development Project Structural BMP Performance Requirements
(3) Alternative Compliance to Onsite Structural BMP Performance Requirements
(b) Alternative Compliance Project Options
(i) Onsite LID Biofiltration Treatment Control BMPs
~~[c] Biofilter at least 1.5 times the design capture volume that is not reliably retained onsite; OR~~
[~~d~~c]Biofilter up to the design capture volume that is not reliably retained onsite, ~~AND 1) treat the remaining portion of the design capture volume not retained onsite with conventional treatment control BMPs in accordance with Provision E.3.c.(1)(c),~~ and ~~2)~~ if necessary, mitigate for the portion of the pollutant load in the design capture volume not retained onsite through one or more alternative compliance project, in-lieu fee and/or water quality credit system options below.

44. Provision E.3.c (Page 78 of 120) – USGBC LEED Certification Is Not An Appropriate Standard In A Stormwater Permit

Provision E.3.c.(3)(b)(ii) allows redevelopment projects to comply with the hydromodification management requirements by achieving LEED Certification. As previously noted inclusion of the USGCB LEED for Homes green building certification program in the Tentative Order is not appropriate as this program encompasses other environmental considerations besides surface water management which are outside the scope of a stormwater permit and outside the authority of the Regional Board.

The County recommends that provision E.3.c.(3)(B)(ii) be deleted from the Tentative Order.

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(3) Alternative Compliance to Onsite Structural BMP Performance Requirements
(b) Alternative Compliance Project Options
~~(ii) LEED Certified Redevelopment Projects~~
~~The Copermittee may allow redevelopment Priority Development Projects to comply with the hydromodification management BMP performance requirements of Provision E.3.c.(2) where the project is designed and constructed to be certified under the USGCB LEED for New Construction and Major Renovations green building certification program. The Priority Development Project must receive at least one (1) Site Design credit and two (2) Stormwater Design credits under the Sustainable Sites category. In addition, the existing and future configuration of the receiving water must not be unnaturally altered or adversely impacted by storm water flow rates and durations discharged from the site.~~

45. Provision E.3.c (Page 78 of 120) – Offsite Regional BMPs Should Be Sized For The Design Capture Volume

Provision E.3.c.(3)(b)(iv)[a] requires that if an offsite regional BMP is used as an alternative compliance method the offsite regional BMP is required to be sized to 1.1 times the design capture volume, which is an increase from the existing Orange County permit. The Fact Sheet provides no technical justification for the 1.1 factor and so the 1.1 factor should be removed and offsite regional BMPs should only be sized for the design capture volume.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(3) Alternative Compliance to Onsite Structural BMP Performance Requirements
(b) Alternative Compliance Project Options
(iv)Offsite Regional BMPs
[a] The Copermittee may allow Priority Development Projects to utilize offsite regional BMPs to comply with the storm water pollutant control BMP performance requirements of Provision E.3.c.(1) if the offsite regional BMPs have the capacity to receive and retain ~~at least 1.1 times~~ the design capture volume that is not reliably retained onsite.

46. Provision E.3.c (Page 78 of 120) – Alternative Compliance In-Lieu Fee Option Is Inconsistent With State Law

Provision E.3.c.(3)(c)(i) requires the in-lieu fee to be transferred to the Copermittee or an escrow account prior to PDP construction. Development fees however, are collected at the time of building permit issuance, and permits can be issued throughout phases of the development whereby the entire in-lieu fee is not necessarily collected upfront when construction first begins. Furthermore, for large master planned developments, fees are negotiated through a development agreement to be collected based on certain development milestones. Therefore collecting and holding fees prior to construction is not common development practice and there should be flexibility in collecting fees given the timing and phasing of development and the market.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(3) Alternative Compliance to Onsite Structural BMP Performance Requirements
(c) Alternative Compliance In-Lieu Fee Option
(i) The in-lieu fee <u>should</u> ~~must~~ be <u>collected and held in accordance with the Mitigation Fee Act and all other applicable development fee laws</u>. ~~transferred to the Copermittee (for public projects) or an escrow account (for private projects) prior to the date construction of the Priority Development Project is initiated.~~

Provision E.3.c.(3)(c)(ii)[d] requires the in-lieu fee to include the cost to operate and maintain the alternative compliance projects. Development fees however are generally limited to capital costs (design and construction) that go to the useful life of the project of 5 years or more. There are sometimes limitations in State Law on the use of development fees for operations and maintenance. Operations and maintenance can probably be negotiated with a developer, but a requirement to include operations and maintenance as part of the fee has potential legal issues. *The County recommends the following language be deleted:*

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(3) Alternative Compliance to Onsite Structural BMP Performance Requirements
(c) Alternative Compliance In-Lieu Fee Option
~~(ii)[d] The in-lieu fee must also include the cost to operate and maintain the offsite alternative compliance projects.~~

47. Provision E.3.c (Page 78 of 120) – The Copermittees Should be Allowed the Flexibility Provided Under EPA Policy to Develop a Trading and Water Quality Credit System

The Copermittees appreciate the flexibility of the Tentative Order to implement a water quality credit system as an alternative compliance schedule. Trading systems create cost-effective, market-based mechanisms for pollutant reduction, and have been successful in other water quality and air quality contexts. The Copermittees do note that any water quality trading system should be implemented in accordance with EPA's 2003 Final Water Quality Trading Policy, which allows for flexibility in generating and trading credits and offsets. The Tentative Order appears to limit a trading system to no net impacts caused by projects meeting the onsite structural BMP performance requirements of Provisions E.3.c(1) and E.3.c(2).

The Copermittees request that this language be stricken and that Copermittees be allowed the flexibility provided under the EPA 2003 Policy. Trading systems differ from program to program and are highly robust and complex credit mechanisms. Therefore, no net impact limitations should be addressed on a case-by-case basis subject to Executive Office approval, and should not immediately be limited by permit language, as certain projects may offer other significant environmental benefits.

The County recommends the following language be deleted:

E. Jurisdictional Runoff Management Programs
3. Development Planning
c. Priority Development Project Structural BMP Performance Requirements
(3) Alternative Compliance to Onsite Structural BMP Performance Requirements
(d) Alternative Compliance Water Quality Credit System Option
The Copermittee may develop and implement an alternative compliance water quality credit system option, individually or with other Copermittees and/or entities. ~~provided that such a credit system clearly exhibits that it will not allow discharges from Priority Development Projects to cause or contribute to a net impact over and above the impact caused by projects meeting the onsite structural BMP performance requirements of Provisions E.3.c.(1) and E.3.c.(2).~~ Any credit system that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance as part of the Water Quality Improvement Plan.

CONSTRUCTION MANAGEMENT

48. Provision E.4 (Page 90 of 120) – The Construction Management Program Provisions Must Be Modified So As Not To Negate The Very Intent And Purpose Of The Watershed Approach And The Focus On The Highest Priorities Within Each Watershed Management Area

(See the corresponding comments under Provision E – Jurisdictional Runoff Management Programs)

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
4. Construction Management [Intro]
Each Copermittee must implement a construction management program in accordance with the strategies identified in the Water Quality Improvement Plan ~~and include, at a minimum, the following requirements.~~ 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 and strategies as identified in the corresponding Water Quality improvement Plan(s).
Move Provision 4f, "Strategies to Address the Highest Priority Water Quality Conditions" to just after the Introduction to the section and before Provision 4.a.

E. Jurisdictional Runoff Management Programs
4. Construction Management

(1) *Provide specific details about how the strategies and/or activities will be implemented (e.g. designate ~~additional~~ BMPs, focus education, and/or increase/decrease frequency of inspections for specific types of sites and/or activities); and*

49. Provision E.4 (Page 90 of 120) – Verification Of Permit Coverage By The Copermittees Should Be For The CGP Only

Per Section 4.a.(4) Copermittees are required to verify that the project applicant has obtained coverage under applicable permits. The fact sheet identifies that "The requirements under Provision E.4. are consistent with the 4th Term Permits for San Diego, Orange, and Riverside Counties", however the requirement of the current Orange County permit is to verify coverage under the Construction General Permit only and so there is not consistency with the 4th Term permits. It is only appropriate to require the Copermittees to verify coverage under the CGP as tracking down the other applicable permits does not assist in ensuring construction management is being implemented correctly. Furthermore, the USACE 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 County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
4. Construction Management
a. Project Approval Process

(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 Qaulity Certification and Section 404 Permit, and California Department of Fish and Game Streambed Alteration Agreement.~~*

50. Provision E.4 (Page 90 of 120) – Maintaining An Inventory Of Construction Sites Should Be Done On A Quarterly Basis

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. Some information for the construction site inventory will be based on inspections and as inspections for some sites will not be completed monthly it is more appropriate to maintain the inventory on a quarterly basis. These sites are tracked through SMARTS already and, therefore, more frequent tracking is not necessary.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
4. Construction Management
b. Construction Site Inventory and Tracking
(1) Each Copermittee must maintain and update at least quarterly ~~monthly~~, a watershed-based inventory of all construction projects issued a local permit that allows ground disturbance or soil disturbing activities that can potentially generate pollutants in storm water runoff. The use of an automated database system, such as GIS, is highly recommended. The inventory must include:

51. Provision E.4 (Page 90 of 120) – Identifying The Weather Conditions During An Inspection Is More Appropriate Than Quantifying The Amount Of Rainfall Since The Last Inspection

The current language requires the inspector to quantify the approximate amount of rainfall since the previous inspection. Quantifying the amount of rainfall since the last inspection provides no benefit in the documentation of an inspection. Documentation of the weather conditions at the time of the inspection however does provide some context as to the state of BMPs during the inspections.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
4. Construction Management
e. Construction Site Inspections
(c) ~~Approximate amount of rainfall since last~~ Weather condition during inspection;

EXISTING DEVELOPMENT

52. Provision E.5 (Page 95 of 120) –The Existing Development Program Provisions Must Be Modified So As Not To Negate The Very Intent And Purpose Of The Watershed Approach And The Focus On The Highest Priorities Within Each Watershed Management Area

(See the corresponding comments under Provision E – Jurisdictional Runoff Management Programs)

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
5. Existing Development Management [Intro]
Each Copermittee must implement an existing development management program in accordance with the strategies identified in the Water Quality Improvement Plan ~~and include, at a minimum, the following requirements.~~ 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 and strategies as identified in the corresponding Water Quality improvement Plan(s).

Move Provision 5e, "Strategies to Address the Highest Priority Water Quality Conditions" to just after the Introduction to the section and before Provision 5.a.

(a) Provide specific details about how the strategies and/or activities will be implemented (e.g. designate ~~additional~~ BMPs, focus education, and/or increase/decrease frequency of inspections for specific types of facilities, areas and/or activities);

E. Jurisdictional Runoff Management Programs
5. Existing Development Management
a. Existing Development Inventory and Tracking
Each Copermittee must maintain, and update at least annually, a watershed-based inventory of the existing development within its jurisdiction that may discharge a high priority pollutant load to and from the MS4……….The inventory must, at a minimum, evaluate and include the following if identified as a source of a high priority pollutant ~~include~~:

(1)(c)(vi) Flood management projects and flood control devices and structures;
(1)(c)(xii) Other municipal facilities that the Copermittee determines may contribute a significant high priority pollutant load to the MS4; and
(2)(g) Identification of the high priority pollutants ~~generated and~~ potentially generated by the facility or area;
~~(2)(j) Whether the facility or area contributes or potentially contributes to the highest priority water quality conditions identified in the Water Quality Improvement Plan.~~

E. Jurisdictional Runoff Management Programs
5. Existing Development Management
b. Existing Development BMP Implementation and Maintenance
Each Copermittee must designate a ~~minimum~~ set of BMPs required for all inventoried existing development, including special event venues. The designated ~~minimum~~ BMPs must be specific

to the identified high priority facility or area types and high priority pollutant generating activities, as appropriate.

53. Provision E.5 (Page 95 of 120) – The Tentative Order Should Recognize That Some Channel Rehabilitation Projects May Occur Downstream Of A Copermittee's Jurisdiction

Some minor changes to the Tentative Order language are needed to recognize that channel rehabilitation projects for a Copermittee may occur just downstream of the Copermittee's jurisdiction.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
5. Existing Development Management
e. Strategies to Address the Highest Priority Water Quality Conditions
(3) Stream, Channel and/or Habitat Rehabilitation in Areas of Existing Development
Each Copermittee must describe in its jurisdictional runoff management program document, a program to rehabilitate streams, channels, and/or habitats in areas of existing development within its jurisdiction or just downstream of its jurisdiction to address the highest priority water quality conditions in the Watershed Management Area. The program must be implemented as follows:

54. Provision E.5 (Page 95 of 120) – Remove The Requirement To Evaluate Retrofit Of Stream Channels From The Tentative Order

Requiring Municipalities to take full responsibility for evaluation of stream channels for restoration goes beyond the intent and scope of Section 402 (p) of the Clean Water Act. The fact sheet identifies that "areas of existing development are responsible for poor water quality, degraded habitats, and hydromodified channels", however existing development may not be the only cause and it is not the responsibility of the Copermittees to restore receiving waters but rather reduce the discharge of pollutants in stormwater and non-stormwater to the Maximum Extent Practicable. Restoration and rehabilitation of stream channels is not the responsibility of the Copermittees. Additionally in many instances the channels are flood control facilities which are designed to protect public safety and developments from flooding. In many instances stream restoration or rehabilitation may not be feasible.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
5. Existing Development Management
e. Strategies to Address the Highest Priority Water Quality Conditions
(3) Stream, Channel and/or Habitat Rehabilitation in Areas of Existing Development
~~(a) Each Copermittee must identify streams, channels, and/or habitats in areas of existing development as candidates for rehabilitation, focusing on areas where stream, channel, and/or habitat rehabilitation projects will address the highest priority water quality conditions identified in the Water Quality Improvement Plan;~~

ENFORCEMENT RESPONSE PLANS

55. Provision E.6 (Page 104 of 120) – The Copermittees Should Be Allowed To Utilize Existing Guidelines And Procedures For Enforcement

Provision E.6 requires each Copermittee to develop and implement an Enforcement Response Plan as a part of its jurisdictional runoff management plan. The Fact Sheet notes that the Enforcement Response Plans will serve as a reference to determine if consistent enforcement actions are being implemented in order to achieve timely and effective compliance. Although the County understands the need for this document, the Tentative Order should be modified to allow the Copermittees to continue to utilize and implement established, equivalent guidelines and procedures for enforcement.

As a part of the development and implementation of a robust Illegal Discharge/Illicit Connection (ID/IC) Program, the Orange County Copermittees have developed an *Investigative Guidance Document* and *Enforcement Consistency Guide*. The response procedures generally include record keeping, notifications and response requests, response activities, investigations, clean-up activities, reporting, education, and enforcement/progressive enforcement. As provided for in the *Enforcement Consistency Guide*, when selecting enforcement options, the County's Authorized Inspectors ensure that violations of a similar nature receive a consistent enforcement remedy. More severe enforcement options may be utilized depending on variables such as history of non-compliance or failure to take good faith actions to eliminate continuing violations or to meet a previously imposed compliance schedule.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
6. Enforcement Response Plans [Intro]
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 approaches and options to enforce its legal authority established pursuant to Provision E.1, as necessary, to achieve compliance with the requirements of this Order. <u>Copermittees may continue to utilize and implement established, equivalent guidelines and procedures for enforcement.</u> The Enforcement Response Plan must include the following:

56. Provision E.6 (Page 104 of 120) – The Term And Definition For "Escalated Enforcement" Should Be Redefined

Although Provision E.6.d requires each Copermittee to include "Escalated Enforcement" in the required Enforcement Response Plan, the definition of what is intended by "Escalated Enforcement" is different within the Tentative Order than the Fact Sheet and may not be enforceable.

The Tentative Order defines "Escalated Enforcement" as "any enforcement scenario where a violation or other non-compliance is determined to cause or contribute to the highest water quality conditions identified in the Water Quality Improvement Plan". This definition seems to indicate that a Copermittee may enforce differently in a particular situation if it involves a high priority pollutant of concern. Not only does the County take exception to the notion that they would enforce differently solely based on the constituent involved, the legality of such an enforcement action is questionable. In fact, when selecting enforcement options, the Co-

Copermittees must ensure that violations of a similar nature are subjected to similar-types of enforcement remedies in order to avoid any claim of selective enforcement of the Ordinance.

However, the Fact Sheet seems to indicate that "Escalated Enforcement" would instead require the Copermittees to "take progressively stricter response to enforce its legal authority and achieve compliance….". The County supports this approach, especially since this is consistent with other ID/IC programs in California and the established guidance that has been developed and implemented by the Copermittees. In fact, the established guidance recognizes that a more severe enforcement option may be selected when a violator has either a history of noncompliance or has failed to take good faith actions to eliminate continuing violations or to meet a previously imposed compliance schedule.

The Tentative Order should be modified as indicated below so that it reflects a standard progressive response approach.

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
6. Enforcement Response Plans
d. ~~Escalated~~ Progressive Enforcement
(1)The Enforcement Response Plan must include a definition of "~~escalated~~ progressive enforcement". ~~Escalated~~ Progressive enforcement must include a series of enforcement actions that match the severity of the violations and include distinct, progressive steps. ~~any enforcement scenario where a violation or other non-compliance is determined to cause or contribute to the highest priority water quality conditions identified in the Water Quality Improvement Plan.~~ ~~Escalated~~ Progressive enforcement may be defined differently for development planning, construction sites, commercial facilities or areas, industrial facilities, municipal facilities, and/or residential areas.
(2)Where the Copermittee determines progressive ~~escalated~~ enforcement is not required, a rationale must be recorded in the applicable electronic database or tabular system used to track violations.
(3)Progressive ~~Escalated~~ enforcement actions must continue to increase in severity, as necessary, to compel compliance as soon as possible.

Add a definition for "Progressive Enforcement" in Attachment C

PUBLIC EDUCATION

57. Provision E.7 (Page 106 of 120) – The Public Education Program Provisions Must Be Modified So As Not To Negate The Very Intent And Purpose Of The Watershed Approach And The Focus On The Highest Priorities Within Each Watershed Management Area

(See the corresponding comments under Provision E – Jurisdictional Runoff Management Programs)

The County recommends the following language changes:

E. Jurisdictional Runoff Management Programs
7. Public Education and Participation [Intro]

Each Copermittee must implement, individually or with other Copermittees, a public education and participation program in accordance with the strategies identified in the Water Quality Improvement Plan to promote and encourage the development…. ~~and include, at a minimum, the following requirements.~~ 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 and strategies as identified in the corresponding Water Quality improvement Plan(s).

Move Provision 7c, "Strategies to Address the Highest Priority Water Quality Conditions" to just after the Introduction to the section and before Provision 7.a.

B. Public Education
The public education program component implemented within the Copermittee's jurisdiction ~~must~~ may 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 and other pollutants of concern in storm water discharges to and from its MS4 to the MEP, as determined and prioritized by the Copermittee(s) by jurisdiction and/or watershed to address the~~ highest priority water quality conditions identified in the Water Quality Improvement Plan;

PROVISION F – REPORTING

58. Provision F (Entire Provision; Begins Page 109 of 120) – The Process For The Development And Updates Of The Various Plans Needs To Be Aligned And Allow For The Time Necessary To Complete The Work

Provision F includes the requirements for the documents and reports that the Copermittees must prepare and provide to the Regional Water Board. This provision incorporates significantly expanded requirements for public participation and involvement in the development and implementation of the WQIPs and JRMPs.

However, the timeframe outlined in this section links each step of the development of the WQIP and JRMP to the commencement of coverage under the Order instead of to the development step that precedes it. The three steps outlined for the development of the WQIP need to be sequential so that the Copermittees have adequate time to complete each step and build the program based on previous comments received. In addition, the timeframe needs to explicitly incorporate adequate time for the Copermittees to review and respond to the comments received on the current action before moving on to the next step of development. For example, it is unclear how the Copermittees would establish their water quality improvement strategies (step 2 of development) at the same time as the establishment of the priority water quality conditions and numeric goals (step 1 of development), however the timelines are concurrent in the Tentative Order.

It should also be noted that this approach appears to establish a heavy workload for the public, Copermittees, and Regional Board. We would submit that a more streamlined approach for the development of the WQIPs should be considered which would provide the Copermittees with the necessary time to develop the final WQIP without extending the overall timeframe. For example, instead of requiring a formal public notice and solicitation of comments by the Regional Board for all three (3) steps of each WQIP, perhaps the Copermittees can work with the local stakeholders to solicit comments for the first two steps of the development of the WQIP and only require formal public noticing for the final approval of the WQIP. Although this is one approach to streamline the development of the WQIP and recommended by the County, an alternative approach would be to modify the timelines as indicated below.

In addition, it should be noted that the preparation of a regional WQIP may trigger local requirements under CEQA. This should be recognized in setting the timeline as noted within the table below.

A comparison of the current and recommended approach is provided in the table below.

Steps and Timelines	**Existing Approach in Tentative Order**	**Total Time from Effective Date of Order**	**Recommended Approach (w/ edits provided in Tentative Order)**	**Total Time from Effective Date of Order**
Establish Priority Water Quality Conditions and Numeric Goals	Within 6 months of commencement of coverage	6 months	Within 6 months of commencement of coverage	6 months
Request Public Comments	60 days from posting	8 months	30 days from posting	7 months
Revise Priority Water Quality Conditions and Numeric Goals	Not specified	? months	30 days from receiving comments	8 months
Establish Water Quality Improvement Strategies and Schedules	Within 9 months of commencement of coverage	9 months	Within 3 months of finalizing Priority Water Quality Conditions and Numeric Goals	11 months
Request Public Comments	60 days from posting	11 months	30 days with stakeholders	12 months
Revise Water Quality Improvement Strategies and Schedules	Not specified	? months	30 days from receiving comments	13 months
Develop WQIP	Within 18 months of commencement of coverage	18 months	Within 18 months of commencement of coverage	**18 months (this allows 5 months for the development of the document)**
Request Public Comments	30 days from posting	19 months	30 days from posting	19 months

If no hearing, Regional Board notify Copermittees that the WQIP is accepted	Within 6 months of the public request for comments	25 months	Within 6 months of the public request for comments	25 months
Finalize WQIP	Not specified	? months	60 days from receiving comments (this assumes that it is concurrent with the Regional Board notification above)	? months
Review for CEQA Requirements	*It should be noted that the preparation of a regional WQIP may trigger local requirements under CEQA. This should be recognized in setting the timeline. This would likely take 30-60 days.*			
Posting on Regional Clearinghouse	Within 30 days of acceptance by Regional Board	26 months	Within 30 days of acceptance by Regional Board	26 months

The County recommends the following language changes

F. Reporting
1. Water Quality Improvement Plans
a. Water Quality Improvement Plan Development
(1)(c) Within 6 months after the commencement of coverage under this Order, the Copermittees must develop and submit the Water Quality Improvement Plan requirements of Provision B.2 to the San Diego Water Board. The San Diego Water Board will issue a public notice and solicit public comments on the Water Quality Improvement Plan for a minimum of ~~6~~30 days.
(1)(d) Within 30 days of receiving the public comments, the Copermittees must revise the priority water quality conditions and numeric goals based on comments received and/or recommendations or direction from the San Diego Water Board Executive Officer.

F. Reporting
1. Water Quality Improvement Plans
a. Water Quality Improvement Plan Development
(2)(b) Within 3 months after the development of the priority water quality conditions and numeric goals, ~~9 months after the commencement of coverage under this Order,~~ the Copermittees must develop and submit the Water Quality Improvement Plan requirements of Provision B.3 to the San Diego Water Board. The San Diego Water Board will issue a public notice and solicit public comments on the Water Quality Improvement Plan for a minimum of ~~6~~30 days.
(2)(c) Within 30 days of receiving the public comments, the Copermittees must revise the water quality improvement strategies and schedules based on comments received and/or recommendations or direction from the San Diego Water Board Executive Officer.

F. Reporting
1. Water Quality Improvement Plans
b. Water Quality Improvement Plan Submittal

(2) 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 within 6 months 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.
(3) Within 60 days of receiving comments, the Copermittees must revise the Water Quality Improvement Plan based on comments received and/or recommendations or direction from the San Diego Water Board Executive Officer.

(4)The Water Quality Improvement Plan must be made available on the Regional Clearinghouse required pursuant to Provision F.4 within 30 days of the finalization of the Water Quality Improvement Plan and acceptance by the San Diego Water Board.

F. Reporting
2. Updates
a. Jurisdictional Runoff Management Program Document Updates
(2)Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E no later than 6 ~~18~~ months after the completion of the corresponding Water Quality Improvement Plan and acceptance of the Water Quality Improvement Plan by the San Diego Water Board ~~commencement of coverage under this Order~~.
(3) Each Copermittee must submit updates to its jurisdictional runoff management program, with a rationale for the modifications, either in the Annual Report required pursuant to Provision F.3.b, and/or as part of the Report of Waste Discharge required pursuant to Provision F.5.b. The requested updates are considered accepted by the San Diego Water Board if no response is provided to the Copermittee after 3 months of submitting the request.
(5) Updated jurisdictional runoff management program documents must be made available on the Regional Clearinghouse required pursuant to Provision F.4 within 30 days of ~~submitting the annual report~~ completing the updates.

F. Reporting
2. Updates
d. BMP Design Manual Updates
(2)Subsequent updates must be consistent with the requirements of Provisions E.3.a-d and must be submitted as part of the Annual Reports required pursuant to Provision F.3.b, and/or as part of the Report of Waste Discharge required pursuant to Provision F.5.b. The requested updates are considered accepted by the San Diego Water Board if no response is provided to the Copermittee after 3 months of submitting the request.

59. Provision F.3 (Page 112 of 120) – The JRMP Annual Report Form Is Not Linked To The Watershed Priorities And Does Not Result In Meaningful Reporting

The Tentative Order states that the purpose of the reporting is to determine and document compliance with the Order and to communicate the implementation status of each jurisdictional runoff management program. This goal is met, in part, through the submittal of the Annual Reports (F.3.b), which includes a requirement for each Copermittee to submit a Jurisdictional Runoff Management Program (JRMP) Annual Report Form (Attachment D). The requirement for the Copermittees to submit Attachment D is problematic for the following reasons:

1. The Form is a significant departure from the current jurisdictional reporting and effectiveness assessment required pursuant to Order R9-2009-002 and will only focus on the *implementation* of the permit provisions instead of the *impact, effectiveness* and potential *modifications* necessary for the program.

2. The jurisdictional reporting should complement the WQIP reporting and be focused on the implementation, impact, and effectiveness assessment of the jurisdictional actions and activities that are being implemented to support the goals, objectives, and high priority water quality issues of the WQIP.

3. The ability of the Copermittees to be able to, on a jurisdictional basis, determine if there are modifications and/or improvements needed to maximize the JRMP and, ultimately, the WQIP effectiveness will be severely limited.

4. The reporting required pursuant to the Form is not linked to the priorities within the WQIP and, is therefore, additive and will require the Copermittees to develop the related data collection and reporting infrastructure without a commensurate benefit for the management of the programs.

5. The Form seems to restrict the reporting capabilities of the Copermittees and requires the compilation of cumbersome and uninformative numbers such as "number of existing developments in residential inventory" and "number of priority development projects in review".

6. Although the Fact Sheet identifies Attachment D as an "example", this is not clearly stated within the provisions. If the Copermittees can develop their own JRMP reporting form that would be aligned with the WQIP priorities and strategies, then this should be clarified within the Tentative Order.

As a result, it is unclear how this new reporting requirement will improve upon existing reporting processes and/or provide information that would inform management decisions at the jurisdictional or watershed scale. Allowing the Copermittees to develop their own jurisdictional reporting to support the overarching WQIP will still be consistent with the reporting requirements identified in 40CFR 122.42(c). The County is recommending that the jurisdictional reporting be aligned with the WQIP reporting and either delete Attachment D or make it optional.

The County recommends the following language changes:

F. Reporting
3. Progress Reporting
b. Annual Reports [add the following provision]
(1)(e) For each Water Quality Improvement Plan, the progress of implementing the corresponding Jurisdictional Urban Runoff Management Programs. Each Copermittee should report on the items listed below. The individual JRMP annual reports may be included as attachments to the corresponding WQIP annual report. The JRMP annual report should include, but not be limited to, the following:

(i) *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,*

(ii) *Proposed modifications to the water quality improvement strategies, with public input received and rationale for the proposed modifications,*

(iii) *Previously proposed modifications or updates incorporated into 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 each Copermittee's jurisdictional runoff management program document;*

(f) ~~A completed Jurisdictional Runoff Management Program Annual Report Form (Attachment D or accepted revision) for each Copermittee in the Watershed Management Area, certified by a~~

~~Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative.~~

F. Reporting
3. Progress Reporting
b. Annual Reports
(2) ~~Each Copermittee must complete and submit a Jurisdictional Runoff Management Program Annual Report Form (Attachment D or accepted revision) no later than October 31 of each year until the first Annual Report is required to be submitted~~. <u>Until the Copermittees have updated their jurisdictional runoff management programs consistent with Provision F.2.a, the Copermittees must continue to utilize the current jurisdictional runoff management program annual reporting format.</u> Each Copermittee must submit the information on the Jurisdictional Runoff Management Program Annual Report Form specific to the area within its jurisdiction in each Watershed Management Area.

F. Reporting
3. Progress Reporting
c. Regional Monitoring and Assessment Report

[This provision should be moved to section F.5.c since it is a part of the ROWD assessment]

Delete Attachment D or make it an "example" of what the Copermittees can prepare for each Watershed Management Area.

60. Provision F.3 (Page 112 of 120) – The Annual Reporting Section Should Be Modified To Distinguish Between The Reporting That Is Conducted During The Transitional Period And The Reporting That Is Conducted Afterward

The language in Provision F.3.b should be clarified to provide additional direction to the Copermittees regarding the transitional period annual reporting and the post-transitional annual reporting requirements.

The County recommends the following language changes:

F. Reporting
3. Progress Reporting
b. Annual Reports
<u>(1) Transitional Period JRMP Reports: Each Copermittee must complete and submit a Jurisdictional Runoff Management Program Annual Report no later than October 31 of each year prior to the implementation of updated JRMP programs pursuant to F.2.a. Each Copermittee must submit the information on the Jurisdictional Runoff Management Program specific to the area within its jurisdiction in each Watershed Management Area</u>.

<u>(2) Transitional Period Monitoring Report: The transitional period monitoring conducted pursuant to D.1.a and D.2.a. shall be reported in a single report that covers the entire reporting period from the initiation of the transitional period monitoring (as described in D.1.a and D.2.a.), through September 30th following approval of the Water Quality Improvement Plan. The Transitional Period Monitoring Report shall include the assessments required per D.4.a.(1)(a), D.4.b.(1)(a) and D.4.b.(2)(a); and be submitted by January 31st following completion of the above mentioned transitional period.</u>

(3) <u>Post-Transitional Annual Reports – Following the initial transitional period after enrollment into this Order, the</u> Copermittees for each Watershed Management Area must submit a <u>combined</u> Annual Report for each reporting period no later than January 31 of the following year. The annual reporting period consists of two periods: 1) July 1 to June 30 of the following year for the jurisdictional runoff management programs, 2) October 1 to September 30 of the following year for the monitoring and assessment programs. ~~The first Annual Report must be prepared for the reporting period beginning July 1 after commencement of coverage under this Order, 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 for the jurisdictional runoff management programs, and September 30 in the following year for the monitoring and assessment programs.~~ Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each Annual Report must include the following:

61. Provision F.4 (Page 115 of 120) –The Copermittees Should Be Able To Define The Geographic Coverage Of And Utilize Established Web-Based Mechanisms As Their Regional Clearinghouse

The Tentative Order requires the Copermittees to develop, update, and maintain an internet-based Regional Clearinghouse, however it does not define what geographic area is covered by a Regional Clearinghouse or if the Copermittees can utilize their existing web-based systems and/or linkages that have been developed over the last four permit terms. The Copermittees should be able to define what geographic area is covered by the Regional Clearinghouse, which could include, but not be limited to, watershed management areas, County jurisdictions and/or the San Diego Regional Water Quality Control Board jurisdiction. In addition, the Copermittees should be able to utilize existing, established mechanisms and linkages, in whole or in part, as their Regional Clearinghouse so that they do not, necessarily, need to expend resources in developing new infrastructure.

The County recommends the following language changes:

F. Reporting
4. Regional Clearinghouse
The Copermittees must develop, update, and maintain an internet-based Regional Clearinghouse that is made available to the public no later than 18 months after the effective date of this Order. <u>The Copermittees may elect to develop and maintain the clearinghouse(s) provided by other Copermittees or agencies</u>.

Add a definition for "Regional Clearinghouse" in Attachment C

ATTACHMENT C
Acronyms, Abbreviations, and Definitions

62. Attachment C (Entire Attachment; Begins Page C-1) – Attachment C Should Clarify The Meaning Or Intent Of Specific Terms Used Within The Order

In addition to the acronyms and abbreviations, Attachment C also includes definitions that may provide an explanation or description of the meaning or intent of specific terms or phrases that are used within the Order. The County recommends the addition and/or modification of the following definitions in order to assist in describing the meaning or intent of these terms and to avoid unnecessary confusion.

The County recommends the following language changes:

This term did not have a definition.

Channel Rehabilitation and Improvement *– Remedial measures or activities for the purpose of improving 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/or restoration of water and sediment transport balance.*

This definition should remain consistent with the Federal regulations.

Copermittee *– A permittee to a NPDES permit that is only responsible for permit conditions relating to the discharge for which it is operator [40 CFR 122.26(b)(1)]. For the purposes of this Order, a Copermittee may include the following jurisdictions: a~~A~~n 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 San Diego Unified Port District.*

This definition should provide additional clarification.

Illicit Connection *– Any man-made conveyance or drainage system through which the discharge of any pollutant to the stormwater drainage system occurs or may occur. ~~Any connection to the MS4 that conveys an illicit discharge.~~*

This definition should remain consistent with the Federal regulations.

Illicit Discharge *- Any discharge to a ~~the~~ municipal separate storm sewer ~~MS4~~ that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].*

This definition should provide additional clarification for the purposes of low impact development.

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.*

This term did not have a definition.

Progressive Enforcement *– A series of enforcement actions that increase in severity commensurate with the violation. Such enforcement actions may include verbal and written notices of violation, fines, stop work orders, administrative penalties, criminal penalties, etc.*

This definition should provide additional clarification.

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.*

This term did not have a definition.

Regional Clearinghouse *– A central location for the collection, classification, and distribution of information including, but not limited to, plans, reports, manuals, data, contact information, and/or links to such documents and information. The clearinghouse(s) may be organized by the following regions: Watershed Management Areas, County jurisdictions, and/or the San Diego Regional Water Quality Control Board jurisdiction.*

This definition should remain consistent with the Federal regulations.

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.*~~

This definition should remain consistent with the State regulations

Waters of the State *- Any* ~~*water,*~~ *surface water or groundwater* ~~*underground*~~*, including saline waters, within the boundaries of the s*~~*S*~~*tate [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*~~*.*

This term should clarify that a wet weather period should be preceded by a minimum dry weather period, unless defined differently in another regulatory mechanism.

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 otherwise defined by another regulatory mechanism, such as a TMDL.*

ATTACHMENT D
Jurisdictional Runoff Management Program Annual Report Form

63. Attachment D (Entire Attachment; Begins Page D-1) – The JRMP Annual Report Form Is Not Linked To The Watershed Priorities And Does Not Result In Meaningful Reporting

(See Comments on Provision F.3.b)

ATTACHMENT E
Specific Provisions for Total Maximum Daily Loads

64. Attachment E (Entire Attachment; Begins Page E-1) – Permit Provisions Must Be Consistent With The Corresponding Basin Plan Amendments (BPAs)

The Regional Board has adopted two Basin Plan Amendments (BPAs) to establish Total Maximum Daily Loads (TMDLs) where the Copermittees are identified as Responsible Parties and assigned wasteload allocations (WLAs): (1) Indicator Bacteria in Baby Beach in Dana Point Harbor[66] and (2) Indicator Bacteria, Project I - Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)[67] (Beaches and Creeks Bacteria TMDL).

However, there are several fundamental and substantive discrepancies between the adopted TMDL BPAs and the provisions of the Tentative Order. These inconsistencies negate the Basin Planning process that occurred to establish the TMDLs and clearly contradict the Board's intent for how the TMDLs would be incorporated into the MS4 Permit. As the TMDLs have been incorporated into the Basin Plan, the TMDLs constitute the "program of implementation needed for achieving water quality objectives"[68] and the provisions in the MS4 Permit must therefore be consistent with the Basin Plan.

For example:

- Both the Baby Beach and Beaches and Creeks TMDLs clearly establish mass-based wasteload allocations. These wasteload allocations are entirely absent from the Tentative Order (see additional comments below for further discussion). Instead, the Tentative Order establishes water quality based effluent limits (WQBELs) based upon an effluent concentration (set equal to the numeric targets).
- For the Beaches and Creeks TMDL, the Tentative Order is not consistent with the compliance schedule approach provided for the comprehensive load reduction plans (CLRPs) established in the BPA. The CLRPs that will be submitted by Copermittees will propose interim compliance dates, as allowed by the BPA, 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 Tentative Order should

[66] Resolution R9-2008-0027
[67] Resolution R9-2010-0001
[68] Water Code section 13050(j)

acknowledge the flexibility allowed by the TMDL[69]. In fact, this scheduling flexibility was a primary "incentive" for Copermittees to develop CLRPs instead of Bacteria Load Reduction Plans (BLRPs).

- For the Baby Beach TMDL, the BPA includes two paths for the implementation of the TMDL – one where the beach has been delisted from the 303(d) list and one where the beach remains impaired[70]. Where a beach has been delisted, the BPA requires that Responsible Copermittees monitor and continue implementation of existing implementation actions "to ensure REC-1 water quality objectives are maintained" (i.e., the beach is not placed back on the 303(d) list). Only if the beach is placed back on the 303(d), the NPDES permit is to be revised to include "requirements consistent with these TMDLs." As Baby Beach is not on the most recent 303(d) list for REC-1 bacteria objectives, the requirements for Responsible Copermittees must be limited to monitoring and implementation of existing implementation actions. The Tentative Order does not recognize the approach for delisted beaches or recognize that Baby Beach is delisted.
- For the Beaches and Creeks TMDL, the BPA clearly establishes that no additional actions are required for beaches that are delisted[71]. This language is not included in the Tentative Order.
- Monitoring requirements in the Tentative Order must be consistent with the requirements of the BPAs. Both the Baby Beach TMDL and the Beaches and Creeks TMDL provide certain flexibility in monitoring, via the BLRPs and CLRPs, respectively, and this flexibility is not captured in the Tentative Order.
- Both the Baby Beach TMDL and the Beaches and Creeks TMDL clearly acknowledges that exceedances in the receiving water may not be from the MS4 and contains specific compliance language to address such a situation. This language is not provided in the Tentative Order.

These examples are not exhaustive of the inconsistencies between the BPAs and the Tentative Order (additional inconsistencies are identified and modified language is proposed in **Attachment B**).

During the workshops on the Tentative Order, Regional Board members raised the question of feasibility of attaining the TMDLs. The Basin Plan Amendments included many considerations and requirements that cumulatively result in a more feasible program of implementation. If many of the requirements of the BPAs are modified or not included in the MS4 permit, such as the mass-based WLAs, flexible monitoring programs, no further action for delisted beaches, and reconsideration of the TMDLs through reopeners, the Tentative Order establishes requirements that are not only inconsistent with the BPAs, but that make attainment of the TMDLs infeasible.

*The County recommends that the Regional Board modify the requirements in Attachment E to establish provisions that are consistent with the adopted Basin Plan Amendments. Specific modifications to address these inconsistencies are provided in **Attachment B**. Certain key inconsistencies are noted in the subsequent comments below. Additional inconsistencies are also captured in the modifications detailed in **Attachment B**.*

[69] Page 68 of Attachment A of the Basin Plan Amendment
[70] See BPA pg. A-12
[71] See the Basin Plan Amendment, pgs. A2, A12, A66

65. Attachment E (Entire Attachment; Begins Page E-1) – The Tentative Order's Numeric WQBELs Violate the Requirements of Law Because They are Infeasible

The Tentative Order's numeric WQBELs are not feasible. The 2010 EPA Memorandum on TMDLs[72] recommends "where feasible, the NPDES permitting authority exercise its discretion to include numeric effluent limitations as necessary to meet water quality standards."[73] This position is based on 40 CFR §122.44(k), which authorizes the use of BMPs "when numeric limitations are infeasible." In 1991, the State Board concluded that "numeric effluent limitations are infeasible as a means of reducing pollutants in municipal storm water discharges, at least at this time."[74]

Although this determination was made over twenty years ago, the State Board's position on this issue has not changed since then, as evidenced by its adoption of the Caltrans MS4 permit in September of 2012. Citing the fact sheet for the Caltrans MS4 permit, the State Board affirmed that "it is not feasible at this time to set enforceable numeric effluent criteria for municipal BMPs and in particular urban discharges."[75]

The Caltrans MS4 permit's fact sheet also supports the use of BMP-based WQBELs as a means of meeting TMDLs and other quality standards. The Caltrans MS4 permit is also subject to TMDLs adopted by the Regional Board and USEPA. If this aspect of the Tentative Order is not corrected, Orange County MS4 Copermittees will be compelled to comply strictly with numeric WQBELs and receiving water limitations while Caltrans need only implement WQBEL BMPs to achieve compliance with the same TMDLs. This inconsistency lacks any justification.

66. Attachment E (Entire Attachment; Begins Page E-1) – The Tentative Order's WQBELs Were Improperly Formulated

The Tentative Order fails to provide adequate justification for incorporating numeric water quality based effluent limitations in the Tentative Order for each of the incorporated TMDLs to which they apply. A WQBEL is an enforceable translation in an MS4 permit for attaining compliance with a TMDL WLA, which serves to protect beneficial uses of a receiving water[76]. The Tentative Order fails to establish that an adequate requisite Reasonable Potential Analysis ("RPA") has been conducted.

The Tentative Order fails to establish if discharges from any individual permittee's MS4 have the reasonable potential to cause or contribute to an excursion above any "State water quality standard including State narrative criteria for water quality." Page 2 of the 2010 EPA Memo states:

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[72] U.S. Environmental Protection Agency, Memorandum, *Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Waste d Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs,"* (Nov. 12, 2010) (*2010 EPA Memo*).
[73] EPA Memo, p. 2 (emphasis added).
[74] State Water Resources Control Board Water Quality Order 91-03, page 49.
[75] Fact Sheet for NPDES Permit and Waste Discharges Requirements for State of California Department of Transportation, NPDES Permit No. CAS000003, Order No. 2012-0011-DWQ, September 7, 2012, page 9.
[76] 40 C.F.R. § 130.2.

> "Where the NPDES authority determines that MS4 discharges *have the reasonable potential to cause or contribute to a water quality excursion*, EPA recommends that, where feasible, the NPDES permitting authority exercise its discretion to include numeric effluent limitations as necessary to meet water quality standards."

There are two generally accepted approaches to conducting an RPA. According to USEPA guidance, "A permit writer can conduct a reasonable potential analysis using effluent and receiving water data and modeling techniques, as described above, or using a non-quantitative approach."[77]

Neither the administrative record nor the Tentative Order's fact sheet contains any evidence of that an RPA has been performed in accordance with the two foregoing approaches. Regarding the first approach, such an analysis would in any case have been impossible to perform given that no outfall (effluent) monitoring has been required for any prior Orange County MS4 permit. No modeling appears to have been conducted either.

Beyond this, federal regulations not only require that an RPA be performed to determine if an excursion above a water quality standard occurred, but also that the storm water discharge must be measured against an "allowable" ambient concentration[78].

A WQBEL is a means of attaining a TMDL WLA, a translation of a WLA into prescribed actions or limits which has in the past been typically expressed as a BMP. Before a WQBEL can be developed, however, a need for it must be established. As the Writers' Manual points out:

> The permit writer should always provide justification for the decision to require WQBELs in the permit fact sheet or statement of basis and must do so where required by federal and state regulations. *A thorough rationale is particularly important when the decision to include WQBELs is not based on an analysis of effluent data for the pollutant of concern*. NPDES Permit Writers' Manual, September 2010, page 6-23 (emphasis added).

No such rationale is provided in the Fact Sheet, which in the absence of effluent data derived from outfall monitoring, would have been absolutely necessary to justify the need for a numeric WQBEL.

Finally, the 2010 EPA Memo is clear that reliance on numerics should be coupled with the "disaggregation" of different storm water sources within permits. The Tentative Order fails to adequately disaggregate storm water sources within applicable TMDLs regarding numeric WQBELs and for receiving water limitations, further making the imposition of numeric standards inappropriate.

67. Attachment E (Entire Attachment; Begins Page E-1) – WQBELs Are Incorrect For Both Baby Beach Bacteria TMDL And Beaches And Creeks TMDLs As They Are Inconsistent With The WLAs

Federal regulations require that NPDES permits contain effluent limits consistent with the assumptions and requirements of all available WLAs[79]. As currently established in the

[77] NPDES Permit Writers' Manual, September 2010, page 6-23.
[78] 40 C.F.R. §122.44(d)(iii).
[79] 40 CFR 122.44(d)(1)(vii)(B)

Tentative Order, the WQBELs are not consistent with the WLAs and are therefore not consistent with federal regulations.

The Tentative Order establishes WQBELs based upon the numeric targets (set equal to water quality objectives), not the mass-based WLAs established by the TMDL. To justify this approach, the Fact Sheet states (emphasis added):

> *"Because **numeric targets** for TMDLs typically include a component that will be protective of water quality standards, a TMDL will likely include one or more numeric receiving water limitations and/or effluent limitations as part of the assumptions or requirements of the TMDL. **Any numeric receiving water limitations and/or effluent limitations developed as part of the assumptions or requirements of a TMDL must be incorporated and included as part of a WQBELs for the MS4s.**" Pg. F-38.*

However, federal regulations require that the WLAs, not the numeric targets, are incorporated into the Tentative Order. Further, federal regulations do not require that any receiving water limitation or effluent limitation developed as part of the TMDL must be incorporated. Rather, federal regulations require that the WQBELs are consistent with the assumptions and requirements of the WLAs.

40 CFR 122.44(d)(1)(vii)(B) states (emphasis added).

> *When developing water quality based effluent limits under this paragraph the permitting authority shall ensure that: (B) Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, **are consistent with the assumptions and requirements of any available wasteload allocation** for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7.*

While in most cases the numeric targets are a component of the allocations, there are numerous additional assumptions and requirements of the WLAs that are also a component of the WLAs. Wasteload allocations take into account various considerations, including the multiple sources of a pollutant, flow rates, critical conditions, and margin of safety. By only incorporating the numeric target component of the WLAs, the Tentative Order fails to include all of the other assumptions and requirements of the WLAs, which is required by federal regulations. Only incorporating the numeric targets negates the entire TMDL analysis and Basin Planning process. Otherwise, TMDLs would be as simple as assigning numeric effluent limitations to MS4 discharges equal to the numeric objectives in the Basin Plan, which is essentially what this Tentative Order is proposing to do, and which is explicitly contrary to the TMDLs that have been established in the Basin Plan.

In fact, simply defining the WQBELs as the numeric targets of the TMDL is contrary to the purpose of the Basin Plan itself, which not only requires the establishment of water quality objectives, but also the program of implementation needed to achieve the water quality objectives[80]. A TMDL, once incorporated into the Basin Plan, is exactly that – a program of implementation needed for achieving water quality objectives.

Per the Beaches and Creeks Bacteria TMDL BPA:

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[80] See Water Code section 13050(j) and as stated in the Beaches and Creeks Bacteria TMDL (Resolution, Pg.2): "A "Water Quality Control Plan" or "Basin Plan" consists of a designation or establishment for the waters within a specified area of all of the following: (1) Beneficial uses to be protected, (2) Water quality objectives and (3) A program of implementation needed for achieving water quality objectives."

> *"TMDLs must be established at levels necessary to attain and maintain the applicable narrative and numerical water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge between effluent limitations and water quality." – Resolution, Pg. 2*

Per the Baby Beach Bacteria TMDL BPA:

> *"The loading capacities are defined as the maximum amount of fecal coliform, total coliform and Enterococcus that the waterbody can receive and still attain water quality objectives necessary for the protection of designated beneficial uses. Each TMDL must accommodate all known sources of a pollutant, whether from natural background, nonpoint sources, or point sources, and must include a margin of safety (MOS) to preclude pollutant loading from exceeding the actual assimilative capacities of the waterbodies. The TMDL calculations also account for seasonal variations and critical conditions and were developed in a manner consistent with guidelines published by USEPA." – Resolution, Pg. 4*

In both the Baby Beach Bacteria TMDL and the Beaches and Creeks Bacteria TMDL, the WLAs clearly take into consideration factors other than the numeric targets, such as flow rates as the WLAs are expressed as mass-based limits. If it was the Regional Board's intent to establish a concentration-based TMDL, then the WLAs would be expressed as a concentration. However, by establishing mass-based WLAs, the TMDL purposefully and explicitly establishes WLAs that incorporate many other factors than just the concentrations of the numeric targets. Therefore, establishing WQBELs that fail to incorporate the mass-based WLAs fails to be consistent with all of the assumptions and requirements of the WLAs as well as failing to be consistent with the intent of the Basin Plan itself.

<u>Baby Beach Bacteria TMDL</u>

In addition to the universal issues identified above, there are additional concerns with the WQBELs specific to the Baby Beach Bacteria TMDL.

Of particular concern are the WQBELs established for wet weather for total coliform (TC) and fecal coliform (FC). The BPA establishes WLAs for those indicators based upon existing conditions as the loading capacity was determined to be greater than the current discharges and clearly states that no further reductions are necessary. The BPA states (pg. A-23)*:*

> *"According to Tables 7-26 and 7-27, no wet weather wasteload reductions are required for total and fecal coliform indicator bacteria. This means that according to the wet weather models for Baby Beach, REC-1 water quality objectives for total and fecal coliform indicator bacteria are not expected to be exceeded due to discharges from the MS4s. The only wet weather wasteload reductions required for MS4s discharging into the receiving waters along the shoreline at Baby Beach is for Enterococcus indicator bacteria.".*

These existing conditions WLAs were based upon a *load assessment, not a concentration assessment* (e.g., the numeric targets). The final compliance date for these WLAs was set equal to the effective date of the TMDL, given that the WLAs were set to existing conditions and no further reductions were required. Therefore, not only are the WLAs in the Tentative Order not incorporated properly as mass-based WQBELs, but the Copermittees are not provided any time to attain these new and inappropriately established concentration-based WQBELs as the effective date, and therefore final compliance date, was 2009.

<u>Beaches and Creeks Bacteria TMDL</u>

In addition to the universal issues identified above, there are additional concerns with the WQBELs specific to the Beaches and Creeks Bacteria TMDL.

Attachment E specifies WQBELs for dry weather flows as both receiving water and effluent limitations, 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 Tentative Order 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.

The County recommends that the Tentative Order is modified to be consistent with the assumptions and requirements of the WLAs by incorporating the WLAs into the Permit. See ***Attachment B*** *for the specific requested modifications.*

68. Attachment E (Entire Attachment; Begins Page E-1) – WQBELs Should Only Be Defined as Effluent Limitations

There is a significant legal distinction between the Receiving Water Limitations established in Provision A (Discharge Prohibitions) and the Receiving Water Limitations established as part of the WQBELs in Attachment E (TMDL provisions). As currently (inappropriately) defined, WQBELs include receiving water limitations based on the numeric targets (set equal to WQOs) and not based upon the WLAs.

Ensuring that MS4 discharges do not cause or contribute to exceedance of WQOs is already and more appropriately addressed via Provision A.2. When an exceedance occurs under Provision A (Discharge Prohibitions), there is the potential for enforcement action and the Regional Board has discretion with enforcement (e.g., issuing a Notice of Violation). However, where an exceedance occurs for a WQBEL, the Copermittees may be subject to Mandatory Minimum Penalties (MMPs) where the Regional Board does not have discretion.

As established in comments above, the WQBELs have been inappropriately defined to be based upon concentrations, not the mass-based WLAs. And ensuring that discharges do not cause or contribute to exceedances of WQOs is already addressed via Provision A.2. Therefore, the inclusion of concentration-based receiving water limitations in the definition of the WQBELs is inconsistent with the assumptions and requirements of the WLAs and unnecessarily exposes Copermittees to MMPs without any requisite change to the protection of water quality. Throughout the Beaches and Creeks Bacteria TMDL, the BPA consistently refers to attaining the numeric targets (e.g., the water quality objectives) via receiving water limitations. Therefore, establishing the mass-based WLAs as the WQBELs and the numeric targets as receiving water limitations, is consistent with federal regulations for the incorporation of WLAs and the BPA for establishing the receiving water limitations.

The WQBELs should be defined only as the mass-based effluent limitations, consistent with the WLAs in the BPAs. While the Copermittees prefer that the receiving water limitations are simply addressed with a cross-reference back to Provision A.2, if the Regional Board prefers to keep the receiving water limitations as part of the TMDL provisions, they must be distinct from and excluded from the definition of the WQBELs.

The County recommends that the Tentative Order is modified to be consistent with the assumptions and requirements of the WLAs by incorporating the WLAs into the Tentative Order and defining the WQBELs as equal to the WLAs. Receiving water limitations should be excluded from the definition of WQBELs as they are not part of the WLAs. See ***Attachment B*** *for the specific requested modifications.*

69. Attachment E (Entire Attachment; Begins Page E-1) – Compliance Determination For Final WQBELs Should Be Based On The Implementation Of BMPs And Not Numeric Effluent Limitations

For interim water quality-based effluent limitations and receiving water limitations, A BMP-based path to compliance is provided via the implementation of an approved Water Quality Improvement Plan[81]. The Copermittees greatly appreciate and support this approach as it acknowledges the inherent challenges unique to stormwater management and provides appropriate flexibility to implement the necessary BMPs. However, the same approach is not applied to the final WQBELs.

A. Regional Board has Discretion to Establish BMP-Based Compliance

State and federal law do not require the use of numeric effluent limitations for MS4 Copermittees, 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.

Over the last decade, EPA has issued a succession of policy memoranda and guidance documents regarding the incorporation of TMDLs into stormwater permits, including:

1) *Guidance for Developing TMDLs in California* (EPA Region 9). January 7, 2000
2) *Establishing Total Maximum Daily Load (TMDL) WLAs for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs* (Wayland and Hanlon). November 22, 2002
3) *TMDLs to Stormwater Permit Handbook* (Draft) (EPA). November 2008
4) *Revision to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"* (Hanlon and Keehner). November 12, 2010
5) Untitled Letter (Kevin Weiss). March 17, 2011

In each of these EPA documents, EPA allows for discretion on the part of the permitting authority in the use of numeric effluent limitations for stormwater or BMP-based effluent limitations. This flexibility is a key aspect of both Wayland and Hanlon (2002), and Hanlon and Keehner (2010).

[81] Attachment E.5.e.(1)(f)); Attachment E.6.e.(1)(f)

Further, it is important to note that the EPA documents did not identify any differences in how interim and final WQBELs may be addressed by effluent limitations. In particular, the guidance did not limit BMP-based effluent limitation approaches to interim WQBELs.

EPA guidance does emphasize that NPDES provisions implementing TMDLs be enforceable, objective, and measurable. The Hanlon and Keehner memorandum notes that while numeric effluent limitations provide this type of accountability, effluent limitations expressed as BMPs can include objective and measurable elements. Such measurable elements might include as noted on page 3 of Hanlon and Keehner (2010), *"schedule for BMP installation or level of BMP performance"* or *"numeric benchmarks for BMPs and associated monitoring protocols or specific protocols for estimating BMP effectiveness."*

The Tentative Order provides for enforceable, objective, and measurable provisions via the Water Quality Improvement Programs (WQIPs). Establishing an additional compliance path for the final WQBELs would therefore be consistent with the approach already provided in the Tentative Order for interim WQBELs as well as guidance issued by EPA over the last decade in numerous policy memoranda and guidance documents.

B. <u>Compliance Mechanism Matters</u>

The Regional Board has the opportunity to exercise discretion in drafting and approving the compliance language in the Order; however, if the Regional Board continues to opt for numeric effluent limitations for final WQBELs, the Regional Board will no longer have discretion for enforcement decisions during implementation of the Order as Copermittees may be subject to Mandatory Minimum Penalties (MMPs). Such a limit on discretion matters both to Copermittees and the Regional Board.

Take for example a watershed where a group of Copermittees implement a suite of BMPs designed to achieve the final WQBELs. The Copermittees work closely with Regional Board staff and non-governmental organizations in developing and implementing the plan. Implementation of the BMPs achieves a 90% reduction in bacteria loads and results in the delisting of the waterbody from the State's 303(d) list, yet the reductions do not attain the WQBELs. Another Permittee does little to nothing to address the TMDL and achieves no reductions in bacteria loads, the waterbody continues to be listed as impaired on the State's 303(d) list, and the WQBELs are not attained.

If numeric effluent limitations continue as the compliance mechanism for final WQBELs, both Copermittees (the group that achieved the 90% reduction and the Copermittee that did little to nothing) would equally be out of compliance with the Order and equally subject to MMPs. If a BMP-based compliance option is provided for final WQBELs, the Regional Board would have the ability to exercise discretion. The Regional Board could continue to work with the group or Copermittees that are successfully implementing actions and evaluate appropriate additional actions. For the Copermittee that did little to nothing, the Regional Board would still be able to take appropriate enforcement action.

BMP-Based Compliance is not a request to decrease accountability or the efforts of the Copermittees or the commitment to water quality, it is a request for the Regional Board to utilize its discretion to establish Permit provisions that will support and reward actions taken by Copermittees that are achieving the intended purposes of the TMDLs.

C. <u>Consistent with Regional Board Approach to Enforcement</u>

A BMP-based compliance mechanism for final WQBELs is consistent with the Regional Board's stated approach to enforcement (as noted in the BPA establishing the Indicator Bacteria TMDL for Baby Beach):

> *"Regional Board typically implements enforcement through an escalating series of actions to:*
>
> > *(1) assist cooperative dischargers in achieving compliance; (2) compel compliance for repeat violations and recalcitrant violators; and (3) provide a disincentive for noncompliance." Baby Beach Bacteria TMDL BPA, pg. A-20*

The Regional Board can structure the final WQBEL compliance options to achieve this escalating approach to enforcement. A BMP-based compliance option can be provided via the implementation of the WQIPs where discrete milestones and actions are identified. For Copermittees that do not implement the WQIPs, this compliance mechanism would no longer be an option and Copermittees would be compelled to comply via the other mechanisms (essentially, no discharge or numeric effluent limitations). Such an approach achieves all three of the escalating compliance approaches identified by the Regional Board in the Baby Beach Bacteria TMDL, while numeric effluent limitations remove the Regional Board's discretion and will require that the Board treat cooperative dischargers and recalcitrant violators equally.

D. <u>Consistent with Basin Plan Amendments</u>

Establishing a BMP-based compliance path is also consistent with the Basin Plan Amendments for both TMDLs.

Beaches and Creeks TMDL (pg. A-41):

> *"The San Diego Water Board will revise and re-issue the WDRs and NPDES requirements for Phase I MS4s to incorporate the following:*
>
> *WQBELs consistent with the requirements and assumptions of the Municipal MS4 WLAs. WQBELs may be expressed as numeric effluent limitations, when feasible, and/or as a BMP program of expanded or better-tailored BMPs."*

Baby Beach Bacteria TMDL (emphasis added):

> *BPA, pg. A-14: WQBELs consistent with the requirements and assumptions of the bacteria WLAs described in Tables [Insert table numbers] and a schedule of compliance applicable to the MS4 discharges into the impaired shoreline segments described in Tables [Insert table numbers].* ***At a minimum, WQBELs shall include a BMP program to attain the WLAs.***
>
> *BPA, pg. A-15: If the WQBELs consist of BMP programs, then the reporting requirements shall consist of annual progress reports on BMP planning, implementation, and effectiveness in attaining the WQOs in impaired shoreline segments, and annual water quality monitoring reports.*
>
> *BPA, pg. A-19: The BLRPs are the municipal dischargers' opportunity to propose methods for assessing compliance with WQBELs that implement TMDLs.*

Additionally, the compliance schedule[82] anticipates revisions to the TMDL after the final compliance date, potentially through the Natural Sources Exclusion Approach (NSEA). It is inconsistent with the assumptions and requirements of the BPA to require strict compliance via numeric effluent limitations at Year 10 when the TMDL explicitly anticipates revisions occurring after that final date. The intent from the BPA is to have 10 years of implementation, evaluate progress, and assess if additional regulatory options (such as the NSEA) are necessary and/or

[82] BPA, pg. A-24

warranted. This approach can only be accomplished if BMP-based compliance is provided as an option for the final WQBELs.

E. BMP-Based Compliance is Not a "Safe Harbor"

The concept of "safe harbor" implies that Copermittees are not being held accountable, the requirements are not enforceable, and Copermittees will not be obligated to implement actions to address the TMDLs. However, BMP-based compliance can be structured to provide strict accountability and enforceability and require concrete and specific actions to be implemented. In fact, EPA guidance does emphasize that NPDES provisions implementing TMDLs be enforceable, objective, and measurable. The Hanlon and Keehner memorandum notes that effluent limitations expressed as BMPs can include objective and measurable elements. Such measurable elements might include as noted on page 3 of Hanlon and Keehner (2010), *"schedule for BMP installation or level of BMP performance"* or *"numeric benchmarks for BMPs and associated monitoring protocols or specific protocols for estimating BMP effectiveness."*

Additionally, the concept of "safe harbor" was raised during the hearing for the recently adopted Los Angeles Region MS4 Permit. The Regional Board as well as Executive Officer of the Regional Board directly addressed the question if BMP-based compliance, via the implementation of a Watershed Management Program (equivalent to the WQIPs), constituted a "safe harbor." Both the Board and Executive Officer clearly stated that BMP-based compliance was not a "safe harbor" for the Copermittees and the Watershed Management Programs provided objective and measureable elements whereby Copermittees would be required to implement actions and would have clear accountability.

F. Numeric Effluent Limitations are Not Feasible

Finally, in Hanlon and Keehner (2010) (EPA's policy memorandum regarding incorporation of TMDLs into stormwater Permits), states "EPA recommends that, where feasible, the NPDES permitting authority **exercise its discretion** to include numeric effluent limitations as necessary to meet water quality standards." (emphasis added). This statement highlights the basic principle that the Regional Board has discretion in how the WLAs are incorporated into the MS4 Permit. Further, the concept of feasibility relates to *achieving* the numeric effluent limitations, not to *calculating* a numeric effluent limitation. As all TMDLs have numeric WLAs, it would be "feasible" for most all TMDLs, from the very first TMDL ever established, to utilize numeric effluent limitations if simply calculating a WQBEL was the intended definition. As Wayland and Hanlon (2002) (EPA's policy memorandum regarding incorporation of TMDLs into stormwater Permits) noted EPA "expects that most WQBELs for NPDES-regulated municipal and small construction storm water discharges will be in the form of BMPs, and that numeric limits will be used only in rare instances." Therefore, in EPA's policy memoranda, the concept of feasibility is not related to the ability to simply calculate the WQBELs. The concept of "feasibility" really relates to whether or not *achieving* a numeric effluent limitations are feasible for the stormwater permit.

The State Water Resources Control Board convened a Blue Ribbon Panel in 2006 to investigate this very question – are numeric effluent limitations feasible for stormwater permits? This panel of national experts ultimately concluded that numeric limits were generally infeasible across all three stormwater activities (municipal, industrial, and construction), with a few exceptions.[83]

[83] *The Feasibility of Numeric Effluent Limits Applicable to Discharges of Stormwater Associated with Municipal, Industrial and Construction Activities, June 19, 2006*.

Therefore, without providing the BMP-based compliance option for Copermittees, the Tentative Order directly contradicts the State Water Resources Control Board's finding regarding the feasibility of achieving numeric effluent limitations for municipal stormwater discharges.

The County recommends that the Regional Board exercise its discretion and establish a BMP-based compliance path for final WQBELs by adding the following provisions as Attachment E.5.e(2)(f) and as Attachment E.6.e.(2)(e):

> *"The Responsible Copermittees have submitted and are fully implementing a Water Quality Improvement Plan, accepted by the San Diego Water Board, which provides reasonable assurance that the final compliance requirements will be achieved by the final compliance dates. A Responsible Copermittee that does not implement its WQIP in accordance with the milestones and compliance schedules shall demonstrate compliance with the final WQBELs pursuant to Attachment E.5.e(2)(a - e)/Attachment E.6.e(2)(a-d)."*

70. Attachment E (Entire Attachment; Begins Page E-1) – An Explicit Re-Opener Provision Is Necessary

In both the Baby Beach TMDL and the Beaches and Creeks TMDL, the BPAs have included an implementation schedule that defines a point at which the TMDL will be reconsidered to incorporate new information and potentially modify targets, allocations and/or implementation requirements. The intent of the approach is clear in both BPAs:

- **Beaches and Creeks TMDL:** There is an entire section of the Basin Plan Amendment that details modifications to the TMDL through a future Basin Plan Amendment. The BPA specifically notes (BPA pg. A49):

  "As the implementation of these TMDLs progress, the San Diego Water Board recognizes that revisions to the Basin Plan may be necessary in the future."

- **Baby Beach TMDL:** The intent to reassess this TMDL is built directly into several sections of the implementation plan as well as the compliance schedule (emphasis added):

  - *"The San Diego Water Board recognizes that there are potential problems associated with using indicator bacteria WQOs to indicate the presence of human pathogens in receiving waters free of sewage discharges. The indicator bacteria WQOs were developed, in part, based on epidemiological studies in waters with sewage inputs. The risk of contracting a water-born illness from contact with urban runoff devoid of sewage, or human-source bacteria is not known. Some pathogens, such as giardia and cryptosporidium can be contracted from animal hosts. Likewise, domestic animals can pass on human pathogens through their feces.* ***These and other uncertainties need to be addressed through special studies and, as a result, revisions to the TMDLs may be appropriate****." – BPA, pg. A-22*
  - *"Ultimately, the San Diego Water Board supports the idea of measuring pathogens (the agents causing impairment of beneficial uses) or an acceptable alternative indicator, rather than indicator bacteria (surrogates for pathogens). However, as stated previously, indicator bacteria have been used to measure water quality historically because measurement of pathogens is both difficult and costly. The San Diego Water Board is supportive of any efforts by the scientific community to perform epidemiological studies and/or investigate the feasibility of measuring pathogens directly.* ***The San Diego Water Board further supports***

subsequent modification of WQOs as a result of such studies. Ultimately, TMDLs will be recalculated if WQOs are modified due to results from future studies*."- BPA, pg. A-23*

- o Excerpt from Baby Beach Bacteria TMDL Compliance Schedule. Revisions to the TMDL are anticipated to occur in Year 10+ (after the final compliance date).

Table 1. Excerpt from Baby Beach Bacteria TMDL Compliance Schedule (BPA, pg. A-24). Revisions to the TMDL are anticipated to occur in Year 10+ (after the final compliance date).

Year (after OAL approval)	Required Wasteload Reduction	TMDL Compliance Action
10	100 percent *Enterococcus* reduction	• Water Quality Monitoring • Implement BMPs • Submit request for removal from 303(d) List • (if not requested and removed earlier)
10+	Same as above	• Water Quality Monitoring • Implement BMPs • **Submit request for TMDL revisions based on Natural Sources Exclusion Approach if supported by data (if not requested and recalculated earlier)** • Submit request for removal from 303(d) List (if not requested and removed earlier)

While the County is not advocating for technical revisions to the TMDL as part of the Tentative Order issuance (such revisions would appropriately occur through the Basin Plan Amendment process with any subsequent revisions incorporated into the Permit), there is a well documented level of uncertainty in the BPAs with the existing TMDLs where revisions to the targets, allocations, and implementation plans and schedules may be warranted. Such uncertainty should be incorporated into the provisions via an explicit re-opener in Provision H (Modifications of Programs) of the Tentative Order.

The explicit re-opener provision for the Tentative Order would serve two purposes:

- Provide a trigger to reconsider the compliance mechanism (BMP-based compliance in lieu of numeric effluent limits) prior to any compliance dates; and
- Ensure that the WQBELs are reconsidered, consistent with the intent of the TMDLs to revisit and revise as necessary the targets, allocations, and implementation actions prior to final compliance being required. This aspect is especially critical as the Beaches and Creeks re-opener would occur during this permit term (request must be made by Permittees by 2016) and the Baby Beach TMDL has final WQBELs compliance dates within the permit term (2014 and 2019).

While the County recognizes that the Regional Board has the authority to re-open the Permit at any time, the explicit re-opener captures the Regional Board's intent to revisit and revise as necessary the TMDL provisions, consistent with the assumption and requirements of the BPAs. Based upon the first year data summary for the on-going San Diego Regional Stream

Reference Study[84], such revisions may likely be warranted. The first year data show that during dry weather, the reference systems demonstrated a 34.1% exceedance rate of the single sample maximum and a 71% exceedance rate of the 30 day geometric mean for enterococci. The TMDL currently allows for a 0% exceedance rate during dry weather. During storm events, the reference systems had a 71% - 100% exceedance rate of the single sample maximum for enterococci. The TMDL currently only allows for a 22% exceedance rate during storm events. Providing the explicit reopener in the Permit will ensure that such compelling information, such as the results of the Reference Study, are considered prior to subjecting Copermittees to enforcement actions, such as Mandatory Minimum Penalties.

The explicit re-opener is consistent with the Regional Board's stated approach to enforcement, an escalating enforcement approach that contemplates "cooperative dischargers" as well as "recalcitrant violators." Lastly, such an approach was built into the recently adopted Los Angeles MS4 Permit[85].

The County recommends that an explicit Permit re-opener is provided, to capture the Regional Board's intent to revisit and revise as necessary the TMDL provisions prior to final compliance dates. The following additional language is requested as Provision H.6 and H.7:

> *H.6. Modifications of the Order shall be initiated to incorporate provisions as a result of future amendments to the Basin Plan, such as a new or revised water quality objectives or the adoption or reconsideration of a TMDL, including the program of implementation. As soon as practicable, but no later than 6 months of the effective date of a revised TMDL where the revisions warrant a change to the provisions of this Order, the Regional Water Board shall modify this Order consistent with the assumptions and requirements of the revised WLA(s), including the program of implementation.*
>
> *H.7. Modification to the Order shall be considered 18 months prior to the compliance date for final WQBELs where the compliance mechanism is based upon numeric effluent limitations. The intent of the reconsideration is to include provisions or modifications to WQBELs in Attachment E of this Order prior to the final compliance deadlines, if practicable, that would allow an action-based, BMP compliance demonstration approach with regard to final WQBELs.*

71. Attachment E (Entire Attachment; Begins Page E-1) – Compliance Mechanism Is Necessary Prior To Approval Of The Water Quality Improvement Plans

The Tentative Order currently provides for BMP-based compliance with interim WQBELs via the implementation of the WQIPs (Attachment E.5.e.(1)(f)); Attachment E.6.e.(1)(f)). However, as the BMP-based compliance mechanism is contingent upon implementation of an approved WQIP, the Copermittees are not provided with a BMP-based compliance mechanism during the development of the WQIPs. Without any modifications to the Tentative Order, the Copermittees would be subject to numeric effluent limitations for during WQIP development, then provided BMP-based compliance for interim WQBELs during WQIP implementation. Prior to the approval of the WQIPs, Copermittees should be provided a similar BMP-based compliance

[84] Southern California Coastal Water Research Project (SCCWRP). San Diego Regional Stream Reference Study, Monitoring Progress Report #3 and Year 1 Data Summary, October 2011 through November 2012. January 3, 2013.
[85] R4-2012-0175

mechanism while resources are devoted to plan development and the continuation with the implementation of the existing programs.

Recognizing that the shift to a watershed approach is an important and necessary shift in the management of stormwater, in the recently adopted Los Angeles MS4 Permit[86], such compliance was provided during the plan development phase.

The County recommends that the TO provide BMP-based compliance as a compliance option during the development of the WQIPs, the Copermittees request that the following provisions are added

- *Interim WQBELs Compliance (Attachment E.5.e(1) and Attachment E.6.e(1)):*

  Upon the effective date of this Order, a Copermittee's full compliance with all of the following requirements shall constitute a Copermittee's compliance with provisions pertaining to interim WQBELs with compliance deadlines occurring prior to approval of a WQIP.

  (1) Meets all interim and final deadlines for development of a WQIP,

  (3 Targets implementation of watershed control measures in its existing storm water management program, including watershed control measures to eliminate non-storm water discharges of pollutants through the MS4 to receiving waters, to address known contributions of pollutants from MS4 discharges that cause or contribute to the impairment(s) addressed by the TMDL(s), and

  (4) Receives final approval of its WQIP from the Regional Board.

- *If the Regional Board makes modifications to provide for a BMP-based compliance path for final WQBELs, the same revisions are requested to be added to Attachment E.5.e(2) and Attachment E.6.e(2).*

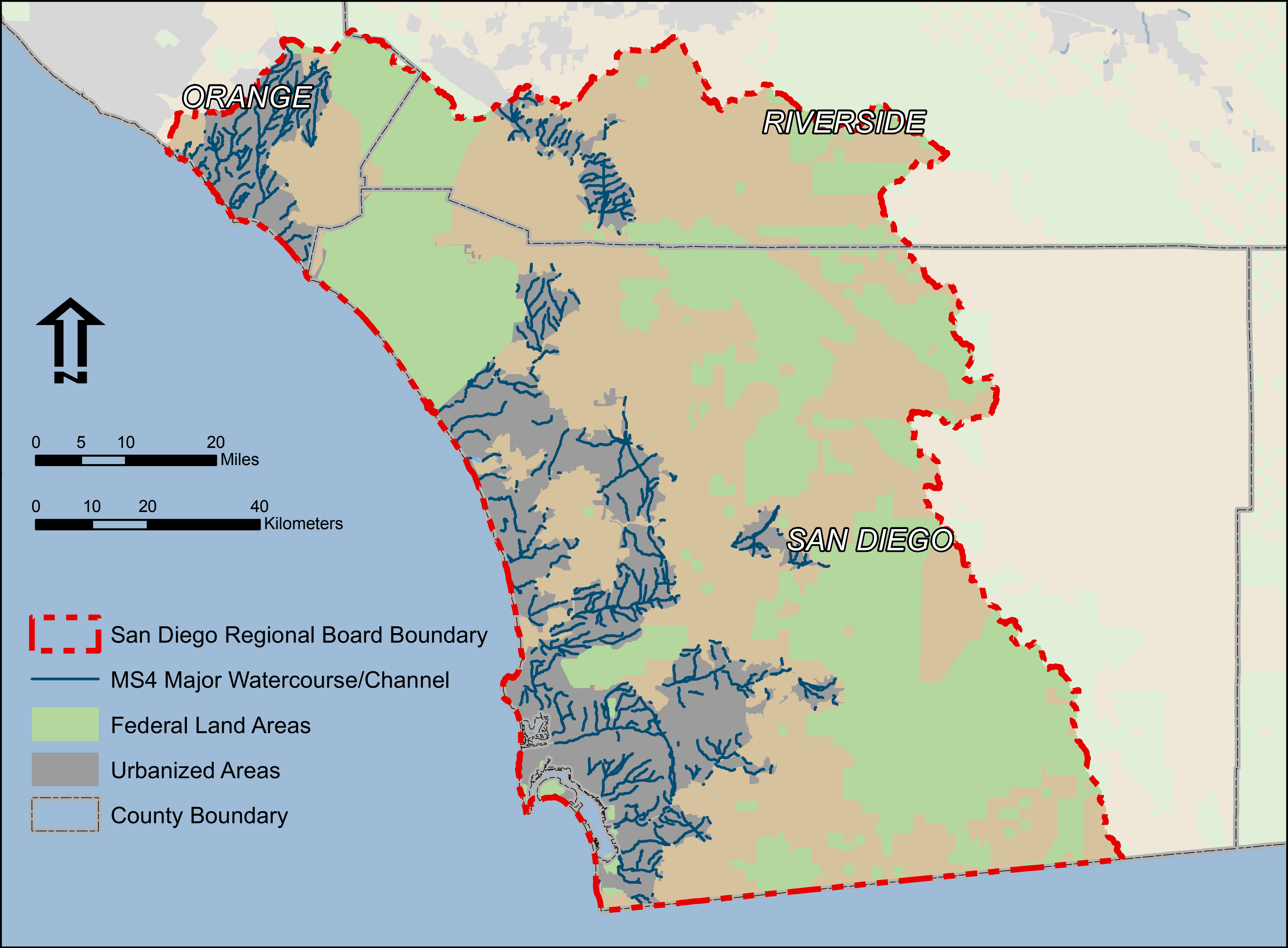
[86] R4-2012-0175

ATTACHMENT A

**ORANGE COUNTY LEGAL &TECHNICAL COMMENTS ON
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
TENTATIVE ORDER No. R9-2013-0001
NPDES NO. CAS0109266**

Appendix A-1

Regional Map


ORANGE
RIVERSIDE
SAN DIEGO
0 5 10 20
Miles
0 10 20 40
Kilometers
San Diego Regional Board Boundary
MS4 Major Watercourse/Channel
Federal Land Areas
Urbanized Areas
County Boundary

ATTACHMENT A

ORANGE COUNTY LEGAL &TECHNICAL COMMENTS ON CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN DIEGO REGION TENTATIVE ORDER No. R9-2013-0001 NPDES NO. CAS0109266

Appendix A-2

SCCWRP Report

HYDROMODIFICATION ASSESSMENT AND MANAGEMENT IN CALIFORNIA

Eric D. Stein
Felicia Federico
Derek B. Booth
Brian P. Bledsoe
Chris Bowles
Zan Rubin
G. Mathias Kondolf
Ashmita Sengupta

SCCWRP
Established 1969

UCLA Institute of the Environment and Sustainability
UCLA La Kretz Center for California Conservation Science

BREN SCHOOL OF ENVIRONMENTAL SCIENCE & MANAGEMENT
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Colorado State University

cbec eco engineering

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LET THERE BE LIGHT

CALIFORNIA Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

Southern California Coastal Water Research Project

Technical Report 667 - April 2012

Hydromodification Assessment and Management in California

Commissioned and Sponsored by California State Water Resources Control Board Stormwater Program

Eric D. Stein	*Southern California Coastal Water Research Project*
Felicia Federico	*University of California, Los Angeles - La Kretz Center for California Conservation Science*
Derek B. Booth	*University of California, Santa Barbara*
Brian P. Bledsoe	*Colorado State University, Fort Collins*
Chris Bowles	*CBEC, Inc., Eco-engineering*
Zan Rubin	*University of California, Berkeley*
G. Mathias Kondolf	*University of California, Berkeley*
Ashmita Sengupta	*Southern California Coastal Water Research Project*

April 2012

Technical Report 667

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EXECUTIVE SUMMARY

Most jurisdictions in California are now required to address the effects of *hydromodification* through either a municipal stormwater permit or the statewide construction general permit. Hydromodification is generally defined as changes in channel form associated with alterations in flow and sediment due to past or proposed future land-use alteration. Hydromodification management has emerged as a prominent issue because degradation of the physical structure of a channel is often indicative of and associated with broader impacts to many beneficial uses, including water supply, water quality, habitat, and public safety. Conversely, reducing hydromodification and its effects has the potential to protect and restore those same beneficial uses. Although hydromodification has the potential to affect all water body types, this document focuses on assessing and managing effects to streams because they are the most prevalent, widely studied, and arguably most responsive type of receiving water.

Hydromodification by definition results from alteration of watershed processes; therefore, correcting the root causes of hydromodification ought to be most effective if based on integrated watershed-scale solutions. To date, such a watershed approach has not been adopted in California; most hydromodification management plans simply consist of site-based runoff control with narrow, local objectives and little coordination between projects within a watershed. Furthermore, each municipality is required to develop its own approach to meeting hydromodification management requirements rather than drawing from standard or recommended approaches that facilitate regional or watershed-scale integration. Long-term reversal of hydromodification effects, however, will require movement away from reliance on such site-based approaches to more integrated watershed-based strategies.

This document has two goals, and hence two audiences. The first goal is to describe the elements of effective hydromodification assessment, management and monitoring. The audience for this goal is primarily the State and Regional Water Boards, since meeting this goal will require integration of watershed and site-scale activities that are likely beyond the responsibility or control of any individual municipality. Success will require fundamental changes in the regulatory and management approach to hydromodification that will likely advance only iteratively and potentially require one or more NPDES permit cycles to fully implement. The second goal of this document is to provide near-term technical assistance for implementing current and pending hydromodification management requirements. This goal can be achieved by municipalities within the construct of existing programs and therefore the primary audience for this aspect of the document is local jurisdictions. Achieving this goal will facilitate greater consistency and effectiveness between hydromodification management strategies, giving them a stronger basis in current scientific understanding.

Watershed analysis should be the foundation of all hydromodification management plans (Figure ES-1). This analysis should begin with a documentation of watershed characteristics and processes, and past, current, and expected future land uses. The analysis should lead to identification of existing opportunities and constraints that can be used to help prioritize areas of greater concern, areas of restoration potential, infrastructure constraints, and pathways for potential cumulative effects. The combination of watershed and site-based analyses should be used to establish clear objectives to guide management actions. These objectives should articulate desired and reasonable physical and biological conditions for various reaches or portions of the watershed and should prioritize areas for protection, restoration, or management. Strategies to achieve these objectives should be customized based on consideration of current and expected future channel and watershed conditions. A one-size-fits-all approach should be avoided. Even where site-based control measures, such as flow-control basins, are judged appropriate, their location and design standards should be determined in the context of the watershed analysis.

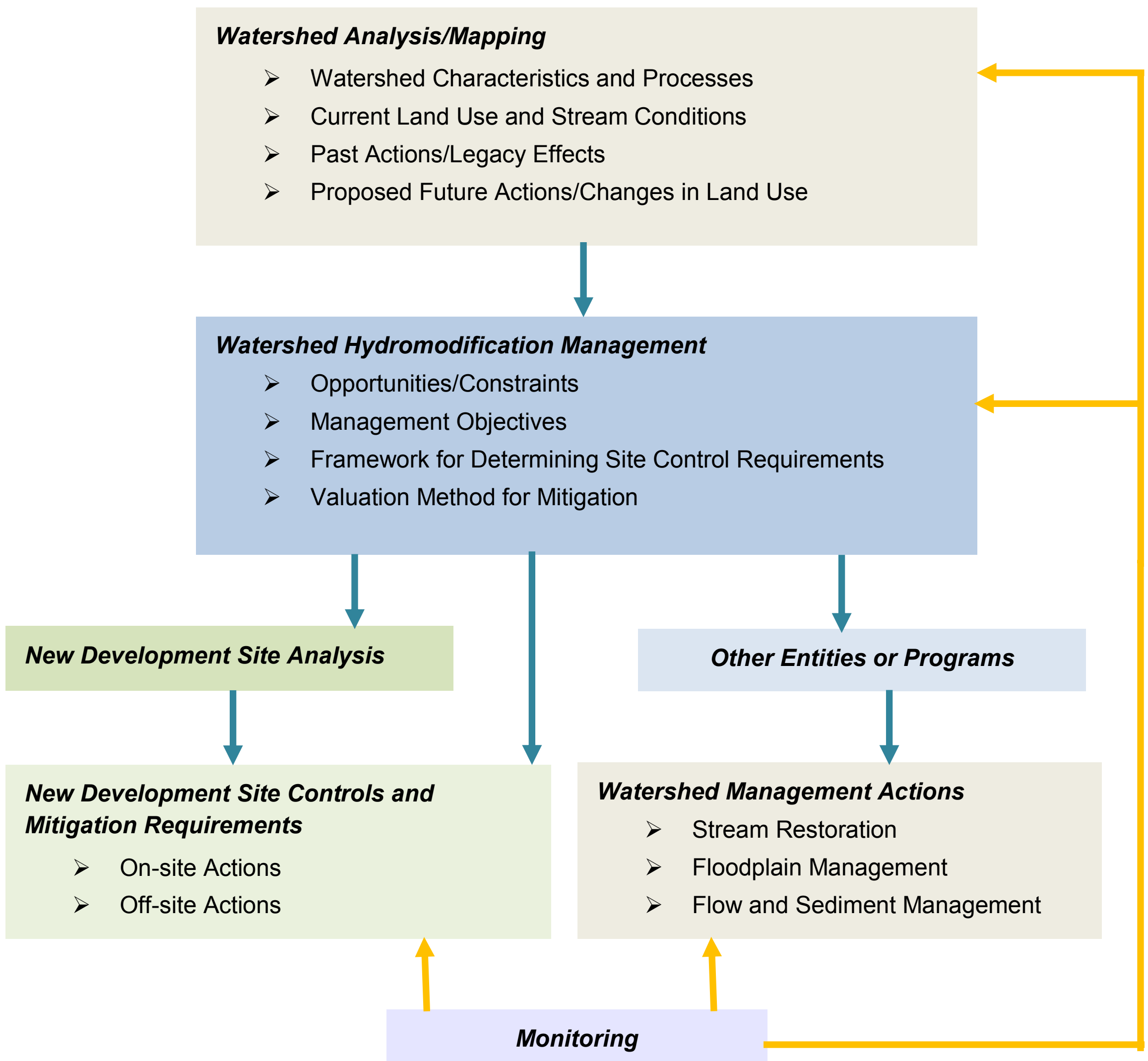


Figure ES-1. Framework for Integrated Hydromodification Management.

An effective management program will likely include combinations of on-site measures (e.g., low-impact development techniques, flow-control basins), in-stream measures (e.g., stream habitat restoration), floodplain and riparian zone actions, and off-site measures. Off-site measures may include compensatory mitigation measures at upstream locations that are designed to help restore and manage flow and sediment yield in the watershed.

Project-specific analysis and design requirements should vary depending on location, discharge point, and size. The range of efforts may include:

- Application of scalable, standardized designs for flow control based on site-specific soil type and drainage design. The assumptions used to develop these scalable designs should be conservative, to account for loss of sediment and uncertainties in the analysis and our understanding of stream impacts.
- Use of an erosion potential metric, based on long-term flow duration analysis and in-stream hydraulic calculations. Guidelines should specify stream reaches where in-stream controls would and would not be allowed to augment on-site flow control.
- Implementation of more detailed hydraulic modeling for projects of significant size or that discharge to reaches of special concern to understand the interaction of sediment supply and flow changes.
- Analysis of the water-balance for projects discharging into streams with sensitive habitat. This may include establishment of requirements for matching metrics such as number of days with flow based on the needs of species present.

Achieving these goals will require that hydromodification management strategies operate across programs beyond those typically regulated by NPDES/MS4 requirements. Successful strategies will need to be developed, coordinated, and implemented through land-use planning, habitat management and restoration, and regulatory programs. Regulatory coordination should include programs administered by the Water Boards, such as non-point source runoff control, Section 401 Water Quality Certifications and Waste Discharge Requirement programs, and traditional stormwater management programs. It should also include other agency programs, such as the Department of Fish and Game Streambed Alteration Program and the Corps of Engineers Section 404 Wetland Regulatory Program. Thus, all levels of the regulatory framework—federal, state, and local—will need to participate in developing and implementing such a program. The integrated watershed-based approach will likely take one or more permit cycles (i.e., at least ten years) to fully implement.

Short- and long-term recommendations for management are summarized in Table ES-1 below.

Table ES-1. Recommendations for implementing watershed-based hydromodification management.

Time Frame	Programmatic: State and Regional Water Boards	Local: City and County Jurisdictions
Short-term (<10 years)	• Establish consistent standards for HMPs • Promote use of watershed approaches in HMPs to move away from reliance on project-based management actions • Develop a valuation method to determine appropriate off-site mitigation • Transition to a broader set of monitoring endpoints including flow, geomorphology, and biology	• Implement watershed analysis of opportunities and constraints related to hydromodification • Implement a broader set of tools to improve on-site management actions • Develop institutional capacity to oversee and review modeling and assessment tools • Develop capacity for information/data management and dissemination
Long-term (1+ decades)	• Develop watershed-based regulatory programs and policies for hydromodification management • Integrate hydromodification management needs into other regulatory programs (e.g. TMDL, 401/WDR)	• Develop institution capacity to implement watershed-based hydromodification programs • Incorporate hydromodification and other water quality management into the land use planning process

To successfully accomplish these various recommendations for implementation, both agencies and private-sector practitioners will need to make use of a range of analytical tools. Such tools generally fall into three categories: descriptive tools, mechanistic models, and empirical/statistical models. Models may be used deterministically and/or in a probabilistic manner. These different types of tools can be selected or combined, depending on the specific objective, such as characterizing stream condition, predicting response, establishing criteria / requirements, or evaluating the effectiveness of management actions. Selection of tools should also consider the type of output, intensity of resource requirements (i.e., data, time, cost), and the extent to which uncertainty is explicitly addressed. It is important to note that deterministic modeling without accompanying probabilistic analysis may mask the uncertainties inherent in predicting hydromodification effects. Short-term and long-term recommendations for the application and improvement of tools to support the management framework are shown in Table ES-2.

Although there is sufficient scientific and engineering understanding of hydromodification causes and effects to begin implementing more effective management approaches now, improvements should be informed and adapted based on subsequent monitoring data. To be useful, monitoring programs should be designed to answer questions and test hypotheses that are implicit in the choice of management actions, such that practices that prove effective can be emphasized in the future (and those that prove ineffective can be abandoned). The focus of monitoring efforts, however, needs to be tailored to the time frame of the questions being addressed and the implementing agency (Table ES-3), reflecting the dual goals and audiences of this document.

Table ES-2. Recommendations for the application and improvement of tools in support of the proposed management framework.

Time Frame	Programmatic: State and Regional Water Boards	Local: City and County Jurisdictions
Short-term (<10 years)	• Develop quality control and standardization for continuous simulation modeling • Perform additional testing and demonstration of probabilistic modeling for geomorphic response • Pursue development of biologically- and physically-based compliance endpoints	• Work cooperatively with adjacent jurisdictions to implement hydromodification risk mapping at the watershed scale • Implement continuous simulation modeling for project impact analysis
Long-term (1+ decades)	• Improve tools for sediment analysis and develop tools for sediment mitigation design • Develop tools for biological response prediction • Improve tools for geomorphic response prediction	• Expand use of probabilistic and statistical modeling for geomorphic response • Apply biological tools for predicting and evaluating waterbody condition

Table ES–3. Recommendations for hydromodification monitoring.

Time Frame	Programmatic: State and Regional Water Boards	Local: City and County Jurisdictions
Short-term (<10 years)	• Define the watershed context for local monitoring (at coarse scale) • Evaluate whether permit requirements are making positive improvements	• Evaluate whether specific projects/ regulations are meeting objectives • Identify the highest priority action(s) to take
Long-term (1+ decades)	• Define watershed context and setting benchmarks for local-scale monitoring (i.e., greater precision, if/as needed) • Demonstrate how permit requirements can improve receiving-water "health," state-wide (and change those requirements, as needed)	• Evaluate and demonstrate whether actions (on-site, instream, and watershed scale) are improving receiving-water conditions • Assess program cost-effectiveness • Identify any critical areas for resource protection

Identifying and, ultimately, achieving the desired conditions in receiving waters requires multiple lines of evidence to characterize condition in an integrative fashion. At their most comprehensive, the chosen metrics should include measures of flow, geomorphic condition, chemistry, and biotic integrity. Biological criteria are key to integrative assessment: in general, biological criteria are more closely related to the designated uses of waterbodies than are physical or chemical measurements. This understanding is reflected in the State's proposed bio-objectives policy, which includes explicit links to hydromodification management.

In summary, transitioning from the current site-based to a more effective watershed-based approach to hydromodification management that addresses both legacy and future impacts will require cooperation between the State and Regional Water Boards and local jurisdictions. Both technical and regulatory/program approaches will need to be updated or revised altogether over the next several permit cycles to realize this long-term goal. Substantial resources will be necessary to realize these goals; therefore, opportunities for joint funding and leveraging of resource should be vigorously pursued from the onset. This cooperative approach should replace the current fragmented efforts among regions and jurisdictions.

1. Overview and Intended Uses of the Document

1.1 Overall Objectives and Intended Audience

Regulation and management of hydromodification is in its infancy in California. As with any new endeavor, initial attempts to meet this need is unproven, inconsistent, and relatively narrow in focus. To improve on existing efforts, the State Water Resources Control Board (SWRCB) has engaged a team of experts to provide technical support to both regulators and permittees for development of Hydromodification Management Plans (HMPs) and their associated permit requirements. This resulting document has two goals and hence two audiences.

The first goal of this document is to provide broad perspectives on what would constitute effective hydromodification assessment, management and monitoring, based on our current best scientific understanding of the topic. The audience for this goal is primarily the State and Regional Water Boards, since meeting this goal will require integration of watershed and site-scale activities that are likely beyond the control or responsibility of any individual municipality. Success will require fundamental changes in the regulatory and management approach to hydromodification that will likely be possible only iteratively and potentially requiring one or more NPDES permit cycles to fully implement. The State and Regional Water Boards will need to provide leadership in implementing these changes, but they will also need to work cooperatively with permittees so that planning, management and monitoring programs can be adapted to operate in a more integrated manner over the broader spatial scales and longer time frames that are necessary to achieve genuine success. Furthermore, hydromodification management plans will need to address preexisting conditions from previous (i.e., legacy) land uses. Clearly, addressing such past effects will require approaches beyond regulation of new development.

This document provides broad perspectives on what would constitute effective hydromodification assessment, management and monitoring, based on our current best scientific understanding of the topic. The document also provides near-term technical assistance for implementing current and pending hydromodification management requirements.

The second goal of this document is to provide near-term technical assistance for implementing current and pending hydromodification management requirements. This goal can be achieved by municipalities within the construct of existing programs, and therefore the primary audience for this aspect of the document is MS4 permittees. Achieving this goal will facilitate greater consistency and effectiveness between HMPs, giving them a stronger basis in current scientific understanding, and will also serve as initial steps toward realizing the broader goal stated above.

1.2 Rationale and Justification

The process of urbanization has the potential to affect stream courses by altering watershed hydrology and geomorphic processes. Development and redevelopment can increase impervious surfaces on formerly undeveloped landscapes and reduce the capacity of remaining pervious surfaces to capture and infiltrate rainfall. The most immediate result is that as a watershed develops, a larger percentage of rainfall becomes surface runoff during any given storm. In addition, runoff reaches the stream channel much more efficiently, so that the peak discharge rates for floods are higher for an equivalent rainfall than they were prior to development. This process has been termed hydromodification. In some instances, direct channel alteration such as construction of dams and channel armoring has also been termed “hydromodification.” Such direct alterations are not the focus of this document. Rather, this document focuses on the geomorphic and biological changes associated with changes in land use in the contributing watershed, which in turn alter patterns and rates of runoff and sediment yield. These changes can result in adverse impacts to channel form, stream habitat, surface water quality, and water supply that can alter habitat and threaten infrastructure, homes, and businesses.

The State and Regional Water Boards have recognized the need to manage and control the effects of hydromodification in order to protect beneficial uses in streams and other receiving water bodies. This recognition has led to the inclusion of requirements for development of “hydromodification management plans” (HMPs) in many Phase 1 and some Phase 2 Municipal Stormwater (MS4) permits. Most HMPs require the permitted municipalities to develop programs and policies to assess the potential effects of hydromodification associated with new development and redevelopment, to require the inclusion of management measures to control the impacts of hydromodification, and to develop monitoring programs to assess the effectiveness of HMP implementation at controlling and/or mitigating the impacts of hydromodification.

Development of HMPs is challenging for several reasons. First, there are few accepted approaches for assessing the impacts of hydromodification. Traditional modeling tools are generally untested and may be difficult to apply or inappropriate for use in some California watersheds and streams. Responses of streams to hydromodification are difficult to assess, given inherent climatic variability and the highly stochastic nature of rainfall and the resulting response of streams to runoff events. There are few local examples or case studies from which to draw experiences or conclusions.

As a result of these challenges, individual HMPs to date have utilized a variety of approaches with little coordination or consistency between them. Little information is available on the relative efficacy of any of these approaches. Furthermore, where approaches and tools developed for HMPs in one region of the State (or even from a different region of the country altogether) have been used in subsequent HMPs elsewhere, there has been little or no consideration of the effect of regional climatological or physiographical differences on the transferability of analytical techniques and tools.

1.3 Need for an Expanded Approach

Current site-based hydromodification management approaches are limited in their ability to address the underlying processes that are responsible for most deleterious impacts of hydromodification. Hydromodification effects, by definition, are watershed-dependent processes that are influenced by water and sediment discharge, movement, and storage patterns that may be occurring up- or downstream of a specific project site. Ideally, then, the first step of any hydromodification management plan (HMP) should be a watershed analysis; management of processes at the site or project scale should be done only in the context of such a watershed analysis. Understanding larger-scale processes facilitates prioritization of activities in areas of greatest need and allows for management measures to be located where they have the largest potential benefit, even if that is not on or adjacent to the project site where the current impact is occurring. It also allows for expansion of site based management beyond simple flow control and/or channel stabilization toward strategies that consider flow, sediment, and biological conditions as an integrated set of desired endpoints.

Because watershed boundaries are often not the same as geopolitical boundaries of cities or counties, incorporation of watershed analysis will require leadership from the State and Regional Water Boards. Changes to the current regulatory structure may be necessary to accommodate inter-jurisdictional cooperation and regional information sharing. Similarly, program implementation by both large and small municipalities must include mechanisms that allow site-specific decisions to be informed by watershed-scale analysis.

This document is intended to help address some of these challenges and needs by providing technical recommendations, both to state and regional program developers and to local implementing agencies, for assessment, modeling, development of management strategies, and monitoring. This document can support current HMP development and, at the same time, serve as a first step toward achieving the longer term goals of more integrated, watershed-based hydromodification management.

> **Current site-based approaches are limited in their ability to address the underlying processes that are responsible for hydromodification impacts.**
>
> **Effective management of hydromodification will require coordinated approaches across programs at the watershed scale that address all aspects of runoff, sediment generation and storage, instream habitat, and floodplain management.**

Adopting this broader approach means that managing the effects of hydromodification cannot be the purview of the stormwater (MS4) program alone. Effective management of hydromodification will require coordinated approaches across programs at the watershed scale that address all aspects of runoff, sediment generation and storage, instream habitat, and floodplain management. Various SWRCB programs have the opportunity and ability to contribute to the goals of comprehensive hydromodification management, including the non-point source control program, water quality certifications, waste discharge requirements, basin planning, SWAMP, and the emerging State Wetland Policy and Freshwater Bio-objectives program. Each of these programs can take advantage of the tools and approaches outlined in this paper to contribute to coordinated management of hydromodification in order to protect beneficial uses and meet basin plan objectives. Furthermore, successful control and mitigation of hydromodification effects will support other programs by improving water quality, enhancing groundwater recharge, and protecting habitat. Therefore, hydromodification management can be a unifying element of many programs and support integrated regional watershed planning.

It is important to note that hydromodification has the potential to affect all water body types; therefore, HMPs should address potential effects to all streams and receiving waters. Because streams are most directly affected by hydromodification, they have been the focus of current regulatory requirements and, therefore, most HMPs. Consequently, this document emphasizes tools and approaches applicable to fluvial systems, which are broadly defined to include wadeable streams, large rivers, headwater streams, intermittent and ephemeral drainages, and alluvial fans (although new specific tools may be necessary for assessment and management of alluvial fans). We recognize, however, that hydromodification can also affect nearshore and coastal environments, including bays, harbors, and estuaries, by altering estuary channel structure, water quality, sand delivery, siltation, and salinity. These effects have been less extensively studied or documented and have received substantially less attention in current hydromodification requirements. Future efforts should more directly address hydromodification effects to all receiving waters, but the information is not presently available to provide equally comprehensive guidance here.

1.4 Scope and Organization

This document is not intended to be prescriptive or to serve as a "cookbook" for development of hydromodification management strategies. Rather, it is a resource to evaluate the utility of existing tools and approaches, and it proposes a framework for integrating multiple approaches for more comprehensive assessment and management. This framework should be used to aid in the development of HMPs that are appropriate for specific regions and settings and take advantage of the best available science. It can also be used to improve consistency in assessment and monitoring approaches so that information collected across regions and programs can be compiled and leveraged to provide more comprehensive assessments of the effectiveness of management actions. Ultimately, such consistency should improve the effectiveness of all programs.

The authors, a team of technical experts, developed the content for this document in consultation with agency staff and regulated entities. The document begins with a brief general discussion of the effects of hydromodification and stream response mechanisms, providing the best available science to support subsequent recommendations. The main body of the document focuses on presenting a proposed new management paradigm where site-based management is nested within an overall watershed assessment that accounts for past, current, and proposed future land use. The body of the document also includes a discussion of existing tools and how they can be used more effectively and appropriately to evaluate potential impacts and guide decisions on selection and design of management practices. The third major section of the document focuses on monitoring that includes evaluation of hydrologic, geomorphic, and biologic conditions with an overriding goal of adaptive management. The document concludes with several technical appendices that offer specific guidance on the appropriate application of tools and models within the existing HMP approaches, and a bibliography of resources.

2. Hydromodification Science

2.1 Introduction

Land-use changes can alter a wide variety of watershed processes, including site water balance, surface and near-surface runoff, groundwater recharge, and sediment delivery and transport. Although alteration to these watershed processes (referred to collectively as hydromodification) can affect many elements of a landscape, the focus of this document is on impacts to stream systems. Furthermore, while this paper will often refer to urbanization, it is recognized that other types of land-use changes (grazing, agricultural, forestry, etc.) can have similar impacts. This section reviews relevant hydrologic processes and summarizes the impact of urbanization on hydrologic, biologic, and geomorphic systems, and it describes our current understanding of the physical mechanisms underlying these impacts. This provides a foundation for establishing assessment tools and predictive models, as well as for developing management and monitoring programs.

Although not addressed by this report, urbanization also has a range of effects on water quality (*Heaney and Huber* 1984, *Brabec et al.* 2002) by increasing pollutant loads (*Owe et al.* 1982), increasing nutrient loads (*Wanielista and Yousef* 1993, *Hubertz and Cahoon* 1999), and diluting dissolved minerals through increased runoff and decreased infiltration and soil contact (*Loucaides et al.* 2007). As a result of both its physical and chemical effects, urbanization also affects the integrity of biota (*Heaney and Huber* 1984) including fishes (*Klein* 1979, *Weaver and Garman* 1994, *Wang et al.* 2000) and invertebrates (*Sonneman et al.* 2001, *Wang and Kanehl* 2003). These impacts are acknowledged and evaluated in the discussion of monitoring Section 4, but the details of their interactions and effects are not otherwise addressed here.

Land-use changes can alter a wide variety of watershed processes, including site water balance, surface and near-surface runoff, groundwater recharge, and sediment delivery and transport. Alteration to these watershed processes are referred to collectively as hydromodification.

2.2 Hydrology Overview

To understand the effects of urbanization, the basic processes of the hydrologic system must be highlighted. A watershed's drainage system consists of all the features of the landscape that water flows over or through (*Booth* 1991). These features include vegetation, soil, underlying bedrock, and stream channels. Urban elements such as roofs, gutters, storm sewers, culverts, pipes, impervious surfaces such as parking lots and roads, and cleared and compacted surfaces fundamentally change the rate and character of hydrologic processes. Generally, the hydrologic changes associated with development and urbanization increases the speed and efficiency with which water enters and moves through the drainage system. In undeveloped watersheds, only a portion of the precipitation that falls ever enters the stream channel. Instead, precipitation may be: 1) evaporated off the ground surface or intercepted by vegetation and evaporated; 2) transpired from the soil; or 3) infiltrated deeply into regional aquifers. For the portion of precipitation that ultimately enters the stream, the rate and processes of delivery vary between watersheds, with important implications for how urbanization will affect runoff.

Flow can be classified as stormflow (or "quickflow") if it enters the stream channel within a day or two of rainfall (*Dunne and Leopold* 1978). Quickflow occurs through 1) infiltration excess (also called "Horton") overland flow, wherever rainfall intensity exceeds the infiltration capacity of the soil and water flows over the ground surface; 2) saturation excess overland flow, where overland flow occurs following filling of all pore space in surface soils; 3) shallow subsurface flow, where water flows relatively quickly through permeable shallow soils (but still more slowly than either Horton or saturation overland flow); and 4) precipitation directly into stream channels. Conversely, water that infiltrates more deeply is classified as delayed flow, because it travels slowly as deep groundwater and emerges into a stream slowly over time.

As a storm progresses, runoff patterns and rates can change, even within the same catchment. For example, surficial soils may become saturated during the course of a storm (or a storm season) as the water table rises, and this can induce a shift in runoff from shallow (or even deep) subsurface flow to the quickflow process of saturation excess overland flow (*Booth* 1991). Even under scenarios in which rainfall intensity exceeds infiltration capacity, Horton overland flow will not be connected to stream channels until surface depressions are filled.

2.3 Impacts of Urbanization

The archetypal model of development involves clearing vegetation; grading, removing, and compacting soils; building roads and stormwater sewers; constructing buildings; and re-landscaping. The specific ways in which these activities alter runoff processes are discussed below. Development may also directly alter stream, such as through channel straightening, levee construction, and flood control reservoirs; however, discussion of the impacts of these alterations is beyond the scope of this document.

2.3.1 Decreased Interception

When rainfall occurs in a watershed, some of the precipitation will be intercepted by vegetation and leaf litter and prevented from entering the stream channel network (Figure 2-1). The percentage of precipitation that can be intercepted varies according to cover type and the character of rainfall (rainfall intensity, storm duration, storm frequency, evaporation conditions) (*Dunne and Leopold* 1978). The effectiveness of interception decreases as a storm progresses because once the surface area of a tree is completely wetted, water will drip off leaves and run down the vegetation as stem flow. Typically, 10-35% of precipitation is intercepted by trees and 5-20% by crops, though these amounts vary widely (*Dunne and Leopold* 1978, *Xiao and McPherson* 2002, *Reid and Lewis* 2009, *Miralles et al.* 2010). In urban environments where vegetative cover is greatly reduced, landscape-scale interception may be lower by an order of magnitude (*Xiao and McPherson* 2002). Precipitation that is not intercepted enters the drainage system. Thus, the mere reduction in interception in urban areas may produce the hydrologic equivalent of a storm that is 10-30% larger.

Figure 2-1. Vegetation reduces runoff by intercepting a portion of the total rainfall and preventing water from entering the drainage system. (Illustration by Jennifer Natali).

The influence of urbanization on climate is complex and varied. For example, urbanization has been shown to increase temperature (*Kalnay and Cai* 2003), increase or decrease wind speeds (*Oke* 1978, *Balling and Brazel* 1987, *Grimmond* 2007), increase pan-evaporation rates (*Balling and Brazel* 1987), and increase shading of the ground surface (*Kalnay and Cai* 2003). In most studies of urban hydrology, the dynamics of evapotranspiration (ET) are typically, explicitly or implicitly, ignored (*Grimmond and Oke* 1999). This exclusion exists because of the widespread assumption that urban ET is negligible compared to rural areas with higher proportions of vegetation-covered soils (*Chandler* 1976, *Oke* 1979). In cases such as urban deforestation in the temperate Eastern United States, it is appropriate to assume a net loss of ET due to urbanization (*Bosch and Hewlett* 1982, *Sun et al.* 2005, *Roy et al.* 2009). However, spatial variability and the site-specific dynamics of climate, vegetation, and land-use should be considered carefully in arid and semi-arid regions where vegetation is limited prior to development. In drier climates (including much of southern California), primary productivity (and ET) may be substantially increased through the irrigation of urban landscaping (*Buyantuyev and Wu* 2008).

2.3.2 Decreased Infiltration

Infiltration in urban areas is decreased due to several factors: impermeable surfaces such as roads, parking lots, and roofs prevent infiltration by blocking water from reaching soils; heavy-equipment construction operations cause soil compaction and degrade soil structures; construction projects may remove surface soils and expose subsurface soils with poorer infiltration capacity; vegetation-clearing and bare-earth construction increase erosion and loss of topsoil (*Pitt et al.* 2008). The effect of impervious surfaces is intuitive, visible, and dramatic (*Booth and Jackson* 1997), but not all impervious areas affect runoff processes equally. For example, if an impervious surface is built over clayey soils with poor infiltration, the overall runoff rates will be less affected than if built over sandy soils with high natural infiltration rates. While the loss of pervious area has received substantial attention within scientific and policy communities, until recent years considerably less attention has been paid to the effects of compaction and the reductions in infiltration capacity of soils (*Pitt et al.* 2008). Commonly, an area of green is assumed to be permeable, but playing fields and even ornamental lawns may have very low infiltration capacities (*Pitt et al.* 2008). A study of urban runoff in Washington found that impervious areas generated only 20% more runoff than what appeared to be green, pervious areas of lawns (*Wigmosta et al.* 1994). Factors such as excavation and lawn-establishment methods appear to be more significant for infiltration than any other factor including grain size of the original sediments (*Hamilton and Waddington* 1999). Tillage may increase infiltration slightly, while compost or peat soil amendments can increase infiltration by 29 to 50 percent (*Kolsti et al.* 1995).

2.3.3 Increased Connectivity and Efficiency of the Drainage System

Rainfall in urban areas moves quickly as overland flow into storm sewers and the stream channel network (Figure 2-2). The delivery of precipitation into urban stream channels is extremely efficient, transforming essentially all precipitation into stormflow and creating nearly instantaneous runoff. Under natural conditions, in contrast, most runoff to streams is via groundwater paths that typically flow at least one or two orders of magnitude slower than surface water. Thus converting subsurface flow into surface stormflow has dramatic consequences. Furthermore, artificial surfaces such as roofs, pavement, and storm sewers are 1) straight, which shortens the travel distance required for delivery into the channel network; and 2) smooth, which decreases friction and allows flow to travel more quickly than in natural channels (*Hollis* 1975). Storm sewer systems increase the density of "channels," which further shortens runoff travel distances (Figure 2-3). In particular, upland regions that may not have had any surface channels prior to urbanization are frequently fitted with storm sewers, which dramatically increase delivery efficiency into the channel network (*Roy et al.* 2009). In sum, urbanization transforms watershed processes and flow paths that were once slow, circuitous, and disconnected into engineered and non-engineered systems that are highly efficient, direct, and connected.

In contrast to the slow measured runoff to natural streams by surface and subsurface pathways, the delivery of precipitation into urban stream channels is extremely efficient, transforming essentially all precipitation into stormflow and creating nearly instantaneous runoff.

2.3.4 Decreased Infiltration into Stream Beds

Concreting of bed and banks, channel narrowing, and channel straightening limit infiltration from a stream into the ground. Concrete channel margins create infiltration barriers, while channel narrowing and straightening limit the surface area accessible for infiltration and also create a less complex channel. Channel complexity such as pools, riffles, steps, and debris dams create hydraulics that slow flow velocities and also divert water into the subsurface (*Lautz et al.* 2005). In arid and semi-arid watersheds where streams may flow only occasionally, infiltration through bed, banks, and floodplain areas may significantly lower peak flows and may sustain aquifers vital to regional water supplies and natural habitats (*Kresan* 1988, *Dahan et al.* 2008). Increasing recognition is being paid in the scientific literature to the infiltration services provided by natural channels and floodplains (*Macheleidt et al.* 2006, *Schubert* 2006).

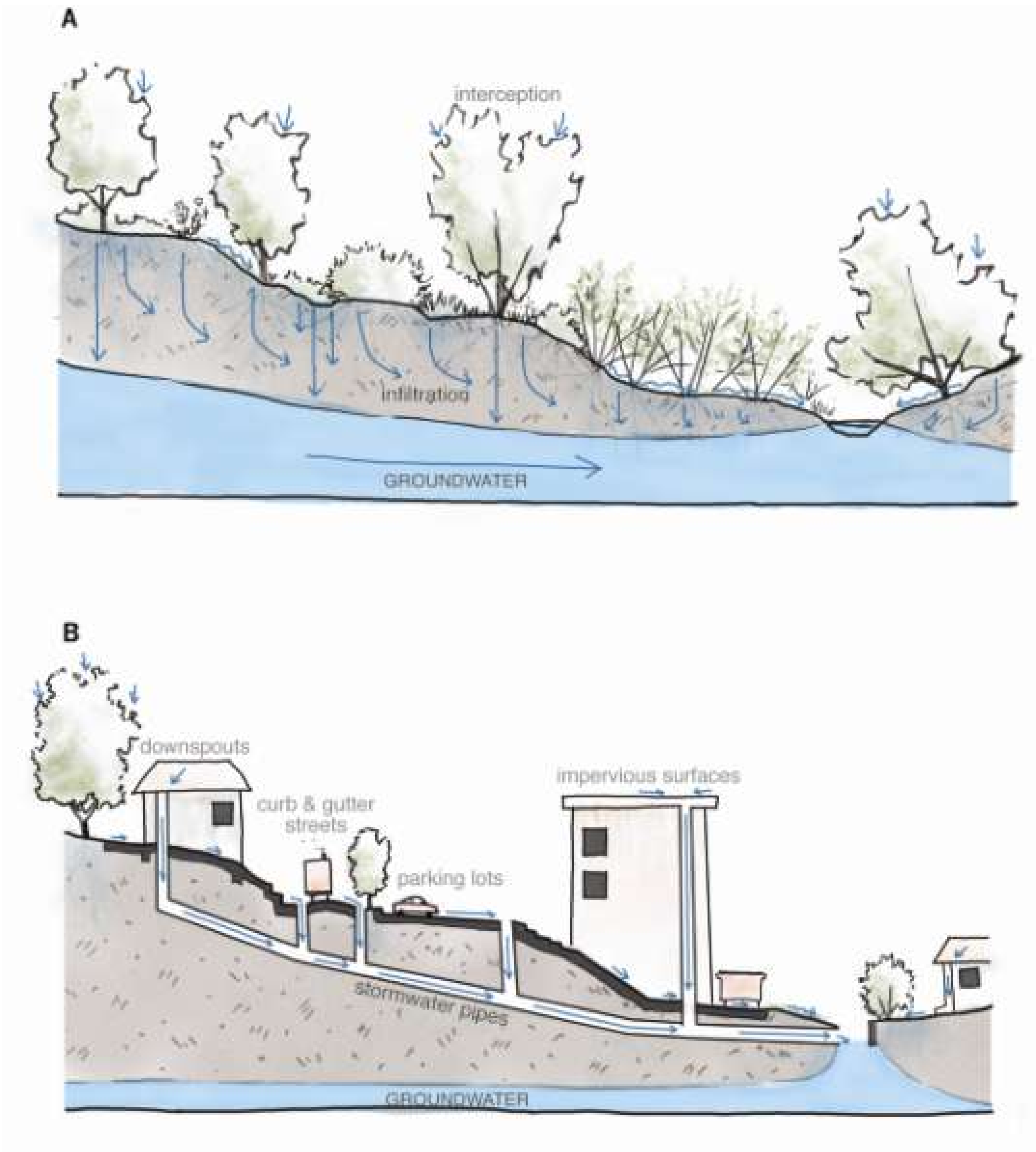


Figure 2-2. Stormwater flowpaths are shortened and quickened through paving, building, soil compaction, and sewer infrastructure. The rapid concentration of streamflow increases storm peaks. Rapid runoff and reduced infiltration prevent groundwater recharge. (Illustration by Jennifer Natali).

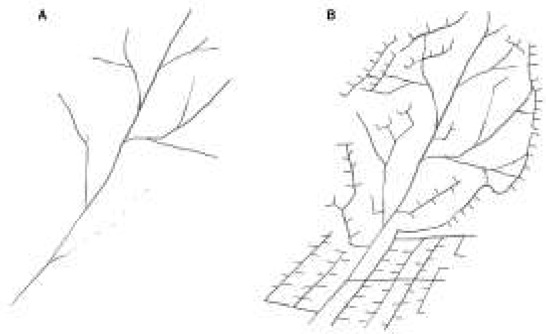


Figure 2-3. Increased surface runoff causes an extension of the channel network. This occurs through increased channel erosion or through constructed networks (to manage increased surface flow). The expanded channel network delivers runoff to downstream reaches much more efficiently. (Illustration by Jennifer Natali).

2.4 Changes in Instream Flow

The instream flow changes resulting from urbanization depend upon site-specific watershed and development characteristics, but typically they include modification of the timing, frequency, magnitude, and duration of both stormflows and baseflow. Urbanization has been shown to increase the magnitude of stormflows, increase the frequency of flood events, decrease the lag time to peak flow, and quicken the flow recession (Figure 2-4; *Hollis* 1975, *Konrad and Booth* 2005, *Walsh et al.* 2005). Because the effects of urbanization manifest differently for different components of the hydrograph, the hydrologic alterations of moderate storms, large storms, and baseflow are discussed individually below.

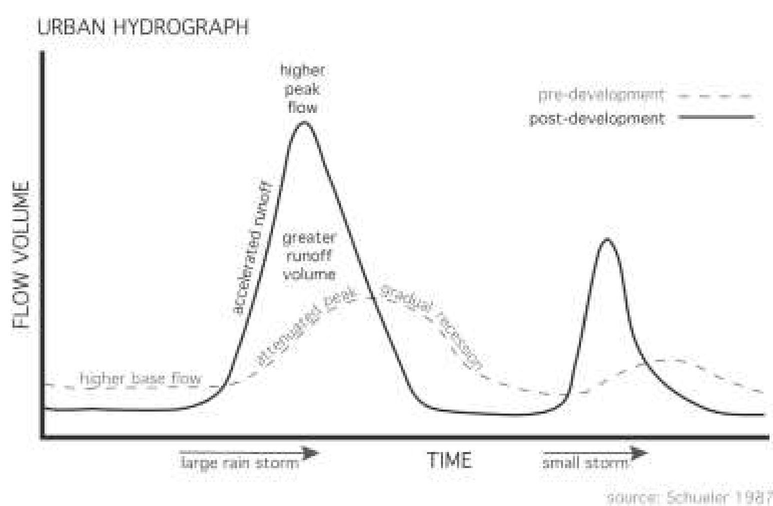


Figure 2-4. Increased runoff efficiency causes higher magnitude peak flows, shorter duration runoff events, decreased baseflow, and dramatic increases in small storms that may have generated little or no runoff under pre-development conditions. (Illustration by Jennifer Natali).

2.4.1 Moderate Stormflow

Urbanization of a watershed can drastically increase the frequency and magnitude of small and moderate flow events (Hawley and Bledsoe 2011). The magnitude of flow amplification increases generally in proportion to the amount of impervious area (*Leopold* 1968, *Hollis* 1975). For example, flows with a return period of one year or longer were shown to be unaffected by paving 5% of the watershed, yet the magnitude of a one-year flow could be more than ten times higher when 20% of a watershed is paved (*Hollis* 1975). In undeveloped watersheds, small storms may not generate any overland flow or streamflow increase at all, because interception, infiltration, soil absorption, and evapotranspiration contain all the precipitation.

Urbanization of a watershed can drastically increase the frequency, duration, and magnitude of small and moderate flow events by factors of 10 or more.

The change to a flashier regime with larger magnitude streamflow generated from small and moderate storms has two primary consequences. First, the stream power and sediment-transport capacity of the stream increase significantly, potentially creating channel erosion and/or stressing instream biota. Second, the season of stormflow is likely to be extended. In undeveloped watersheds, early or late-season storms typically do not generate significant runoff because soils are dry, can effectively absorb most precipitation, and therefore do not generate overland flow or streamflow. Antecedent moisture conditions are less important in urban watersheds where overland flow is generated regardless, and streamflow is generated by even a small storm in a dry watershed. Through magnifying small and moderate storms, urbanization may increase the duration of sediment-transporting and habitat-disturbing flows by factors of 10 or more (*Booth* 1991, *Booth and Jackson* 1997).

2.4.2 Large, Infrequent Storms

In large storms with return intervals of 10 or more years, the influence of urbanization is less pronounced though still present. Whereas a 1-year stormflow may be increased by ten times by paving 20% of the watershed, historical data from humid-region watersheds suggest that the peak magnitude of a 100-year flood would not even be doubled (*Hollis* 1975). The diminishing influence of urbanization on floods of higher recurrence intervals is understood by recognizing that the hydrologic processes of large storms resemble the processes of urban runoff. Essentially, a 100-yr flood is an event that is long in duration, severe in intensity, and likely occurs when soils are already wet. Even in an undeveloped watershed, a storm of this magnitude can typically generate (saturation) overland flow and transport water efficiently into the channel network in a manner more generally comparable to an urban setting.

2.4.3 Baseflow

Urbanization does not affect instream baseflows consistently. Many studies have documented baseflow reductions and/or lowered groundwater levels that have been attributed to decreased infiltration (*Simmons and Reynolds* 1982, *Ferguson and Suckling* 1990) and groundwater extraction (*Postel* 2000). In extreme cases, baseflow in urban watersheds can disappear completely during drought years, dry seasons, or even between storm events during the wet season. The effect of reducing infiltration may be counteracted in urban and suburban landscapes, however, through irrigation of lawns, parks, golf courses, and other water inputs such as septic systems, leaky pipes, and sewage treatment outflow which typically import water from outside the watershed and contribute to both streamflow and groundwater recharge (*Konrad and Booth* 2005, *Walsh et al.* 2005, *Roy et al.* 2009). Indeed, imported water volumes in very dense cities may be an order of magnitude greater than precipitation. Lerner (2002) judged that leakage in water importation and delivery infrastructure typically ranges from 20-50%, and in general this leakage will increase groundwater recharge in urban areas. Similarly, other studies have found municipal irrigation capable of raising groundwater levels and causing surface flooding (*Rushton and Al-Othman* 1994) and changing ephemeral streams into perennial streams (*Rubin and Hecht* 2006, *Roy et al.* 2009). In summary, the magnitude and direction baseflow and groundwater recharge alteration depends on climate, land use, water use, and the infrastructure system of the watershed. There are no simple "rules."

2.5 Changes in Sediment Yield

The role of watershed sediment yield in the behavior of watersheds was first characterized systematically by Wolman (1967) in a three-part conceptual framework of how rivers respond to urban development, in which 1) pre-development quasi-equilibrium conditions are followed by 2) a period of active construction involving grading, vegetation removal, and bare earth exposed to erosion; and 3) the establishment of an urban landscape consisting of pavement, houses, gutters and sewers etc. The construction period is marked by an increase in sediment (typically 2-10 times pre-development rates) produced from bare surfaces and the disturbances associated with construction (*Chin* 2006). The sediment produced during construction is often deposited within stream channels, initiating aggradation and/or channel widening. Following the construction period, sediment production decreases (Figure 2-5) and runoff increases, resulting in increased transport capacity and the potential for severe channel erosion that can result in channel enlargement of commonly 2-3 (and as much as 15) times the original channel cross-section (*Chin* 2006). Changes in post-construction sediment production rates are not well studied, though case studies have found sediment yields in post-construction watersheds to be somewhat higher than rural, undeveloped basins.

The combination of increased runoff and decreased sediment production can result in channel enlargement of commonly 2-3 (and as much as 15) times the original channel cross-section.

Post-construction sediment loads are typically derived from channel enlargement as a result of increased peak flows and the legacy of construction-phase disturbance (*Trimble* 1997, *Nelson and Booth* 2002). The rate of decline in post-construction sediment yields is therefore predominantly controlled by the degree of channel instability caused by the construction phase and the effect of increased peak flows. If the channel margins are armored, densely vegetated, or otherwise erosion resistant, sediment yields may decline quickly following urbanization. If channel instability ensues, elevated sediment yields may persist for decades or more.

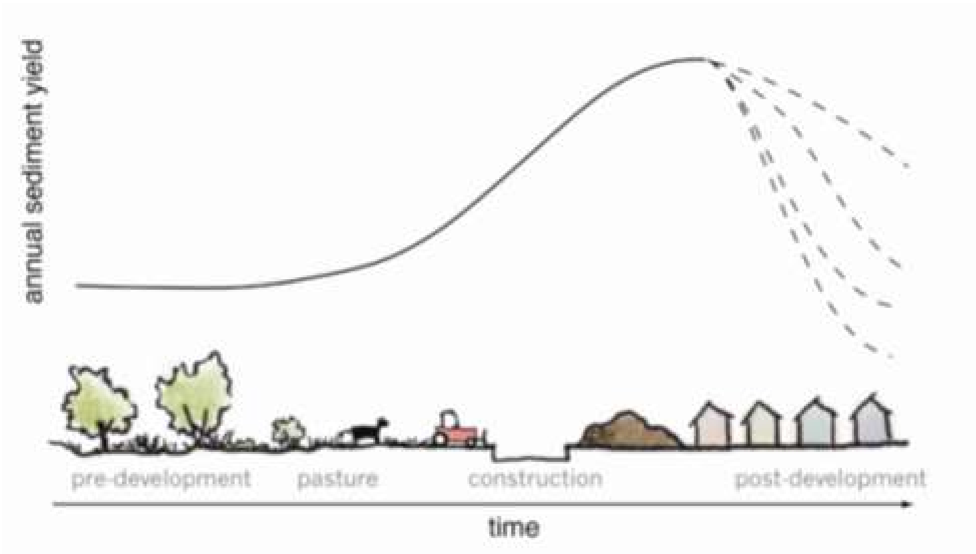


Figure 2-5. Increased sediment yields occur during the land-clearing and construction phases of development. Post-construction sediment yields decrease, though the rate of decrease varies considerably depending on the degree of channel instability caused by the construction phase and by increased runoff. (Illustration by Jennifer Natali).

2.6 Impacts on Channel Form and Stability

Channel form and stability reflect both hydrologic and geomorphic processes. Changes to runoff characteristics and sediment supply can affect all aspects of stream morphology, including planform, cross-sectional geometry, longitudinal profile, bed topography (e.g., pools, riffles), and bed sediment size and mobility. While many factors influence the type and degree of impacts (discussed below), a suite of commonly observed morphological changes due to hydromodification include channel enlargement (incision and widening), decreased bank stability, increased local sediment yield from eroding reaches, overall simplification of stream habitat features such as pools and riffles, changes in bed substrate conditions, loss of connectivity between channel and floodplain (*Segura and Booth* 2010), and changes in sediment delivery to coastal waters (*Jacobson et al.* 2001). Impacts may also propagate upstream as headcuts resulting from reductions in base level due to excess erosion. Likewise, tributaries entering downstream of a developed area may also experience the upstream propagation of headcuts due to base level reductions of the mainstem.

In addition to Jacobson *et al.* (2001), two well-researched literature reviews of morphological impacts (as well impacts to riparian habitat and biota) can be found in: “Impacts of Impervious Cover on Aquatic Systems” by The Center for Watershed Protection (2003) and “Physical Effects of Wet Weather Flows on Aquatic Habitats: Present Knowledge and Research Needs” published by Water Environment Research Foundation (*Roesner and Bledsoe* 2003). Note that these two studies differ significantly in how they synthesize and interpret the reviewed literature, and the CWP publication acknowledges that it does not necessarily apply to streams in the arid west.

2.6.1 Physical Principles Underlying Channel Impacts

A convenient conceptual framework for the physical impacts of hydromodification on stream morphology is “Lane’s Balance” (*Lane* 1955; Figure 2-6). This framework encapsulates a fundamental (albeit qualitative) relationship between the hydrologic and geomorphic processes that balance water flow and sediment in a channel. It expresses the condition of sediment transport capacity, as controlled by water discharge and slope, in broad balance with the supplied load and size of bed sediment for a channel in equilibrium. An increase in streamflow or a decrease in sediment supply (for example) will typically initiate a corresponding decrease in slope and/or increase in grain size in order to reestablish equilibrium. That decrease in slope is expressed by channel incision or degradation. In contrast, an increase in sediment supply or decrease in streamflow will typically result in aggradation and a corresponding increase in slope.

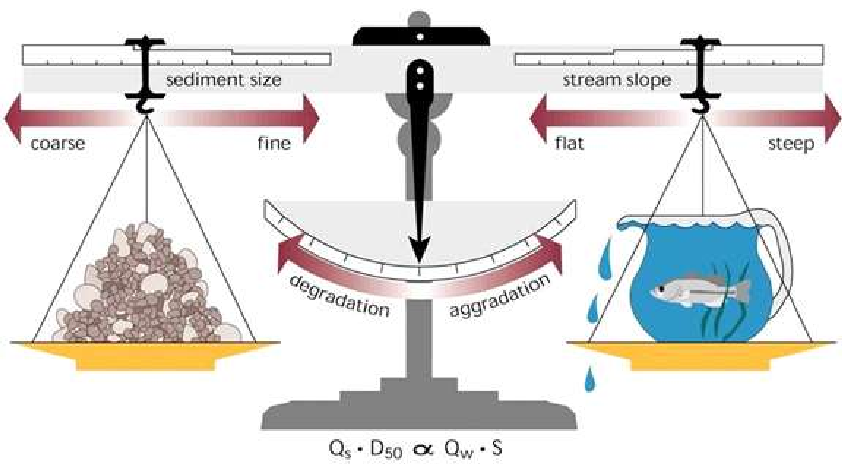


Figure 2-6. Lane’s Balance, showing the interrelationship between sediment discharge (Q_s), median bed sediment size (D_{50}), water discharge (Q_w), and channel slope (S).

Slope and grain size are not the only modes of adjustment, as stream channels have many more degrees of freedom in responding to changes in streamflow and sediment supply. For example, Schumm (1969) extended Lane’s Balance to include width, depth, sinuosity, and meander wavelength. More quantitatively (and more complexly), adjustments to channel form resulting from hydromodification are controlled by interactions among flow-generated shear stresses (described by hydraulic equations for open channel flow, as a function of channel geometry, roughness, and longitudinal slope), inflowing sediment load, and the shear strength of the bed and bank sediments (a function of their size distribution and cohesiveness).

2.6.2 Natural Variability in Stream Systems

Understanding natural variability in streams is critical to predicting and assessing anthropogenic impacts. A stream may be considered "stable" or "at equilibrium" when its overall planform, cross-section and profile are maintained with no net degradation or aggradation within a range of variance, over extended timeframes (*Mackin* 1948, *Schumm* 1977, *Leopold and Bull* 1979, *Biedenharn et al.* 1997). Such systems can often withstand short-term disturbances without significant change. Even without discrete disturbances, natural streams may be in a state of dynamic equilibrium (*Schumm* 1977), where the channel exhibits stability over the long term even while actively migrating laterally such that erosion of outer banks is accompanied by sediment deposition and bar building on inner banks. Streams may also be fluctuating between aggradation/ degradation/ stability, all within a limited range of conditions. A large-scale event, like a flood or landslide, can cause dramatic changes in channel form, but the channel will often re-established its pre-event planform, geometry and slope over time.

In contrast, a persistent alteration like hydromodification can cause the rate of change to increase. As a result, the channel may begin an evolutionary (or catastrophic) change in morphology, leading to enlargement and instability. A geomorphic threshold is the condition at which there is an abrupt and significant channel adjustment or failure because the channel has evolved to a critical situation. It is the condition at which the proverbial straw breaks the camel's back. Channels that are near a geomorphic threshold can exhibit significant adjustments in response to a relatively small degree of hydromodification. For example, a channel with banks that are near the height and angle for geotechnical failure may widen abruptly due to slight incision.

2.6.3 The Role of Sediment Transport and Flow Frequency in Channel Morphology

Extensive research has been devoted to establishing specific relationships between flow frequency and characteristics of channel morphology. The concept of "effective discharge" was introduced by Wolman and Miller (1960), using a magnitude-frequency analysis to assess the effectiveness of flow events to transport sediment. They concluded that, for the rivers in their analysis, relatively frequent events (occurring on average about 1 times/year) are most effective over the long term in transporting sediment. This concept has formed the basis for a large body of literature (and occasional controversy) over the subsequent five decades relating to the relationships between these flow frequencies and principal channel dimensions (e.g., bankfull stage, width-to-depth ratio), and the application of these relationships to stream design and restoration, as well as prediction and control of hydromodification impacts. Much of the controversy has related to the use of a single event ("dominant discharge" or "bankfull flow") as the basis for such applications, with the implicit assumption that control for that single discharge will result in commensurate channel changes regardless of the distribution of flow frequencies and flow durations over a wider range of discharges.

More recently, the concept of a *range* of moderately frequent, "geomorphically significant" flows that transport the majority of the sediment over the long term (King County 1990, *Bledsoe* 2002, *Roesner and Bledsoe* 2003) was proposed to replace the focus on a single event. The geomorphically significant flow range is considered to be the most influential in determining channel form, as this collective group of flows typically does the most "work" on the channel boundary over engineering time scales. Controlling changes to the frequency of flows within this range is therefore critical to reducing impacts to stream morphology, and is the scientific basis for the "flow-duration" control criteria discussed in the following sections. A flow-duration criterion aims to match the pre-development volumes, durations, and frequencies of this critical range of sediment transporting flows over a period of many decades. Even this concept, however, relies on the implicit assumption that infrequent large events, no matter how dramatic their effects, typically occur "too infrequently" to reset channel morphology and habitat over the timescales of concern in meeting regulatory requirements. These events are typically managed through traditional flood control practices as opposed to hydromodification management.

A flow-duration management approach aims to match the pre-development volumes, durations, and frequencies of this critical range of sediment transporting flows over a period of many decades.

2.6.4 Applicability to California Streams

The traditional concepts of dynamic equilibrium in streams and geomorphically significant flows, discussed above, derive largely from studies on perennial streams in humid areas. An important question is: to what extent do these concepts apply to managing hydromodification impacts to streams within arid and semi-arid areas (such as large portions of California, and particularly the southern and eastern regions)? In such climate regions, precipitation is highly variable, with low annual totals and episodic, large events. Many streams are ephemeral or intermittent and located in a setting of extremely high sediment production associated with erosive geology resulting from high rates of tectonic uplift, sparse vegetative cover and frequent fires (*Graf* 1988, *Stillwater Sciences* 2007). These streams are often characterized by multi-thread sand-bed channels that are inherently unstable and readily respond to changes in flow conditions. In the ephemeral streams described by Bull (1997), for example, the natural behavior is one of alternating periods and locations of aggradation and degradation, varying both temporally and spatially. In such "episodic" streams, the vast majority of sediment may be moved by extreme, highly infrequent events. The importance of understanding the role of episodic events has been emphasized for semi-arid and arid fluvial systems (e.g., *Wolman and Gerson* 1978, *Brunsden and Thornes* 1979, *Yu and Wolman* 1987). The latter authors reviewed concepts of frequency and magnitude in geomorphology research and noted that episodic behavior hinges on frequency of episodic events relative to the time required to return to an "equilibrium" channel form. Episodic behavior is more prevalent where the average long-term disturbance is low but the year-to-year variability is high, a characteristic of arid and semi-arid climates.

Although the morphology of arid and semi-arid streams may be more strongly influenced by extreme events under natural conditions, hydromodification has nevertheless been shown to cause rapid and significant physical changes in such California streams (*Trimble* 1997, *Coleman et al.* 2005, *Hawley and Bledsoe* 2011). Such dramatic responses to the effects of urbanization on relatively frequent flows, often over periods of a decade or less, have profound implications for aquatic life and physical habitat. Despite the flashy streamflow regimes, high sediment supplies, and steep gradients of many streams in the region, the responses of California streams are controlled by the same physical processes as those in other regions that have been studied more extensively. As such, the key controls of stream response can be identified and managed to mitigate the chronic effects of hydromodification between infrequent extreme events. However, it is always advisable to ensure that the application of tools and approaches for prediction and assessment should be based on reference data and empirical models (where applicable) drawn from stream types that are similar in both hydrologic and geomorphic characteristics.

2.6.5 Factors Determining Extent of Impacts

The extent and nature of impacts to stream morphology and habitat from a given change in runoff and sediment supply vary widely, depending on the channel geometry, longitudinal slope, channel material type(s) and size(s), and the type and density of channel vegetation (*Center for Watershed Protection* 2003, *Roesner and Bledsoe* 2003). For example, increased flows within a deep, narrow channel may result in significantly higher shear stresses at the bed; this same increase in a wide, shallow channel may become predominantly overbank flow, with less effect on bed shear stress. Where all other factors are equal, fewer impacts would be expected where flows have access to broad overbank areas (i.e., floodplains) during relatively common floods (*Segura and Booth* 2010), channel materials are more resistant, and stabilizing riparian vegetation is present. Conversely, where erosion and bank instability result in the loss of vegetation reinforcement, a positive feedback response may cause erosion to be accelerated. Furthermore, the relative erosive resistance of bed and bank materials will influence the extent of lateral versus vertical channel adjustments (*Simon and Rinaldi* 2006, *Simon et al.* 2007). For example, if bank resistance is lower than bed resistance, then the channel will tend to widen rather than deepen.

The extent of impacts will also depend on the stream's physiographic context and spatial and temporal patterns of urban development within the watershed (Konrad and Booth 2005). Large-scale studies of hydrologic responses to urbanization (Chin 2006, Poff et al. 2006) also highlighted the regional variation in these responses and reinforced the need to understand local watershed and channel characteristics when managing hydromodification impacts. The presence of road crossings and other infrastructure can provide local grade control and create sediment bottlenecks which often translate to exacerbated erosion in the immediately downstream areas.

The extent and nature of impacts to stream morphology and habitat from a given change in runoff and sediment supply vary widely, depending on the channel geometry, longitudinal slope, channel material type(s) and size(s), and the type and density of channel vegetation, and the spatial and temporal patterns of urban development

An additional consideration relates to the pre-development balance between sediment and streamflow, which is dependent on precipitation patterns, the location of a stream reach within the watershed, the associated sediment behavior of that reach (i.e., production, transport or deposition zone), and local rates of sediment production.

While many of these factors may be quantified for a given time and location, stream systems are enormously complex both spatially and temporally. The existence of physical thresholds and feedback systems can cause an incremental change to result in a disproportionately large response (*Schumm* 1977, 1991). Furthermore, there may be significant temporal lags between the point in time at which land use is altered and when channel impacts are observed (*Trimble* 1995, 1997). In recognition of these effects and the associated uncertainty, predictive models and management tools may present results in terms of probabilities or within the context of a risk-based approach, as discussed further in this document. Such effects also have substantial implications for the design of assessment and monitoring programs.

There may be significant temporal lags between the point in time at which land use is altered and when channel impacts are observed.

2.6.6 Impacts on Other Types of Receiving Waters

Although outside the scope of this document, hydromodification impacts to other water body types are recognizable and should be the subject of additional research and future consideration.

Wetlands, Estuaries, and Coastal Ecosystems. Urbanization can alter water quality, quantity and sediment delivery to wetlands and sensitive coastal ecosystems. Urbanization has led to loss or degradation of wetlands and estuaries as a result of 1) draining and conversion to agriculture (*Dahl*, 1997); 2) upstream alterations to flow and sediment regimes that can change the magnitude, frequency, timing, duration, and rate of change of estuarine salinity, turbidity, freshwater flooding, freshwater baseflow, and groundwater recharge dynamics (*Azous and Horner* 2001); and 3) contaminated runoff from urban areas (*Paul and Meyer* 2001, *J Brown et al.* 2010). Urbanization may also lead to coastal erosion in circumstances where reservoir sediment trapping or post-development decreases in sediment yield reduce the sediment supply to the coast (*Pasternack et al.* 2001, *Syvitski et al.* 2005).

Alluvial Fans. Alluvial fans are dynamic landforms that are under increased development pressure in recent decades, particularly in the expanding cities of the American West. Upstream urbanization, and the resultant flashier flow regime, shortens the time available for infiltration and groundwater recharge in alluvial fans. Furthermore, development on fans themselves results in channel straightening and/or construction of concrete flood conveyance channels that also reduce or eliminate infiltration. The reduction in infiltration amplifies the flood risk further downstream. Additionally, alluvial fans may be more vulnerable than other landscapes to channel instability resulting from hydromodification, because they lack intrinsic geologic controls on channel gradient, and commonly have little vegetation or bank cohesion to provide stability in the purely alluvial deposits (*Chin* 2006).

2.6.7 Influence of Scale

The ability to detect impacts from land-use changes depends upon the spatial and temporal scale at which they are measured. Issues of hydrograph timing and the relative size of the storm system with respect to the watershed area may confound relationships at larger spatial scales. Furthermore, a number of fluvial geomorphic features that are commonly used as metrics of geomorphic condition are scale-dependent. For example, width-depth ratio, tendency toward braiding, and channel depth relative to stable bank height all commonly increase downstream. Other factors, such as the influence of vegetation, depend on protrusion relative to width and rooting depth relative to bank height. The temporal scale over which channel changes occur will be influenced by precipitation variability, in addition to the many physical factors already discussed.

These scale considerations, as well as previous discussion of factors influencing stream response, are important when determining the choice of both management tools and monitoring approaches. It is generally much easier to predict the direction of response than the magnitude. Accurate, detailed predictions of response are difficult to make, and they are generally only possible when applied to specific locations, using extensive data input, to answer very specific questions; even then they are subject to uncertainty. Policies or assessment methods aimed to address a range of streams and geographic conditions are better suited to probabilistic approaches that explicitly acknowledge uncertainty, as described further in subsequent sections.

2.7 Impacts on Fluvial Riparian Vegetation

Stream channel form and stability is closely linked with the ecology of instream and floodplain habitats (Figure 2-7). Spatial and temporal distributions of plant communities are tied to moisture availability and seasonality. The ability of vegetation to stabilize soils, trap sediments, and reduce flow velocities (*Sandercock et al.* 2007) can create positive feedback that promotes further vegetation establishment and enhancement of these stabilizing features. This can result in a strong influence on channel geometric features, specifically channel narrowing (*Anderson et al.* 2004). The change in frequency of overbank flows resulting from channel incision will also affect riparian processes, including nutrient transfer and seed dispersal. For example, it is believed that *Tamarix* dominance over native species along Western US rivers would be less extensive if not for anthropogenic alteration of streamflow regimes (most recently supported by Merritt and Poff (2010)).

Impacts to stream biota may occur through the alteration of habitat structure and habitat dynamics caused by hydrologic and geomorphic changes, as well as directly from hydrologic alteration.

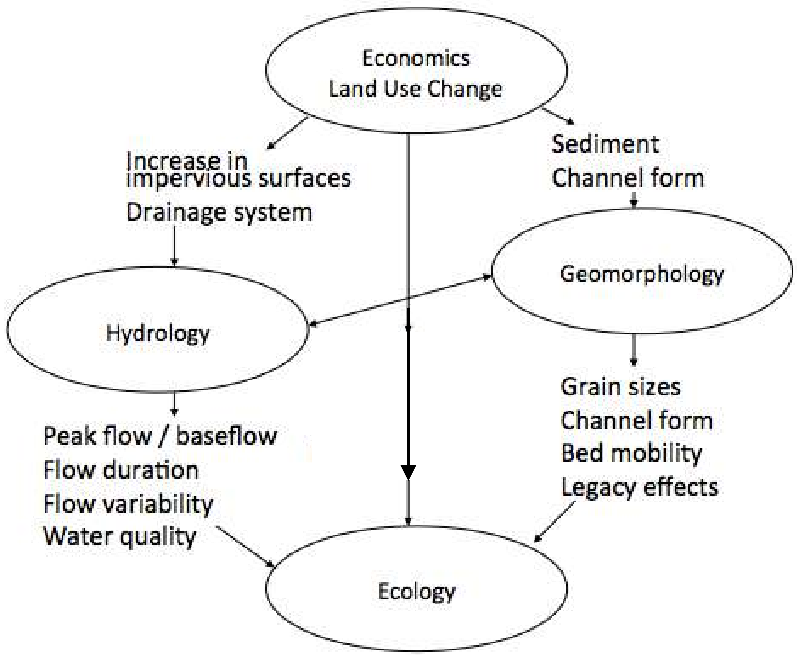


Figure 2-7. Land use changes, hydrology, geomorphology and ecology are closely and complexly interrelated. (Adapted from Palmer *et al.* 2004).

Vegetation changes not only are a result of morphological impacts but also can result directly from changes in streamflow. These findings continue to be supported by recent studies; for example, increases or decreases in baseflow or changes to the seasonal availability of water can determine the extent and type of riparian vegetation capable of thriving in that environment (*White and Greer* 2006). Vegetation changes can have cascading effects on indigenous fauna that require native plants for food or nesting (*Riley et al.* 2005). Channel incision can also result in phreatic draining of adjacent wetland and floodplain habitats and result in loss of key riparian species (*Scott et al.* 2000).

2.8 Impacts on In-Stream Biota

As shown in Figure 2-7, impacts to stream biota may occur through the alteration of habitat structure and habitat dynamics caused by hydrologic and geomorphic changes, as well as directly from hydrologic alteration. (The term biota is used here to refer to a range of non-plant species including algae, macroinvertebrates, amphibians, fishes, etc.) Because of these relationships, the condition of in-stream biota is considered to reflect the effects of all other impacts and has been recommended as an integrative measure of stream health (discussed further in Section 5).

Studies continue to build on Poff *et al.* (1997), who highlighted the importance of the "natural flow regime" and its variability as critical to ecosystem function and native biodiversity. Streamflow pattern or "regime" interacts with the geomorphic context to control the physical and biological response of streams to hydromodification. The basic characteristics of streamflow regimes are typically described in five ways: magnitude, frequency, duration, timing, and rate of change. There is a large body of science linking one or more of these five elements of flow regimes to geomorphic processes, physical habitat, and ecological structure and function. A few examples of linkages with physical habitat are provided in Table 2-1; these linkages describe the mechanisms by which flow changes can impact stream ecology through morphological alterations.

Table 2-1. Examples of Relationships between Flow Regime Attributes and Physical Habitat Characteristics (adapted from Roesner and Bledsoe 2002).

Flow Attribute	Example Relationships with Physical Habitat
Magnitude	• Determines extent to which erosion/removal thresholds for substrate, banks, vegetation, and structural habitat features are exceeded • Determines whether floodplain inundation/exchange occurs • Habitat refugia may become ineffective during extreme events
Frequency	• Flashiness can affect potential for recovery of quasi-equilibrium channel forms between events, bank stability, and streambank/riparian vegetation assemblages • Frequency of substrate disturbance can act as a major determinant of fish reproductive success and benthic macroinvertebrate abundance and composition
Duration	• Determines the impact of a threshold exceeding event, e.g., scour depths • Urbanization frequently increases the duration of geomorphically effective flows which also affect bank vegetation establishment and maintenance • Extended durations of high suspended sediment concentrations can act as chronic and acute stressors on fish communities
Timing	• The temporal sequence of flow events affects channel form and stability as geomorphic systems may be "primed" for abrupt changes. • Stream biota may use flow timing as a life-cycle cue • Predictability of flow can affect utilization of habitat refugia
Rate of Change	• Affects bank drainage regimes (bank stability) and sedimentation processes, e.g., re-suspended fine sediment concentrations during storm hydrographs, embeddedness, armoring • Rapid drawdown can result in stranding of instream biota • Rise and fall rates control riparian water table dynamics and seedling recruitment

The mechanisms of such impacts are also well detailed by Center for Watershed Protection (2003); for example, increased flows are related to a reduction in habitat diversity and simplification of habitat features such as pools; this in turn reduces the availability of deep-water cover and feeding areas.

Many studies support the conclusion that stream biota are also directly impacted by altered flow regimes, independent of channel instability and erosion. Konrad and Booth (2005) identified four hydrologic changes resulting from urban development that are potentially significant to stream ecosystems: increased frequency of high flows, redistribution of water from baseflow to stormflows, increased daily variation in streamflow, and reduction in low flow. They caution that ecological benefits of improving physical habitat and water quality may be tempered by persistent effects of altered streamflow and sediment discharge, and that hydrologic effects of urban development must be addressed for restoration of urban streams. Walsh *et al.* (2007) concluded that low-impact watershed drainage design was more important than riparian revegetation with respect to indicators of macroinvertebrate health. Bioengineered bank stabilization can also have positive effects on habitat and macroinvertebrates, but it cannot completely mitigate impacts of urbanization with respect to stream biotic integrity (*Sudduth and Meyer* 2006). Walters and Post (2011) and Brooks *et al.* (2011) found impacts to benthic macroinvertebrates due to upstream water abstractions, including reductions in total biomass of insects and reductions in abundance respectively.

2.9 Conclusions

Alterations in streamflow and sediment transport as a result of land use change can have severe impacts on streams. Common responses include changes in water balance, surface and near-surface runoff timing and magnitude, groundwater recharge, sediment delivery and transport, channel enlargement, widespread incision, and habitat degradation. The extent and consequences of these impacts depend on stream type, watershed context, and local controls on channel adjustment; as such, stream responses to hydromodification are complex and difficult to predict with any precision. Due to the direct impacts of streamflow modification on vegetation and biota, channel morphology cannot be the sole measure of hydromodification impacts. Thus, mitigation efforts that are narrowly focused on channel stability may be insufficient for sustaining key ecological attributes. Likewise, reach-scale stabilization of streams will not necessarily result in the return of comparable habitat quality and complexity (Henshaw and Booth 2000, Roesner and Bledsoe 2003). Hydromodification management should be considered in the context of an overall watershed-scale strategy that targets maintenance and restoration of critical processes in critical locations in the watershed. Furthermore, it is imperative that monitoring and adaptive management be focused on achieving desired objectives for aquatic life and overall stream "health" in addition to simply measures of geomorphic response.

3. Framework for Hydromodification Management

3.1 Introduction and Overview

The current approach to managing hydromodification impacts on a project-by-project basis is not sufficient to protect beneficial uses of streams. This section outlines a comprehensive, alternative framework that begins with watershed analysis and uses the results to guide the site-based management decisions that are the current focus of most hydromodification management strategies. It also recommends the implementation of a compensatory mitigation program in support of hydromodification management objectives identified in the watershed analysis. Figure 3-1 summarizes this approach and illustrates how current site-based management relates to the larger framework.

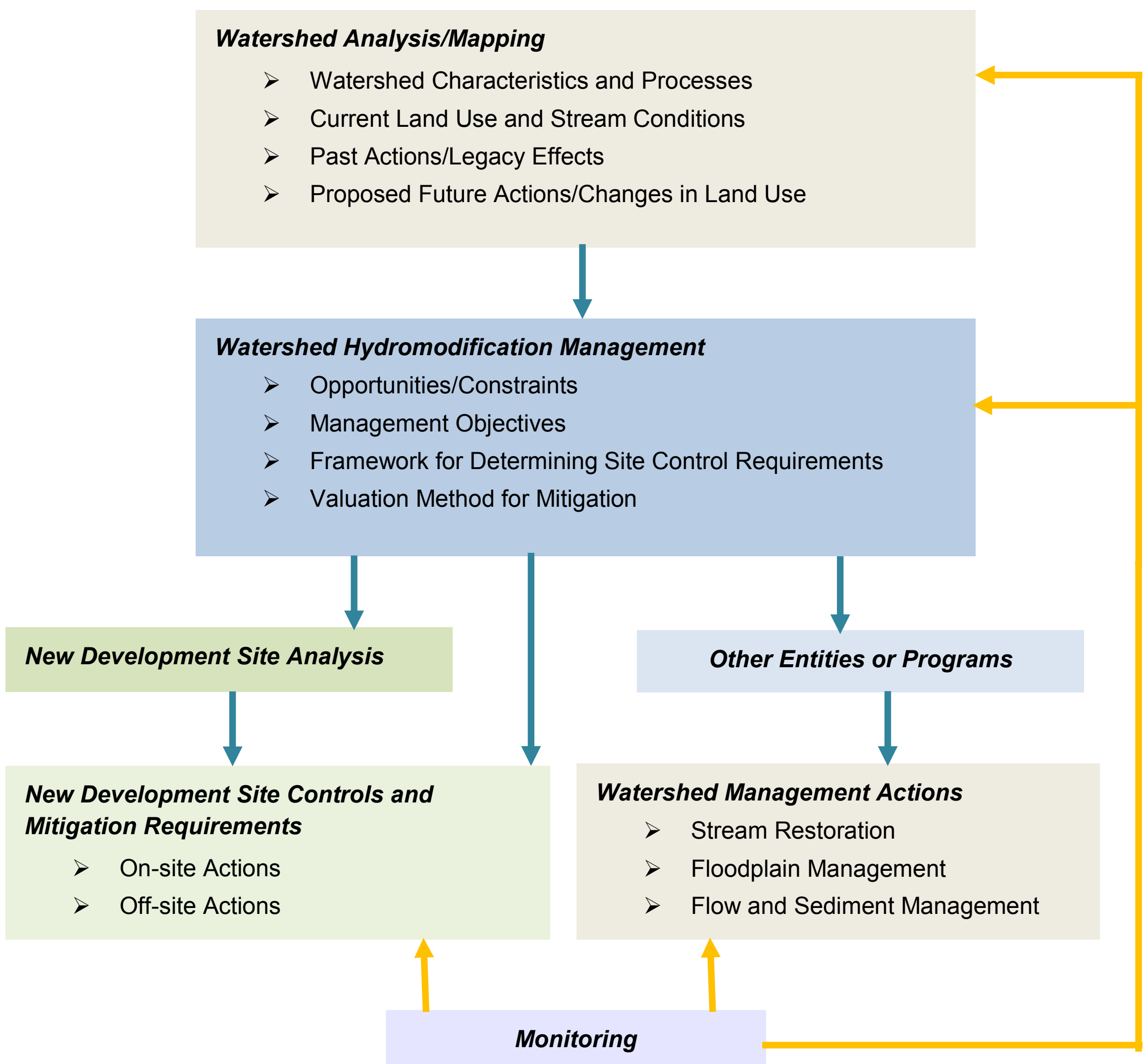


Figure 3-1. Framework for Integrated Hydromodification Management.

This section discusses the details of the integrated framework proposed in Figure 3-1. Key features of this comprehensive approach to hydromodification management are:

- Hydromodification management needs to occur primarily at the watershed scale. The foundation of any hydromodification management approach should be an analysis of existing and proposed future land use and stream conditions that identifies the relative risks, opportunities, and constraints of various portions of the watershed. Site-based control measures should be determined in the context of this analysis.
- Clear objectives should be established to guide management actions. These objectives should articulate desired and reasonable physical and biological conditions for various reaches or portions of the watershed. Management strategies should be customized based on consideration of current and expected future channel and watershed conditions. A one-size-fits-all approach should be avoided.
- An effective management program will likely include combinations of on-site measures (e.g., low-impact development techniques), in-stream measures (e.g., stream habitat restoration), and off-site measures. Off-site measures may include compensatory mitigation measures at upstream locations that are designed to help restore and manage flow and sediment yield in the watershed.
- Management measures should be informed and adapted based on monitoring data. Similarly, monitoring programs should be designed to answer questions and test hypotheses that are implicit in the choice of management measures, such that measures that prove effective can be emphasized in the future (and those that prove ineffective can be abandoned).
- Hydromodification potentially affects all downstream receiving waters; therefore, there generally should be no areas exempted from hydromodification management plans. However, the variety of types and conditions of receiving waters should result in a range of requirements. This also means that objectives, and the management strategies employed to reach them, will need to acknowledge pre-existing impacts associated with historical land uses.

A watershed-based approach to hydromodification management will allow integration of objectives with related programs such as water quality management, groundwater management, and habitat management and restoration through mechanisms such as Integrated Regional Water Resources Management Plans.

Implementation of this approach will likely require changes in the current administration of hydromodification management plans statewide, both in the development and promulgation of regulations by the State and Regional Water Boards and in the administration and execution of those regulations by local jurisdictions (Table 3-1). In the short term, municipalities will need to broaden the approaches to on-site management measures and expand monitoring and adaptive management programs based on the tools described in this document. In the long term, regulatory agencies will need to develop watershed-based programs that allow for implementation of management measures in the locations and manner that will have the greatest impact on controlling hydromodification effects. A watershed-based approach will also allow the integration of hydromodification management objectives with related programs such as water quality management, groundwater management, and habitat management and restoration through mechanisms such as Integrated Regional Water Resources Management Plans.

Table 3-1. Recommendations for implementation of watershed-based hydromodification management, organized by the scale of implementation and the time frame in which useful results should be anticipated.

Time Frame	Programmatic: State and Regional Water Boards	Local: City and County Jurisdictions
Short-term (<10 years)	• Define the watershed context for local monitoring (at coarse scale) • Evaluate whether permit requirements are making positive improvements	• Evaluate whether specific projects/ regulations are meeting objectives • Identify the highest priority action(s) to take
Long-term (1+ decades)	• Define watershed context and setting benchmarks for local-scale monitoring (i.e., greater precision, if/as needed) • Demonstrate how permit requirements can improve receiving-water "health," state-wide (and change those requirements, as needed)	• Evaluate and demonstrate whether actions (on-site, instream, and watershed scale) are improving receiving-water conditions • Assess program cost-effectiveness • Identify any critical areas for resource protection

3.2 Background on Existing Strategies and Why They are Insufficient

Current hydromodification approaches and strategies, such as flow and sediment-control basins, have been long-recognized as insufficient to fully address hydromodification impacts (e.g., Booth and Jackson 1997, Maxted and Horner 1999). Present understanding of the causes and effects of urbanization suggest that such approaches must be expanded to include integrated flow and sediment management at the watershed scale, along with stream corridor/floodplain restoration (NRC 2009).

Flow management has its origins in flood-control basins intended to reduce peak discharge through stormwater detention (Dunne and Leopold 1978). A key shortcoming of these approaches for hydromodification management is that they do not address (and may exacerbate) cumulative erosive forces on the receiving channel because they trap sediment and release sediment-starved water to downstream areas. Simple detention can increase the frequency and duration with which channels are exposed to erosive effects (McCuen and Moglen 1988, Bledsoe *et al.* 2007), resulting in an increase in the downstream impacts of hydromodification.

Since the late 1980's in parts of the US, hydromodification management plans began to explore "flow-duration" control standards as a way to address this shortcoming. These standards require that the post-project discharge rates *and durations* may not deviate above the pre-project discharge rates and durations by more than a specific (and typically quite small) percent, across a broad range of discharges at and above the presumed threshold of instream erosion and sediment transport, as averaged over a multi-year period of measured (or simulated) record. This approach is a dramatic improvement over earlier methods, although it does not adequately address the issues of sediment deficit associated with urbanization (Chin 2006). In addition, current flow-duration standards do not fully account for the effects of flow alteration on in-stream habitat and biological functions (e.g., they do not address the seasonality of peak flows, rates of hydrograph rise and recession, low-flow magnitude and duration) and therefore may not be protective of all beneficial uses of downstream waterbodies.

Current strategies are also insufficient with respect to how municipal stormwater permits apply hydromodification standards. Currently, development triggers are established to determine if a project is subject to the standards. These triggers are generally specified by either project land use type in conjunction with size, or by project size alone (e.g., 20 units or more of single family residential housing, or 10,000 square feet or more of new impervious area). The exemption of many small projects from hydromodification controls can result in cumulative impacts to downstream waterbodies (see Booth and Jackson, 1997, for an example from western Washington of the cumulative effects of a small-project exemption); a move to include LID requirements that apply to all projects, regardless of size, is a positive development to begin to address this issue. There is usually also an exemption for projects discharging to hardened channels or waterbodies; however these exemptions may not be supportive of future stream restoration possibilities, and do not address the impacts of hydromodification on lentic and coastal waterbodies (as yet not fully understood). A further limitation of the current permit structure is that there is no consideration of project characteristics such as position within the watershed, sensitivity of the receiving stream reach, or level of coarse sediment production on the proposed project site. Finally, current programs rely solely on regulating new development and re-development to prevent hydromodification impacts without addressing pre-existing conditions which may limit the effectiveness of future management actions.

Shortcoming of current hydromodification standards that may limit their effectiveness include the exemption of many small projects, which can result in cumulative impacts to downstream waterbodies, and the reliance solely on regulating new development and re-development without addressing pre-existing conditions which may limit the effectiveness of future management actions.

When flow-control measures of whatever regulatory standard have failed to protect streams from erosion, hydromodification “management” typically consists of bank or channel armoring, drop structures, and other hard engineering approaches. Although these methods may reduce local hydromodification impacts, it is typically at the expense of other in-stream or riparian functions or beneficial uses. For example, channel armoring can reduce habitat and water conservation functions and services by direct habitat removal, increased bed scour, and decreased connectivity between the channel and its floodplain. In addition to loss of biological and physical stream function, many armoring solutions degrade or fail over time because they address only the localized channel instability rather than the overarching processes that led to the instability (Kondolf and Piegay 2004). For example, drop structures constructed to stabilize a specific channel reach will tend to shift downstream the consequences of an insufficient sediment load—the reach immediately upstream of the drop structure is "protected," but that immediately downstream is degraded even more severely. In extreme cases, the structure itself can be undermined by downstream erosion and headcutting that is exacerbated by the sudden shift in velocity and associated eddy effects (i.e., hydraulic jump) that often occurs downstream of grade stabilization (Chin 2006). Bank armoring can also fail due to being undermined by erosion at the toe of slope, which can lead to scour (Figure 3-2). In both cases, structural failures often lead to a sequence of incremental increases in the size and extent of the structural solution in an attempt to continually repair increasing channel degradation. In extreme cases, catastrophic failure of bank or grade stabilization can lead to sudden and dramatic changes in channel form, which can be associated with devastating loss of habitat, infrastructure, and property.

Figure 3-2. Undermining of grade control and erosion of banks downstream of structures intended to stabilize a particular stream reach. Left photo is looking upstream at drop structure; right photo is looking downstream from the drop structure.

3.3 Development of Comprehensive Hydromodification Management Approaches

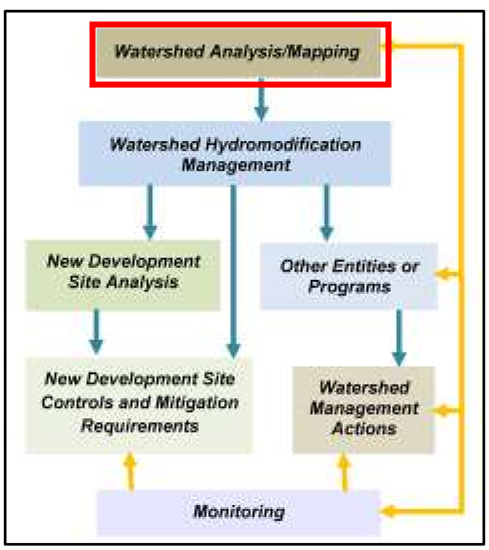
The goal of hydromodification management should be to protect and restore overall receiving water conditions, by maintaining or reestablishing the watershed processes that support those conditions, in the face of urbanization. Achieving these goals will require that hydromodification management strategies operate across programs beyond those typically regulated by NPDES/MS4 requirements. Successful strategies will need to be developed, coordinated, and implemented through land-use planning, non-point source runoff control, and Section 401 Water Quality Certifications and Waste Discharge Requirement programs in addition to traditional stormwater management programs. Thus, all levels of the regulatory framework—federal, state, and local—will need to participate in developing such a program, with program development occurring mainly through regulatory and resource protection agencies and program implementation occurring mainly through local jurisdictions.

As shown in Figure 3-1, watershed-scale hydromodification management should include all of the following key elements:

The goal of hydromodification management should be to protect and restore overall receiving water conditions, by maintaining or reestablishing the watershed processes that support those conditions, in the face of urbanization.

- Watershed-wide assessment of the condition of key watershed processes, to understand the natural functioning of the watershed and what has been (or is at risk of being) altered by urbanization.
- Watershed-wide assessment of hydromodification risk, to categorize areas based on the likelihood of hydromodification impacts and to identify opportunities for restoration or protection of key reaches or sub-basins.
- Appropriate management objectives for various stream reaches and/or portions of the watershed.
- Process for selecting management actions and mitigation measures for project sites and stream reaches.
- Monitoring program that is consistent with the goals of the HMP so that information generated can be used to improve the HMP over time.

3.4 Watershed Mapping and Analysis – Identification of Opportunities and Constraints



Watershed analysis should be the foundation of all hydromodification management plans. Analysis should identify the nature and distribution of key watershed processes, existing opportunities and constraints in order to help prioritize areas of greater vs. lesser concern, areas.

"Watershed analysis" has several steps, of which the first is mapping. Mapping may occur at the watershed or regional (i.e., multiple watersheds) scale. Mapping should include data layers to facilitate the following analyses. Most of these data layers are freely available as online. Further information on analysis tools is provided in the next section. These maps should be designed for iterative updates over time as new information becomes available:

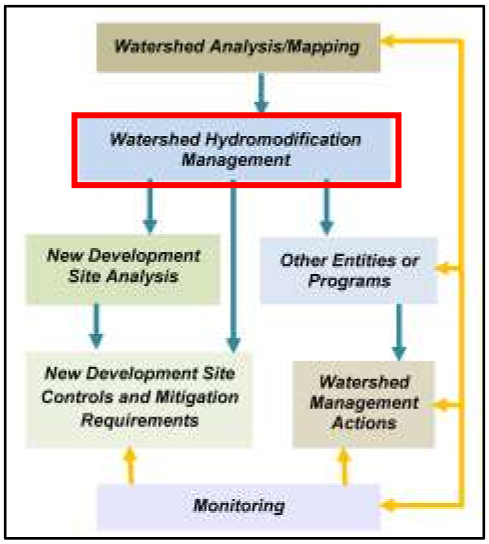
- <u>Dominant watershed processes</u> – analysis of topography (10-m digital elevation model), hydrology, climate patterns, soil type (NRCS soil classifications) and surficial geology can be used to identify the location and type of dominant watershed processes, such as sediment source areas and areas where infiltration is important or where overland flow likely dominates. This can provide a template for the eventual design of management measures that correspond most closely to the pre-development conditions, which support processes that promote long-term channel health. The Central Coast Hydromodification Control Program (the "Joint Effort"; see Booth *et al.* 2011) provides an example of this type of analysis.

- Existing stream conditions – At a minimum the National Hydrography Database (NHD) can provide maps of streams and lakes in the watershed. Additional information on stream condition should be included to the extent that it is available. This could include major bed material composition, channel planform, grade control locations and condition, and approximate channel evolution stage. These maps can also be used to conduct general stream power evaluations.
- Current (Past) and anticipated future land use - Current land use and land cover plus proposed changes due to general or specific plans. Historical information on past land use practices or stream conditions should be included if it is readily available. Classified land cover (NLCD 2006) is available from the Multi-Resolution Land Characteristics Consortium (MRLC).
- Potential coarse and fine sediment yield areas – methods such as the Geomorphic Land Use (GLU) approach (Booth *et al.* 2010) can be used that to estimate potential sediment yield areas based on geology, slope and land cover.
- Existing flood control infrastructure and channel structures – maps should include major channels, constrictions, grade control, etc. that affect water and sediment movement through the watershed. Any available information on water quality, flood control or hydromodification management basins should also be included.
- Habitat – both upland and in-stream and riparian habitat should be mapped to help determine areas of focus for both resource protection and restoration. This may be based on readily available maps such as the National Wetlands Inventory and National Land Cover Database, aerial photo interpretation, or detailed local mapping.
- Areas of Particular Management Concern – these may include sensitive biological resources, critical infrastructure, 303(d) listed waterbodies, priority restoration areas or other locations or portions of the watershed that have particular management needs.
- Economic and social opportunities and constraints – comprehensive watershed management includes consideration of opportunities for improving community amenities associated with streams, economic redevelopment zones, etc. Details on this are beyond the scope of this paper, but emphasize the need to include planning agencies in the development of hydromodification management plans.

Substantial resources will be necessary to implement a watershed analysis approach; therefore, opportunities for joint funding and leveraging of resources should be vigorously pursued.

Watershed analysis will be challenging especially for smaller municipalities with limited resources or where their jurisdiction only encompasses a portion of the watershed. Substantial resources will be necessary to implement this approach; therefore, opportunities for joint funding and leveraging of resource should be vigorously pursued. A cooperative approach should replace the current fragmented efforts among regions and jurisdictions. Furthermore, the State and Regional Water Boards should support completion of these maps and common technical tools as the foundation for future hydromodification management actions.

3.5 Defining Management Objectives



Results of the watershed analysis should be used to determine the most appropriate management actions for specific portions of the watershed. Management strategies should be tailored to meet the objectives, desired future conditions, and constraints of the specific channel reach being addressed.

Decisions should be based on considerations of areas suitable for specific ecosystem services, opportunities, and constraints as described above. Management objectives may be aimed at reducing effects of proposed future land use or mitigating for the effects of past land use, and they may apply to stream reaches or upland areas. Potential management objectives for specific stream reaches may include: protect, restore, or manage as a new channel form.

The specific manifestation of each of these strategies will differ by location, based on constraints of the stream, watershed plan objectives, etc. Decisions about appropriate objectives will need to consider current and future opportunities and constraints in upland, floodplain, and in-stream portions of the watershed. General definitions are provided below as a starting point for case-specific refinement.

Management strategies should be tailored to meet the objectives, desired future conditions, and constraints of the specific channel reach being addressed. Objectives for specific stream reaches may include:

- **Protect**
- **Restore**
- **Manage as a new channel form**

3.5.1 Protect

This approach consists of protecting the functions and services of relatively unimpacted streams in their current form through conservation and anti-degradation programs. This strategy should not be used if streams are degraded, or nearing thresholds of planform adjustment or changes in vegetation community. This strategy may apply following natural disturbances such as floods depending on the condition of the stream reach and the ability for natural rehabilitation to occur (due to how intact watershed processes are). The goal of this strategy is not to create an artificial preserve (such as a created stream running through an urban park) but rather a naturally function river system. Fully channelized systems are not considered in this framework. Examples of specific actions include:

- Preserving intact channel systems through easements, restrictions, covenants, etc. This should be considered in the watershed context to ensure adequate connectivity with upstream and downstream reaches of similar condition, and to ensure that the watershed processes responsible for creating and maintaining instream conditions will persist.
- Providing appropriate space for channel processes to occur (e.g., floodplain connectivity).
- Establishing transitional riparian and upland buffer zones that are protected from encroachment by infrastructure or development.

3.5.2 Restore

There are many definitions of "restoration". For the purposes of this document, restoration is considered re-establishing the natural processes and characteristics of a stream. The process involves converting an unstable, altered, or degraded stream corridor, including adjacent riparian zone (buffers), uplands, and flood-prone areas, to a natural condition. In most cases, restoration plans should be based on a consideration of watershed processes and their ability to support a desired stream type. The watershed analysis discussed above should be used to determine how and where watershed process should be protected or restored in order to best support stream and stream-corridor restoration. This process should be based on a reference condition/reach for the valley type and includes restoring the appropriate geomorphic dimension (cross-section), pattern (sinuosity), and profile (channel slopes), as well as reestablishing the biological and chemical integrity, including physical processes such as transport of the water and sediment produced by the stream's watershed in order to achieve dynamic equilibrium. Design of restoration structural elements must be based on existing and anticipated upstream land uses, and reflect the modified hydrology resulting from these uses. Restoration should apply to streams that are already on a degradation trajectory where there is a reasonable expectation that a more stable equilibrium condition that reflects previously existing conditions can be recreated and maintained via some intervention. Creating a stream system that differs from "natural conditions" is not considered restoration. All elements of the "protection" strategy should also be included once the restoration actions are complete. Examples of specific actions include:

- Floodplain and in-stream measures that restore natural channel form consistent with current and/or anticipated hydrology and sediment yield. Examples include recontouring, biotechnical slope stabilization, soft-grade control features (e.g., woody debris).
- Revegetation of stream banks and beds, including removal of invasive species.
- Preserving intact channel systems through easements, restrictions, covenants, etc. This should be considered in the watershed context to ensure adequate connectivity with upstream and downstream reaches of similar pristine condition.

- Providing appropriate space for channel processes to occur (e.g. channel migration at allowable levels, floodplain connectivity, and development of self-sustaining riparian vegetation).
- Establishing transitional riparian and upland buffer zones that are protected from encroachment by infrastructure or development.

3.5.3 Manage as New Channel Form

Once a stream channel devolves far enough down the channel evolution sequence, it is extremely difficult to recover and restore without substantial investment of resources. If critical thresholds in key structural elements, such as planform or bank height, are surpassed, streams should be allowed to continue progressing toward a new stable equilibrium condition that is consistent with the current setting and watershed forcing functions, if such progress does not pose a danger to property and infrastructure. Substantial alteration of flow or sediment discharge, slope or floodplain width may make it improbable that a stream can be restored to its previous condition. In such circumstances, it may be preferable to determine appropriate channel form given expected future conditions and "recreate" a new channel to match the appropriate equilibrium state under future conditions. For example, a multi-thread braided system may not be the appropriate planform based on new runoff and sediment pattern; instead, a single-thread channel or step-pool structure may be a more appropriate target. Examples of specific actions include:

- In-channel recontouring or reconstruction of channel form.
- Floodplain recontouring or reconstruction that improves connectivity with the channel.
- In extreme circumstances based on channel condition, position in the watershed, etc. this may involve hardening portions of the channel and focusing "mitigation" measures at off-site measures at a different part of the watershed. Off-site mitigation can be informed by "hydromodification risk mapping".
- Re-establishing longitudinal connectivity for sediment transport and ecological linkages.
- Preserving intact channel systems through easements, restrictions, covenants, etc. This should be considered in the watershed context to ensure adequate connectivity with upstream and downstream reaches of similar pristine condition.
- Providing appropriate space for channel processes to occur (e.g. floodplain connectivity).
- Establishing transitional riparian and upland buffer zones that are protected from encroachment by infrastructure or development.

Several authors have previously noted that in urban systems, natural channel state often can no longer be sustained under changed hydrological conditions. Thus, different management goals are probably appropriate for watersheds at varying stages of development (Booth, 2005) and at varying degrees of adjustment (Chin and Gregory 2005). In this context, identifying which channels are suitable for protection, restoration, or alternative channel form can be used to guide restoration and management efforts (Booth *et al.* 2004).

Upland objectives should be established to support management objectives for stream reaches. These objectives will have direct implications and will influence site-specific control requirements (discussed below). Potential management objectives for upland areas may include:

- *Conserve open space for infiltration*: Infiltration reduces the magnitude and duration of runoff to the stream channel and allows flow to re-enter the stream through diffuse overland flow, shallow subsurface flow, or groundwater recharge. This in turn reduces the work (energy) on the channel bed and banks and helps promote stability.
- *Conserve open space for stream buffers*: Buffers allow many of the same infiltration processes discussed above to occur. In addition, they provide space for channel migration and overbank flow, both of which function to reduce energy and allow the channel to better withstand potentially erosive forces associated with high flow events.
- *Conserve open space for coarse sediment production*: Course sediment functions to naturally armor the stream bed and reduce the erosive forces associated with high flows. Absence of coarse sediment often results in erosion of in-channel substrate during high flows. In addition, coarse sediment contributes to formation of in-channel habitats necessary to support native flora and fauna.
- *Encourage development on poorly-infiltrating soils*: The difference between pre and post development runoff patterns is less when development occurs on soils that have low infiltration rates and functioned somewhat like paved surfaces. Focusing development on these areas reduces changes in hydrology associated with transition to developed land uses.
- *Encourage urban infill*: Urban infill reduces the effect on watershed processes by concentrating development on previously impacted areas. This reduces disruption of hydrology and sediment process compared to developing on open space or other natural areas.

3.6 Selecting Appropriate Management Objectives

The combination of expected force acting on the stream channel (in terms of higher flow and less sediment) and estimated resistance (in the form of channel and floodplain condition) can be used to inform selection of an appropriate management objective for a specific stream reach, as shown in Figure 3-3. This figure represents a conceptual approach to selecting appropriate management objectives, in which modifications to runoff and sediment are compared against stream reach conditions. By weighing these factors within the context of watershed opportunities, constraints and resources, management objectives and specific actions can be determined. More complete decision support systems or guidance will need to be developed for individual

Selection of appropriate management objectives should consider changes to runoff and sediment, and existing stream reach conditions, within the context of watershed opportunities, constraints and resources.

hydromodification management plans that account for other considerations such as upstream and downstream conditions, cost, infrastructure constraints, availability of floodplain area for restoration, presence of downstream sensitive resources, etc. All decisions should be made in the context of the watershed position of a project site relative to existing opportunities and constraints as discussed above.

A number of tools are available to be used in conjunction with watershed mapping to inform this prioritization process. For example, GLU mapping (Booth *et al.* 2010) and hydromodification risk mapping can be used to assign high, medium or low ratings to watershed resistance (i.e., susceptibility to change). Similarly, field based tools such as the hydromodification screening tool (Bledsoe *et al.* 2010) or European tools such as Fluvial Audit or River Habitat Survey can be used to assign a rating of high, medium or low at the reach scale. In addition to geomorphic assessments, habitat assessments such as the California Rapid Assessment Method (CRAM; Collins *et al.* 2008) or biological evaluations via an index of biotic integrity (IBI; e.g., Ode *et al.* 2005) should be used as measures of biological condition to provide a more complete stream assessment. The next section provides an overview of hydromodification assessment and prediction tools, as well as further details on specific tools to support the selection of management objectives.

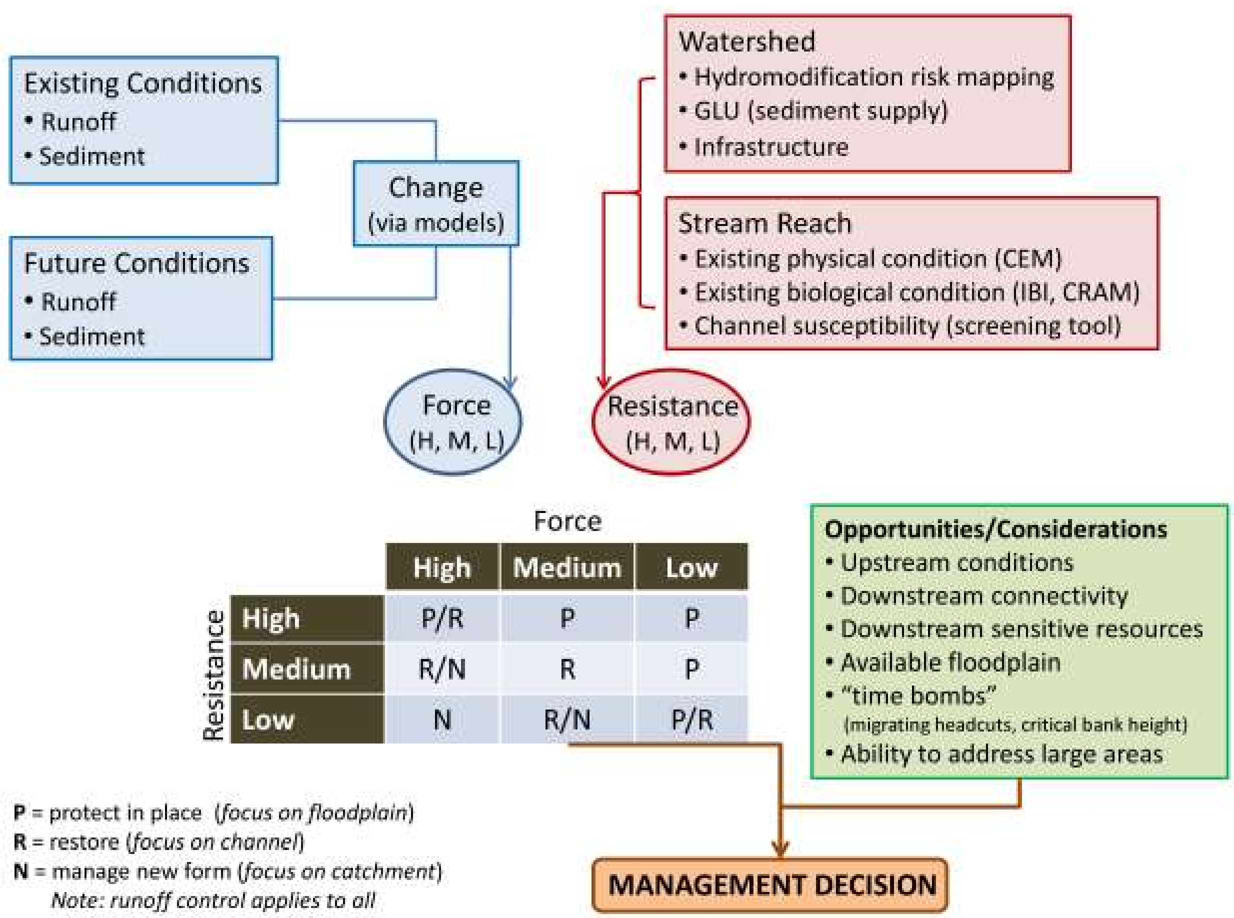
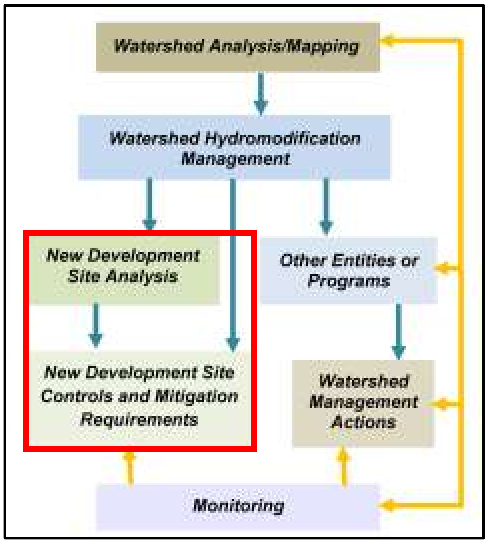


Figure 3-3: Example of a hydromodification management decision-making process.

3.7 Framework for Determining Site-Specific Control Requirements



Once the watershed analysis is complete and opportunities, constraints and management objectives have been identified for both upland areas and stream reaches, a framework should be developed for site-specific project analyses and control requirements. The level of detail required for the analysis of proposed projects should be based on a combination of factors including project size, location within the watershed, and point of discharge to receiving waterbody.

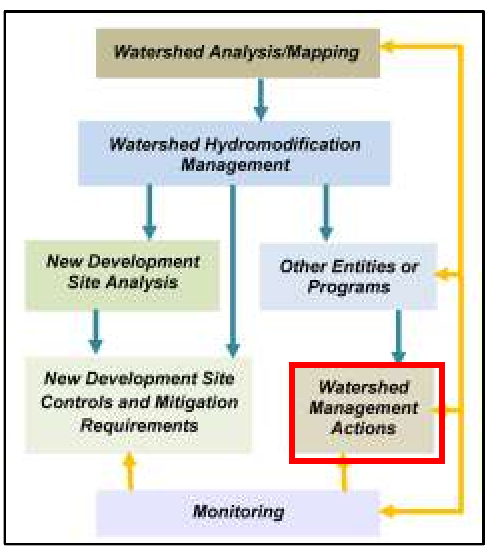
The HMP should specify how these factors will be evaluated within the context of the identified management objectives to determine analysis requirements. The HMP should also ideally contain scalable BMP designs (based on conservative assumptions and consistent with prevailing watershed conditions) that can be applied by small projects where appropriate to avoid overly burdensome requirements for site-specific analysis. The framework should include the following components:

- A set of standard on-site management measures/BMPs that should apply to all projects; no projects should be exempted from these measures as they will have broader water quality benefits beyond helping to control the effects of hydromodification. These management actions consist of reducing the effects of urbanization on catchment runoff and sediment yield. On-site management measures should attempt to reduce excess runoff, maintain coarse sediment yield (if possible) and provide for appropriate discharge to receiving streams to support in-stream biological resources. In some cases, common features or facilities may be able to accommodate these objectives. In other cases, separate features or facilities will be necessary to deal with distinct objectives. On-site measures should ***generally be applied in all cases*** as allowed by site-specific geotechnical constraints, with specific management practices informed by the watershed processes most important at particular locations in the watershed, as well as by the nature of downstream receiving waters:
    - Low impact development (LID) practices.
    - Disconnecting impervious cover through infiltration, interception, and diversion.
    - Coarse sediment bypass through avoidance of sediment yield areas or measures that allow coarse sediment to be discharged to the receiving stream.
    - Flow-duration control basins to reduce runoff below a threshold value.

- Specification of the level of analysis detail and design requirements for the project, depending on project location, discharge point, and project size. Levels of analysis and design requirements may include:
    - Application of scalable, standardized designs for flow control based on site-specific soil type and drainage design. The assumptions used to develop these scalable designs should be conservative, to account for loss of sediment and uncertainties in the analysis and our understanding of stream impacts.
    - Use of an erosion potential metric, based on long-term flow duration analysis and in-stream hydraulic calculations. Guidelines should specify stream reaches where in-stream controls would and would not be allowed to augment on-site flow control.
    - Implementation of more detailed hydraulic modeling for projects of significant size or that discharge to reaches of special concern to understand the interaction of sediment supply and flow changes.
    - Analysis of the water-balance for projects discharging into streams with sensitive habitat. This may include establishment of requirements for matching metrics such as number of days with flow based on the needs of species present.
- Guidelines for prioritization of on-site or regional flow and sediment control facilities. Watershed analysis will help identify opportunities for regional flow or sediment control facilities, which may help to mitigate for existing hydromodification impacts.

Appendix A provides detailed guidance on the appropriate application of tools to meet site control requirements.

3.8 Off-site Compensatory Mitigation Measures



In some cases, on-site control of water and sediment will not be sufficient to offset the effects of hydromodification on receiving waters. In these cases, off-site compensatory mitigation measures will be necessary (similar to the concepts used in the Section 401/404 permitting programs). Off-site measures could be implemented by project proponents or through the use of regional mitigation banks or in-lieu fee programs.

Off-site mitigation may be necessary for several reasons:

- Off-site measures may be more effective at addressing effects or at achieving desired management goals. This may be particularly true for sites near the bottom of a watershed where upstream measures may be preferred

- Off-site measures may be necessary to supply compensation for residual project impacts where on-site measures are limited by site constraints or solutions are beyond the scope of what can be accomplished on an individual site.
- Off-site measures may be necessary where accomplishing specified management objectives is not practical using on-site measures alone. Off-site measures may be desired to remedy legacy effects of prior land use or to achieve desired beneficial uses.

Performance monitoring and adaptive management must be a part of compensatory mitigation given its inherent uncertainty.

The location and type of mitigation should be determined in the context of the watershed analysis and should account for the size and nature of the impact, location in the watershed, pre-existing conditions in the watershed, and uncertainty associated with the success of the proposed mitigation actions. In some cases these measures may be near the project site (e.g., restoring a stream reach downstream of the project site), but in other cases the off-site mitigation may be in the form of in-lieu fee or "mitigation bank" type contributions to a project located in a different portion of the watershed (e.g. upstream grade control, protection of sediment source areas). Such off-site mitigation relatively far from the site will only be possible if conducted in the context of an overall watershed plan, as discussed above. Off-site measures may include:

In cases where on-site control of water and sediment will not be sufficient to offset the effects of hydromodification on receiving waters, off-site compensatory mitigation measures will be necessary. Implementation of this approach will require that the State Water Board develop a valuation method to help determine appropriate off-site mitigation requirements in light of the anticipated impacts of hydromodification on receiving streams.

- Stream corridor restoration
- Purchase, restoration and protection of floodplain/floodway habitat
- Purchase and/or protection of critical sediment source or transport areas
- Regional basins or other retention facilities
- Upstream or downstream natural/bio-engineered grade control
- Retrofit or repair of currently undersized structures (e.g. culverts, bridge crossings)
- Removal or hydrologically disconnecting impervious surfaces

A valuation method will be necessary for assigning appropriate mitigation requirements in light of the anticipated impacts of hydromodification on receiving streams. The valuation method should be developed by the State Water Board.

To support the management approaches discussed above, HMPs should provide general guidance for application of models and other tools based on the questions being asked and the desired outcomes of the HMP. Models can also be used to help communicate levels of uncertainty in particular management actions and to guide restoration / in-channel management actions. Modeling and other tools are discussed in detail in Section 4 and Appendices A and B.

Management endpoints should articulate the desired physical and biological conditions for various reaches or portions of the watershed. To the extent possible, these desired conditions should be expressed in numeric, quantifiable terms to avoid ambiguity.

Finally, management endpoints should articulate the desired physical and biological conditions for various reaches or portions of the watershed. To the extent possible, these desired conditions should be expressed in numeric, quantifiable terms to avoid ambiguity. Additionally, since regulatory strategies will invariably rely on quantifiable measures to determine whether stormwater management actions achieve these desired conditions, identifying appropriate numeric objectives will support determinations of regulatory compliance. As desired physical and biological watershed conditions are expressed in quantifiable terms to the extent possible, a similar need would apply to site control requirements. Control measures should be linked to, a) a desired condition (or goal), b) the parameter(s) that best define that condition, and c) quantifiable measures that serve to evaluate performance of the control measure. Direct measures (e.g., volume of runoff to be retained) as well as indirect or surrogate measures (IBI scores) are appropriate if they are quantifiable.

4. OVERVIEW OF ASSESSMENT AND PREDICTION TOOLS

4.1 Introduction

The previous section discussed a number of potential actions for managing hydromodification impacts. These ranged from high-level watershed-scale characterization to the site-specific design of a proposed development. This section provides an overview of the current and emerging assessment and prediction tools available to inform these management actions. An organizing framework helps explain the appropriate application of these tools, as well as their strengths and weaknesses. Specific tools that support the selection of management objectives are also discussed. Examples of "suites" of tools that are commonly used together to predict stream responses and formulate management prescriptions for channels of varying susceptibility are presented in Appendix B. Appendix A provides detailed guidance on the appropriate application of tools to meet site control requirements.

Municipalities are the primary audience for this section, as they select and incorporate these tools into their HMPs. However, the State and Regional Water Boards should be aware of the overall capabilities, appropriate uses, and gaps in our current toolbox. The development of new and improved tools should ideally be coordinated at the State level for optimum cost effectiveness and widest applicability. The table below identifies the key actions necessary at both the programmatic and local level to address the considerations discussed above, within the context of the goals of the framework described in Section 3.

Table 4-1. Recommendations for the application and improvement of tools in support of the proposed management framework.

Time Frame	Programmatic: State and Regional Water Boards	Local: City and County Jurisdictions
Short-term (<10 years)	• Develop quality control and standardization for continuous simulation modeling • Perform additional testing and demonstration of probabilistic modeling for geomorphic response • Pursue development of biologically- and physically-based compliance endpoints	• Work cooperatively with adjacent jurisdictions to implement hydromodification risk mapping at the watershed scale • Implement continuous simulation modeling for project impact analysis
Long-term (1+ decades)	• Improve tools for sediment analysis and develop tools for sediment mitigation design • Develop tools for biological response prediction • Improve tools for geomorphic response prediction	• Expand use of probabilistic and statistical modeling for geomorphic response • Apply biological tools for predicting and evaluating waterbody condition

4.2 Background

In the context of hydromodification, tools and models are typically used to help answer one or more of the following questions involving an assessment of natural and human influences at various spatial and temporal scales:

- How does the stream work in its watershed context?
- Where is the stream going? For example, have past human actions induced channel changes? What are the effects on sediment transport and channel form? What is the magnitude of current and potential channel incision following land use conversion?
- How will the stream likely respond to alterations in runoff and sediment supply?
- How can we manage hydromodification and simultaneously improve the state of the stream?

Previous sections have underscored the variability and complexity of relationships among land use, the hydrologic cycle, and the physical and ecological conditions of stream systems. It follows that the process of assessing stream condition and predicting future conditions is highly challenging and subject to uncertainty. Therefore it is important to understand the inherent strengths and limitations of the available tools, especially with respect to prediction uncertainty and how it is expressed for various tools. Considerable judgment is needed to choose the appropriate model for the question at hand. In addition to prediction uncertainty, considerations in choosing the right model for a particular application include appropriate spatial and temporal detail, cost of calibration and testing, meaningful outputs, and simplicity in application and understanding (NRC 2001; Reckhow 1999a,b).

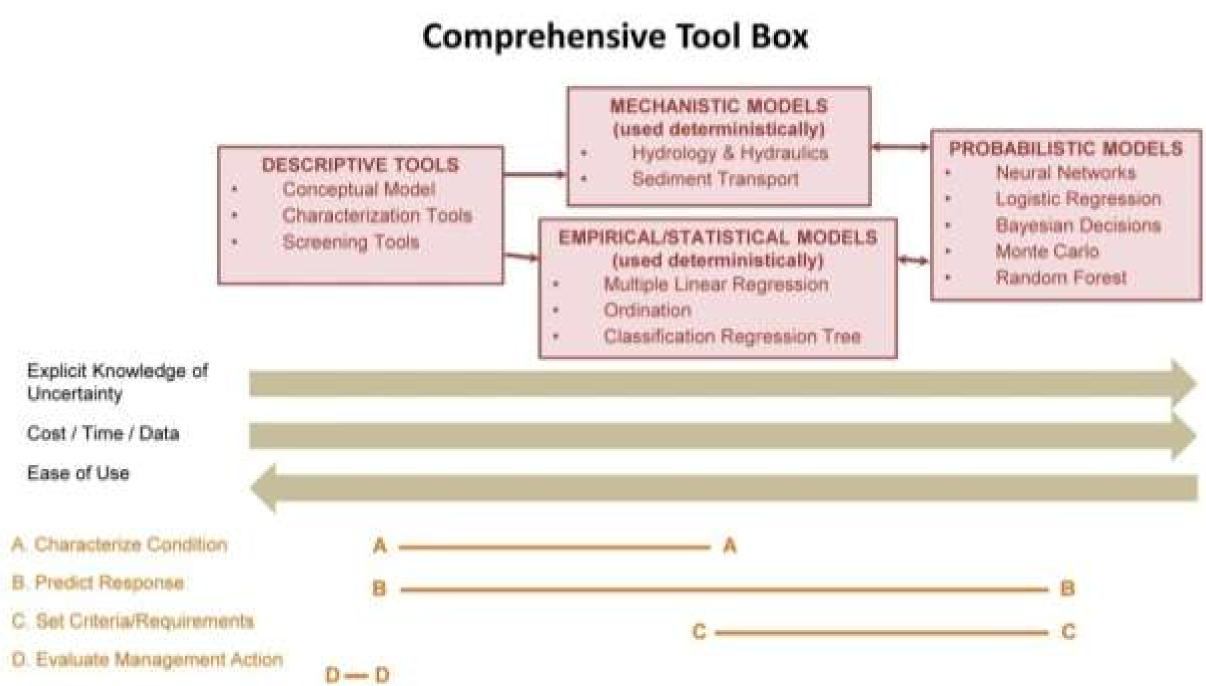


Figure 4-1. Organizing Framework for understanding hydromodification assessment and management tools.

4.3 Organizing Framework

Figure 4-1 presents an organizing framework by which to understand the available tools that may be applied in support of hydromodification management and policy development. Tools fall into three major categories: descriptive tools, mechanistic and empirical/statistical models that are used deterministically, and probabilistic models/predictive assessments with explicitly quantified uncertainty. The organizing framework relates these categories to the types of question the tools are designed to answer, specifically: characterization of stream condition, prediction of response, establishment of criteria/requirements, or evaluation of management actions. The framework also characterizes the tools according to the following features: intensity of resource requirements (i.e., data, time, cost), and the extent to which uncertainty is explicitly addressed. Subsequent sections of this section discuss each of the three major categories in turn, highlighting examples of specific tools within each category.

Given the uncertainty associated with predicting hydromodification impacts, probabilistic models should be incorporated into analysis and design, particularly where resource values or potential consequences of impacts are high.

Tools required to support the management framework presented in Section 3 include watershed characterization and analysis tools and project analysis and design tools. The level of resolution that is required will depend on the point in the planning process. At early stages, descriptive tools will be sufficient, but more precise tools will be required toward the design phase. Currently, most projects rely solely on deterministic models. However, given the uncertainty associated with predicting hydromodification impacts, probabilistic models should be incorporated into analysis and design, particularly where resource values or potential consequences of impacts are high.

4.3.1 Descriptive Tools

Descriptive tools include conceptual models, screening tools, and characterization tools. These tools are used to answer the question: *What is the existing condition of a stream or watershed?* Although descriptive tools are not explicitly predictive, they can be used to assess levels of susceptibility to future stressors by correlation with relationships seen elsewhere. The application of some type of descriptive tool, such as a characterization tool, is almost always necessary before applying a deterministic model. In particular, descriptive tools can aid in understanding the key processes and boundary conditions that may need to be represented in more detailed models.

Conceptual Models. A conceptual model, in the context of river systems, is a written description or a simplified visual representation of the system being examined, such as the relationship between physical or ecological entities, or processes, and the stressors to which they may be exposed. Conceptual models have been used to describe processes in a wide range of physical and ecological fields of study, including stream-channel geomorphology (Bledsoe *et al.* 2008). For example, Channel Evolution Models (CEMs) are conceptual models which describe a series of morphological configurations of a channel, either as a longitudinal progression from the upper to the lower watershed, or as a series at a fixed location over time subsequent to a disturbance. The incised channel CEM developed by

Schumm *et al.* (1984) is one of the most widely known conceptual models within fluvial geomorphology. This CEM documents a sequence of five stages of adjustment and ultimate return to quasi-equilibrium that has been observed and validated in many regions and stream types (ASCE 1998, Simon and Rinaldi 2000). The Schumm *et al.* (1984) CEM has been modified for streams characteristic of southern California, including transitions from single-thread to multi-thread and braided evolutionary endpoints (Hawley et al., in press).

Conceptual models also include planform classifications of braided, meandering and straight, and other general geomorphic classifications, which categorize streams by metrics such as slope, sinuosity, width-to-depth ratio, and bed material size. The qualitative response model described by Lane's diagram (1955), and discussed earlier in this report, is also a conceptual model.

Characterization Tools. Examples of characterization tools include baseline geomorphic assessments, river habitat surveys, and fluvial audits. A fluvial audit uses contemporary field survey, historical map and documentary information and scientific literature resources to gain a comprehensive understanding of the river system and its watershed. Fluvial audits, along with watershed baseline surveys are a standardized basis for monitoring change in fluvial systems. These types of comprehensive assessments are comprised of numerous, more detailed field methodologies, such as morphologic surveys, discharge measurements, and estimates of boundary material critical shear strength through measurements of resistance (for cohesive sediments) or size. Baseline assessments may also draw on empirical relationships such as sediment supply estimation models.

Screening Tools. Screening tools can be used to predict the relative severity of morphologic and physical-habitat changes that may occur due to hydromodification, as a critical first step toward tailoring appropriate management strategies and mitigation measures to different geomorphic settings. However, assessing site-specific stream susceptibility to hydromodification is challenging for several reasons, including the existence of geomorphic thresholds and non-linear responses, spatial and temporal variability in channel boundary materials, time lags, historical legacies, and the large number of interrelated variables that can simultaneously respond to hydromodification (Schumm 1991, Trimble 1995, Richards and Lane 1997).

Screening tools can be used to predict the relative severity of morphologic and physical-habitat changes due to hydromodification, as a critical first step toward tailoring appropriate management strategies and mitigation measures to different geomorphic settings.

Despite the foregoing difficulties, the need for practical tools in stream management have prompted many efforts to develop qualitative or semi-quantitative methods for understanding the potential response trajectories of channels based on their current state. For example, predictors of channel planform can be used to identify pattern thresholds and the potential for planform shifts (e.g., van den Berg 1995, Bledsoe and Watson 2001, Kleinhans and van den Berg 2010).

In addition, regional CEMs (discussed above) can partially address the needs of the hydromodification management community by providing a valuable framework for interpreting past and present response trajectories, identifying the relative severity of potential response sequences, applying appropriate models in estimating future channel changes, and developing strategies for mitigating the impacts of processes likely to dominate channel response in the future (Simon 1995).

More recent screening-level tools for assessing channel instability and response potential, especially in the context of managing bridge crossings and other infrastructure, have borrowed elements of the CEM approach and combined various descriptors of channel boundary conditions and resisting vs. erosive forces. For example, Simon and Downs (1995) and Johnson *et al.* (1999) developed rapid assessment techniques for alluvial channels based on diverse combinations of metrics describing bed material, CEM stage, existing bank erosion, vegetative resistance, and other controls on channel response. Although based on a strong conceptual foundation of the underlying mechanisms controlling channel form, these specific examples are either overly qualitative with respect to the key processes, or developed with goals and intended applications (e.g., evaluating potential impacts to existing infrastructure such as bridges or culverts) that differ from what is needed by current hydromodification management programs.

SCCWRP has recently proposed a general framework for developing screening-level tools that help assess channel susceptibility to hydromodification, and a new region-specific tool for rapid, field-based assessments in urbanizing watersheds of southern California (Booth *et al.* 2010, Bledsoe *et al.* 2010). The criteria used to assign susceptibility ratings are designed to be repeatable, transparent, and transferable to a wide variety of geomorphic contexts and stream types. The assessment tool is structured as a decision tree with a transparent, process-based flow of logic that yields four categorical susceptibility ratings through a combination of relatively simple but quantitative input parameters derived from both field and GIS data. The screening rating informs the level of data collection, modeling, and ultimate mitigation efforts that can be expected for a particular stream-segment type and geomorphic setting. The screening tool incorporates various measures of stream bed and bank erodibility, probabilistic thresholds of channel instability and bank failure based on regional field data, integration of rapid field assessments with desktop analyses, and separate ratings for channel susceptibility in vertical and lateral dimensions.

An example of a specific analysis component that predicts changes in post-development sediment delivery, and that can be applied within this screening tool framework, is a GIS-based catchment analyses of “Geomorphic Landscape Units” (GLUs). A GLU analysis integrates readily available data on geology, hillslope, and land cover to generate categories of relative sediment production under a watershed’s current configuration of land use. Those areas subject to future development are identified, and corresponding sediment-production levels are determined by substituting developed land cover for the original categories and reassessing the relative sediment production. The resultant maps can be used to aid in planning decisions by indicating areas where changes in land use will likely have the largest (or smallest) effect on sediment yield to receiving channels.

Effective screening tools for assessing the susceptibility of streams to hydromodification necessarily rely on both field and office-based elements to examine local characteristics within their broader watershed context. Proactive mapping of flow energy measures (e.g., specific stream power) throughout drainage networks has the potential to complement field-based assessments in identifying hotspots for channel instability and sediment discontinuities as streamflows change with land use. Such analyses may partially guide subsequent field reconnaissance; however, this approach also has limitations in that some geomorphic settings are inherently difficult to map using widely available digital elevation data. In particular, maps of stream power in narrow entrenched valleys and low gradient valleys (ca. <1%) with sinuous channels should be carefully field-truthed and used with a level of caution commensurate with the accuracy of the input data.

Moreover, spatial variability in channel boundary materials and form cannot be accurately mapped at present using remotely sensed data. Thus, boundary materials and channel width are typically assumed in watershed-scale mapping efforts, thereby introducing potential inaccuracies. Coupling desktop analysis with a field-based assessment when using such an approach can help resolve variation in site-specific features such as the erodibility of bed and bank materials, channel width, entrenchment, grade control features, and proximity to geomorphic thresholds.

4.3.2 Mechanistic and Empirical/Statistical Models with Deterministic Outputs

Mechanistic/deterministic models are simplified mathematical representations of a system based on physical laws and relationships (*link to next*). Empirical/statistical models use observed input and output data to develop relationships among independent and dependent variables. Statistical analyses determine the extent to which variation in output can be explained by input variables. Both types of models are typically used to generate a single output or answer for a given set of inputs. These tools can be used to help answer such questions as: *What are the expected responses in the stream and watershed given some future conditions? What criteria should be set to prevent future hydromodification impacts?* However, hydromodification modeling embodies substantial uncertainties in terms of both the forcing processes and the stream response. Deterministic representations of processes and responses can therefore mask uncertainties and be misleadingly precise, unless prediction uncertainty is explicitly characterized as described later in this section.

Although valuable, deterministic representations (such as those derived from continuous simulation modeling) of processes and responses can mask uncertainties and be misleadingly precise unless prediction uncertainty is explicitly characterized.

Hydrologic Models are used to simulate watershed hydrologic processes, including runoff and infiltration, using precipitation and other climate variables as inputs. Some models, such as the commonly-used HEC-HMS, can be run for either single-event simulations or in a continuous-simulation mode which tracks soil moisture over months or years. Other hydrologic models that are commonly used for event-based and continuous simulation modeling include HSPF and SWMM. It is widely accepted that continuous simulation modeling, rather than event-based modeling, is required to assess long term changes in geomorphically-significant flow events (Booth and Jackson 1997; Roesner *et al.* 2001).

Several HSPF-based continuous simulation models have been developed specifically for use in hydromodification planning. These include the Western Washington Hydrology Model (WWHM) and the Bay Area Hydrology Model (BAHM). Hydromodification Management Plans (HMPs) in Contra Costa County, San Diego County and Sacramento County have developed sizing calculators for BMPs based on modeling done using HSPF models. To illustrate the point about uncertainly in mechanistic models, HSPF contains approximately 80 parameters, only about 8 of which are commonly adjusted as part of the calibration process.

Hydraulic Models are used to simulate water-surface profiles, shear stresses, stream power values and other hydraulic characteristics generated by stream flow, using a geometric representation of channel segments. The industry standard hydraulic model is the HEC River Analysis System (HEC-RAS).

Coupled Hydrologic and Hydraulic Models represent a valuable tool in hydromodification management. Because the streamflow regime interacts with its geomorphic context to control physical habitat dynamics and biotic organization, it is often necessary to translate discharge characteristics into hydraulic variables that provide a more accurate physical description of the controls on channel erosion potential, habitat disturbance, and biological response. For example, a sustained discharge of 100 cfs could potentially result in significant incision in a small sand bed channel but have no appreciable effect on the form of a larger channel with a cobble bed. By converting a discharge value into a hydraulic variable (common choices are shear stress, or stream power per unit area of channel relative to bed sediment size), a “common currency” for managing erosion and associated effects can be established and applied across many streams in a region. Such a common currency can improve predictive accuracy across a range of stream types. As opposed to focusing on the shear stress or stream power characteristics of a single discharge, it is usually necessary to integrate the effects of hydromodification on such hydraulic variables over long simulated periods of time (on the order of decades) to fully assess the potential for stream channel changes. By using channel morphology to estimate hydraulic variables across a range of discharges, models like HEC-RAS provides a means of translating hydrologic outputs from continuous simulations in HEC-HMS, SWMM, or HSPF into distributions of shear stress and stream power across the full spectrum of flows.

Sediment Transport Models such as HEC-6T, the sediment transport module in HEC-RAS, CONCEPTS, MIKE 11 and FLUVIAL12, use sediment transport and supply relationships to simulate potential changes in channel morphology (mobile boundary) resulting from imbalances in sediment continuity. This means that hydraulic characteristics are calculated as channel form and cross-section evolve through erosion and deposition over time. Such models have high mechanistic detail but are often difficult to apply effectively. Although it is not a mobile boundary model, the SIAM (Sediment Impact Analysis Method) module in HEC-RAS represents an intermediate complexity model designed to predict sediment imbalances at the stream network scale and to describe likely zones of aggradation and degradation.

Statistical Models use descriptive tools and empirical data to develop relationships that quantify the risk of specific stream behaviors. For example, Hawley (2009) developed a statistical model to explain variance in channel enlargement based on measures of erosive energy and channel features such grade control and median bed sediment size. Such models often include independent variables based on input from the mechanistic models described above; however, a key difference is that statistical models do not explicitly represent actual physical processes in their mathematical structure. Instead, these models simply express the observed correlations between dependent and independent variables. Like mechanistic models, the output from these models is commonly treated as precise results in management decisions, despite the fact that predictions from most statistical models could be readily (and more accurately) expressed in terms of confidence intervals with a range of uncertainty.

Probabilistic/Risk-based Models integrate many of the tools discussed above, using modeled changes in hydrology as input to hydraulic models, which in turn provide input to various types of statistical models to predict response. However, the predictions are not represented as deterministic outputs, instead, the range of (un)certainty in the likelihood of the predicted response is explicitly quantified. Although not commonly used for hydromodification management at this time, there are well established models based on these principals currently in use in other scientific disciplines. An example of a probabilistic approach that has been used for hydromodification management is a logistic regression analysis that was used to produce a threshold "erosion potential metric" that can be used to quantify the risk of a degraded channel state. More details on this approach are provided in Appendix B.

Risk-based modeling in urbanizing streams provides a more scientifically defensible alternative to standardization of stormwater controls across stream types, and can inform management decisions about acceptable levels of risk.

Risk-based modeling in urbanizing streams provides a more scientifically defensible alternative to standardization of stormwater controls across stream types. A probabilistic representation of possible outcomes also improves understanding of the uncertainty that is inherent in model predictions, and can inform management decisions about acceptable levels of risk.

Predictive Tools for Habitat Quality and Stream Biota. The tools discussed above focus on physical stream impacts; however, as discussed in the preceding chapter, it is recognized that maintenance of stream "stability" does not necessarily conserve habitat quality and biological potential. In general, the knowledge base for biota/habitat associations is not generally adequate to allow for prediction of how whole communities will change in response to environmental alterations associated with urbanization. Making such predictions deterministically requires a thorough knowledge of species-specific environmental responses, as well as an adequate (accurate) characterization of habitat structure and habitat dynamics (both of which are modified by urbanization). However, recent studies have demonstrated that the effects of hydrologic alterations induced by urbanization on selected stream biota can be quantitatively described without a full mechanistic understanding, using stressor-response type relationships and empirical correlations from field-measured conditions (Konrad and Booth 2005, Konrad *et al.* 2008, DeGasperi *et al.* 2009).

In moving beyond a narrow focus on linkages between flow alteration and channel instability, scientific understanding of hydrologic controls on stream ecosystems has recently led to new approaches for assessing the ecological implications of hydromodification. The essential steps in developing quantitative "flow-ecology relationships" have been recently described in the Ecological Limits of Hydrologic Alteration (ELOHA) process (Poff *et al.* 2010), a synthesis of a number of existing hydrologic techniques and environmental flow methods. ELOHA provides a regional framework for elucidating the key hydrologic influences on biota of interest, and translating that understanding into relationships between hydromodification and biological endpoints that can be used in management decision making. This requires a foundation of hydrologic data provided by modeling and/or monitoring, and sufficient biological data across regional gradients of hydromodification. Although hydrologic–ecological response relationships may be confounded to some extent by factors such as chemical and thermal stressors, there are numerous case studies from the US and abroad in which stakeholders and decision-makers reached consensus in defining regional flow standards for conservation of stream biota and ecological restoration (Poff *et al.* 2010; http://conserveonline.org/workspaces/eloha).

4.3.3 Strengths, Limitations and Uncertainties

The Organizing Framework shown in Figure 4-1 shows the applicability of the three major categories of tools in support of various management actions. This section addresses a range of issues relating to strengths, limitations and uncertainty of the tools discussed above. Detailed analysis of individual models is beyond the scope of this document, but EPA/600/R-05/149 (2005) contains an extensive comparison of functions and features across a wide range of hydrologic and hydraulic models.

> **Explicit consideration, quantification, and gradual reduction of model uncertainty will be necessary to advance hydromodification management.**
>
> **The uncertainty inherent to hydromodification modeling underscores the need for carefully designed monitoring and adaptive management programs.**

General Considerations. The well-known statistician George Box famously said that "all models are wrong, some are useful." The usefulness of a model for a particular application depends on many factors including prediction accuracy, spatial and temporal detail, cost of calibration and testing, meaningful outputs, and simplicity in application and understanding. There is no cookbook for selecting models with an optimal balance of these characteristics. Models of stream response to land-use change will always be imperfect representations of reality with associated uncertainty in their predictions. In addition to the prediction errors of standard hydrologic models, common limitations and sources of uncertainties include insufficient spatial and/or temporal resolution, and poorly known parameters and boundary conditions. Ultimately, the focus of scientific study in support of decision making should be on the decisions (or objectives) associated with the resource and not on the model or basic science. Each model has limitations in terms of its utility in addressing decisions and objectives of primary concern to stakeholders. Prediction error, not perception of mechanistic correctness, should be the most important criterion reflecting the usefulness of a model (NRC 2001; Reckhow 1999a,b). The predictive models discussed above may be thought of as predictive scientific assessments; that is, a flexible, changeable mix of small mechanistic models, statistical analyses, and expert scientific judgment.

Region-Specific Considerations. Because all models are vulnerable to improper specification and omission of significant processes, caution must be exercised in transferring existing models to new regional conditions. For example, mobile boundary hydraulic models are mechanistically detailed but not generally well-suited to many southern California streams given the prevalence of near-supercritical flow, braiding and split flow (Dust 2009). In addition, bed armoring and channel widening resulting from both fluvial erosion and mass wasting processes are key influences on channel response in semi-arid environments. These processes are not well-represented and constrained in current mobile boundary models. Accordingly, the appropriateness of existing models for addressing a particular hydromodification management question should be empirically tested and supported with regionally appropriate data from diverse stream settings.

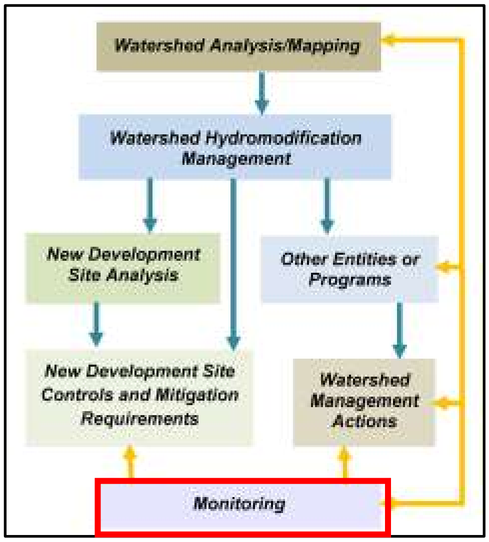
Managing Uncertainty. To date, hydromodification management has generally relied on oversimplified models or deterministic outputs from numerical models that consume considerable resources but yield highly uncertain predictions that can be difficult to apply in management decisions. Numerical models are nevertheless an important part of the hydromodification toolbox, especially in characterizing rainfall-response over decades of land-use change. It is challenging to rigorously quantify the prediction accuracy of these mechanistic numerical models; however, their utility of can be enhanced by addressing prediction uncertainties in number of ways (Cui *et al.* 2011). Candidate models can be subjected to sensitivity analysis to understand their relative efficacy for assessment and prediction of hydromodification effects. Moreover, it should also be demonstrated that selected models can reasonably reproduce background conditions before they are applied in predicting the future. Modeling results that are used in relative comparisons of outcomes are generally much more reliable than predictions of absolute magnitudes of response.

Hydromodification modeling embodies substantial uncertainties in terms of both the forcing processes and stream response. Deterministic representations of processes and responses can mask uncertainties and can be misleading unless prediction uncertainty is explicitly quantified. Errors may be transferred and compounded through coupled hydrologic, geomorphic, and biologic models. Accordingly, explicit consideration, quantification, and gradual reduction of model uncertainty will be necessary to advance hydromodification management. This points to two basic needs. First, there is a need to develop more robust probabilistic modeling approaches that can be systematically updated and refined as knowledge increases over time. Such approaches must be amenable to categorical inputs and outputs, as well as combining data from a mix of sources including mechanistic hydrology models, statistical models based on field surveys of stream characteristics, and expert judgment. Second, the uncertainty inherent to hydromodification modeling underscores the need for carefully designed monitoring and adaptive management programs, as discussed in Section 5.

A risked-based framework can provide a more rational and transparent basis for prediction and decision-making by explicitly recognizing uncertainty in both the reasoning about stream response and the quality of information used to drive the models. Prediction uncertainty can be quantified for any of the types of models described above; however, some types are more amenable to uncertainty analysis than others. For example, performing a Monte Carlo analysis of a coupled hydrologic-hydraulic model is a very demanding task. A simple sensitivity analysis of high, medium, and low values of plausible model parameters is much more tractable and still provides an improved understanding of the potential range of system responses. Such information can be subsequently integrated with other model outputs and expert judgment into a probabilistic framework. For example, Bayesian probability network approaches can accommodate a mix of inputs from mechanistic and statistical models, and expert judgment to quantify the probability of categorical states of stream response. Such networks also provide an explicit quantification of uncertainty, and lend themselves to continual updating and refinement as information and knowledge increase over time. As such, they have many attractive features for hydromodification management, and are increasingly used in environmental modeling in support of water quality (Reckhow 1999a,b) and stream restoration decision-making (Stewart-Koster *et al.* 2010).

Sediment Supply. As described above, a reduction in sediment supply to a stream may result in instability and impacts, even if pre- and post-land use change flows are perfectly matched. Thus, there is a need to develop management approaches to protect stream channels when sediment supply is reduced, and to refine and simplify tools to support these approaches. This continues to prove challenging because, the effects of urban development on sediment supply in different geologic settings are not well understood and poorly represented in current models. As a starting point, models used to analyze development proposals that reduce sediment supply could be applied with more protective assumptions with respect to parameters and boundary conditions (inflowing sediment loads). Effects of altered sediment supply on stream response could be addressed in a probabilistic framework by adjusting conditional probabilities of stream states to reflect the influence of reductions in important sediment sources due to land use change.

5. Monitoring



"Monitoring" can cover a tremendous range of activities in the context of stormwater management in general, and of hydromodification in particular. For example, the NPDES Phase 2 general permit for California (SWRCB, 2003 (*www.swrcb.ca.gov/**water**_issues/.../storm**water**/.../final_ms 4_**permit**.p...)*, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000004, p. 11) notes that the objectives of a monitoring program may include:

- Assessing compliance with the General Permit.
- Measuring and improving the effectiveness of stormwater management plans.
- Assessing the chemical, physical, and biological impacts on receiving waters resulting from urban runoff.
- Characterizing storm water discharges.
- Identifying sources of pollutants.
- Assessing the overall health and evaluating long-term trends in receiving water quality.

These objectives span multiple goals, ranging from verifying of compliance, evaluating effectiveness, characterizing existing conditions, and tracking changes over time. Each would likely require different monitoring methods, duration of measurement, and uses of the resulting data (Table 5-1). This variability emphasizes what we consider the key starting point of any monitoring program: to answer the questions, "What is the purpose of monitoring? How will the data be used?" Even secondary considerations can exert great influence over every aspect of the design of a monitoring program: "How quickly do you need to have an answer?" And, perhaps most influential of all, "What are the resources available to provide that answer?"

Table 5-1. The recommended purpose(s) of monitoring associated with hydromodification control plans, organized by the scale of implementation and the time frame in which useful results should be anticipated.

Time Frame	Programmatic: State and Regional Water Boards	Local: City and County Jurisdictions
Short-term (<10 years)	• Define the watershed context for local monitoring (at coarse scale) • Evaluate whether permit requirements are making positive improvements	• Evaluate whether specific projects/ regulations are meeting objectives • Identify the highest priority action(s) to take
Long-term (1+ decades)	• Define watershed context and setting benchmarks for local-scale monitoring (i.e., greater precision, if/as needed) • Demonstrate how permit requirements can improve receiving-water "health," state-wide (and change those requirements, as needed)	• Evaluate and demonstrate whether actions (on-site, instream, and watershed scale) are improving receiving-water conditions • Assess program cost-effectiveness • Identify any critical areas for resource protection

5.1 The Purpose of Monitoring

In the context of hydromodification assessment and management, we propose three interrelated purposes for monitoring that will guide the discussion and recommendations in this section:

- **Characterizing the conditions** of receiving waters downstream of urban development (including any trends in those conditions over time).
- **Evaluating the effectiveness** of hydromodification controls at protecting or improving the conditions of downstream receiving waters (and modify them, as needed).
- **Setting priorities** on the wide variety of hydromodification control practices, as promulgated by the State and Regional Boards and as implemented by local jurisdictions.

These needs give rise to several interrelated types of monitoring, all common to many watershed and stormwater monitoring programs. They are typically executed at different spatial and temporal scales, and if well-designed and executed they can collectively help guide management actions. We define them here, using terms and definitions that are common to the monitoring literature:

- **Performance monitoring,** by which is normally meant the evaluation of a particular stormwater facility relative to its intended (or designed) performance, but independent of whether that intended design is actually beneficial for downstream receiving waters.
- **Effectiveness monitoring,** by which we mean the assessment of how well specific management actions or suites of actions reduce or eliminate the direct impacts of stormwater on receiving waters. This type of monitoring can answer a question common to stormwater management: does a particular facility actually achieve its intended goal (e.g., flow releases from a stormwater facility protect the stream channel downstream from erosion)? More broadly, monitoring can evaluate the "effectiveness" of a suite of measures or an overall program designed to produce

beneficial outcomes (or avoid negative ones) in downstream receiving waters. In this context, the precise boundaries division between effectiveness monitoring and other types are blurry and unnecessarily artificial.

- **Trends monitoring,** by which we mean an integrative assessment of whether our "endpoint" indicators (physical, chemical, or biological) are showing any consistent, statistically significant change over time. Such monitoring rarely "proves" the direct impacts of a specific stressor on a receiving water, but it is critical to setting and evaluating progress towards integrative assessment endpoints at a regional scale. If well-designed, trend monitoring commonly provides useful information at smaller spatial scales as well, particularly in evaluating response to recent management actions or recovery from a prior disturbance.
- **Characterization monitoring**, by which is commonly meant the identification and (or) the quantification of various parameters in stormwater or a receiving-water body. Characterizing the condition of an outflow discharge or a water body at a particular time and place is always an outcome of the other kinds of monitoring; when it is called out as a goal in-and-of itself, however, it is can be useful to prioritize actions—but only if there is a preexisting standard for what constitutes a "good" or "acceptable" condition (also termed "status monitoring"), and a program to implement (or at least to set the priority for implementing) actions to improve the condition of waterbodies found to be "not good" or "unacceptable."

Without a context for evaluation, characterization monitoring is prone to generate large quantities of rarely used data. We strongly encourage that the purpose of any "characterization" monitoring be clearly articulated in hypothesis testing, priority setting, or systematic trend evaluation. As noted by NRC (2009, p. 508) with respect to this type of monitoring, "…monitoring under all three (NPDES municipal, industrial, and construction) stormwater permits is according to minimum requirements not founded in any particular objective or question. It therefore produces data that cannot be applied to any question that may be of importance to guide management programs, and it is entirely unrelated to the effects being produced in the receiving waters." We seek to proactively avoid this problem.

Monitoring should occur at two scales:

- **Regional or state-wide scale- this will require a time frame of one to several decades**
- **Local scale – this is required to evaluate the performance and effectiveness of specific management measures.**

In this sub-section, we focus our discussion on two interrelated scales at which these various types of monitoring should be applied as outlined in Table 5-1 at the beginning of this section. The first, which here and elsewhere in this document is termed "programmatic," has a regional or state-wide spatial scale; many of its key actions will require a time frame of one to several decades. Monitoring data from this scale should inform the broadly construed "health" of receiving waters to assess whether the range of hydromodification strategies being implemented is maintaining desired conditions across the (state-wide) range of physiography, climate, land-use change, and regulatory approaches of the regional boards. They should be used to identify particularly promising (or particularly ineffective) combinations of control strategies and landscape conditions. Finally, they should provide regionally tailored benchmarks for what constitutes "healthy watersheds" and "healthy receiving waters" so regulators and permittees alike know what still needs to be done, where it should be done, and how urgently it needs to happen.

The second scale of monitoring data we term "local." It comprises the generation of monitoring data to evaluate the performance and effectiveness of specific management measures (be they structural or nonstructural) at reducing the negative consequences of hydromodification on downstream receiving waters. Useful information at this scale will normally be generated in the time frame of an NPDES permit cycle (i.e., ~5 years) and should provide direct guidance on whether the evaluated management strategies are working, need refinement, or should be abandoned altogether. They should also provide guidance on the degree to which management efforts should be prioritized where regulatory flexibility exists, given the conditions (and, perhaps, the potential responsiveness) of downstream receiving waters. Over longer time frames, monitoring at this scale can also provide public demonstration of the value of regulatory and programmatic efforts, and it can also help identify the most cost-effective mix of publically funded projects and regulatory protection to achieve (or maintain) receiving-water health.

5.2 Programmatic Monitoring at the Regional Scale

5.2.1 Defining Watershed Context

Although not "monitoring" in the strictest sense of this word, establishing a watershed context for the measurement and evaluation of receiving waters is a hallmark of virtually all recommended monitoring strategies (e.g., Beechie *et al.* 2010, Brierley *et al*. 2010). Monitoring programs should be consistent with the watershed perspective that forms the basis for the management framework discussed in Section 3. In California (as in most other states), this can only be executed at a supra-jurisdictional scale, because most watersheds cross one or more city and/or county boundaries. This presents the long-term challenge that many jurisdictions do not have authority over parts of the landscape that can affect the quality of rivers and streams that pass through their boundaries; more immediately, however, it makes an inclusive watershed assessment almost impossible to execute at a local level.

5.2.2 Determining the Effectiveness of Permit Requirements

A second, more challenging contextual need at the regional scale is the definition of thresholds or endpoints against which to compare the results of monitoring or modeling. Both of these "assessment tools" can guide the application of hydromodification control strategies, evaluate their real or likely success, and predict the consequences of hydromodification on downstream receiving waters. However, they provide little insight into the question, "how good is good enough?" Answering this question requires a definition of "assessment endpoints" (borrowing the term from NRC 1994), which in turn requires objective, quantifiable criteria for evaluating progress or outright success.

Most existing HMPs require the permitted municipalities to develop programs and policies to assess the potential effects of hydromodification associated with new development and redevelopment, to include management measures to control the effects of hydromodification, and to implement a monitoring program that assesses the effectiveness of HMP implementation at controlling and/or mitigating the effects of hydromodification. Yet the appropriate objectives of such management measures, or a basis to evaluate success or failure of the HMP through monitoring data, are rarely provided in consort. Setting these endpoints is beyond the capacity of any but the largest municipalities—and even for those, neither the field of watershed science nor the arena of public policy is so clear that an unequivocally “correct” answer is likely to emerge without much additional work. Any such finding would also lack state-wide applicability; California is far too physically and ecologically diverse for an assessment endpoint developed in one part of the state to transfer everywhere without careful consideration.

For these reasons, we consider this aspect of monitoring at the regional scale to be a long-term, state-wide effort. This reflects the challenge of conducting meaningful characterization (or “status”) monitoring: it requires a benchmark against which the measured condition can be compared, and to which an absolute rating (“good,” bad,” etc.) can be assigned.

In contrast, “trends” monitoring requires no such benchmark, only equivalent measurements undertaken at multiple times coupled with an understanding of what direction of change is desirable. For this reason, evaluating whether permit requirements are making positive improvements is a reasonable (and probably critical) short-term effort, one that can be conducted locally (see below). It should also be integrated and compiled at a regional level, however, the better to inform the continued development of hydromodification requirements.

5.3 Monitoring at the Local Scale

The needs of a monitoring program for local jurisdictions should complement those being satisfied at a regional scale. Showing net improvement is critical to maintaining support for regulatory actions and capital expenditures, but any monitoring program must reflect the typical constraints of showing rapid results while acknowledging constraints on staff resources and expertise (Scholz and Booth 2001). No less urgent is the need to identify what to do “next”—not necessarily establishing a multi-year capital improvement plan, but at least identifying key problems with one or two associated actions that would likely result in significant improvements in receiving-water conditions. Watershed characterization, as discussed above and applied to a specific jurisdiction, can provide useful guidance for such identification; even without it, local knowledge is commonly sufficient in-and-of itself. Targeted monitoring can normally confirm (or refute) such inferences in short order, which is why we place this monitoring application in the “short-term” category.

However, a monitoring program can also provide longer term guidance to local jurisdictions. When supported by the regional context of receiving-water conditions, local monitoring data can demonstrate trends over time that can lend support to (or indicate necessary changes to) hydromodification control plans. In combination with economic data, they can show long-term cost-effectiveness. Finally, site-specific monitoring data, when analyzed in the context of an appropriate scale of watershed characterization, can guide the stratification of less developed and undeveloped watershed areas into those where more assertive protection (or restoration) will be most worthwhile. None of these outcomes depend solely on collecting monitoring data, which is why none of them are presumed to be credible “short-term” applications of monitoring data. However, they have found expression in other parts of the country having long-term monitoring efforts, and they should provide similar benefits to California as well.

5.4 Developing a Monitoring Plan

"Monitoring" the effects of a management action, whether it is a new regulation, a change in operational procedures, or a constructed project, is commonly included by design or required by regulation. The collection of monitoring data may be seen as a worthwhile activity in its own right, but this discussion uses a more restrictive, implementation-based definition: any "monitoring" needs to demonstrate a direct connection to management actions, such that the results of monitoring are translated into on-the-ground management actions (or changes in management actions). This focus on the *use* of monitoring data requires clear linkages between a management action, the uncertainties associated with that action, the ways in which the effects of that action are expressed (and can be measured) in the world, and the management changes that should be implemented if monitoring results provide unanticipated (or equivocal) resolution to those uncertainties. This is the basis for establishing an "adaptive management" approach to hydromodification monitoring, discussed in more detail in Appendix C. Here, we discuss the design of a monitoring program and outline the variety of measurements that can be made, under the assumption that the intended use(s) of the monitoring data have already been established.

"Stormwater management would benefit most substantially from a well-balanced monitoring program that encompasses chemical, biological, and physical parameters from outfalls to receiving waters" (NRC 2009, p. 257). In pursuit of a comprehensive monitoring program we might also add regular documentation of weather and climate conditions and land-cover changes. As a practical matter, however, monitoring at a site scale is almost never coordinated with other equivalent efforts at other locations, nor placed in a broader spatial context being developed as part of a regional effort. For monitoring data to have greatest value, however, such coordination and context-setting is needed.

Stormwater management would benefit most substantially from a well-balanced monitoring program that encompasses chemical, biological, and physical parameters… (NRC, 2009)

5.4.1 Design of a Monitoring Plan

As noted at the beginning of this section, the overarching question that must be asked and answered at the beginning of any monitoring design effort is "What is its purpose?" The considerations enumerated below cannot be addressed without an explicit answer to this question, because the outcome of those considerations will depend on how the data are to be used. For certain common application of monitoring data we suggest guidance that will be widely appropriate, but there are no recommendations in this section (or any other monitoring guidance document) that apply universally.

Multiple authors have condensed their guidance for designing a monitoring plan into a short list of steps that should precede the first instance of field data collection (e.g., Shaver *et al.* 2007). Although all differ in details and intended audience, they share significant commonalities that can be distilled as follows:

- Articulate the purpose of the monitoring (the “management question”).
- Identify key constraints, in particular the geographic range and scale over which the monitoring can occur, financial/staff resources available, and the time frame in which results must be generated.
- Evaluate existing information, model outputs, and/or regulatory requirements to identify promising metrics and specific sites appropriate to the management question.
- Identify the specifics of the monitoring plan: what parameter(s), where, for how often and for how long. This may include multiple iterations, wherein the guidance of Step 3 must align with the constraints of Step 2.

Most such guidance is written with site-specific, “local” monitoring in mind—the existing literature provides less direction for monitoring that is herein recommended to occur at a regional scale over the next one or more decades. However, the basic principles are the same at all scales: a coherent, explicit purpose needs to be articulated, resource constraints need to be acknowledged, and a credible strategy needs to be developed with its specifics fleshed out. Below we discuss some of the primary considerations in this last step, because they are common across a wide range of monitoring purposes, programmatic constraints, and indicator types.

5.4.2 Constraints (Step 2 of the Monitoring Plan)

Ideally, a monitoring program should be designed to detect trends, assess effectiveness and allow for source identification.

Scale. Ideally, a monitoring program should encompass multiple, nested scales of monitoring that are determined by the question(s) being addressed. For hydromodification applications, the broadest scale of monitoring is that of the integrated effect of stormwater impacts and stormwater management on receiving waters. *Trends monitoring* (and characterization monitoring, if regionally appropriate ranges of quality have been determined) addresses these questions, and it also allows stormwater and resource managers to measure the broad benefits obtained from management investments. Site-specific conditions normally cannot be traced back to specific generators of pollution (NRC 2009), and so monitoring at the broadest scales (i.e., many tens of square miles and larger) should not attempt to do so. Instead, identifying overall conditions and trends requires a broad spatial scale over long time frames (i.e., multiple years), the essence of trends monitoring. This level of effort is recommended as a regional responsibility, because the area(s) of interest will normally far exceed the geographic limits of any single jurisdiction.

If trends monitoring (or long-standing prior knowledge) indicates that there are impacts on beneficial uses, a second (and more site-specific) scale is invoked, that of *effectiveness monitoring:* which of our many stormwater-management actions are achieving the greatest reduction in downstream impacts (and which are not)? On the whole, such stormwater control measures, both structural and nonstructural, vary by land use—the measures suitable for a residential neighborhood will likely be impractical or ineffective (or both) in an industrial setting. We therefore anticipate that most effectiveness monitoring will be stratified by land use and conducted by individual jurisdictions (see, for example, such an approach in the Nationwide Stormwater Quality Database, which contains water-quality data from more than 8600 events and 100 municipalities throughout the country).

The finest scale of monitoring is that of *source identification*, a form of characterization monitoring: what specific locations and which parts of the landscape generate stormwater of sufficiently deleterious quantity and (or) quality to cause impacts to beneficial uses, be they direct or indirect effects? This question is widely posed in stormwater management programs, and a number of existing monitoring programs seek to provide answers. The science of stormwater already suggests where the greatest attention is probably warranted (NRC 2009), namely a particular focus on areas of well-connected (or "effective") impervious area, high vehicular traffic, and exposure to toxic chemicals. We therefore suggest these categories should define areas of highest priority for this type of targeted investigation, allowing even a resource-constrained jurisdiction to conduct a useful, well-focused monitoring effort with good efficiencies.

Siting. Site selection is most commonly guided by the location of the management action being evaluated while dictated by more mundane considerations of property ownership and access logistics. In general, sites need to meet a few following basic criteria.

- Appropriate scale: the upstream area should be dominated by, or at least significantly affected by, the management action of interest.
- Responsiveness: at the chosen location, the parameters being measured should be amenable to change in response to the management action (e.g., monitoring for geomorphic change in a concrete channel is ill-advised).
- Representativeness: the results at the chosen location should be credibly extrapolated to "similar" sites, and those sites in aggregate should constitute a widespread (or otherwise important) subset of the landscape as a whole.
- Access: the site should be easily reached by the appropriate personnel and equipment, and with a cost of doing so consistent with the frequency of measurements being made. Any equipment left unattended needs to be secure (or well-hidden).

There are institutional considerations in site selection as well. Multiple programs implement monitoring or impose monitoring requirements, and coordination can provide mutual benefits and efficiencies to all. In particular, monitoring driven by management actions at a particular location (i.e., a local scale) will always benefit from information from one or more regional-scale reference sites that can characterize natural or background variability. Local studies will rarely have resources to execute such an effort themselves, again emphasizing the importance of a nested (and coordinated) hierarchy of monitoring programs.

Time and Variability. Evaluating the effectiveness of management actions requires a preliminary judgment of the time frame over which effects can be recognized. For water-quality parameters, storm-specific grab samples or continuous flow-weighted sampling has been most common; for changes in geomorphic form or in the population attributes of benthic macroinvertebrates, one-time annual sampling that presumes to integrate the effects of the past year are typical. Flow metrics are normally extracted from "continuous" (i.e., 5-, 15-, or 60-minute) measurements of discharge. However, every measurement has some degree of variability, a consequence of "natural" variability, measurement errors, and induced change (i.e., the effects of the management action we are trying to perceive). Separating these components is a matter of statistical analysis (see next section) based on repeated measurements, either in time or in space (or both).

We note that many practices common to past monitoring efforts, particularly the use of individual grab samples to characterize stormwater quality, have yielded results with little to no subsequent value: "…to use stormwater data for decision making in a scientifically defensible fashion, grab sampling should be abandoned as a credible stormwater sampling approach for virtually all applications" (NRC 2009, p. 330).

The duration of a monitoring program is commonly determined by the desire for "timely" answers, although normally the ability to generate statistically significant results is a function of the system being evaluated and the indicators being measured. This often creates a conflict between the intended "mission" of the monitoring program and its ability to produce defensible results, a conflict that can only be avoided by a design that identifies meaningful variables to measure, conducts sufficiently frequent measurements to dampen random variability, and must persist~~s~~ for long enough to allow a management "signal" to emerge from the data. This is the essence of the iteration noted above in Step 4 of monitoring-plan design above.

The monitoring program design must persist long enough to a allow management "signal" to emerge from the data. Consequently, long-term records (i.e., one to several decades) will be needed to detect all but the most dramatic of trends in biological indicators.

In one of relatively few quantitative studies of variability in biological indicators, Mazor *et al.* (2009) found that year-to-year variability for the same site sampled in the same season showed a variability (i.e., ±1σ) was typically about 10 points for a benthic IBI. With average scores for their 5 sites ranging from 28–51 (on a 100-point scale), this reflects a coefficient of variation of about 25%. Individual metrics were even more variable. This emphasizes that long-term records (i.e., one to several decades) will be needed to detect all but the most dramatic of trends in biological indicators.

The duration of monitoring also needs to capture the events that are most important to the anticipated responses of the measured system. For evaluating the effects of hydromodification, frequent storms (i.e., those that are normally expected to occur one to several times per year) are commonly judged important and their effects would normally be captured by a monitoring effort of even just one or a few years' duration. Particularly in more semi-arid regions of the state, however, significant channel-altering events may occur only after many decades of relative quiescence and stability, and noticeable (or documentable) response of streams to hydromodification may only occur under certain circumstances or following specific combination of events. Therefore, the lack of channel response on an annual basis may not necessarily indicate that management actions are effective. Thus a long-term, ongoing monitoring effort is necessary to capture the responses to infrequent, stochastic events, but determining the likely duration of such a program requires some knowledge (or assumptions) of the critical drivers of those responses. It therefore requires a well-posed set of management questions underlying the monitoring effort as well.

For management questions concerning the effectiveness of hydromodification controls, monitoring will almost always benefit from long-term flow monitoring at multiple sites, especially those in the mid to upper watershed (and key tributaries, depending on the scale of the effort). Local rainfall measurements are nearly as essential, since flow data without rainfall data resolved at a similar spatial and temporal scale are useless at best, misleading at worst. Baseline (pre-project) monitoring normally is also invaluable. However, each of these elements will normally require some combination of a multi-scale, long-term, coordinated monitoring program with an investment of at least several years' duration in anticipation of (and follow-up after) a specific management action at a specific location. Despite the value for evaluating the effects of hydromodification (and hydromodification control efforts), such monitoring almost never occurs to this degree. To the extent this remains a practical constraint on implementation, the range of management questions needs to be commensurately narrowed as well.

Statistical Considerations. The statistical design of a monitoring program is beyond the scope of this section, because the range of possible requirements and approaches is tremendously broad. Several general principals are worth articulating, however, because they apply almost universally (and are commonly ignored):

- Although trends can be "suggested" by monitoring data, only statistically rigorous results can be offered as "proof." Thus, ignoring this dimension of monitoring program design severely limits future applicability of the results.
- Most natural parameters display high variability when measured outside a laboratory, and thus the magnitude of change caused by a management action also needs to be great before it can be recognized. There is a trade-off between the relative magnitude of change and the number of samples required to recognize it (i.e., large relative changes require fewer samples), but many monitoring efforts pay little attention to this basic fact. Where sampling can only occur during specified storm conditions or once during the same season each year, the duration of a monitoring campaign sufficient to detect even large changes in naturally variable parameters is likely to be a decade or longer. For many management applications, this is tantamount to generating no useful information at all (but is significantly more costly).
- The level of effort needed can be estimated *a priori* to help guide final monitoring design, but only if the degree of variability and the magnitude of change to be perceived are known or estimated ahead of time. One such example is given below, where the diagonal lines are labeled with the number of independent samples needed to achieve a typical level of statistical power for various combinations of permissible error from the "true" value (x axis), and the intrinsic variability in values across the population being measured (y axis) in Figure 5-1 below.

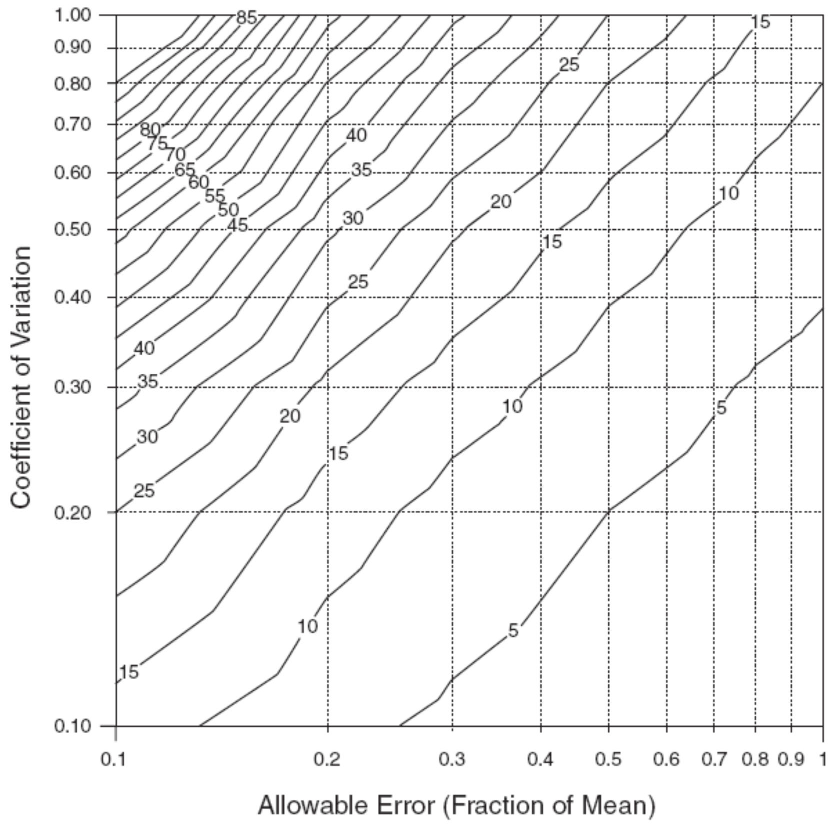


Figure 5-1. Sample requirements for confidence of 95% (α = 0.05) and power of 80% (β = 0.20). Figure from Pitt and Parmer 1995.

5.4.3 What to Monitor (Step 3 of the Monitoring Plan)

The choice of "what to monitor" follows from the choice of assessment endpoints, which in turn depends on the choice of management goals: for example, if "stable stream channels" is the intended outcome of an HMP, then measurement of the physical form of a channel over time would be appropriate. If diagnosing the cause of observed changes is also desired, then some evaluation of potential causal agents (e.g., hydrology, sediment input, or direct disturbance) would also be needed. Because management goals are now commonly (and appropriately) cast more broadly, however, they can embrace less clearly defined endpoints such as "watershed health" or "biological integrity." Many such endpoints fail the test of quantifiable objectivity.

However, these goals invoke a broad scope of concern, embracing not only physical stream conditions but also a range of chemical, hydrologic, and biological attributes. They encompass a broader catalog of receiving waters that may need to be evaluated. Finally, they emphasize the importance of looking more broadly to identify the cause of observed changes—both spatially, to conditions throughout a watershed that may have influence downstream; and temporally, to recognize ongoing adjustments to past disturbance (i.e., legacy effects) and to future environmental changes (e.g., climate change) that commonly lie well beyond the ability of local watershed managers to address. The imprecision of these goals should not obscure the importance of broadening the scope of stormwater and hydromodification assessments to include not only the traditionally emphasized characterization of selected water-quality constituents and channel stability, but also more integrative measures.

These considerations suggest two broad categories of assessments, which largely but not entirely align with the two scales of implementation (i.e., "programmatic" and "local") defined in Table 4–1:

- Integrative: defining an overall level of "health" of the watershed, as expressed in the condition(s) of its receiving waters. Current scientific consensus suggests that biological indicators are best suited to this scale of evaluation (Karr and Chu 1999), insofar as they integrate the consequences of multiple stressors on aquatic systems and because many management goals (and regulatory requirements) are cast in biological terms. To be meaningful, however, any such indicators need to be suitably chosen and stratified for their particular geo-hydro-climatological region (e.g., "ecoregions"; Omernick and Bailey 1997).
- Targeted: demonstrating the achievement of an established regulatory standard or a designated threshold (typically, a measured or modeled pre-development condition) by a particular parameter, commonly one or more chemical constituents or a specific hydrologic metric of flow. This can be evaluated at the outfall of a single stormwater facility, at the discharge point for a site, or in the receiving water itself. Many of these thresholds are important in their own right—to protect human health, to preserve riparian property from erosion, to avoid flooding of previously non-inundated lands. However, they should be recognized as providing only one-dimensional views of a much broader system. Thus, targeted monitoring can supplement but should not replace more integrative measures.

Integrative assessment endpoints require multiple lines of evidence to characterize receiving-water conditions. At their most comprehensive, they should include measures of flow, geomorphic condition, chemistry, and biotic integrity (Griffith *et al.* 2005, Johnson and Hering 2009). However, biological criteria are generally key to integrative assessment: "In general, biological criteria are more closely related to the designated uses of waterbodies than are physical or chemical measurements" (NRC 2001, p. 8). In most applications, such assessments are compared to one or more reference sites where conditions have been independently judged as "excellent," or where human disturbance is minimal and so best-quality conditions are assumed.

Integrative assessment endpoints require multiple lines of evidence to characterize receiving-water conditions. At their most comprehensive, they should include measures of flow, geomorphic condition, chemistry, and biotic integrity.

The task of identifying and quantifying reference conditions in California streams is presently being carried out by the Reference Condition Management Program (RCMP) of the State Water Board's Surface Water Ambient Monitoring Program (SWAMP; see 2009 Recommendations). About 600 sites have been recognized by this program as "reference" based on having minimal human disturbance, and they have been geographically stratified into the 12 Level III ecoregions mapped for the state of California (by USEPA 2000). The metrics chosen to characterize their biologic conditions should provide an appropriate list for the evaluation of impaired (or potentially impaired) streams.

An equivalent set of reference sites and conditions for other receiving-water types does not presently exist. California also presently lacks a systematic basis for defining relative categories of "poor," "fair," "good," or "excellent" based on numeric values of biological indicators, such as exists in parts of the Pacific Northwest. Several regions, however, now have multimetric biological indicators with defined reference conditions (see below).

Elsewhere, however, there is as yet no context for setting assessment endpoints for biological indicators in California receiving waters. Such an effort is in progress, at least for streams, and its eventual completion to support the management application of more local monitoring results is a key recommendation of this report. Biological assessment endpoints will need to be established region by region on an as-needed basis; in the interim, locally collected data can be very useful for trend monitoring of receiving water but not for defining existing levels of "health."

5.4.3.1 An Example from Washington State

The Puget Sound region of western Washington State provides an instructive example for identifying indicators and establishing desired assessment endpoints. Multiple agencies over the last two decades have sought to measure the overall ecological health of the region and to define targets for recovery. Following the most recent three-year process, the lead agency for the current effort released its set of 20 "dashboard indicators" designed both to express scientific understanding of conditions needed for ecological health and to communicate that understanding in a public-accessible manner (http://www.psp.wa.gov/pm_dashboard.php; accessed September 5, 2011). They cover physical, chemical, and biological indicators: all expressed in terms of relative improvement or quantified conditions to be reached by the year 2020.

This level of target-setting is possible only after extensive study and public discussion; it falls far beyond the scope of the present document. It is instructive for the state of California, however, in several regards as it looks to the future:

- The physiographic scope of the indicators and their target values is well-constrained to a particular geographic region with broadly similar geologic, hydrologic, and climatological attributes. Multiple parallel efforts would almost certainly be needed for a more diverse region (such as the entire state).
- Each indicator has a strong scientific basis for inclusion and at least some scientific basis for specific targets. Their communication value with the public was also an explicit criterion for inclusion.
- The most numerous indicators are biological, and they address multiple levels of the trophic chain from top predators to plants (a planktonic metric, however, was rejected as requiring too much additional scientific study and offering little communication value to the general public).
- Although emphasizing biology, the indicators are broadly distributed amongst biological, chemical, and physical metrics; most are broadly integrative in nature (e.g., reference to "bug populations" (the Puget Sound B-IBI) and a "freshwater quality index").

- The set of physical indicators is most parsimonious for instream conditions, and excluding marine nearshore and estuary conditions is restricted to a single hydrologic metric (chosen for its presumed influence on fish). This stands in stark contrast to most existing hydromodification monitoring plans, which emphasize measures of channel geomorphology and a wider range of hydrologic metrics. Such indicators may provide useful performance measures, but they should not be mistaken for more integrative measures of ecosystem or watershed "health."
- Although each indicator has a specified, numeric goal to be reached by 2020, there are no articulated changes to the current management plan if any of those goals are not reached (or if interim measures suggest that they will not be reached). This is a recognized shortcoming of the present plan but there is no mechanism yet in place to address it. As such, it does not currently meet the test for "adaptive management" (see Appendix C).

In California, such a list of integrative assessment indicators (let alone quantified endpoints for those indicators) cannot presently be defined, except in a few specific localities where data collection and analysis have been ongoing for many years. Thus, we recognize the value of such targets but must guide the present development of monitoring in recognition of their near-complete absence. Rectifying this shortcoming is the central recommendation for long-term program development; in the interim, short-term monitoring at both the regional and local levels need to acknowledge the absence of an integrative context in which to interpret their results.

In California, a list of integrative assessment indicators (let alone quantified endpoints for those indicators) cannot presently be defined, except in a few specific localities. Rectifying this shortcoming is the central recommendation for long-term program development.

Regulatory standards are established on the assumption that "clean water" will result in "healthy streams," but the elements of a watershed are far too complexly interrelated to permit such a simplistic perspective. Although the inverse ("polluted water results in unhealthy streams") is almost always true, the challenge for inferring causality from typical monitoring data is that *many* such stressors can all yield the same, degraded outcome. For this reason, targeted monitoring can provide useful diagnostic information and demonstrate regulatory compliance, but it cannot provide sufficient information to address integrative assessment endpoints.

5.4.3.2 Indicators from Existing Programs

We now turn to some of the most common indicators used in monitoring programs today, recognizing that their suitability in any given application depends on the questions being asked, the characteristics of the natural system being measured, and the practical constraints imposed on the monitoring program.

Hydrologic Indicators. Historically, the effects of urbanization on flow were characterized exclusively in terms of peak flow increases (e.g., Leopold 1968, Hollis 1975). Study since those early works has emphasized the degree to which other attributes of a stream hydrograph are changed by watershed imperviousness, and the importance of assessing the *duration* of moderate flows that are capable of transporting channel sediments and the frequency with which those geomorphically active flows occur

(Section 2). Thus, monitoring relevant to a particular hydromodification management application will likely include a variety of flow metrics (e.g., Konrad and Booth 2005, Degasperi *et al*. 2009).

In moving beyond a narrow focus on linkages between watershed urbanization, flow alteration, and in-stream effects, scientific understanding of hydrologic controls on stream ecosystems has recently led to new approaches for assessing the ecological implications of hydromodification. For example, the ecological limits of hydrologic alteration (ELOHA) framework is a synthesis of a number of existing hydrologic techniques and environmental flow methods that allows water-resource managers and stakeholders to develop socially acceptable goals and standards for streamflow management (Poff *et al.* 2010). The central focus of the ELOHA framework is the development empirically testable relationships between hydrologic alteration and ecological responses for different types of streams. This requires a foundation of hydrologic data provided by gaging and/or monitoring, and sufficient biological data across regional gradients of hydromodification. Although hydrologic–ecological response relationships may be confounded to some extent by factors such as chemical and thermal stressors, there are numerous case studies from the US and abroad in which stakeholders and decision-makers have reached consensus in defining regional flow standards for conservation and ecological restoration of streams and rivers (Poff *et al.* 2010).

Hydrologic monitoring provides essential information needed for establishing flow–geomorphology–ecology relationships, validating conceptual models, and assessing effectiveness of management actions in developing watersheds. Implementing regional flow standards should proceed in an adaptive management context, where collection of monitoring data or targeted field sampling data allows for testing of flow alteration–geomorphic–ecological response relationships. This allows for a fine-tuning of flow management targets based on improved understanding of the actual mechanisms; however, such monitoring can be expensive and it may take many years to adequately characterize the full spectrum of streamflows. Thus, hydrologic monitoring programs should be carefully planned and executed so that they are cost-effective and address the key uncertainties In this paper we primarily focus on indicators that do not require additional, extensive data collection.

Hydrologic indicators provide essential information needed for establishing flow–geomorphology–ecology relationships, validating conceptual models, and assessing effectiveness of management actions in developing watersheds.

Geomorphic indicators have been long-recognized as simple, easy-to-measure, and relatively responsive indicators of changes to the flow regime or sediment supply of a river or stream.

Biological indicators provide an integrative view of river condition, or river health.

Hydrologic monitoring is feasible in the context of a short-term program only if the purpose is to evaluate the engineering performance of a particular facility. For most applications, however, at least two (and commonly many more) years are necessary to measure a range of variable conditions sufficient to capture significant geomorphic and/or biological effects. Measurement of precipitation, generally a less cost-intensive effort than flow monitoring, must occur in consort for the data to be useful. In an effort to minimize the cost of continuous long-term flow modeling, a hydrologic model may be calibrated on one or two years of actual data and then used *in lieu* of further data to predict flow conditions. Whether the level of imprecision so introduced is appropriate will depend on the management questions being asked, but in general such an approach is normally judged more appropriate for comparative results (e.g., did a specified flow magnitude increase in frequency or duration?) than for absolute results (what is the magnitude of the 2-year discharge?).

Geomorphic Indicators. Geomorphic indicators have been long-recognized as simple, easy-to-measure, and relatively responsive indicators of changes to the flow regime or sediment supply of a river or stream (e.g., Leopold 1968). They require little specialized equipment, many commonly can be measured "in the dry" (or close to it), they typically change little from week-to-week (and so are often measured only once per year), and the morphologic features of interest provide the physical template on which a wide range of biological conditions are expressed.

Scholtz and Booth (2000) recognized five geomorphological "channel features" commonly measured as part of monitoring programs:

- Channel geometry (cross sections, longitudinal profile).
- Channel erosion and bank stability.
- Large woody debris.
- Channel-bed sediment.
- In-stream physical habitat (pools, riffles, etc.).

To this list, others have also added:

- Floodplain connectivity.
- Channel planform (meandering, braiding, rates of channel shifting).

Each metric has well-defined methods for field (or, in some cases, airphoto) measurements that need not be repeated here. However, despite broad agreement on *how* to measure each parameter, there is substantially less agreement on the meaning of particular measurements, or indeed under what circumstances (if any) such measurements should be made at all. Most contentious are the various protocols for assessing instream physical habitat (#5 above)—seemingly the most "relevant" for a host of biological applications and for evaluating restoration success. However, a variety of studies have documented a high level of uncertainty imposed by observer bias:

> "Habitat-unit classification was not designed to quantify or monitor aquatic habitat. At the level necessary for use as a stream habitat monitoring tool, the method is not precise, suffers from poor repeatability, cannot be precisely described or accurately transferred among investigators, can be insensitive to important human land-use activities, is affected by stream characteristics that vary naturally and frequently, and is not based on direct, quantitative measurements of the physical characteristics of interest. Relying on habitat-unit classification as a basis for time-trend monitoring is time-consuming, expensive, and ill-advised." (Poole *et al*. 1997, p. 894)

Other geomorphic metrics, in contrast, can provide a robust, albeit coarse, characterization of the channel boundaries. Some changes, particularly if consistently expressed by multiple adjacent cross-sections, can provide clear documentation of systematic channel changes over time that can be credibly associated with upstream changes (e.g., increased discharge from urbanization leading to channel enlargement). Other changes, however, may have a more indirect or uncertain association with upstream conditions (e.g., grain-size changes) because of the potential for rapid, ill-described changes over time without a corresponding human "cause." This emphasizes the importance of having a well-crafted purpose for the monitoring program into which the utility of any chosen parameter can be clearly described.

Biological Indicators. Biological indicators have been long-applied in society's evaluation of stream conditions, but historically that application has been rather informal. Observation of major fish kills, for example, is the application of a "biological indicator," but it provides little diagnostic or discriminatory information except in those streams where conditions are so poor that even casual awareness is inescapable. As a more refined assessment tool, however, their application to freshwater streams is only a few decades old. As such, the science is still under construction and some basic principles are still debated.

The rationale behind using biological indicators, however, is relatively undisputed. Karr (1999) has provided a useful summary of that rationale, of which the key elements are:

- Biological monitoring and biological endpoints provide the most integrative view of river condition, or river health.
- Biological monitoring is essential to identify *biological* responses (emphasis added) to human actions.
- Communicating results of biological monitoring to citizens and political leaders is critical if biological monitoring is to influence environmental policies.

Some of the earliest references to biological monitoring are associated with the development of RIVPACS, the River Invertebrate Prediction and Classification System, developed by the Centre for Ecology and Hydrology in the United Kingdom and now applied in a number of countries worldwide to predict instream biological conditions from a suite of watershed and channel variables. Since that beginning, other approaches have been advanced and practiced (e.g., the US Environmental Protection Agency's *Rapid Bioassessment Protocols*) that provide alternative, but likely near-equivalent results (e.g., Herbst and Silldorf 2004).

In this section we compare several biological indicators recently applied in various regions of California. This not intended as a comprehensive comparison of all available approaches potentially applicable to California; rather, it simply provides a few examples that illustrate the differences, and the similarities, of the various approaches. As the comparisons demonstrate, there is no "right" approach—but all share commonalities that are likely to be valuable elements of any biological monitoring program. We focus exclusively on benthic macroinvertebrates (BMI), because these have seen the longest and most widespread application (both in California and worldwide) given their species diversity and their relative geographic immobility. However, a variety of other biological metrics (particularly fish and periphyton) have relevance to biological monitoring and strong advocates in the scientific community. Their omission here is not a judgment on their value, merely a reflection of the broader applicability and richer scientific development of BMI-based indicators.

Multimetric indices are presently completed for four areas of the state (Eastern Sierra, North Coast, Central Valley, and Southern Coast). They are not standardized or calibrated state-wide (nor should they necessarily be), and they do not provide statewide coverage. In addition, the City of Santa Barbara (Ecology Consultants 2010) has sponsored development of its own BMI index (geographically embedded within the Southern Coast region), with both commonalities and differences between it and the others.

Eastern Sierra Nevada. Herbst and Silldorf (2009) developed an IBI based on streams from the upper Owens River north to the Truckee River. Their purpose was both to provide a region-specific IBI for future use and to evaluate the results of such an approach with others that also make use of BMIs to assess stream conditions. They evaluated the performance of 12-, 10-, and 8-metric indices, recommending the 10-metric index as providing the best overall performance included in the 12-metric index were these 10 and also predator richness and EPT% abundance:

- % tolerant percent richness (% of taxa with TV= 7,8,9,10).
- Richness (total number of taxa).
- Chironomidae Percent Richness (% of taxa that are midges).
- Ephemeroptera (E) Richness (number of mayfly taxa).
- Plecoptera (P) Richness (number of stonefly taxa).
- Trichoptera (T) Richness (number of caddisfly taxa).
- Dominance 3 (proportion of 3 most common taxa)
- Biotic Index (modified Hilsenhoff, composite tolerance).
- Acari richness (number of water mite taxa).
- Percent shredders (% of total number that are shredders).

A statistical analysis suggests that as many as 10 distinct classes can be discriminated using this IBI, although their recommended application uses only five categories of quality.

North Coast. Rehn *et al.* (2005) developed an IBI based on coastal-draining streams from Marin County north to the Oregon border. They evaluated 77 individual metrics, testing them for responsiveness to human disturbance and redundancy, and ultimately settled on eight:

- EPT richness.
- Coleoptera richness.
- Diptera Richness.
- Percent intolerant individuals.

- Percent non-gastropod scraper individuals.
- Percent predator individuals.
- Percent shredder taxa.
- Percent non-insect taxa.

Their statistical analysis indicated that five categories of quality could be discriminated; response was driven most strongly by watershed land cover (natural vs. unnatural) and percent of substrate that was sand-sized or finer. They also suggested a set of thresholds for rejecting potential "reference" sites (Rehn *et al.* 2005; Table 5-2), which was also used in the Southern Coast study (Ode *et al.* 2005; see below):

Table 5-2. Thresholds for rejecting potential "reference" sites.

Stressor	Threshold
Percentage of unnatural land use at the local scale	> 5%
Percentage of urban land use at the local scale	> 3%
Percentage of total agriculture at the local scale	> 5%
Road density at the local scale	> 1.5 km/km^2
Population density (2000 census) at the local scale	> 25 ind./ km^2
Percentage of unnatural land use at the watershed scale	> 5%
Percentage of urban land use at the watershed scale	> 3%
Percentage of total agriculture at the watershed scale	> 5 %
Road density at the watershed scale	> 2.0 km/km^2
Population density (2000 census) at the watershed scale	> 50 ind./ km^2

Central Valley. Rehn *et al.* (2008) also developed an IBI for Central Valley streams, evaluating 80 candidate metrics to yield a final list of five:

- Collector richness.
- Predator richness.
- Percent EPT taxa.
- Percent clinger taxa.
- Shannon diversity (a composite measure of taxonomic richness and evenness of abundance).

They found that reach-scale physical habitat variables were more critical in their data set than water chemistry or land use. They also presented their findings with greater caution than with other regions of the state, noting the difficulty of identifying truly "unimpaired" reference conditions and the geographic concentration of much of their source data.

Southern Coast. Ode *et al.* (2005) developed a BMI index of biological integrity based on 61 potential metrics from reference sites drawn from relatively undisturbed coastal-draining watersheds from Monterey Bay south to the Mexican border. They included seven final metrics:

- Percent tolerant taxa.
- Percent collector-gatherer + collector-filterer individuals.
- Predator richness.
- Percent intolerant individuals.
- EPT richness.
- Percent noninsect taxa.
- Coleoptera richness.

They note that the last two on the list are not common in other multimetric B-IBIs but were statistically appropriate for their data set. They judge that this "SoCal B-IBI" can discriminate 5 categories of condition, using 5 categories evenly divided along a 100-point scale. Particularly strong correlations amongst all seven metrics were displayed in comparison to road density and percent "watershed unnatural."

A portion of the Southern Coast region has also been the subject of independent IBI development over the past decade (Ecology Consultants 2010, 2011). The region of study spans the Santa Barbara coastal streams from the Ventura County line west about 45 miles to Gaviota Creek. Their work led to the development of an IBI using the following 7 metrics:

- # of insect families
- # of EPT families
- % EPT minus Baetidae
- % PT
- Tolerance value average
- % sensitive BMIs
- % predators + shredders

In the course of this work, tolerance values were adjusted for certain taxa based on local observations of presence/absence relative to the level of watershed disturbance. With these changes, they found strong statistical basis for discriminating five categories of biological quality. They also found that considering both watershed-level land use patterns and localized physical habitat conditions were necessary to achieve the best prediction of biological integrity.

Summary. A compilation of the various metrics (Table 5-3) demonstrates only broad commonalities between the various regional IBI's presently available for specific parts of California, suggesting that additional work needs to be done before comprehensive recommendations for biological monitoring can be made. At present, perhaps half(?) of the state's area is covered by existing multimetric indices as noted above, and for these areas they provide the best (indeed, the only) guidance for meaningful collection and interpretation of biological data. Elsewhere, however, only a few general points can be made:

- Biological monitoring in un-assessed regions of the state cannot be used to identify absolute conditions of biological health (i.e., "status" monitoring). However, they will likely be useful for "trends" monitoring, where only the change relative to a prior state is being sought.
- Despite the variability in metric choices amongst the various regions (Table 5-2), some broad commonalities are apparent. In particular, several types of metrics are likely to provide useful indicators of change in a known direction (i.e., an increase or decrease in the metric can be confidently assigned to a change in quality in a known direction):
    - One or more measures of tolerance or intolerance
    - One or more measures of predator prevalence
    - One or more measures of EPT taxa or taxa richness

This list does not purport to describe a true multimetric B-IBI, nor to provide a basis to evaluate instream biological health on an absolute scale (i.e., from "poor" to "excellent"). In the absence of any region-specific guidance, however, changes in one or more of these metrics are each likely to provide some initial, useful indication of temporal trends in biological health until such time as the types of studies referenced above can be conducted.

Table 5-3. Compilation of metrics used in the five regional B-IBI's described in the text.

METRIC	Eastern Sierra	North coast	Central Valley	Southern coast	Santa Barbara
Percent intolerant individuals		X		X	X
% tolerant (% of taxa with TV= 7,8,9,10)	X			X	
Tolerance value average					X
# of insect families					X
Percent non-insect taxa		X		X	
Percent shredders (% of total number that are shredders)	X	X			
Percent predator individuals		X			
% predators + shredders					X
Predator richness			X	X	
Collector richness			X		
Percent non-gastropod scraper individuals		X			
Percent clinger taxa			X		
Percent collector-gatherer + collector-filterer individuals				X	
EPT richness		X		X	X
Percent EPT taxa			X		
% EPT minus Baetidae					X
% PT					X
Ephemeroptera (E) Richness (number of mayfly taxa)	X				
Plecoptera (P) Richness (number of stonefly taxa)	X				
Trichoptera (T) Richness (number of caddisfly taxa)	X				
Coleoptera richness		X		X	
Diptera Richness		X			
Chironomidae Percent Richness (% of taxa that are midges)	X				
Richness (total number of taxa)	X				
Dominance 3 (proportion of 3 most common taxa)	X				
Biotic Index (modified Hilsenhoff, composite tolerance)	X				
Acari richness (number of water mite taxa)	X				
Shannon diversity index			X		

5.5 Recommendations

Based on this review of monitoring theory, current applications, and current needs, the following steps are recommended to advance a state-wide program of monitoring to support the management of hydromodification control plans.

5.5.1 Programmatic Monitoring

Over the next several years, the following actions should be implemented at the state and/or regional level:

- Executing broad-scale, GIS-based watershed characterization;
- Identifying a set of representative indicator watersheds, and a basic suite of regular measurements that are suitable for establishing trends in physical, chemical, and biological indicators;
- Identifying (and multi-metric monitoring within) a relatively small set of watersheds that have implemented recent hydromodification control plans to initiate the long-term evaluation of downstream trends.

Over the course of the next several NPDES permit cycles (i.e., one or more decades), the following actions should also be undertaken as a regional responsibility:

- Setting regionally appropriate endpoints for biological health of receiving waters;
- Identifying particularly promising (or particularly ineffective) combinations of control strategies across a range of different landscape conditions;
- Providing supplemental data collection at reference sites to support trends monitoring by local jurisdictions;
- Compiling local results to guide development and refinement of regionally appropriate hydromodification control strategies.

5.5.2 Local Monitoring

Over the next several years, the following actions should be implemented by local jurisdictions at a local scale:

- Implementing a program of source identification at one or more high-risk locations (e.g., high vehicular traffic, high imperviousness, toxic chemical storage/transport);
- Demonstrating the hydrologic performance of one or more representative hydromodification control facilities;
- Monitoring trends at one or more representative receiving waters, ideally at a regionally identified site (see the second bullet under “Programmatic monitoring,” above);

- Conducting a synoptic evaluation of waterbodies, stratified by watershed type (see the first bullet under “Programmatic monitoring,” above), to identify highest priority systems for protection or rehabilitation, if not already known.

Over the course of the next several NPDES permit cycles, the following long-term actions should also be undertaken as a local responsibility:

- Monitoring representative conditions to evaluate whether management actions are improving overall receiving-water health;
- Evaluating cost-effectiveness of implemented hydromodification control measures;
- Identifying critical areas for resource protection by virtue of existing high-quality conditions.

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APPENDIX A: GUIDANCE FOR APPROPRIATE APPLICATION OF HYDROLOGIC AND HYDRAULIC ANALYSES

Information contained in this document is intended solely for guidance purposes only. It is not intended to be an instruction manual and use of any of the guidance provided herein is at the risk of the user. No other person or entity shall be entitled to rely on the services, opinions, recommendations, plans or specifications provided in the document.

1. INTRODUCTION AND PURPOSE

The purpose of this Appendix is to provide technical guidance on hydrologic and hydraulic analyses, including the use of Continuous Simulation (Hydrologic) Modeling (CSM), in support of hydromodification assessment and mitigation. CSM is the industry standard developed since the early 2000s for use in the assessment and mitigation of hydromodification. The fundamental difference between CSM and peak flow hydrologic modeling, is that CSM considers the full range of flow events over a long period of record, typically 30 years or more, to develop flow duration curves, whereas peak flow hydrologic modeling generally considers synthetically (usually calibrated to measured data) produced event-based hydrographs (2-, 10-, 50-, 100- and 200-year return frequency events). CSM allows flow duration curves and other derived hydraulic metrics to be compared between existing and proposed conditions in order to assess hydromodification impact potential and to develop mitigation strategies. The guidance provided in this appendix is the product of the experience gained in the application of hydromodification management strategies to multiple urban development projects. This appendix is not intended to be an instruction manual but to provide guidance to engineers, planners and regulatory staff on specific modeling elements involved with HMPs.

MODELING METOHDOLOGY REVIEW

Modeling Approaches

A common approach to mitigating hydromodification impacts from development projects is to construct best management practices (BMPs) which capture, infiltrate and retain runoff, where possible. In such cases, the water is detained and released over a period of time at rates which more closely mimic pre-project hydrology. Methods commonly used to size hydromodification BMPs include hydrograph matching (matching pre and post-project flow regimes), volume control and flow duration control. Hydrograph matching is most traditionally used to design flood detention facilities for a specific storm recurrence interval, such as the 100-year storm, whereby the outflow hydrograph for a project area matches the pre-project hydrograph for a design storm. Volume control matches pre- and post-project runoff volume for a project site; however, the frequency and duration of the flows are not controlled. This can result in higher erosive forces during storms. Flow duration control matches both the duration and magnitude of a range of storm events for pre- and post-project runoff. The complete hydrologic record is taken into account, and runoff magnitudes and volumes are matched as closely as possible.

It is generally accepted that flow duration control matching is the most appropriate method to be used in the design of hydromodification BMPs. The flow duration control approach has been used in at least half a dozen HMPs in California, all of which used a CSM to match flow durations. However, differences exist in how the continuous simulation modeling is used between programs.

OVERVIEW OF APPENDIX

This appendix covers the following specific topics, addressed in the order in which they would arise as part of a hydromodification analysis for a major development project:

Section 2 addresses calculation of a flow control range, including identification of an acceptable low flow value, based upon critical flow for incipient motion of the channel material. .

Section 3 addresses the development of evaluation criteria to assess the effectiveness of a proposed mitigation design, including a discussion of flow duration matching and the erosion potential metric.

Section 4 addresses CSM, including precipitation data requirements, hydrologic time steps, model calibration and validation, and other modeling considerations and tips.

2. METHOD FOR SELECTION OF A FLOW CONTROL RANGE

INTRODUCTION TO FLOW CONTROL

Most hydromodification plans (HMPs) in California have adopted a flow control approach, which establishes a range of flow magnitudes discharging from the proposed site that must be controlled. The magnitude of the flow range is commonly expressed in terms of a percentage of the return period flow to which it is equivalent; for example: from 10% of the Q2 to 100% of the Q10. Flow magnitudes within the prescribed range must not occur more frequently under the proposed condition than they do in the existing (or pre-project) condition. Another way of expressing this is that the long term (decadal) cumulative duration of these flows must not be longer in the post-project condition compared to the pre-project condition. Generally, a small exceedance tolerance is allowed. For example, the following is a typical criterion that has been used in HMPs:

> For flow rates ranging from 10% of the pre-project 2-year recurrence interval event (XQ2) to the pre-project 10-year runoff event (Q10), the post-project discharge rates and durations shall not deviate above the pre-project rates and durations by more than 10% over and more than 10% of the length of the flow duration curve. The specific lower flow threshold should be influenced by results from the channel susceptibility assessment.

The rationale behind setting an upper limit is the understanding that when less frequent, high intensity/volume precipitation events occur, the watershed reaches a saturation level and responds in a similar manner for undeveloped and developed conditions. Furthermore, while these less frequent, high magnitude events do induce significant geomorphic change, they occur so infrequently that over a long time period, they comprise only a small portion of the work done on a channel. For example GeoSyntec (2007) used a hydro-geomorphic model to assess cumulative sediment transport on Laguna Creek (near Sacramento) and determined that 95% of the total erosion and sediment transport in the creek is accomplished by flow rates less than Q_{10}.

The purpose of determining a low flow range is one of practical design consideration when meeting a requirement for flow duration matching. The requirement to match flow durations between a pre- and post-project condition requires that runoff be detained and infiltrated within a BMP (e.g. open basin or underground vault). If flow matching is required to be achieved for all flows down to zero, the BMP volume will be significantly larger (and therefore more costly) than if there were some low flow below which runoff could be discharged at durations longer than in the pre-project condition. A key assumption underlying the concept of a low-flow discharge is that the increase in discharge durations below this rate will not increase channel erosion because the flows are too small to initiate movement of channel materials to any significant extent. Another critical assumption in the flow duration matching approach is that a single discharge value is valid across the range of grain sizes and geometries in the streams to which that low flow value applies.

For a specific set of hydraulic conditions (e.g., cross sectional shape, channel slope, bed and bank roughness), the flow rate can be calculated where the critical shear strength value is reached. Thus with an estimate of the critical shear strength of the materials composing a channel's bed or banks, and the hydraulic conditions occurring at the same location, the critical flow rate can be determined at which transport (or erosion) begins. This critical flow rate (Q_c) can then be compared to the magnitude of a flood peak which occurs every two years (Q_2) to establish the estimate of percent Q_2 to be used as the lower flow threshold.

Thus in order to calculate the lower flow threshold as expressed by a percentage of Q_2, three values must be determined for each analysis location (described in further detail below):

- The critical shear strength (τ_c) of bed and bank materials;
- The critical flow rate (Q_c) at which this critical shear strength is reached and exceeded;
- The magnitude of a flood peak which occurs every two years (Q_2).

In contrast, when using an erosion potential (Ep) metric (rather than flow duration matching) for BMP sizing, the Ep analysis incorporates channel geometry to estimate shear stresses generated at various flow rates, and then compares these to estimated critical shear stresses (i.e., shear stress required to initiate transport) for the grain size distribution within the stream. However, for either flow duration matching or for erosion potential analysis, the first step is to determine the critical shear stress for incipient motion of channel materials.

DETERMINATION OF CRITICAL SHEAR STRESS

The composition and condition of the bed and banks of a stream channel are the best indicators of how a channel will react (i.e., its susceptibility) to hydrologic changes resulting from development projects (i.e., hydromodification). Channels composed of materials more resistant to erosion are less susceptible to excessive erosion due to hydromodification than channels composed of less resistant materials. Channel material type can vary widely between, as well as within, watersheds. Figure 2-1 **Error! Reference source not found.**a. and b. illustrate stream incision through (a) relatively loosely consolidated, non-cohesive sand and gravels, and (b) relatively cohesive silty-clays. The resistance of bed and bank materials is quantified by their critical shear strengths, (τ_c) that is, the value where entrainment or transport begins.

Typical stream erosion in a southern California stream (granular, non-cohesive
(Photo courtesy of Eric Stein, SCCWRP)

Typical stream erosion in a northern California stream (generally cohesive silty clays)
(Photo cbec, inc.)

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Examples of Stream Erosion in Southern and Northern California

Project: 11-1001 | Created By: CBB | **Figure 2-1**

Figure 2-1. a. Example of a loosely consolidated, non-cohesive sand and gravel stream bed. b. Example of a relatively cohesive silty-clay stream bed.

Several methods are available for the estimation of critical shear stress, including laboratory studies (e.g., flume studies) and field measurements, with different methods utilized for cohesive materials and non-cohesive materials.

Estimating Critical Shear Stress for Non-Cohesive Materials

The most common method for determining the critical shear stress of a non-cohesive material is through the application of the Shields relationship. This relationship is applicable to the calculation of critical shear stress for a uniform size mixture of sediment with a known particle size and specific gravity. Since it was originally proposed by Shields in 1936, the relationship has been tested and further investigated by several other researchers, resulting in a variety of modifications, primarily through variation of the Shields parameter. The original value of the Shields parameter proposed by Shields was 0.06, however, values from 0.03-0.06 have been suggested, with 0.045 acknowledged as a good approximation. Recent research has demonstrated that a value of 0.03 may be more appropriate for estimating incipient motion in streams with gravel beds (Neill 1968, Parker et al. 2008, Wilcock et al. 2009), where D50 estimates are based upon data collected via pebble count. The decision of what value of Shields parameter is used can have a large influence on the resulting τ_c estimate. For example, if a value of 0.06 is used, it results in twice as large of an estimate of τ_c than if a value of 0.03 is used.

While the Shields relationship was developed for a mixture of uniform sized sediment, it can be applied to a mixture of sediment with varying sizes as long as the distribution is uni-modal and does not have a high standard deviation of grain sizes (Wilcock 1993). In contrast, for sediment mixtures which are bimodal (e.g., if there is a large amount of sand in addition to gravel), a different approach (e.g., Wilcock and Crowe 2003) is recommended. For a more in depth discussion of sediment transport and incipient motion, the reader is referred to Wilcock et al. (2009).

In order to apply the Shields relationship to determine τ_c, the median grain size (d50) present on the channel surface must be determined. River channels are often armored; meaning that coarser material is present on the surface than is present underneath the armor layer. However to access and transport the finer material beneath, the surface layer must first be mobilized. The median grain size is determined by analysis of a particle size distribution.

A particle size distribution can take the form of: 1) a cumulative *frequency* distribution which is determined by way of a pebble count or photographic analysis, or 2) a cumulative *weight* distribution. For a cumulative frequency distribution a subset of particles present on the surface are measured, and the frequency of particles within different size class bins is used. **Error! Reference source not found.** shows a sample particle size distribution graph developed from a pebble count. For a cumulative weight distribution, a bulk sample of the surface material is collected, and then sorted using a set of sieves with different screen sizes. The amount of material retained by each sieve is weighed and then used to plot the cumulative weight distribution. Both approaches have advantages and disadvantages.

A pebble count is a relatively straightforward field technique that is easily applied in streams which are wadable. **Error! Reference source not found.** shows photographs of pebble counts being conducted in the field. They can be performed relatively quickly, which means more samples can be collected to better characterize the conditions present in a reach. However, there are a variety of ways a pebble count can be conducted, and there is tremendous opportunity to introduce bias to the measurement. Furthermore, while studies often cite Wolman (1954) as the method employed in data collection, strict adherence to this protocol is not always achieved. Rather than the method suggested by Wolman (1954), a refined, more regimented approach has been suggested by Bundte and Abt (2001a), and is recommended. In addition, it should be noted that pebble counts generally do a poor job of characterizing sand and smaller sized material. In addition to pebble counts, software can be used to process a digital image of an area of the bed. The software samples a subset of particles present in the image, and using assumptions regarding the amount of given particle that is visible, is able to provide a cumulative frequency distribution.

Collecting a bulk sample for sieve analysis is another method frequently employed to determine values for typical characteristic indices of a particle size distribution. In this method a sample is collected from the channel surface, and then the sample is segregated into various size classes with sieves. One advantage of this approach is that it utilizes all the data available from the sampled area (as opposed to a pebble count which uses a subset of the entire population, e.g., ~100 particles as opposed to thousands), however the sampled area is typically smaller than the area sampled within one pebble count. One disadvantage is the size of sample that is necessary. Because the resulting particle size distribution is based upon weight, the largest particles present can have a very large influence on the resulting particle size distribution. Research has suggested that the weight of the entire sample must exceed 100x the weight of the largest particle present to escape this possible bias. This means large (volume and weight) samples are often required. Some sieving can occur on site through the use of shaker sieves, but typically some portion of the sample is also taken back to the lab for further analysis. Thus, bulk samples typically require more effort and equipment to establish a particle size distribution, however they provide a much more accurate estimate, especially when a large fraction of the sample is sand sized (2mm) and smaller.

For a more in depth discussion of sampling methods to determine particle size distributions in wadable streams, the reader is referred to Bunte and Abt (2001).

Estimating Critical Shear Stress for Cohesive Materials

The methods described above are not appropriate for cohesive materials, which due to chemical cohesion between particles exhibit larger τ_c values than would be estimated by consideration of particle size/weight in isolation (i.e., cohesive properties not considered). One method that allows for the determination of τ_c *in situ* is the application of a jet test (ASTM 2007). The jet-testing apparatus and analytical methods were developed by researchers at the USDA Agricultural Research Station (Hanson and Cook 1999; Hanson et al. 2002; Hanson and Cook 2004; ASTM 2007). The method uses a submerged impinging jet of water directed perpendicularly at the material surface, in order to erode the material. As erosion occurs, a scour hole is created. The depth of this hole is measured periodically as time progresses through the test. As the scour hole increases in depth, the strength of the jet is reduced because it is travelling longer distance through water from the jet orifice to the soil surface. Eventually, the energy of the jet is dissipated enough that it no longer has energy in excess of the material's shear strength and erosion stops. **Error! Reference source not found.** shows a photograph of a jet testing rig deployed in a stream bank.

In addition to jet testing, *in situ* testing of shear strength can be obtained through the application of a field vane shear test (ASTM 2008). This method provides τ_c values based upon the assumption that the bed or bank will fail via large blocks (composed of thousands of particles), as opposed to erosion occurring particle by particle. As such, the values measured by a shear vane are often several orders of magnitude larger than those obtained via testing with the jet-device.

Estimating Critical Shear Stress Through the Use of Literature Values

An alternative to the measurement/calculation of τ_c, is the use of values found in the literature. Indeed, several HMPs have several HMPs have been developed through assumption of material resistance properties found in the literature based upon literature based upon a textural description of the material. An often-cited reference is Fischenich (2001), which provides a (2001), which provides a summary (compiled from the relevant literature) for critical shear strength values for various values for various materials. An extract from this reference is provided in

Figure 2-5.

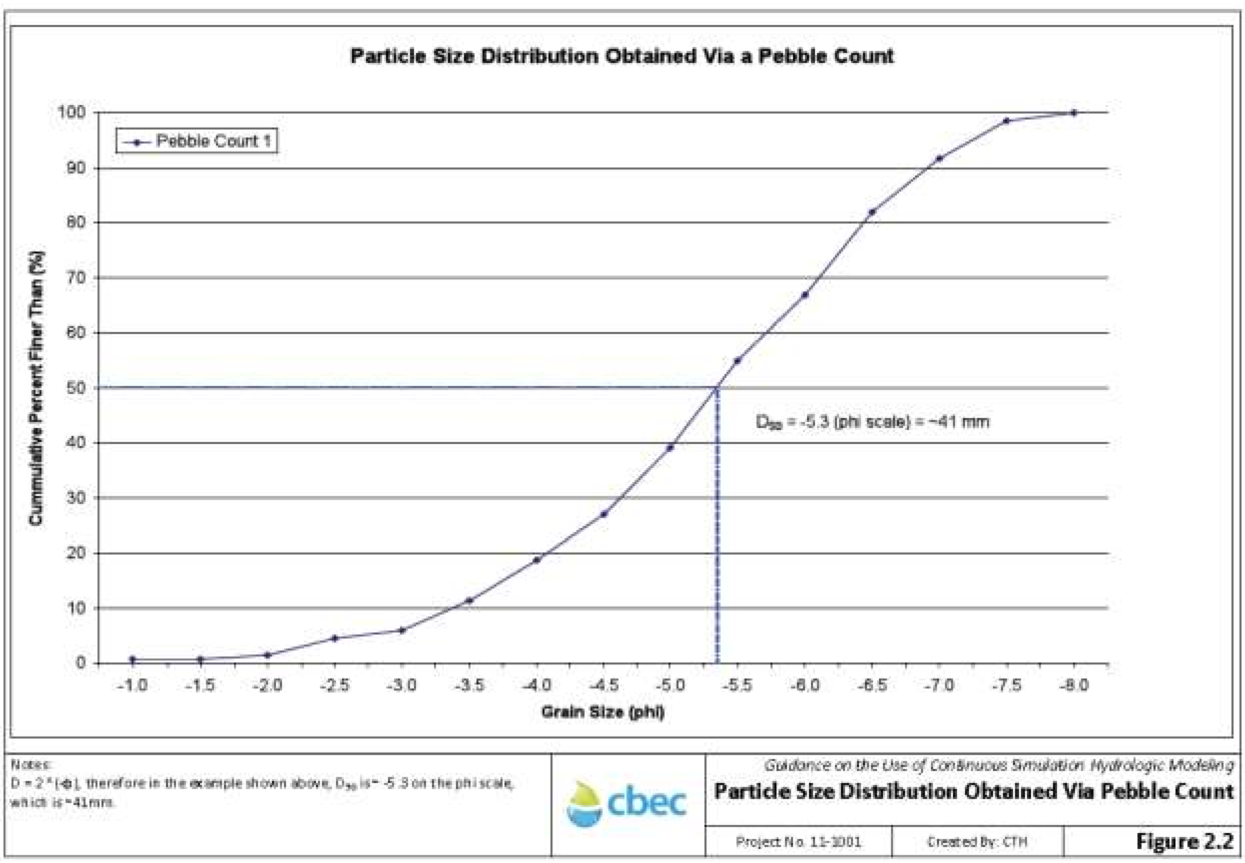

Figure 2-2. Particle Size Distribution Graph Developed from a Pebble Count

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Pebble Counts Being Conducted in the Field

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Figure 2-3. Pebble Counts Being Conducted in the Field

Typical installation of jet testing equipment in stream bank

Hole created in cohesive bank material by jet impinging on surface

Notes:	cbec	*Guidance on the Use of Continuous Simulation Hydrologic Modeling* **Jet Testing Equipment Deployed in a Stream Bank**		
		Project: 11-1001	Created By: CBB	**Figure 2-4**

Figure 2-4. Jest Testing Equipment Deployed in a Stream

Table 2. Permissible Shear and Velocity for Selected Lining Materials[1]

Boundary Category	Boundary Type	Permissible Shear Stress (lb/sq ft)	Permissible Velocity (ft/sec)	Citation(s)
Soils	Fine colloidal sand	0.02 - 0.03	1.5	A
	Sandy loam (noncolloidal)	0.03 - 0.04	1.75	A
	Alluvial silt (noncolloidal)	0.045 - 0.05	2	A
	Silty loam (noncolloidal)	0.045 - 0.05	1.75 – 2.25	A
	Firm loam	0.075	2.5	A
	Fine gravels	0.075	2.5	A
	Stiff clay	0.26	3 – 4.5	A, F
	Alluvial silt (colloidal)	0.26	3.75	A
	Graded loam to cobbles	0.38	3.75	A
	Graded silts to cobbles	0.43	4	A
	Shales and hardpan	0.67	6	A
Gravel/Cobble	1-in.	0.33	2.5 – 5	A
	2-in.	0.67	3 – 6	A
	6-in.	2.0	4 – 7.5	A
	12-in.	4.0	5.5 – 12	A
Vegetation	Class A turf	3.7	6 – 8	E, N
	Class B turf	2.1	4 – 7	E, N
	Class C turf	1.0	3.5	E, N
	Long native grasses	1.2 – 1.7	4 – 6	G, H, L, N
	Short native and bunch grass	0.7 - 0.95	3 – 4	G, H, L, N
	Reed plantings	0.1-0.6	N/A	E, N
	Hardwood tree plantings	0.41-2.5	N/A	E, N
Temporary Degradable RECPs	Jute net	0.45	1 – 2.5	E, H, M
	Straw with net	1.5 – 1.65	1 – 3	E, H, M
	Coconut fiber with net	2.25	3 – 4	E, M
	Fiberglass roving	2.00	2.5 – 7	E, H, M
Non-Degradable RECPs	Unvegetated	3.00	5 – 7	E, G, M
	Partially established	4.0-6.0	7.5 – 15	E, G, M
	Fully vegetated	8.00	8 – 21	F, L, M
Riprap	6 – in. d_{50}	2.5	5 – 10	H
	9 – in. d_{50}	3.8	7 – 11	H
	12 – in. d_{50}	5.1	10 – 13	H
	18 – in. d_{50}	7.6	12 – 16	H
	24 – in. d_{50}	10.1	14 – 18	E
Soil Bioengineering	Wattles	0.2 – 1.0	3	C, I, J, N
	Reed fascine	0.6-1.25	5	E
	Coir roll	3 - 5	8	E, M, N
	Vegetated coir mat	4 - 8	9.5	E, M, N
	Live brush mattress (initial)	0.4 – 4.1	4	B, E, I
	Live brush mattress (grown)	3.90-8.2	12	B, C, E, I, N
	Brush layering (initial/grown)	0.4 – 6.25	12	E, I, N
	Live fascine	1.25-3.10	6 – 8	C, E, I, J
	Live willow stakes	2.10-3.10	3 – 10	E, N, O
Hard Surfacing	Gabions	10	14 – 19	D
	Concrete	12.5	>18	H

[1] Ranges of values generally reflect multiple sources of data or different testing conditions.

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Guidance on the Use of Continuous Simulation Hydrologic Modeling

Permissible Shear Strength and Velocity for Selected Lining Materials

Project No:11-1001 | Created By: CBB | **Figure 2-5**

Figure 2-5. Permissible Shear and Velocity for Selected Lining Materials

DETERMINATION OF CRITICAL FLOW (Q_c)

For a specific set of hydraulic conditions at a location (i.e., cross sectional shape, channel slope, bed and bank roughness), the flow rate at which critical shear values are reached can be calculated. These calculations can be made with a programed spreadsheet analysis, or with a hydraulic model (e.g., HEC-RAS, Brunner 2010). Because of their ease of use and the ease at which multiple flow rates can be assessed (in order to determine when τ_c is reached), hydraulic models are typically employed for this part of the analysis. Average boundary shear stress is calculated with the following equation:

$$\tau = \rho g R s$$

where *p* represents the density of water, *g* represents the gravitational constant, R represents the hydraulic radius (defined as the wetted area dived by the wetted perimeter), and *s* represents the slope. For wide channels the value of the hydraulic radius is approximately equal to the average depth of the cross section. The hydraulic model calculates the value for R for a given discharge based on the channel dimensions.

Typically one-dimensional approximations are used for this analysis, which means that the value of Q_c determined is that where the cross sectional average of τ_c is reached, not the highest value which is occurring at the deepest point of the cross section. This is typically considered reasonable because the grain size is determined for the bed of the cross section, not just the shallow or deep area.

Analyses can be conducted at a station, or in other words just looking at one cross section in isolation using normal depth calculations, or within a larger hydraulic model constructed for the entire reach (i.e., multiple distributed cross sections upstream and downstream of the location of interest). The advantage of looking at the cross section of interest within the context of the entire reach is that conditions downstream (e.g. a constriction which causes a backwater condition) may affect the flow depth (or hydraulic radius), yielding different results than would be obtained if the cross-section was analyzed in isolation.

It is important that the determination of τ_c (via pebble count or other means) and the hydraulic calculations to determine Q_c, occur at the same location. Typically the analysis is undertaken at a riffle because these are the high points of a long profile and are what are controlling incision in the system. Bed material characterization in a pool is much more difficult (because of the depth of water), in addition the resulting calculated shear values are typically much higher, because of the added depth.

If HEC-RAS is used (which is typical), the way the bank markers are set can have a dramatic influence on the calculated shear results. The bank markers are used to delineate differences in roughness across the channel and flood plain (typically higher values are used on the lateral margins to include the influence of vegetation roughness in the resulting depth calculations). The shear values calculated by HEC-RAS are segregated by these bank markers, and thus may include values for each of the floodplains as well as the channel. If bank markers are set too wide, and the shear stress calculation may include a portion of the floodplain too, and subsequently the conditions in the actual channel will be greatly underestimated. Remember that the model is essentially using the average depth for the entire cross section (as limited by the bank markers), so including floodplain with shallow depths greatly influences the average depth and thus the resulting calculated shear value.

DETERMINATION OF Q_2

The determination of a value of Q_2 is the third and final piece of the equation used to determine what percent of Q_2 the lower threshold should be. As with the other two pieces, several options are available, and again the decision on what method is used can have a profound influence upon the final results. Q_2 can be determined through the results of a calibrated and validated hydrologic model (e.g., HEC-HMS, HSPF, SWMM, etc.) which uses precipitation, sub basin area, soil conditions, etc. to calculate a runoff hydrograh. This type of model can be used in one of two ways, to simulate a single precipitation event or to simulate a long term (e.g., 50 year) precipitation record. The first approach produces a single runoff hydrograph resulting from a "design" storm, from which the peak magnitude can be determined. As such the results are largely controlled by the precipitation hyetograph, so a good understanding of how that was developed is important. This method has been used considerably less than the approach detailed below. The advantage of this method is that, if any existing model has already been developed (e.g., SacCalc; DFCE 2001), it will be cheaper and easier for an agency to review. However, it can yield different values for Q_2, due to differing assumptions employed in the modeling.

The second method uses a long-term precipitation record for simulation which results in a flow record containing a large number of runoff events of varying magnitudes (i.e., which are subsequently analyzed to determine the magnitude of the 2 year recurrence interval event). This method is more typical for HMP assessments, but again methodical decisions can have a large influence on the results. The rigor of the model calibration and validation has a strong influence. If the model is not representing through simulation what is actually occurring, then the simulation results are questionable.

Assuming the model has been calibrated and satisfactorily validated or verified, the manner in which the simulated runoff record is analyzed is important. The first basic distinction is whether an annual maximum series (AMS) or a partial duration series (PDS) is used. In an AMS analysis, just the single largest flood peak of any given year is used in the analysis, and the second and third largest events of the year are ignored. This is the method typically utilized when analyzing the flood frequency of large, less frequently occurring flood events. In the second approach, PDS, multiple flood events are considered in any given year. This is important when the second or third largest flood events in one year are greater than the annual maximum of another year. Because more large events are included, the resulting estimate of the given return period event (e.g., Q_2) is larger. For example, Langbein (1960) showed that a 1.45 year event determined with PDS is the same magnitude as a 2 year event with an AMS, and a 2 year event determined with PDS is a 2.54 year event with an AMS. Thus the value of Q_2 determined by PDS is larger than the value of Q_2 determined by AMS. While significant differences are apparent for smaller magnitude, more frequently occurring events (e.g., Q_2), for return periods greater than 10 years, there is almost no difference between the results obtained from the AMS and PDS.

When compiling a PDS for a recurrence interval analysis, the manner in which events are identified as independent can also have an effect upon the results. One typical method is to include all flood peaks above a certain base magnitude. This base value is often selected as equal to the lowest annual maximum flood of record, however can also be chosen such that the PDS only contains as many peaks as there are years of record. Some analysts have established a base value (e.g., 0.002 cfs/acre), and then added a duration below this base value as well (i.e., flow must be below 0.002 cfs/acre for at least 24 hours for events to be considered independent). One additional method is to identify individual events by extracting the highest peak (not just the maximum value) within a moving time window (e.g., 3 days), and therefore determine independence through time, rather than the discharge rate receding to a non-storm condition. With all of these options available, and no prescribed standard, the use of a PDS can have different Q_2 results even if an identical flow time series is used.

SUMMARY

The determination of the lower flow threshold, defined as a percentage of $Q_{2,}$ is heavily influenced by three primary inputs: τ_c, Q_c, and Q_2. The determination of each of these values is sensitive to a variety of factors determined by the particular methodology. To demonstrate the sensitivity of the lower flow threshold to methodological decisions, a few examples are provided below.

- If 0.06 is used rather than 0.03 for Shields parameter in Shields relationship, τ_c increases, subsequently Q_c increases and ultimately the lower limit increases
- If bank markers are set too wide (including the floodplain and not just the channel) in the hydraulic analysis, a larger value for Q_c is calculated (because of a reduction of the hydraulic radius due to the inclusion of extensive shallow floodplain areas), resulting in an increase of the lower limit.
- If an annual maximum series is used in place of a partial duration series, the calculated Q_2 will be less than that obtained by a PDS analysis, and the ratio of Q_c to Q_2 will be higher if the AMS is used.

3. DEVELOPMENT OF EVALUATION CRITERIA

FLOW DURATION CONTROL AND PEAK FLOW CURVE MATCHING

Flow Duration Control (FDC) and Peak Flow Curve (PFC) matching criteria in their current form for many counties in CA are similar in form to the curve matching criteria from WA (WADOE, 2001). The curve matching criteria typically include a goodness of fit or variance due to the difficulty in achieving a precise match across the range of flows. The criteria are typically applied at the subwatershed scale based on continuous simulation flow results for pre- and post-project conditions to size individual BMP or LID features. In this instance, flow matching at the subwatershed scale assumes that there are no routing or timing effects in the treated runoff when it rejoins the receiving waterbody; however, this may not be true in all cases. For example, if treated runoff is delayed and rejoins the upstream runoff such that there is an increase in flow rates and durations or an increase in the peak flows in the receiving waterbody, then there is the potential to impair the receiving waterbody. To address this potential concern, the FDC and PFC criteria could be applied to the routed flows in the receiving waterbody as a check.

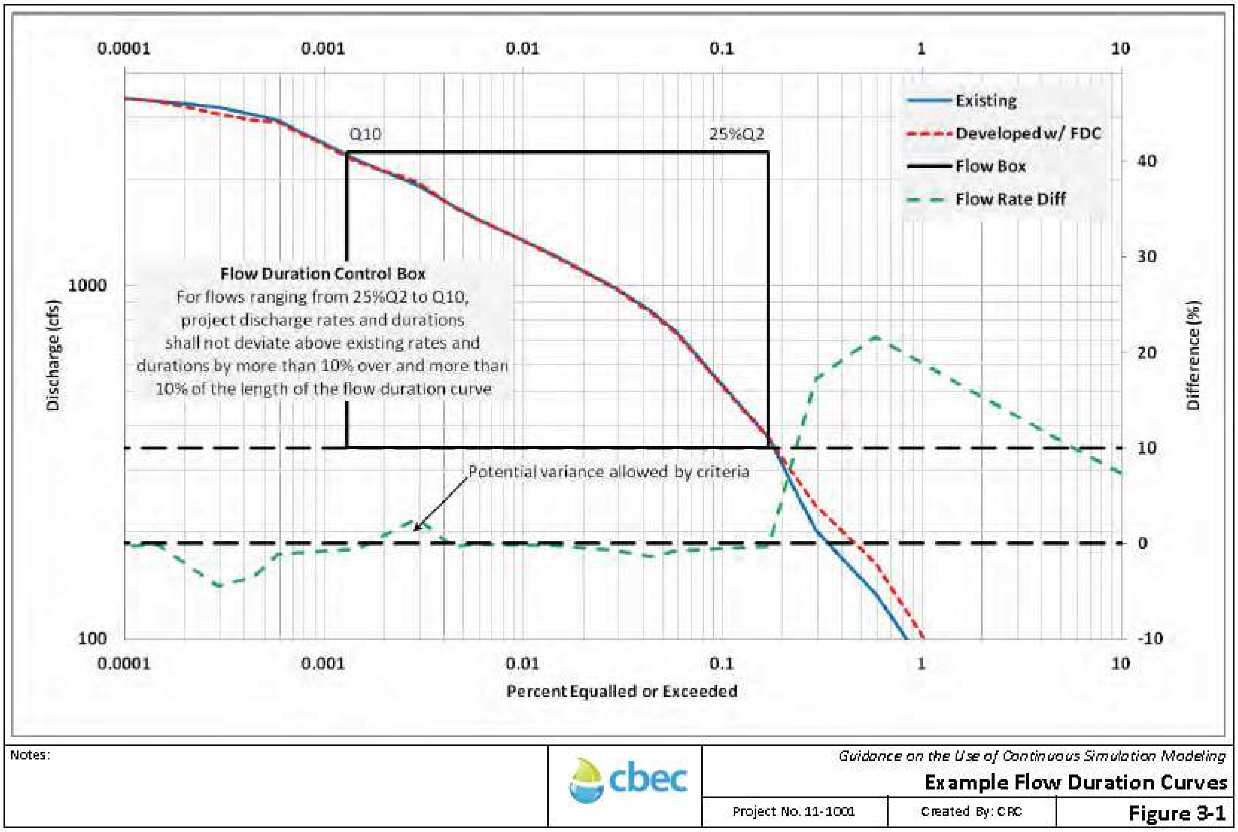


Figure 3-1 shows an example of FDC matching on the routed flows within a receiving waterbody with an example of the variance allowed by the criteria. However, it is cautioned that the FDC variance (e.g., "…by more than 10 percent over and more than 10 percent of the length…") may need to be reduced to something less than 10 percent (perhaps based on a ratio of watershed areas) to account for cumulative effects if there remain the potential for continued development in the watershed.

EROSION POTENTIAL

Erosion Potential (EP) is an index to indicate the impact of increased flows on stream stability and is based on bed mobility and an integration of work (as a function of velocity and excess shear stress in the channel only) over time, expressed as a ratio of post-project work divided by pre-project work in the receiving waterbody. Total work is based on integrating effective stream power as:

$$W = \sum_{i=1}^{n} (\tau_i - \tau_c)^e \cdot V_i \cdot \Delta t_i$$

where W is the total work done (ft-lbf/ft^2), τ is the average channel shear stress, τ_c is the critical shear stress to initiate erosion, e is an exponent varying from 1 to 2.5 to account for the exponential rise in stream power with flow, V is the velocity (ft/sec), and Δt is the numerical time step (sec). The EP index is then calculated as the ratio of W_{dev} / W_{ex} where W_{ex} and W_{dev} is the total work for existing and developed conditions, respectively. EP can be calculated at any location in the waterbody based on continuous simulation time series of flow, velocity, and excess shear stress in the channel as derived from hydraulic model outputs.

EP criteria are not widely integrated into HMPs. Notably Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) included EP criteria in their HMP, but in so much as it was used to inform their overall management objective (i.e., post-project runoff shall not exceed estimated pre-project rates and/or durations) and the development of their FDC / PFC criteria. In the SCVURPPP (2005) final HMP, an EP ratio <= 1.0 was recommended as the instream target value to be maintained for stream segments downstream of the point of discharge for HMP management. From a risk management perspective, the chance of a stream becoming unstable at an EP of 1.0 is 9%, meaning that 1 in 11 streams could become unstable even with controls (SCVURPPP, 2005). As such, instream EP must be evaluated considering the effects of the cumulative changes that have or may take place in the watershed.

Even though EP criteria are not widely promoted in county HMPs, that does not preclude analyses based on EP from being used, especially when instream measures permit more robust geomorphic analyses (e.g., SCVURPPP final HMP; SSQP draft HMP). While EP analyses are more time and data intensive, there is the potential outcome to discharge runoff at higher rates and durations than FDC / PFC criteria would allow, thus resulting in possibly smaller onsite measures. The time and data intensiveness of EP analyses stem from the need to evaluate the hydraulic and geomorphic conditions of the receiving waterbody to be protected at multiple locations based on continuous simulation hydraulic model outputs and geomorphic data. Potential hydraulic model considerations when performing EP calculations are addressed below.

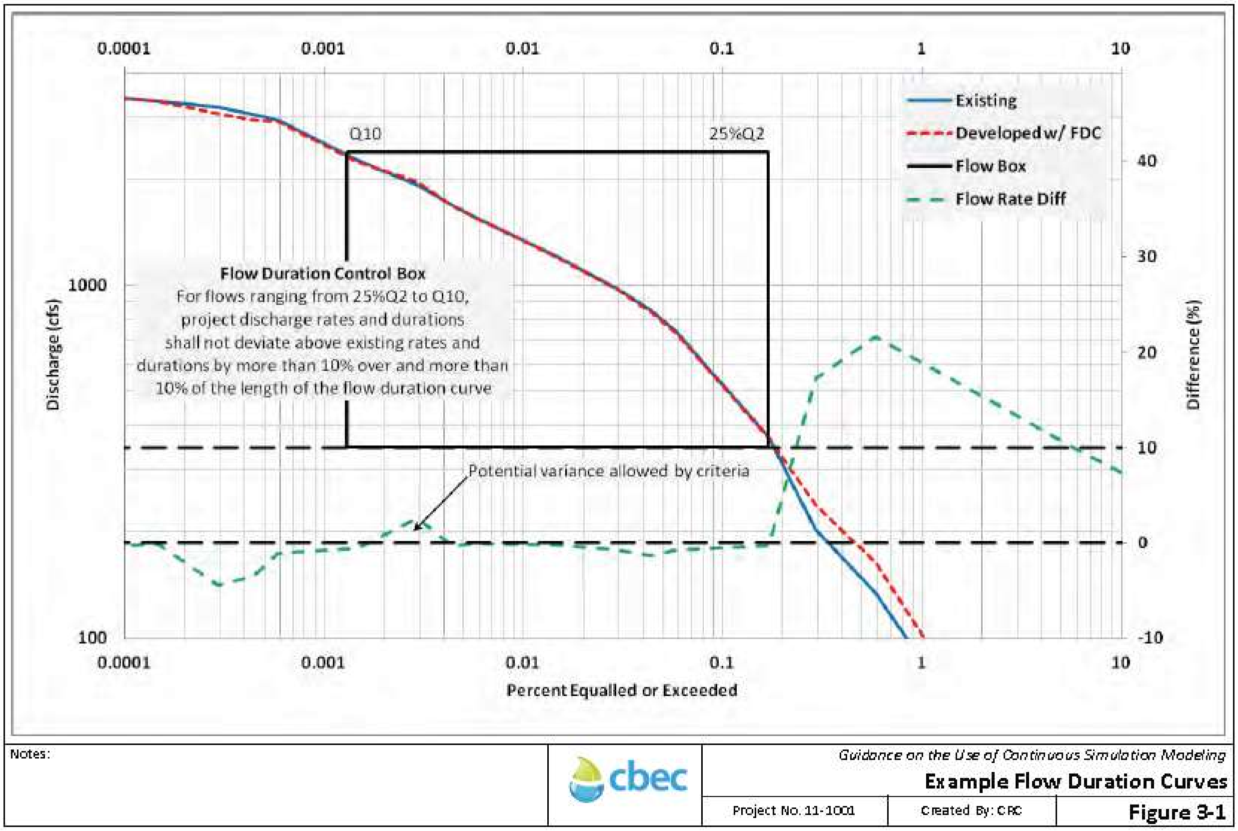


Figure 3-1. Example Flow Duration Curves

4. DATA REQUIREMENTS FOR CSM AND HYDRAULIC ANALYSIS

Hydrologic models capable of performing long-term continuous simulation to support HMPs include, but are not limited to, HSPF, HEC-HMS soil moisture accounting (SMA) method, and other hydrology models, such as the Bay Area Hydrology Model (BAHM). The first two are public domain software models and the third is a proprietary software model customized for specific counties that uses HSPF as its computational engine. A fourth modeling tool based on continuous simulation results, and also using HSPF as its computational engine, are the suite of BMP sizing calculators specifically designed for HMP management for select counties. These have been developed for Contra Costa and San Diego County and Sacramento County (in draft form). All four suites of models use site conditions (i.e., topography, soils, vegetation, and land use) and long-term precipitation data to calculate the various components of the hydrologic cycle (i.e., infiltration, surface runoff, soil moisture, evapotranspiration, percolation, interflow, and groundwater). Specific details about each model and model comparisons (e.g., TetraTech, 2011) are not discussed here, but can be reviewed in available literature.

Following model selection, hydrologic models are created for existing and project conditions based on various considerations, some of which are discussed in subsequent sections. For project conditions, county specific HMP measures need to be specified to manage project runoff to meet the evaluation criteria identified above. The BMP sizing calculators and BAHM-type hydrology models do have optimization routines to size BMP and LID measures. Automatic sizing allows for efficient and quick sizing of such features based on county specific, model specific (e.g., the sizing calculator for San Diego and Contra Costa County is based on pre-defined sizing factors such that site specific continuous simulations do not need to be performed, and is limited to drainage management units of less than 100 acres), and user-defined (e.g., the BAHM-type hydrology models require site specific continuous simulation with a wide selection of measure configurations) assumptions and limitations. As standalone models, HSPF and HEC-HMS offer flexibility as it relates to model configuration, model inputs, and user-defined parameters. However, these models do not have optimization routines to size various BMP and LID measures, thus requiring manual iteration to achieve a satisfactory solution.

PRECIPITATION DATA

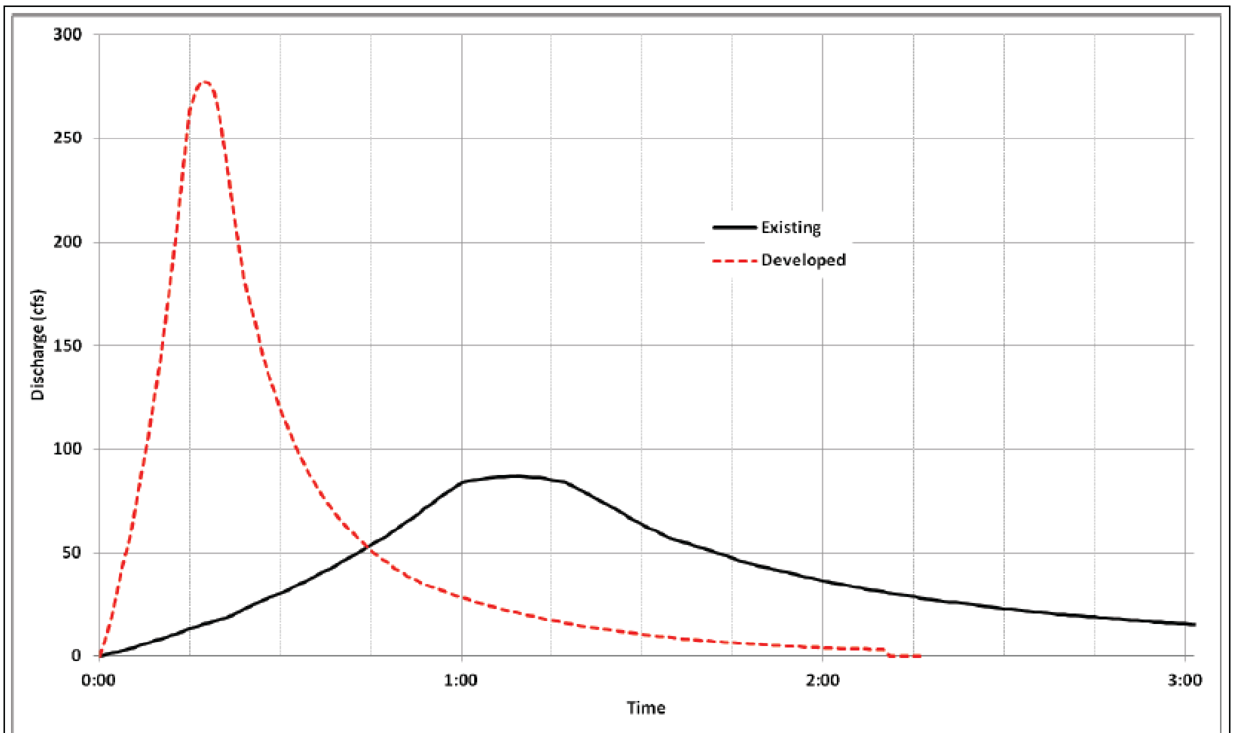
Long-term precipitation data in the range of 30 to 50 years is typically needed to generate a sufficiently long flow record from which FDC and PFC analyses and/or subsequent hydraulic analyses can be performed. The precipitation data observation interval should ideally be no coarser than hourly, and if available, can be sub-hourly (e.g., 15 minutes) to coincide with a finer continuous simulation time step.

The precipitation data should ideally be located near the project site, and if needed, scaled to the project site based on a ratio of mean annual precipitation as derived from county specific mapping or regional sources (e.g., PRISM [http://www.prism.oregonstate.edu/]) and reviewed to ensure that it captures key IDF characteristics from county specific mapping or regional sources (e.g., NOAA Atlas 14 [http://www.nws.noaa.gov/oh/hdsc/index.html]). A variety of precipitation data sources exist, and include, but are not limited to:

- ALERT system for individual counties (e.g., Sacramento [http://www.sacflood.org/])
- Western Region Climate Center (WRCC [http://www.wrcc.dri.edu/])
- NOAA National Climatic Data Center (NCDC [http://www.ncdc.noaa.gov/])
- California Irrigation Management Information System (CIMIS [http://wwwcimis.water.ca.gov/])

HYDROLOGIC SIMULATION TIME STEP

The continuous simulation time step and output reporting interval for the four models identified above has traditionally has traditionally been hourly. However, an hourly time step is often significantly larger than the time of concentration for concentration for developed subwatersheds relative to existing subwatersheds, especially those commonly configured commonly configured developed subwatersheds that are limited to less than 100 acres. The sizing calculator and BAHM-type calculator and BAHM-type models are hardwired at hourly, but the public domain software still affords the user to go to a the user to go to a finer time step. As such, a sub-hourly time step and output reporting interval is preferred in order to preferred in order to adequately resolve and sample flow from developed subwatershed elements where time of where time of concentrations are typically less than one hour. As shown by



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Guidance on the Use of Continuous Simulation Modeling

Example Unit Hydrographs

Project No. 11-1001 | Created By: CRC | **Figure 4-1**

Figure 4-1 for a typical developed subwatershed, the unit hydrograph for developed conditions is flashier, peaks quicker (well within one hour), and the recession limb becomes small quickly. While a sub-hourly time step and output reporting interval may not be desirable due to the volume of model output that will be generated, it is possible to bias the results in favor of the developed condition due to under sampling of the flashier and larger developed flows under an hourly time step.

HYDROLOGIC MODEL CALIBRATION AND VALIDATION

In developing continuous simulation models, the model parameters describing soil characteristics, land use descriptions, and evapotranspiration should be derived from published data (e.g., soil survey, local studies, county standards, etc.). These parameters should be calibrated and validated, where applicable, by comparing modeled flows to measured or observed flows with the receiving waterbody for specific overlapping periods when there is adequate precipitation, evapotranspiration, and flow data. In the absence of site-specific data for calibration and validation, calibrated model parameters from neighboring watersheds within the region could be used so long as proper justification is provided that said parameters are appropriate. However, it is not recommended that local studies rely upon calibrated parameters from other regions where soil characteristics and land use descriptions are markedly different. Rather, when calibration cannot be performed, general review and comparison of continuous simulation model outputs (e.g., hydrograph shape, AMS, etc.) to standardized event-based approaches could be performed to demonstrate that continuous simulation results are generally consistent with local standards and methodologies.

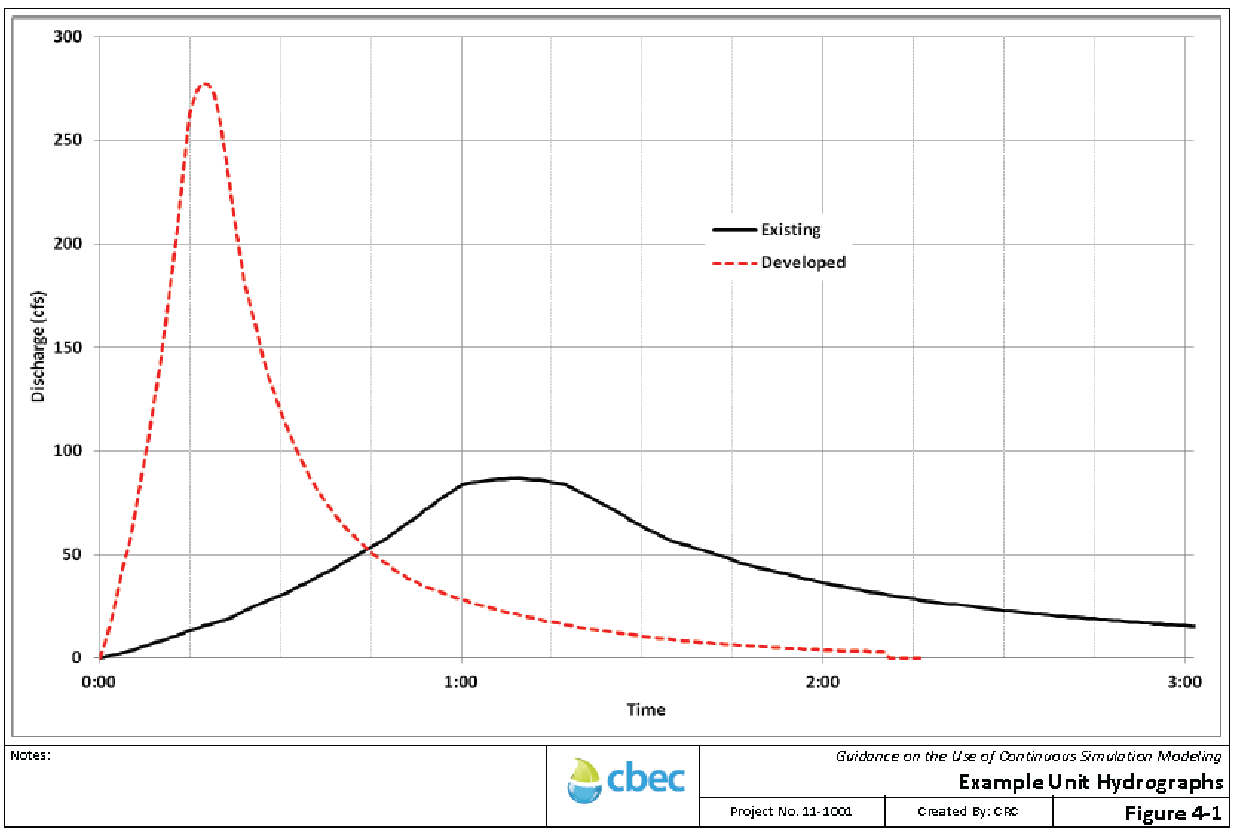

Figure 4-1. Unit Hydrograph Method

For example, continuous simulation modeling in Sacramento County for some developments has relied up conversion of SacCalc (HEC-1 pre- and post-processor) event-based models to the SMA method within HEC-HMS. This conversion often involves retaining the surface infiltration rate determined by SacCalc based on accepted land use descriptions, but parameterizing the subsurface based on soil survey information and local studies, using local potential evapotranspiration data, and reviewing model hydrographs for reasonableness.

HYDRAULIC MODEL CONSIDERATIONS

Sometimes hydraulic models are needed since the basic flow routing within the hydrologic models is not adequate to characterize the potential changes to the hydraulic and geomorphic character of the receiving waterbody, especially when instream measures are suggested or EP is used as the evaluation criteria. Potential considerations and issues encountered when developing and using hydraulic models for continuous simulation include:

1. Low flow instabilities can introduce anomalies into model output (which is commonly encountered in HEC-RAS), so careful hydraulic model selection is important for accuracy and efficiency
2. The sensitivity of the hydraulic model outputs (i.e., velocity and shear stress) to accurate hydraulic description of the receiving waterbody (i.e., cross section geometry (i.e., is it based on LiDAR influenced by vegetation or ground survey), proper definition of channel transitions, proper definition of channel bank markers, appropriate Manning's n-values, etc.)
3. Selection of appropriate compliance points that are representative of the reach and capture flow changes (e.g., downstream of points of discharge and not in backwater areas).

All of these issues have the potential to introduce error and subjectivity into long-term hydraulic analyses and care should be taken to systematically address each source of error.

GENERAL TIPS

A series of general tips are provided as follows. These can be used to increase efficiency and accuracy when performing CSM.

- To shorten the simulation time, the precipitation record can be truncated to only the rainy season (e.g., October through May) by removing the dry summer months from the simulation, especially in ephemeral systems where applicable.
- Hourly precipitation data does not prohibit the continuous simulation model from being run at a sub-hourly time step.
- Subwatershed delineation between existing conditions and developed conditions can often result in relatively large existing subwatersheds compared to relatively small developed subwatersheds. It is commonly known that smaller subwatersheds have flashier flows, so making existing and developed conditions subwatershed sizing consistent is recommended to provide a more meaningful comparison.

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APPENDIX B: APPLICATION OF SUITES OF MODELING AND ASSESSMENT TOOLS

Introduction. This appendix provides a discussion of four example "suites of tools" that can be used to perform predictive scientific assessments and address specific questions related to hydromodification assessment and management. The suites are changeable mixes of mechanistic models, statistical analyses, and expert scientific judgment that incorporate a number of the tools discussed in Chapter 4, combined in various ways. For example, some suites apply a series of cascading models, in which the output from one is used as input to the next; other suites apply a number of models in parallel to develop an assessment based on the weight of evidence. The suites of tools discussed below are used to perform a baseline stability assessment, a channel forming discharge analysis, an erosion potential analysis, and a sediment transport analysis. Most of these standard tools (with the exception of the erosion potential suite) have been widely employed in a variety of stream management activities for decades, and are considered essential components of the broader fluvial geomorphology toolbox. This is far from a comprehensive list of tools, as there are many other important tools (focused on both geomorphic and biologic endpoints) relevant to hydromodification management (Kondolf et al. 2003; Poff et al. 2010); however, the purpose of this appendix is to briefly illustrate how several standard tools can be integrated to answer key questions about stream responses and to provide a stronger technical basis for hydromodification management.

Application of these tools provides basic geomorphic data and knowledge that are typically needed to manage a stream for some desired future state in a watershed with changing land uses. This critical information comes at a cost—the tools require substantially more time and effort to apply than has been the norm in hydromodification management because they involve examining streams within their watershed context with a deeper level of geomorphic analysis. Stormwater management programs typically have made the "practical" assumptions that stream reaches can be managed in isolation from the larger systems of which they are a part, and that effective management prescriptions can be formulated with little or no substantive geomorphic analysis. ***These assumptions are in direct conflict with current understanding in fluvial geomorphology and stream ecology, which indicates that protection of stream integrity is often predicated upon careful assessments of geologic and historical context, performing detailed hydraulic and sedimentation analyses where appropriate, and developing basic understanding of streamflow-ecology linkages***. If hydromodification management policies are to have a reasonable chance of actually achieving their aims, then it will most likely be necessary to reject these simplifying assumptions and instead rely on approaches rooted in current scientific understanding of stream systems.

The suites of tools described below go beyond screening level assessments that are designed, in part, to identify which streams lend themselves to relatively straightforward management prescriptions versus which streams do not. For streams that do not lend themselves to generic management prescriptions, the level of analysis performed with these tools should increase with the level of risk and geomorphic / biologic susceptibility of the streams. This does not mean that every stream will require in-depth analysis by local permitting agencies. It is not possible to carry out sufficient geomorphic analyses with the tools illustrated below on a permit-by-permit basis, and local governments may lack the resources and/or technical capacity to effectively apply these tools. Instead, ***the vital information provided by these tools***

will need to be obtained through proactive regional studies that involve baseline assessments followed by progressively more in-depth analyses as necessary to provide local governments with a sound basis for effective project-by-project decision-making within a broader watershed management framework.

1. **Baseline Stability Assessment**. This suite of tools is designed to answer the following key questions:
   - What is the trajectory of the stream's form over time?
   - How has the channel form responded to changes in water and sediment supply over the years?
   - Is the channel close to a geomorphic threshold that could result in rapid, significant change in response to only minor flow alteration?
   - How can past channel responses provide insight into potential responses to future watershed change, and so aid in prediction of future hydromodification-induced changes?
   - What level of subsequent geomorphic analysis is appropriate given the complexity of the situation and the susceptibility of the streams of interest?

   The goals of a baseline stability assessment are to:
   - Document the historical trends of the system;
   - Establish the present stability status of the system and identify the dominant processes and features within the system;
   - Provide the foundation for projecting future trends with and without proposed project features;
   - Provide critical data for calibration and proper interpretation of models; and
   - Provide a rational basis for identification and design of effective alternatives to meet project goals.

   The key tools that comprise this suite include:
   - GIS mapping of topography, soils, geology, land use/land cover across the contributing watershed (e.g., Thorne 2002)
   - Analysis of hydro-climatic data, e.g. streamflow gauge records, changes in stage-discharge relationships over time (e.g., Thorne 2002)
   - Analysis of aerial photos and historical data (e.g., Thorne 2002)
   - Field reconnaissance (e.g., Thorne 1998)
   - Qualitative response (e.g., Lane 1955b, Schumm 1969, Henderson 1966 relations)
   - Classification systems - (e.g., Thorne 1997; Schumm et al. 1982; and channel evolution model developed for S CA by Hawley et al. in press)
   - Relationships between sediment transport and hydraulic variables
   - Regional hydraulic geometry (e.g., Hawley 2008; Haines in prep)
   - Regional planform and stability predictors (e.g., Hawley et al. in press, Bledsoe et al. in press, Dust and Wohl 2010)

- Bank stability analysis (e.g., BSTEM http://www.ars.usda.gov/Research/docs.htm?docid=5044, Hawley (2009), Bledsoe et al. in press, Osman and Thorne 1988; Thorne et al. 1998)
- Sediment budgets (Booth et al. 2010; Reid and Dunne 1996)
- Fluvial audit (Thorne 2002 – a comprehensive framework for performing baseline assessments)

A baseline assessment is completed by integrating information from all the available data sources and analytical tools. Analysis with each of the individual tools may yield a verdict of aggradation, degradation, or dynamic equilibrium with respect to the channel bed, and stable or unstable with respect to the banks. The individual assessments can produce contradictory results. In this case, one should assign a level of confidence to the various components based on the reliability and availability of the data, and the analyst's own experience level. As is often the case in the management of fluvial systems, there is no "cookbook" answer, and we must always incorporate sound judgment.

A process-based channel evolution model (CEM) is a particularly useful element of the baseline assessment process. A CEM aids in identifying the dominant processes and trends of channel change and provides a framework for subsequent, more detailed modeling (ASCE 2008). In some locations, CEMs have already been developed and calibrated with regional data. For example, the CSU / SCCWRP Screening Tool (Bledsoe et al. 2010) grew out of a regional CEM (Hawley et al. in press) and integrates several baseline assessment tools including regionally-calibrated braiding, incision, and bank stability thresholds, and sediment supply analysis with "Geomorphic Landscape Units" (Booth et al. 2010). In locations where a CEM has not been sufficiently defined, the baseline assessment suite of tools can provide the data and understanding needed to develop a regionally calibrated CEM.

The following are example outputs from a baseline stability assessment, including channel stability and bank stability diagrams associated with key geomorphic thresholds of management concern in the channel evolution sequence (i.e. braiding, incision, and bank failure):

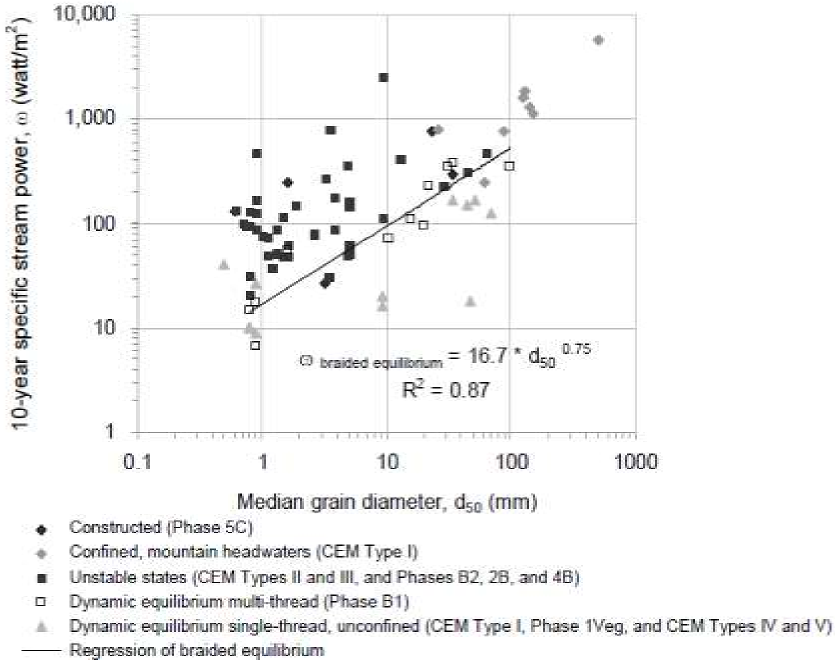

Figure B-1. Stability thresholds for channel types of southern CA, as identified through the development of a regional CEM (Hawley et al., in press).

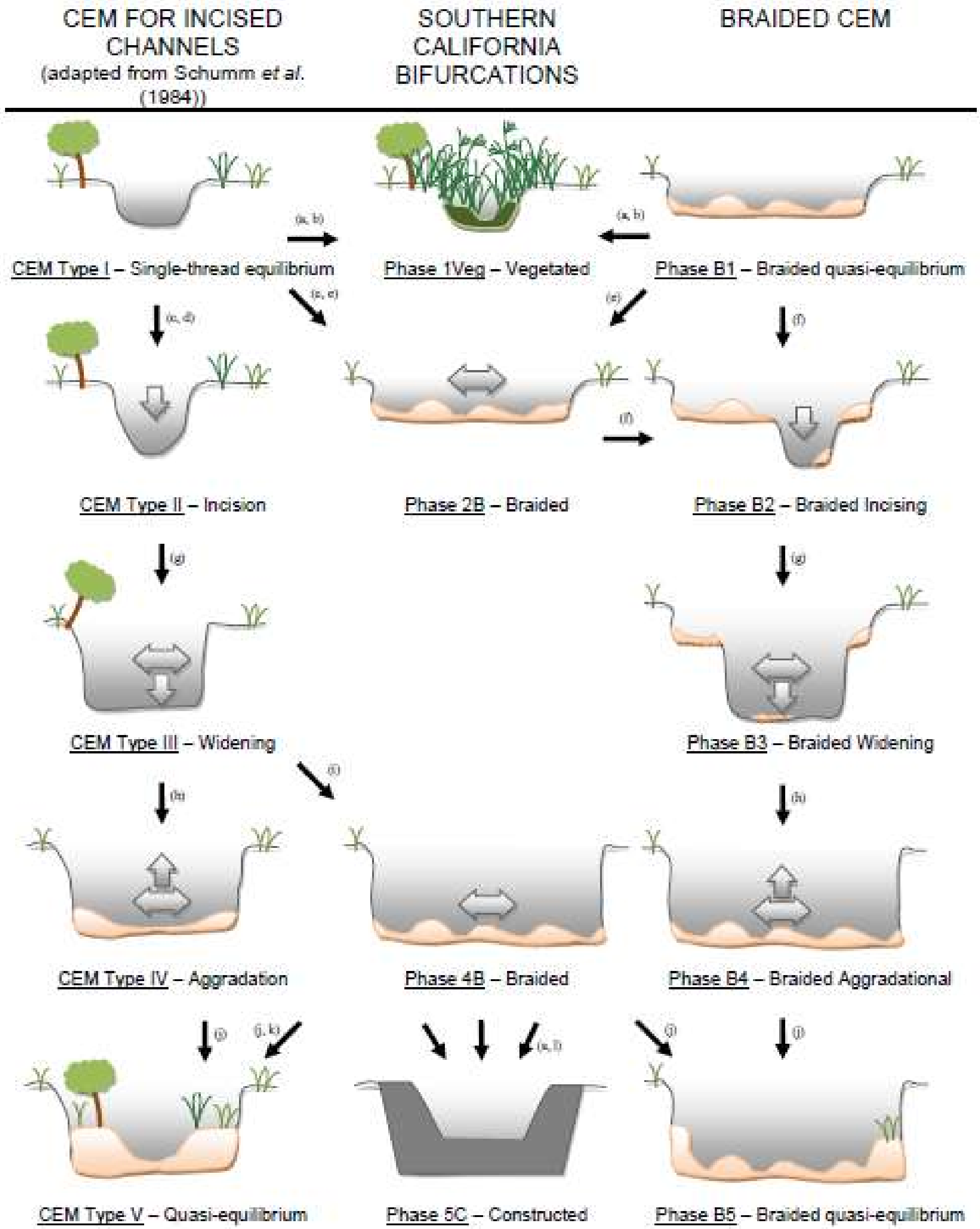

Figure B-2. Channel evolution model of response to hydromodification in southern California (Hawley et al. in press). Red and blue ovals highlight geomorphic thresholds that may be quantified using the baseline assessment suite of tools. By developing a general physical understanding of channel evolution sequences commonly observed in urbanizing watersheds of southern CA, two braiding thresholds and a bank stability threshold of management concern were identified. Channels may shift from single thread to braided planforms if widening is the dominant mode of initial adjustment. Alternatively, single thread channels may become braided after an initial period of incision that triggers geotechnical instability and failure of the banks. Quantitative predictors of these thresholds of braiding, incision, and bank failure can be developed in the baseline assessment process to evaluate the proximity of streams to these critical stages of channel evolution and instability.

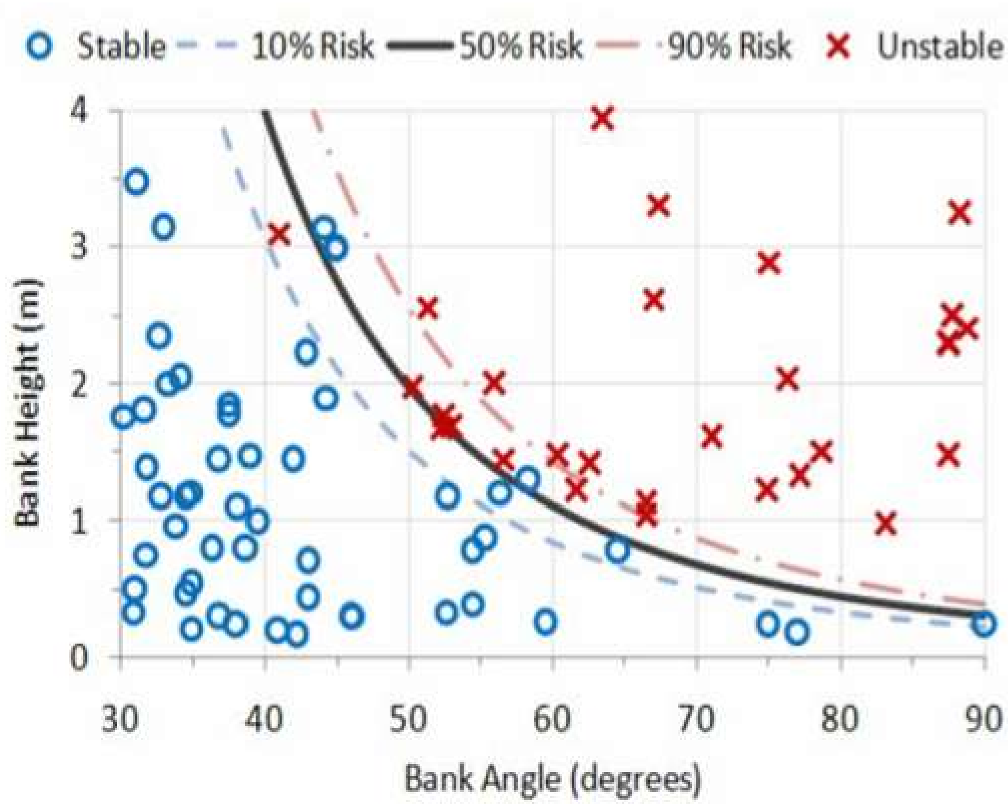

Figure B-3. Bank stability threshold for mass wasting identified through analysis of field data from southern California streams with stable and unstable banks (Bledsoe et al., in press).

2. **Channel-forming discharge suite of tools.** This suite of tools is designed to answer the following key questions:
   - What ranges of discharges are most influential in controlling channel form and processes over decadal time scales?
   - What channel-forming discharge should be used in sediment transport analyses to identify sediment transport capacity, equilibrium slope and geometry, etc.?

   The tools that comprise this suite include the following:
   - Effective discharge computations (e.g., Soar and Thorne 2001; Biedenharn et al. 2000; GeoTools – Bledsoe et al. 2007). An effective discharge analysis directly quantifies the range of discharges that transport the largest portion of the annual sediment yield over a period of many years.
   - Field identification of high water elevations, depositional surfaces, and “bankfull” features
   - Flood frequency analysis
   - Un-gauged site analysis (e.g. USGS StreamStats) http://water.usgs.gov/osw/streamstats/california.html; Hawley and Bledsoe (2011), regional flow duration curve extrapolation – Biedenharn et al. 2000)

This suite incorporates a number of parallel analyses that can be used to establish likely upper and lower bounds to the range of influential discharges, and that can be assessed through a weight-of-evidence evaluation. The following is an example output from the channel forming discharge suite of tools:

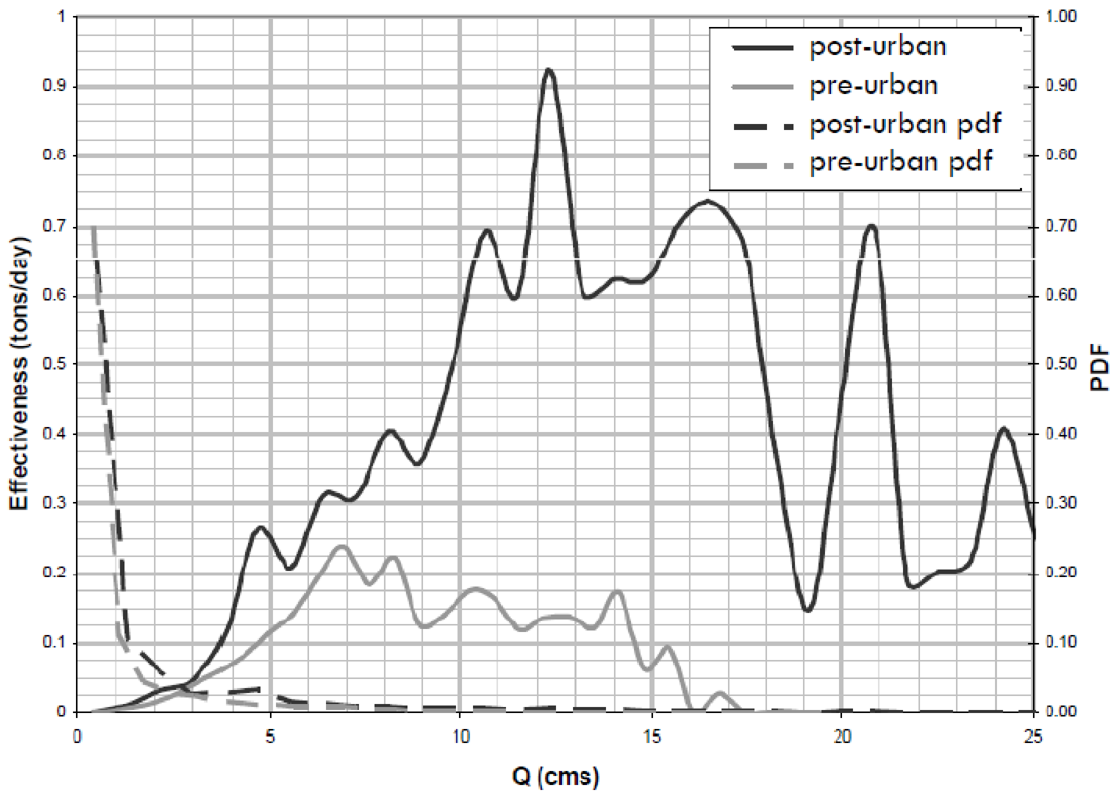

Figure B-4. Flow effectiveness curves for continuous series of pre-urban and post-urban discharges (Biedenharn et al. 2000; Bledsoe et al. 2007). Cumulative sediment yield is approximated by the area under the respective curves. If the stream bed is the most erodible channel boundary, the ratio of areas under these curves would be the erosion potential metric described below in the next suite of tools.

3. **Erosion potential suite of tools.** This suite of tools is designed to answer the following key questions:
   - How do proposed land-use changes or channel alteration affect the capacity of a channel to transport the *most erodible material in its boundary* over a period of many years (erosion potential – Ep)?
   - Do proposed mitigation approaches match the pre- vs. post- development erosion potential over the full spectrum of erosive flows?
   - Do past changes in erosion potential correspond to different states of channel stability and degradation in this region?
   - Does a proposed change in streamflow make it more likely that a channel will enter an alternative / degraded state?

The underlying premise of the erosion potential approach advances the concept of flow duration control (discussed in Chapters 2 and 3) by addressing in-stream processes related to sediment transport. An erosion potential calculation combines flow parameters with stream geometry to assess long term (decadal) changes in the sediment transport capacity. The cumulative distribution of shear stress, specific stream power and sediment transport capacity across the entire range of relevant flows can be calculated and expressed using an erosion potential metric, Ep (e.g., Bledsoe, 2002). This erosion potential metric is a simple ratio of post- vs. pre-development sediment transport capacity over a period of many years. The calculated capacity to transport sediment can be based on the channel bed material or the bank material, depending on which one is more erodible.

This Ep suite of tools has been applied in two primary ways:

a) At a project-level analysis, it has been applied to answer the first two questions above. A municipal stormwater permit may require a project design to achieve an erosion potential (Ep) value of 1.0. This means that a project must be designed so that the long-term erosion potential of the site's stormwater discharge is equal to the erosion potential of the pre-development condition. Section 3.1 below explains the process by which this analysis is conducted.
b) At a regional level, this suite of tools can be applied to answer the third and fourth questions above and to provide further guidance to project-level assessments. For example, practical engineering considerations generally require that a tolerance be permitted around a target design value. It is unlikely that a project design can match an Ep target of 1.0 across all conditions and through all stream reaches, due to variations in a multitude of contributing factors. The selection of an acceptable tolerance or variance from 1.0 is a management decision that should be informed by regional data presented in a risk-based format. Section 3.2 below explains how such a study has been conducted, using the Santa Clara Valley example from northern California.

3.1. *Project-Level Analysis.* As applied to the analysis of project impacts and mitigation design, the steps and associated tools that comprise this suite include the following (Figure B-5):

- Perform continuous simulation of hydrology (e.g. SWMM, HEC-HMS, HSPF) for the project site, for both pre-project condition and post-project condition with the proposed mitigation design.
- Convert discharges and field surveys to hydraulic parameters (shear stress and specific stream power) – e.g., for uniform flow analysis use Manning's equation, GeoTools; for varied flow analysis use HEC-RAS
- Convert hydraulic parameters into sediment transport capacity – e.g., at-a-station hydraulic geometry, HEC-RAS, GeoTools, sediment transport relationships (bedload and total load)
- Integrate Ep over time – e.g., GeoTools

- Compare Ep values for pre-development and post development to determine if the proposed mitigation design is adequate. Adjust stormwater controls as necessary to meet target Ep.

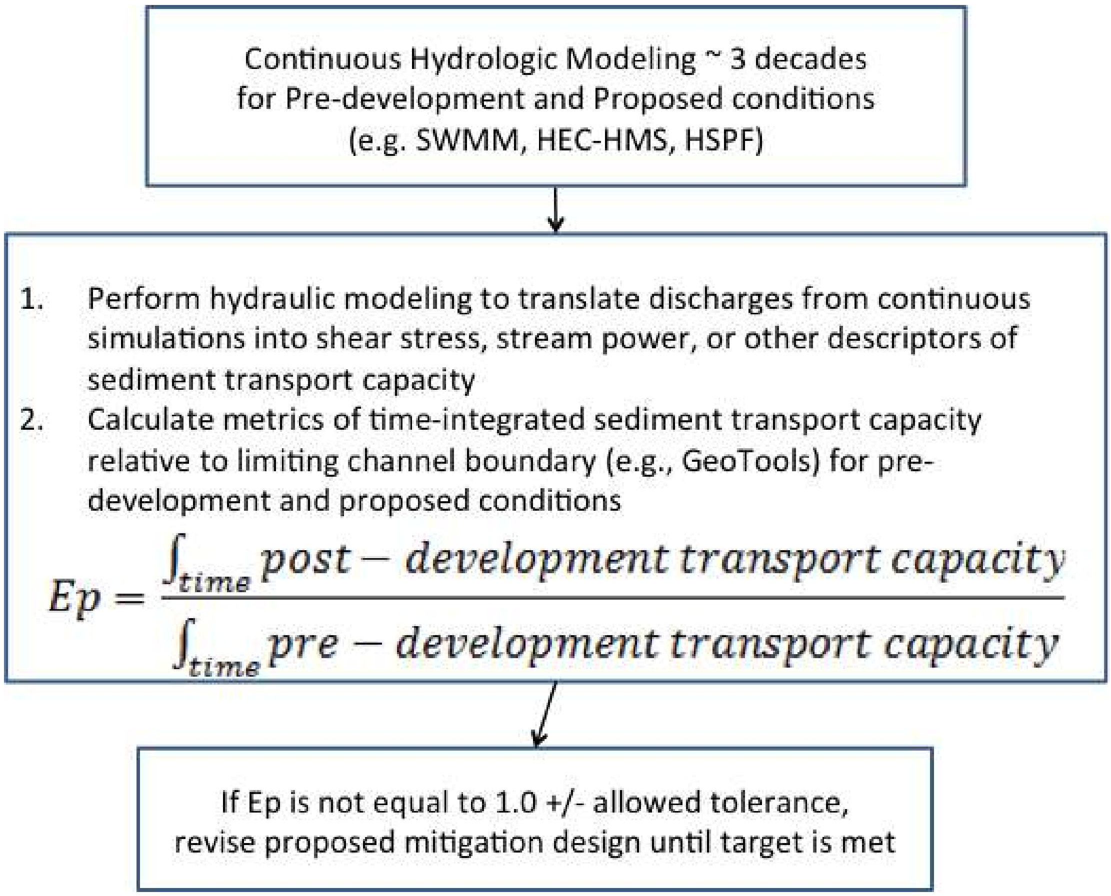

Figure B-5: Steps involved in a project-level Erosion Potential analysis

3.2. *Risk-Based Regional Analysis*. Risk-based modeling estimates the probability of stream geomorphic states. Decision-makers can then choose acceptable risk levels based on an explicit estimate of prediction error. The foundation of risk-based modeling in the context of hydromodification management is the integration of hydrologic and geomorphic data derived from the output of continuous hydrologic simulation models to generate metrics describing expected departures in the most important stream processes. These physical metrics are provided as inputs to probabilistic models that estimate the risk of streams shifting to some undesirable state. Because the decision endpoint is often categorical (e.g., stable, good habitat) the statistical tools of choice are often logistic regression, classification and regression trees (CART), and/or Bayesian probability networks.

The steps below are used to develop a risk-based framework (Fig. B-6) for assessing how hydromodification may impact streams within a region, and for understanding the relationships between deviation from an Ep of 1.0 and the likelihood of channel instability. Illustrating figures are taken from a risk-based approach was used in the development of the Santa Clara Valley Urban Runoff Program Hydromodification Management Plan (www.SCVURPPP.org). This study demonstrated that a time-integrated index of erosion potential based on continuous hydrologic simulation and an assessment of stream power relative to the erodibility of channel boundary materials could be used to distinguish between channels of a particular regional type that are stable vs. degraded by hydromodification in urban watersheds.

- Perform project-level analysis as described in section 3.1 above for existing developments throughout the study watersheds.
- Perform stream surveys throughout the study watersheds to characterize condition (i.e., stable, unstable)
- Create statistical relationships between Ep and different channel states – e.g., logistic regression in R, SAS, Statistica, Minitab, etc. Note that standard regression techniques are applied when the dependent variable and the explanatory variables are quantitative and continuous. To analyze a binary qualitative variable (e.g., 0 or 1, stable or unstable, healthy or degraded) as a function of a number of explanatory variables, alternative techniques must be used. The regression problem may be revised so that, rather than predicting a binary variable, the regression model predicts a continuous probability of the binary variable that stays within 0–1 bounds. One of the most common regression models that accomplishes this is the logit or logistic regression model (Menard, 1995; Christensen, 1997).

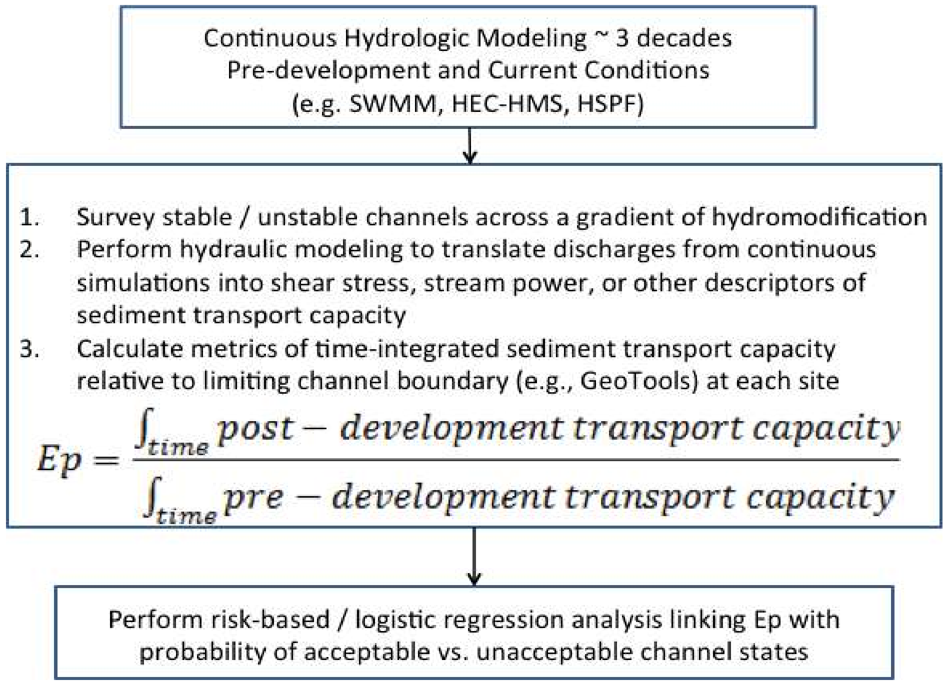

Figure B-6: Steps involved in a Risk-Based Erosion Potential analysis

The variables included in risk-based models of stream response are not limited to erosion potential. Additional multi-scale controls could be included. For example, simple categories of physical habitat condition and ecological integrity could be predicted by augmenting erosion potential metrics with descriptors of the condition of channel banks and riparian zones, geologic influences, floodplain connectedness, hydrologic metrics describing flashiness, proximity to known thresholds of planform change, and BMP types. Furthermore, although most of the emphasis to date has been on predicting geomorphic endpoints, the risk-based approach can be extended to the prediction of biological states in urban streams if the necessary data are available.

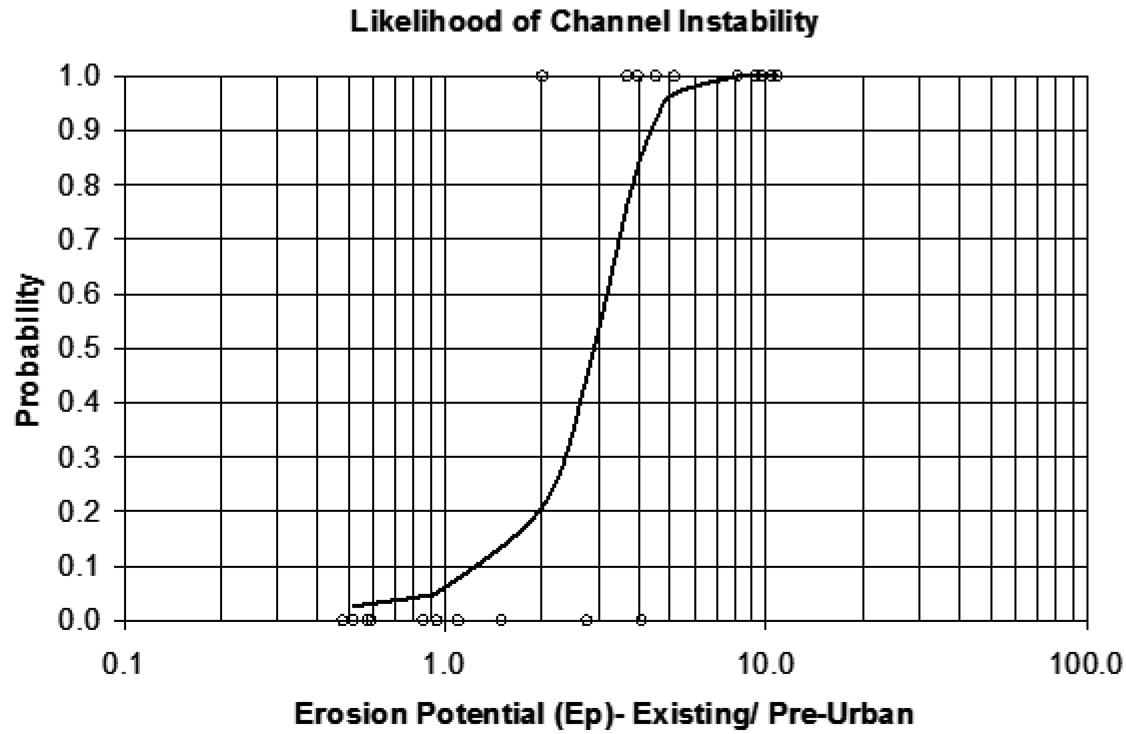

Figure B-7: Example of a logistic regression analysis of stable vs. unstable channels (Bledsoe and Watson, 2001; Bledsoe et al., 2007). The vertical axis represents the probability of stream instability which increases rapidly for channels with sediment transport capacity increased by urban hydromodification (Ep > 1).

3.3. *Strengths and Limitations.* The Erosion Potential approach combines a sound physical basis with probabilistic outputs and requires a substantial modeling effort. Such an effort is necessary to adequately characterize the effects of hydromodification on the stability of streams that are not armored with very coarse material such as large cobbles and boulders. Although policies based on this approach should reduce impacts to channel morphology, they may still fail to protect stream functions and biota. Key simplifying assumptions and prediction uncertainty in the inputs (hydrologic modeling, assumptions of static channel geometry in developing long term series of shear stresses or stream powers, assumptions of stationarity in sediment supply, etc.) have not been rigorously addressed. Its effectiveness also depends on careful stratification of streams in a region such that fundamentally different stream types are not lumped together (e.g. labile sand channels vs. armored threshold channels with grade control) in developing general relationships for instability risk. Endpoints to date have been rather coarse, e.g. stable vs. unstable; as such, they do not provide sufficient resolution for envisioning future stream states. However, the Erosion Potential approach provides promise as an important tool for hydromodification management; it is recommended that it be refined to address sediment supply changes and to provide more finely resolved endpoints for improved predictive capabilities.

4. **Sediment transport analysis suite of tools.** This suite of tools is designed to answer the following questions:
    - Do I need to incorporate sediment transport analysis in predicting channel response to hydromodification, i.e. what is the sensitivity of channel slope and geometry to inflowing sediment load?
    - At what discharges are different fractions of bed material mobilized in a particular stream segment?
    - What is inflowing sediment load to a stream segment, i.e. what is the water discharge Q(t) and sediment supply rate Qs(t) and grain size D(t) delivered to the upstream end of the channel segment of interest?
    - How will the available flow move the supplied sediment through the segment of interest?
    - What is the new equilibrium slope given some change in streamflow, and how much incision would be necessary to achieve this new slope?
    - What is the sediment transport capacity of the segment of interest *relative to* the inflowing sediment load from *upstream* supply reaches?
    - What is the sediment transport capacity of the segment of interest *relative to* the capacity of *downstream* reaches?
    - At the network scale, where are zones of low vs. high energy, aggradation vs. degradation potential, and coarse sediment constriction located?

    The primary tools that comprise this suite include the following:
    - Tools for estimating watershed sediment supply (Reid and Dunne 1996), including the RUSLE (Renard et al. 1997; http://www.ars.usda.gov/Research/docs.htm?docid=5971) and WEPP (Laflin et al. 1991; http://www.ars.usda.gov/Research/docs.htm?docid=10621) models.
    - Effective discharge analysis (see above)
    - Incipient motion analysis (tractive force, e.g. ASCE 2008; Brown and Caldwell 2011; Buffington and Montgomery 1998; Lane 1955a)
    - Sediment continuity analysis at single dominant discharge with an appropriate sediment transport relation – e.g., HEC-RAS, Bedload Assessment for Gravel-bed Streams (BAGS -Pitlick et al. 2009; GeoTools)
    - Equilibrium slope / geometry analysis e.g., HEC-RAS – Copeland et al. 2001, iSURF-NCED 2011)
    - Sensitivity to inflowing sediment load analysis e.g., Copeland's method in HEC-RAS, iSURF-NCED 2011)
    - Sediment continuity analysis over the entire flow frequency distribution e.g., Capacity-Supply Ratio of Soar and Thorne (2001), BAGS, GeoTools

- Network scale sediment balance – Sediment Impact Analysis Methods (SIAM) module in HEC-RAS

Movable bed / mobile boundary models also provide a mechanistic tool for estimating the trend and magnitude of changes in channel geometry due to hydromodification. However, a recent study evaluated the potential applicability of various movable bed and/or boundary models to streams in southern CA (Dust 2009), including HEC-RAS, CONCEPTS (Langendoen, 2000), and FLUVIAL 12 (Chang, 2006). The results of tests performed on urban streams in southern CA indicate that these models are difficult to apply and have high prediction uncertainty due to flows near critical, split flow conditions, and lack of fidelity to complex widening, bank failure, and armoring processes.

The following figures depict example outputs from an application of the sediment-transport suite of tools:

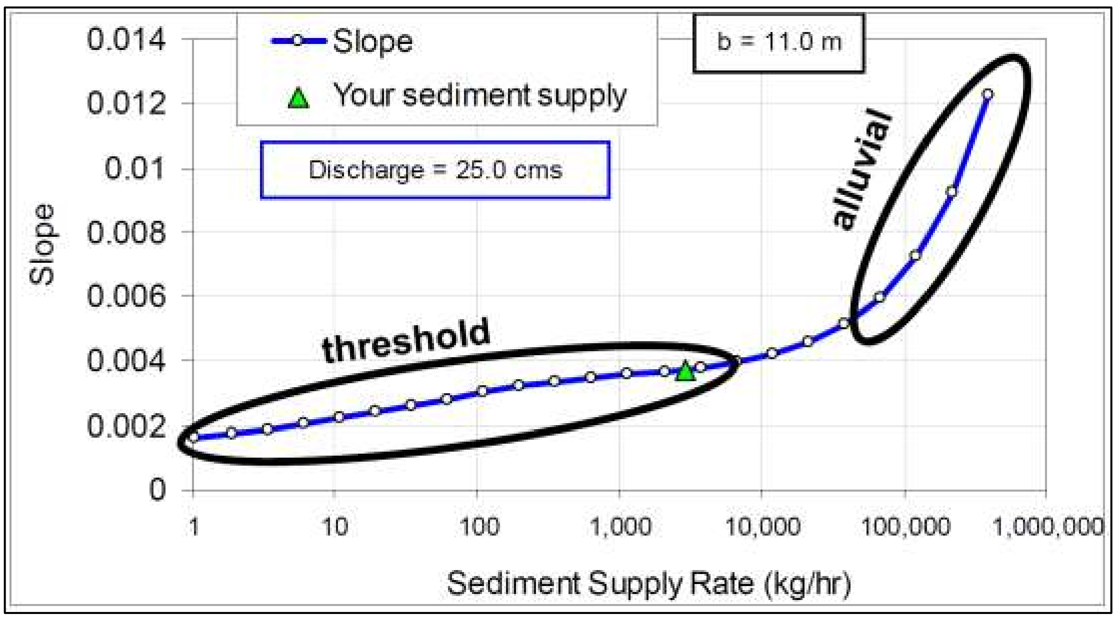

Figure B-8. Sensitivity analysis of equilibrium channel slope to inflowing sediment load (from iSURF, NCED 2011). Slopes of alluvial channels with high sediment supply are much more sensitive than threshold channels with relatively low sediment supply. Channels with beds composed of sand and fine gravels are generally much more geomorphically sensitive to hydromodification than threshold channels in which coarse bed sediments are primarily transported at relatively high flows.

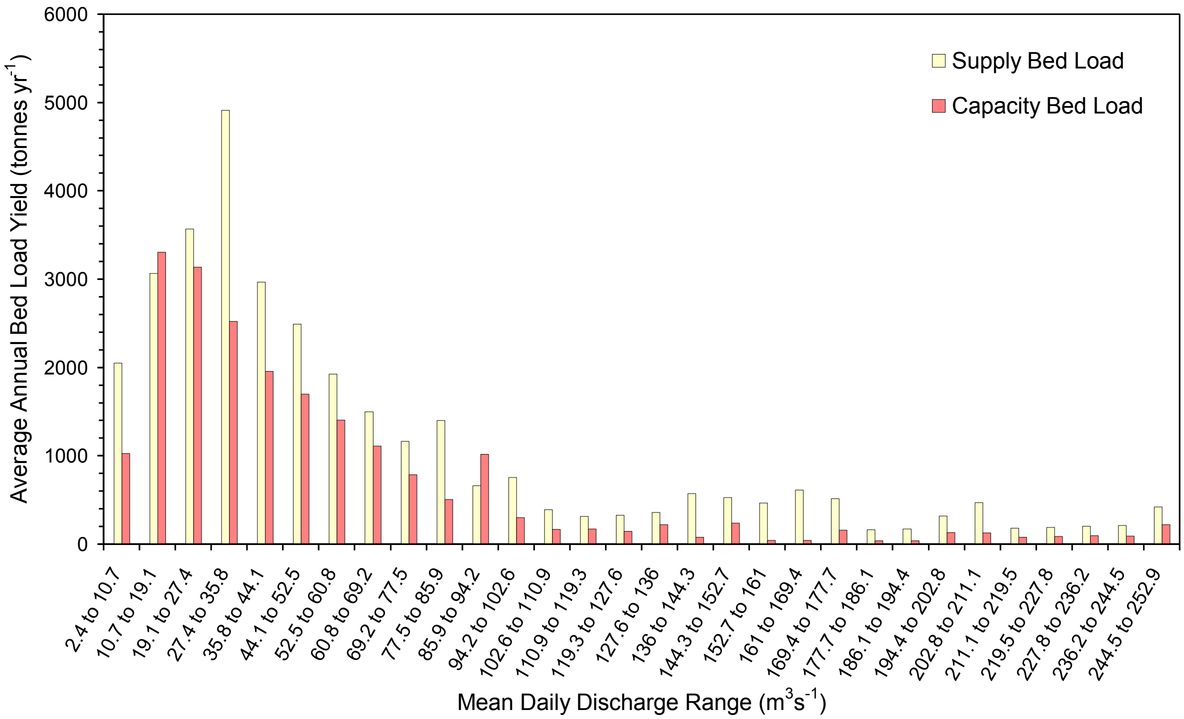

Figure B-9. Analysis of sediment transport capacity vs. inflowing sediment load over the full spectrum of stream discharges (capacity-supply ratio; Soar and Thorne 2001). In this case, the time-integrated capacity to transport bedload is 64% of the supplied bedload and significant aggradation is expected.

5. **Relationship to Management Framework**. These suites of tools could be applied to establish project-specific requirements for hydromodification assessment and mitigation, as recommended in the Management Framework presented in Chapter 3. In the example shown in the diagram below, results of the Baseline Assessment are used as a screening tool to assign high, moderate or low risk levels for stream reaches, in conjunction with the proposed land-use changes. Thus, the Baseline Assessment suite of tools is crucial in determining whether a detailed survey-level assessment and additional suites of tools are necessary for an adequate analysis. The need to apply additional suites of tools in formulating a management approach is commensurate with the level of risk and susceptibility of the stream. More complex and rigorous analysis with multiple suites of tools is necessary in predictive assessments for relatively susceptible stream types such as alluvial channels with sand beds.

   Although a stream may have relatively low susceptibility for overall geomorphic change, it may nevertheless have ecological attributes that are highly susceptible to hydromodification. Thus, suites of tools focused on both geomorphic and biological endpoints must be used to fully assess stream susceptibility to hydromodification. More work will be required to develop tools for prediction of biological response to flow alterations throughout California, as noted in Chapter 3 (see Poff et al., 2010 and http://conserveonline.org/workspaces/eloha).

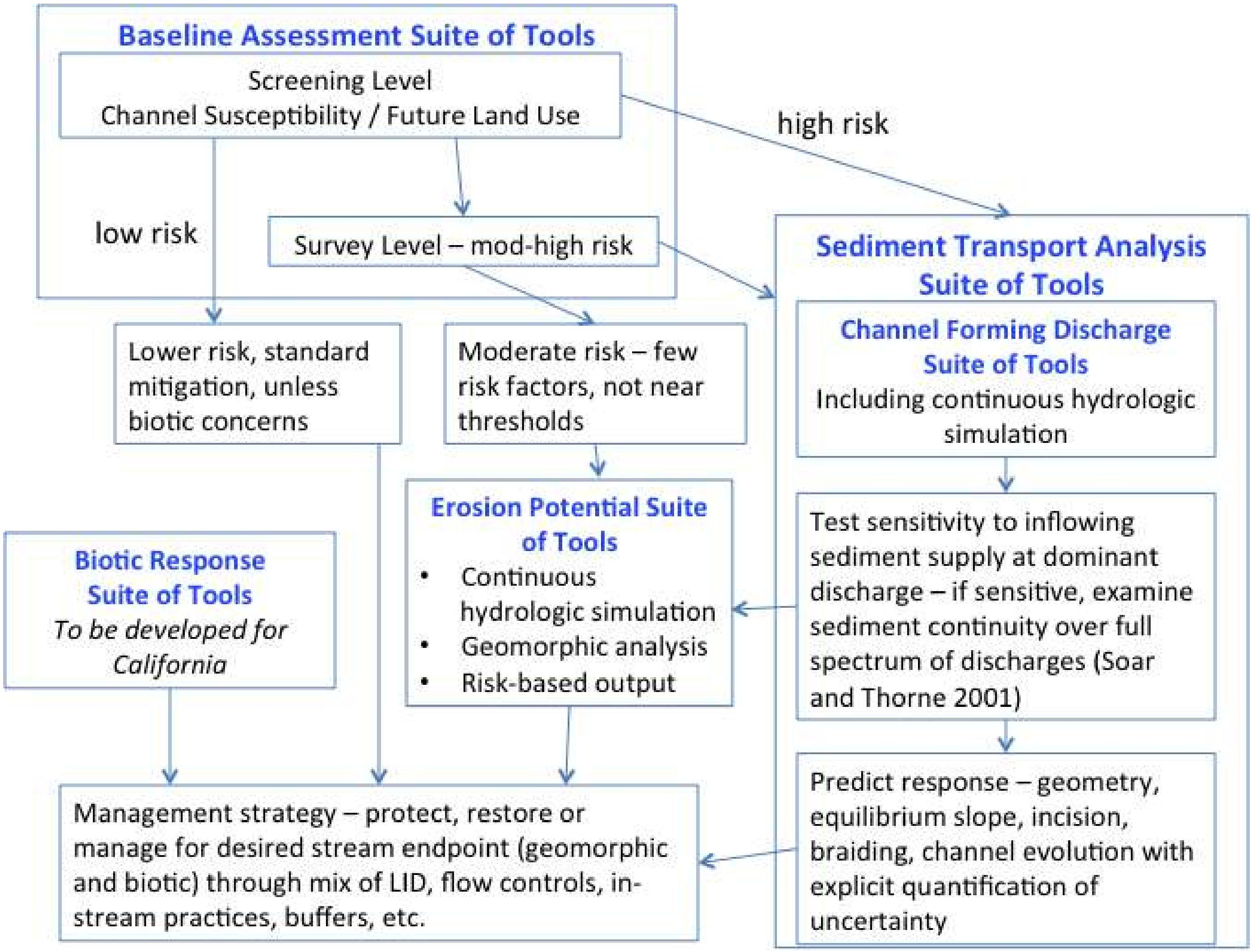

Figure B-10. Conceptual diagram showing relationships among the four suites of existing tools and biotic response tools to be developed in the future. Additional analyses will be required for engineering design.

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APPENDIX C: ADAPTIVE MANAGEMENT

WHAT IS ADAPTIVE MANAGEMENT

Adaptive management is a formalized approach for overcoming the inescapable difficulty in predicting ecological outcomes resulting from natural-resource management actions. It accomplishes this by treating all "management actions" (whether intentional or not) as experimental components within the larger structure of a monitoring program (Holling 1978, Walters 1986, Lee 1999, Ralph and Poole 2003). In other words, specific management actions that may affect ecological processes and functions are systematically evaluated, via "monitoring," to provide the data to affirm or refute the expected outcomes. To the extent that the monitoring results indicate a need to revise the scientific understanding or the management actions built on that understanding, establishing the mechanism to change management actions is a precursor, not an afterthought, of the monitoring program.

Adaptive Management was first articulated over 30 years ago (Holling, 1978) and more recently embraced through various conservation efforts worldwide. Fundamental to this approach is the integration of management and monitoring, recognizing that any management action in the context of a complex ecological system is ultimately experimental, requiring feedback to make progress.

The process of adaptive implementation is iterative and continuous; new knowledge is actively incorporated into revised experiments, a practice best described as "learning while doing" (Lee 1999). The key difference between this approach and other commonly implemented environmental management strategies is the application of scientific principles, such as hypotheses-testing,[is used] to explicitly define the relationships between policy decisions, management actions, and their measured ecological outcomes. Furthermore, this approach provides a means to understand and document these cause-and-effect relationships; it can also point to alternative actions that may produce more desirable outcomes. Uncertainty is embraced and serves as a focal point for defining ever-more specific evaluations.

Scientifically credible and relevant information can only be generated when the management "experiments" are designed with clear hypotheses about the effects of proposed actions or prescriptions. These hypotheses must be testable at multiple scales using available technology and methods (Conquest and Ralph 1998; Currens *et al*. 2000). Hypotheses that cannot be tested, are trivial (e.g., "water flows downhill"), are not credible ("water flows uphill"), or only account for site-specific conditions are not useful in considerations of the singular or cumulative effects of management actions.

In order to retain clear linkages between key questions, hypotheses, and monitoring protocols, the experimental approach must be designed before determining which goals and endpoints are appropriate (Ralph and Poole 2003) since appropriate goals should be *outcomes* of the effort, not a precondition; and the approach must explicitly tie stated hypotheses to the key ecological questions.

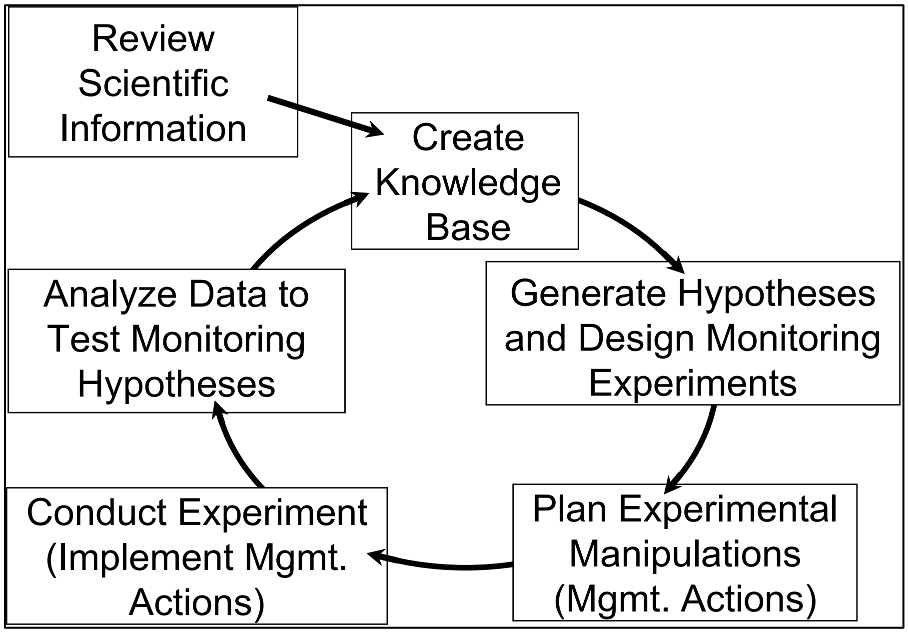

Figure A-1. Framework for an adaptive management program. The key feature of this cycle is the foundation of scientific principles and hypothesis generation; design of the management actions and the monitoring to evaluate their effects are integrated and designed to test assumptions, improve understanding, and reduce uncertainty (modified from Ralph and Poole 2003, Figure 3).

Wagner (2006) asserts that [stormwater] regulatory programs in the past often failed because they were designed in ways that ignored technological and scientific limitations. "Science-based" does not simply mean the monitoring of status and trends followed by responding to imposed benchmarks and goals, but rather that scientific principles must be the foundation of regulatory program design, and that these programs must rely on scientific methods to demonstrate results. Wagner suggests that regulations can still be designed despite incomplete or developing knowledge, but that gaps and limitations must be acknowledged and used to inform ongoing investigations. His argument clearly echoes those of scientists who insist that monitoring experiments and testable hypotheses must frame management decisions and land-use objectives.

WHAT IS *NOT* ADAPTIVE MANAGEMENT, AND WHY IS IT SO PROBLEMATIC?

Unlike the experimental approach embodied by adaptive management, an alternative process traditionally dominates in natural resource management: (1) a problem is identified, but a cause is simultaneously presumed (e.g., "increased sediment inputs into a stream are negatively impacting salmonid survival"); (2) a solution or set of solutions is proposed (e.g., timber harvest is restricted and riparian buffer width is increased), but the prescription is not translated into a testable hypothesis associated with the problem or question; and (3) if the problem is not solved within an arbitrarily reasonable period of time (e.g., a few years) then a different solution is proposed (e.g., "augmented upland and riparian restoration must be implemented"). Although simplified, this outline displays its divergence from adaptive management and from the basic principles of the scientific process—the resulting process is perpetually reactive.

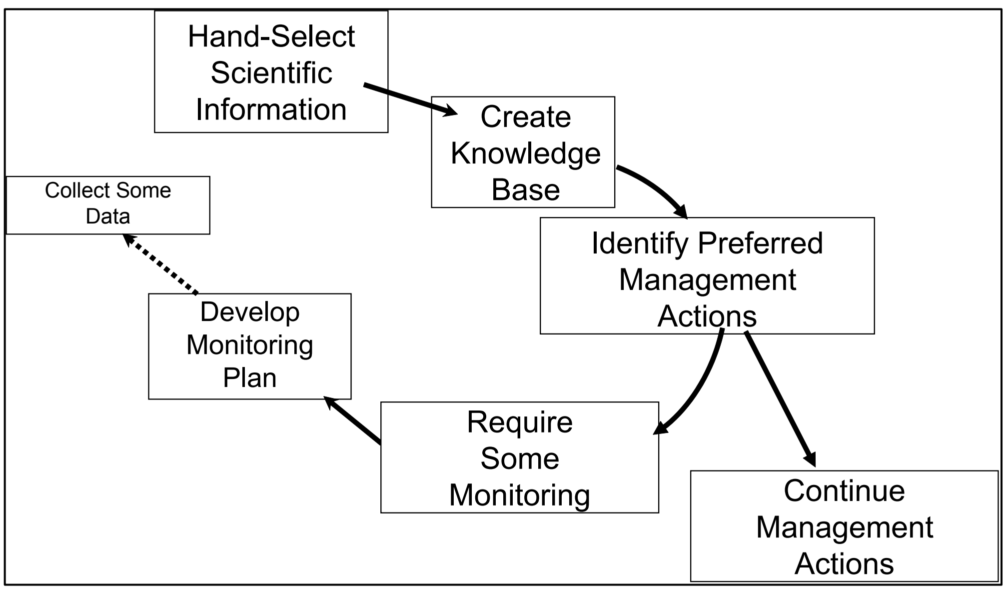

Figure A-2. Common framework for monitoring outside of an adaptive management structure. Management actions are chosen with a presumptive effect on ecological systems, and monitoring is conducted without any feedback to future actions. Even where monitoring is intended to "inform" future management actions, the absence of an explicit experimental design normally limits the utility of any monitoring data to provide meaningful insights.

In its best form, this paradigm has been termed passive adaptive management:

> Restoration planners' current management approach has been described as a "passive" adaptive management approach: science is used to

> develop best-guess predictive models, make policies according to these models, and revise them as data become available. The National Academies advise that every effort be made to take a more "active" adaptive management approach by developing alternative hypotheses for the expected consequences of a particular project and then design the project so the hypotheses can be experimentally tested" (from the summary to *Adaptive Monitoring and Assessment for the Comprehensive Everglades Restoration Plan*, 2003, National Academies Press, 122 pp.).

Ralph and Poole (2003) have aptly named this approach "socio-political adaptive management" (i.e., SPAM).

BARRIERS TO IMPLEMENTING "ACTIVE" ADAPTIVE MANAGEMENT

Although the virtues of active adaptive management are readily articulated, the framework is surprisingly rare in practice. Some of these barriers are practical or logistical, and they include such issues as:

- Longevity and long-term institutionalization of monitoring;
- Effective data management systems that allow managers to readily access data;
- Ability to differentiate effects from natural variability and events, such as flood and fire;
- Cost and technical limitations of necessary data collection.

The most severe impediments, however, are not scientific but social: "We suggest that watershed-scale adaptive management must be recognized as a radical departure from established ways of managing natural resources if it is to achieve its promise... Adaptive management encourages scrutiny of prevailing social and organizational norms and this is unlikely to occur without a change in the culture of natural resource management and research" (Allan et al. 2008).

While science can provide defensible and replicable insights regarding the ecological outcomes of management prescriptions, it cannot offer absolute certainty. Policy can be and should be informed by science but is ultimately based on a variety of considerations that are not always amenable to the spatial, temporal, and technological limitations of the scientific process (Van Cleave et al. 2004). This is an uncomfortable truth for agency managers and elected officials to acknowledge, and it commonly results in funding decisions and public pronouncements using the "language" of science but not its substance.

Although efforts to build large, collaborative programs are commonly characterized by increasing stakeholder involvement and outreach, greater participation does not necessarily mean that true adaptive management is occurring, or that scientific principals are being applied to either the choice of management actions or their evaluation. These efforts, however, do reflect a movement to extend natural resource management decision-making processes beyond just technical experts in order to reflect evolving social values (Pahl-Wostl *et al*. 2007). If they are successful, this approach can open a path to achieving the best of both realms, namely scientific rigor with a broad base of community support.

ATTRIBUTES OF USEFUL HYPOTHESES FOR AN ADAPTIVE MANAGEMENT PROGRAM

A key element of any adaptive management approach is the set of hypotheses that guide both the management actions and their associated monitoring. Because these management actions are recognized as "experimental" (because in a complex system most outcome(s) cannot be predicted with absolute certainty), their selection must be guided by assumptions about what *might happen,* or what is *expected* to happen. This defines the first attribute of a useful hypothesis: it is **credible**, typically because it is based on prior knowledge or scientific understanding of the system. Indeed, some hypotheses may already be so well evaluated and understood (e.g., "Stormwater runoff from freeways carries measurably elevated concentrations of toxic pollutants") that there is little point in framing them in this structure at all—as new monitoring programs to address such hypotheses are highly unlikely to result in new information or knowledge and might be perceived as an unwise expenditure of scarce monitoring resources.

The second attribute of a useful hypothesis stems from the scientific reality that any experiment, whether conducted in the laboratory or across the landscape, provides value only insofar as its outcomes are measured and the effects are distinguishable from the influence of other, unrelated factors. Thus, the hypothesis that guides the experiment should not only be credible but also **testable**. Otherwise, why bother making measurements at all?

Lastly, these actions and measurements and analyses do not occur in a vacuum. Thus, the final guiding principle for any hypothesis in an adaptive management approach is that it be **actionable**, or that different outcomes, as revealed by monitoring, can (and will) result in different management responses. If no difference occurs, then clearly there is no reason to have made the effort in the first place.

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ATTACHMENT A

ORANGE COUNTY LEGAL &TECHNICAL COMMENTS ON
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
TENTATIVE ORDER No. R9-2013-0001
NPDES NO. CAS0109266

Appendix A-3

2009 Presentation to Santa Ana Regional Board

Storage and Reuse Systems for Stormwater Mangement

Preliminary Cost and Performance Estimates for Residential Land Use in Irvine, CA

Eric Strecker, P.E.

Geosyntec consultants

Summary of Study

- Compared hypothetical scenarios for rainwater harvesting and reuse systems (cisterns)
  - single lot scenario
  - 100 ac neighborhood scenario
- Compared resulting costs and for both scenarios
- Performed modeling (long term simulation) analysis for neighborhood scenario
- Evaluated water quality loading differences between rainwater harvesting and reuse systems and typical bioretention installation for single family residential
- Performed preliminary review of applicable codes

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Rainwater harvesting and Reuse Systems

Impervious Area

- Roof tops
- Driveways
- Streets

Stormwater Conveyance and Pretreatment

- Pipes
- Filters

Storage

- Cistern
- Storage Basin
- Underground Vault

Treatment

- UV treatment
- Filtration

Pumping and Piping

- Pipes back to house (purple)

Indoor Use and Irrigation

- Toilet flushing
- Yard and Garden irrigation

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Single Lot Scenario

- Two reuse demands were examined: 1) indoor use only (toilet flushing), and 2) indoor and outdoor use (toilets and irrigation)

- Lot Characteristics:
  - 0.1 acres
  - 69% impervious area
    - Roof area - 2400 ft^2
    - Other (patio) - 600 ft^2
  - 3.5 people/house
  - Toilet use/capita = 18.5

- Method assumptions:
  - Rational Method
    - Impervious Runoff Coeff. (0.9)
    - Precipitation Depth – 0.8 in (85th percentile for large parts of Orange County)
    - Toilet use / house = 65 gal/day
    - Irrigation /house = 77 gal/day (Avg. from Irvine Water District data)

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Single Lot Scenario Results

Water Collected From:	Roof	Roof + Other Impervious area
Demand Scenario	**Average Drawdown Time (days)**	
Toilets only	17	21
Both Toilets & Outdoor uses	7.6	9.5

Note: Outdoor demand assumes that irrigation demand is immediate; more sophisticated modeling would allow more accurate characterize of irrigation demand, but for purposes of this analyses, it was assumed to be immediate. This likely significantly overstates the demand for irrigation.

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Neighborhood Scenario

- Two reuse demands were examined: 1) indoor use only (toilet flushing), and 2) indoor and outdoor use (toilets and irrigation)

- Neighborhood Properties:
  - 100 acres – 60 % impervious
  - 0.1 acre lots at 4.5 du/ac = 450 houses
  - 3.5 people/house
  - Toilet use/capita = 18.5
  - Basin used to store runoff

- Method assumptions:
  - Rational Method
    - Impervious Runoff Coeff. (0.9)
    - Precipitation Depth – 0.8 in (85th percentile for large parts of Orange County)
    - Toilet use / house = 65 gal/day
    - Irrigation /house = 77 gal/day (Avg. from Irvine Water District data)

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Neighborhood Scenario Results

Demand Scenario	Average Drawdown Time (days)
Toilets only	45
Both Toilets & Outdoor uses	10

Note: Outdoor demand assumes that irrigation demand is immediate; more sophisticated modeling would allow more accurate characterize of irrigation demand, but for purposes of this analyses, it was assumed to be immediate. This likely significantly overstates the demand for irrigation.

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General Cost List

Item	Description	Cost	Reference/Source
TANKS			
Galvanized steel	200 gal	$225	Fairfax County, 2005
Polyethylene	165 gal	$160	Fairfax County, 2005
Fiberglass	350 gal	$660	Fairfax County, 2005
Plastic	800 gal	$400	Plastic-mart.com
Plastic	1100 gal	$550	Plastic-mart.com
Plastic	1350	$600	Plastic-mart.com
Plastic cone	1500 gal w/metal stand	$1500	Plastic-mart.com
Plastic	2500 gal	$900	Plastic-mart.com
Plastic	5000 gal	$3000	Plastic-mart.com
Plastic	10000 gal	$6000	Plastic-mart.com
[1] Dry Det. Basin(1997)	$C = 12.4V^{0.760}$: for 1 ac-ft	$41,600	stormwatercenter.net
[2] Below Ground Vault	$C = 38.1 (V / 0.02832)^{0.6816}$	$55,300	fhwa.dot.gov
Concrete	1,000,000 gal above g. (O&P)	$548,000	RSMeans
Steel	1,000,000 gal above g. (O&P)	$467,000	RSMeans
TREATMENT			
UV (house-scale)	Whole system - 12 gpm	$700-$900	rainwatercollection.com
UV bulb	Life: 10,000 hrs or 14 months	$80-$110	rainwatercollection.com
UV (neighborhood-scale)	Whole system - 200 gpm	$10,000	Bigbrandwater.com
Downspout filter	Placed in Gutter	$20 - $500	many online
1st Flush Diverter	Vertical pipe w/ ball float	$50-$100	raintankdepot.com
PUMP	1 hp (all in one package)	$575 - varies	rainwatercollection.com
PIPING (Purple)			
to Tank (lot)	PVC: 2”-6” (O&P)	$2-$12 / LF	RSMeans
to House (lot)	PVC: 2”-6” (O&P)	$2-$12 / LF	RSMeans
to Tank (neighbor.)	Concrete: 6” – 18” (O&P)	$15-$30 /LF	RSMeans
to House (neighbor.)	HDPE- 4” – 10” (O&P)	$11-$27 / LF	RSMeans
to Irrigation	PVC: 2”-6” (O&P)	$2-$12 / LF	RSMeans
Backflow prev. valve	Each	$100-$200	web
STENCILS	Non-potable water	----	
INSTALLATION	Percentage of material cost	40 % – 50%	

[1] This dry detention cost equation - Brown and Schueler, 1997: C is the construction, design and permitting cost and V is the volume (cu-ft) need to control the 10-year design storm. In this case, the 0.8” storm runoff volume was used in place of the 10-yr design storm volume.

[2] This below ground storage vault equation - Weigand et al., 1986:C is the construction cost estimate (1995 dollars), and V is the runoff volume (cubic meters)

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Single Lot Costs

Item	Description	Cost
TANKS		
Plastic	1100 gal and 1350 gal	$550
TREATMENT		
UV	Whole system - 12 gpm	$800
UV bulb	Life: 10,000 hrs or 14 months	$80-$110
Downspout filter	Placed in Gutter	$250
1st FLUSH DIVERTER	Vertical pipe w/ ball float	$100
PUMP	1 hp (all in one package)	$575
PIPING (Purple)		
to Tank (lot)	PVC: 2”-6” (O&P) 20ft	$8 / LF
to House (lot)	PVC: 2”-6” (O&P) 50ft	$8/ LF
to Irrigation	PVC: 2”-6” (O&P) 50ft	$8 / LF
Backflow prev. valve	each	$200
STENCILS	Non-potable water	----
INSTALLATION	40% of material cost	$1400
TOTAL		**$4,900**

Neighborhood Costs

Item	**Description**	**Cost**	**Units Assumed**
TANKS			
Dry Det. Basin(1997)	$C = 12.4V^{0.760}$	$119,000	174,000ft^3
Below Ground Vault	$C = 38.1\ (V / 0.02832)^{0.6816}$	$142,000	174,000ft^3
TREATMENT			
UV - neighborhood	Whole system - 200 gpm	$10000	
Catch basin filters	1 every 2 acres	$2000	50 catch basins
PUMP		$50,000	
PIPING (Purple)			
to Tank (neighbor.)	Concrete: 6" – 18" (O&P)	$15-$30 /LF	$23 - 14000 ft
to House (neighbor.)	HDPE- 4" – 10" (O&P)	$11-$27 / LF	$19 - 14000 ft
to Irrigation	PVC: 2"-6" (O&P)	$2-$12 / LF	$8 - 60 ft /house
Backflow prev. valve	each	$100-$200	$200 per house
STENCILS	Non-potable water	----	
INSTALLATION	40% of material cost	$470,000	
TOTAL		**$1,650,000**	

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SWMM Modeling Analysis

- Long term (40 yr) analysis of the neighborhood scenario was performed using SWMM. Two scenarios analyzed:
  - 0.8 inch design storm
  - 1.6 inch design storm
- Modeling assumptions:
  1. Toilet flushing – same as scenarios and applied as constant rate
  2. Irrigation – monthly values (from the IRWD) applied as constant rates by month (i.e. demand occurs continuously during and after storm event)
  3. Overflow from tanks considered to be untreated bypass
  4. Same total area and impervious areas in both studies

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SWMM Modeling Results

		Scenario			
		A	**B**	**C**	**D**
	Units	Toilet Flushing Only, 0.8" design storm	Toilet Flushing + Irrigation, 0.8" design storm	Toilet Flushing Only, 1.6" design storm	Toilet Flushing + Irrigation, 1.6" design storm
Average Annual Drawdown Time	**days**	**47**	**8.5**	**94**	**17**
Average Stormwater % Capture and Reuse	**%**	**32%**	**55%**	**41%**	**68%**
Avg Annual Volume of Stormwater Reused	MG | CCF	5.2 | 6,950	8.8 | 11,800	6.5 | 8,700	10.9 | 14,620
Avg % of Total Residential Demand Satisfied	**%**	**6.2%**	**11%**	**7.8%**	**13%**

Note: Outdoor demand assumes that irrigation demand is immediate; more sophisticated modeling would allow more accurate characterize of irrigation demand, but for purposes of this analyses, it was assumed to be immediate. This likely significantly overstates the demand for irrigation.

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Pollutant Loading Example

Assumptions

- Median Runoff EMC for TSS for HSFD**: 70 mg/L**
- Median Effluent Concentration for TSS for Media Filters from International BMP Database: **15 mg/L**
- % Captured by cistern per SWMM (Scenario B – 0.8" design storm with toilet and irrigation re-use): **55%**
- % Captured by Bioretention with Underdrains per DAMP requirement: **80%** (requires approx 0.4" design storm)
- Bypass from both BMPs assumed to be untreated

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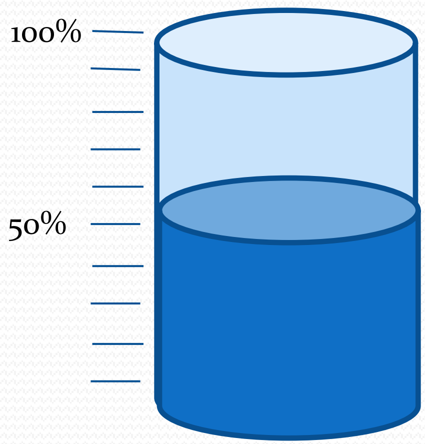
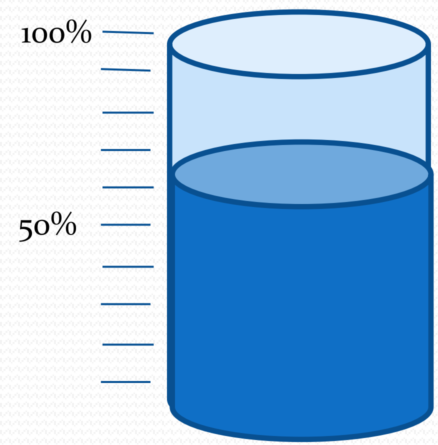
Pollutant Loading Example

<u>Results – Average Annual TSS Load Removed</u>

Cisterns and Re-Use: **55%**



Bioretention with Underdrains: **63%**



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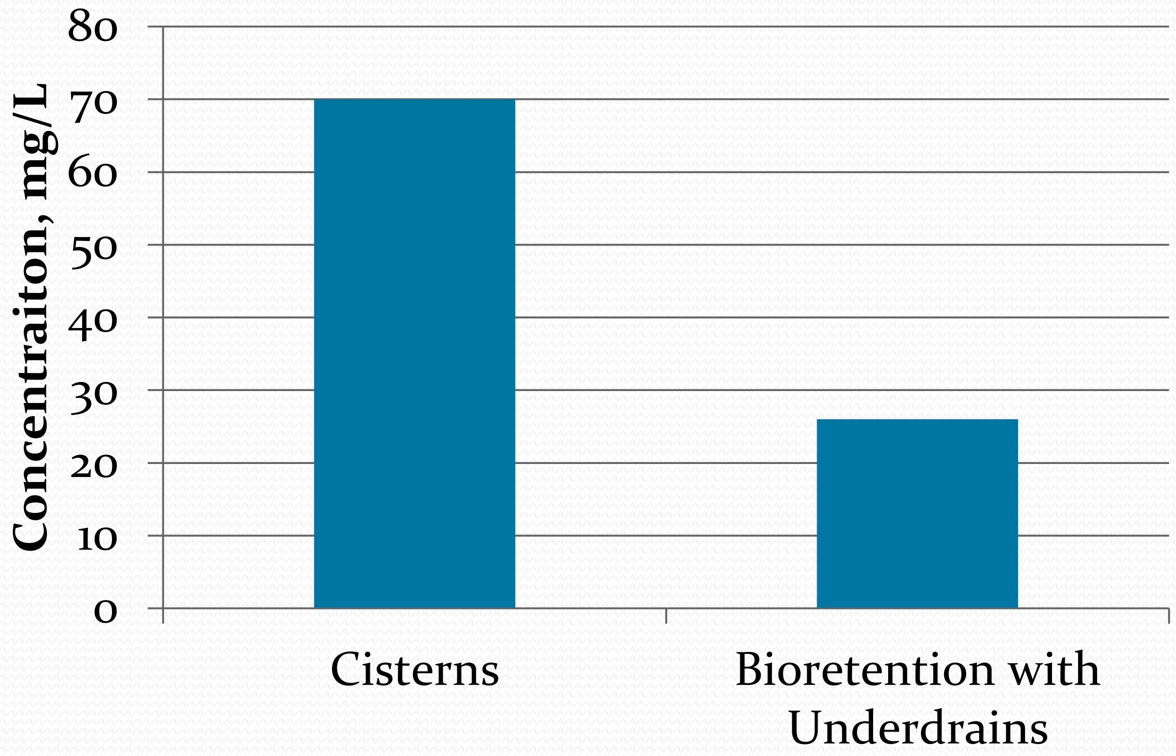
Pollutant Loading Example

<u>Results – Average Annual TSS Concentration with BMPs</u>



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Rainwater Harvesting - Code and Regulations

Applicable Codes

- Title 24—Building Standards Code (plumbing code)
  - Mechanical design and installation procedures
- Title 22—Social Security (recycled water quality standards)
  - Current technologies can meet this requirement (filtration, UV, and others)
- Title 17—Public Health (public water system cross-connection and backflow prevention)

Preliminary Conclusions

Since state codes do not currently recognize rainwater harvesting and reuse, discretion in approval will likely reside at the county and/or City levels through local codes and ordinances.

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ATTACHMENT A

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NPDES NO. CAS0109266

Appendix A-4

The Water Report Issue #65:
Stormwater Retention on Site, An Analysis Of Feasibility and Desirability, Strecker and Poresky (2009)

The Water Report™

Water Rights, Water Quality & Water Solutions in the West

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Groundwater Decline

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STORMWATER RETENTION ON SITE

AN ANALYSIS OF FEASIBILITY AND DESIRABILITY

by Eric W. Strecker, PE, and Aaron Poresky, EIT, Geosyntec Consultants (Portland, OR)

INTRODUCTION

Both nationally and in various localities, there is increasing regulatory pressure to maximize or require the retention of stormwater on site with compliance often linked to matching post-development runoff with predevelopment hydrology.

For example, in California the recently adopted Ventura Municipal Separate Storm Sewer System (MS4) NPDES permit requires retention on site — via infiltration, evapotranspiration and/or harvest and "re-use" — of precipitation from storms ranging up in size to the permit-defined "design storm" (Standard Urban Stormwater Mitigation Plan (SUSMP) depth of 3/4 of a inch — "design storms" are events defined in regulation and reflected in stormwater system design). There is an exception allowed where it is not feasible to retain the entire volume: the project may then retain "only" 70 percent of the SUSMP storm on site and mitigate the remaining volume off site. Another example is the North Orange County permit, which requires that infiltration, evapotranspiration, and/or harvest and re-use be employed to manage the water quality design storm, unless infeasible.

Nationally, the recent Energy Independence and Security Act (EISA) Section 438 requires that any Federal project with over 5,000 square feet of impervious area "maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow." Guidance for compliance with this provision allows either retention of the 90th percentile, 24-hour storm event or a model-based evaluation of discharge rates and volumes, matching predevelopment with post-development runoff hydrology. In effect , both of these conditions mandate substantial on site retention.

These permits/regulations have "narrowed" the traditional definition of Low Impact Development (LID) down to only a few elements — i.e., infiltration, evapotranspiration and/or harvest and use. This narrowing precludes management options present in the broader LID definition, such as detention and bio-filtration in vegetation-based facilities that provide incidental infiltration and evapotranspiration, but have a surface discharge point (e.g. bioretention with underdrains).

Nationally, the US Environmental Protection Agency (EPA) has also limited the definition of LID in some of their various guidance documents. For example, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, December 2007 (EPA 841-F-07-006) includes the definition: "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." (Emphasis added) It should be noted that other EPA documents include

Stormwater On Site

LID Definitions

Harvested Water

Natural Balance

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Editors: David Light
David Moon

Phone: 541/ 343-8504
Cellular: 541/ 517-5608
Fax: 541/ 683-8279
email:
thewaterreport@hotmail.com
website:
www.TheWaterReport.com

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definitions with the broader definition of filtration and surface release (see **Table 1**). It also should be noted that even in the guidance that includes the narrowed definition, in most cases the examples and guidance details include filtration and surface release of runoff.

Table 1. Summary of Filtration and Surface Release Inclusion in LID Definitions and associated guidance

Document/Reference	Filtration and Surface Release	
	In Definition	In Guidance/Examples
Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices, December 2007 (EPA 841-F-07-006)	No	Yes
Low Impact Development (LID) Literature Review, October 2000 (EPA-841-B-00-005	Yes	Yes
Low-Impact Development: An Integrated Environmental Design Approach (Prepared by the Prince George's County Maryland Department of Environmental Resources Programs and Planning Division, with assistance from EPA), June 1999	Yes	Yes
Polluted Runoff (Nonpoint Source Pollution) Low Impact Development (LID), Last updated on Thursday, January 15th, 2009 Additional information from linked factsheet: *Design Principles for Stormwater Management on Compacted, Contaminated Soils in Dense Urban Areas*, April 2008 (EPA-560-F-07-231)	Not Clear	Yes
Low Impact Development (LID) and Other Green Design Strategies, Last updated on October 09, 2008	No	Not Clear

To date, the retention of stormwater on site has been primarily been accomplished via infiltration and, to a much more limited extent, evapotranspiration. Only in a few cases has harvest and use (the authors believe that stormwater that is captured and used is not "re-used") been employed on a site scale (typically as a part of a Leadership in Energy and Environmental Design (LEED) rating process). Uses for harvested water typically include non-potable uses such as irrigation and toilet flushing and in some cases process water for industrial uses.

The feasibility and desirability of retaining stormwater on site up to some design storm level has not been vetted technically on a national or regional scale. For example, in the EPA *Reducing Stormwater Costs* Guidance referenced above there is virtually no assessment via monitoring or modeling information of the potential results of the case studies presented. It is primarily a compendium of antidotal information. There has been almost no consideration of the natural water balance (i.e., predevelopment conditions) in technical guidance or whether infiltrating more volume than occurs under natural conditions (as would tend to result from matching runoff hydrology without matching evapotranspiration) could, in many cases, cause problems. This paper attempts to present some of the considerations for retaining on site to determine whether it is feasible and/or desirable. It focuses on Southern California examples, but the factors discussed are applicable to much of the West and beyond.

It should be noted that "retaining stormwater on site" in its contemporary usage typically only refers to not having surface discharges result from specific "design storm" events. This usage ignores the fact that infiltrated or evapotranspirated stormwater is not actually "retained" on site — it either enters a deeper aquifer, flows as shallow interflow which may emerge elsewhere or, in the case of evapotranspiration, escapes to rain another day.

The authors believe that, while one should try to maximize the retention of stormwater on site, such retention should not be mandated, as site specific circumstances often indictate wiser alternatives.

PERFORMANCE OF STORMWATER BEST MANAGEMENT PRACTICES (BMPs)

General Considerations

In order to assess the performance of stormwater treatment Best Management Practices (BMPs), it is important to understand the range of factors which may impact BMP performance. BMP performance is effected by: runoff patterns; pollutant types and forms; the storage volume and/or treatment rate; the ability to recover storage capacity (for BMPs that rely on storage); the treatment processes for released flows (to surface waters or groundwaters); and operations and maintenance issues that affect the ability of the BMP to continue operations (Strecker, et. al., 2006). For storage-based BMPs, methods for recovering storage capacity include: surface discharge; evapotranspiration; deeper infiltration; and putting the stored water to use. For systems which include cisterns (harvest and use), one of the most critical factors is the ability to quickly recover storage capacity before the next storm event arrives. Typically, if storage capacity cannot be recovered within two-to-four days, then the amount of runoff bypassing storage becomes significant due to the cistern being partially to nearly full.

Stormwater On Site

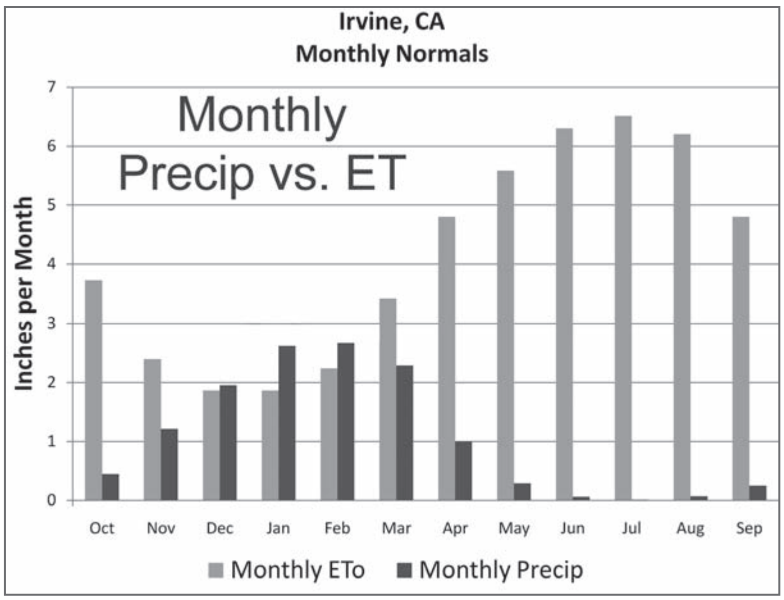
Storage Capacity Recovery

Weather and Resulting Runoff Patterns

In Southern California and the West Coast in general, precipitation patterns in most urban areas are affected by the presence or absence of a high pressure ridge that in essence blocks-out low pressure storm systems. Typically, once the high pressure ridge is absent a series of storms arrives, delivering "back-to-back" storms until a high pressure ridge re-establishes. Storms arrive about every two to three days during this period. If the storage capacity is not quickly recovered, these back-to-back storms can result in storage-based BMPs that are full or partially full when the next storm arrives, which then causes significant bypass or overflow to occur. In Southern California, most precipitation arrives from December to March. **Figure 1** shows the monthly normal rainfall in Irvine California (and monthly **e**vapo**t**ranspiration (ET)). Monthly normals tend to mask the patterns that occur within specific months in the period of record. **Figure 2** shows a typical precipitation pattern for the same gage, which includes the effect of 'back-to-back" storm events on a weekly timescale in an actual year. These weather patterns indicate that the recovery of storage on a sub-weekly time scale is critical to ensure that sequential storms do not result in excessive bypass or overflow of BMPs. Study of typical storm patterns indicates that storage capacity should be regenerated within two-to-three days to maximize the stormwater management performance when harvesting stormwater.

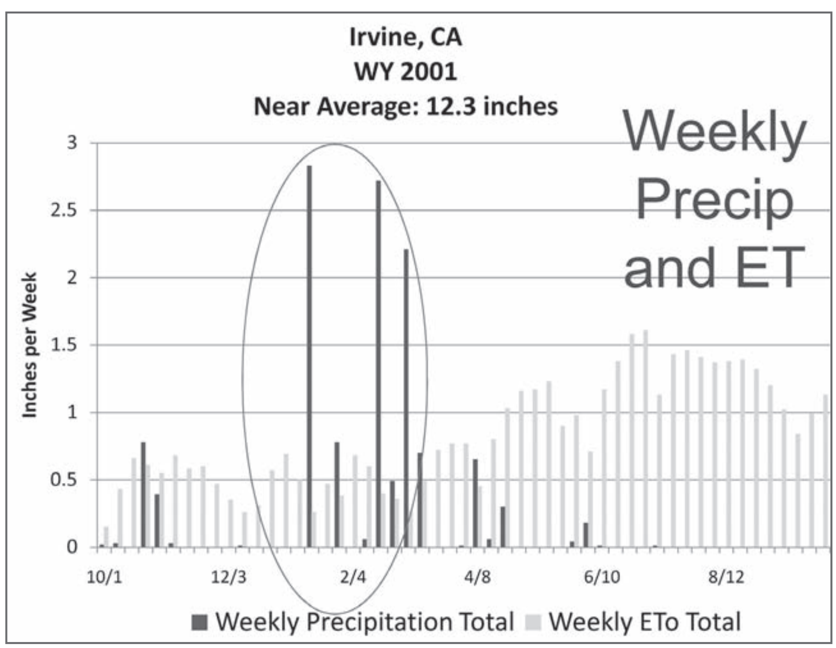
Precipitation v. "ET"

Figure 1. Monthly Precipitation vs. Monthly Evapotranspiration for Irvine, California.



Precipitation Pattern

Figure 2. Typical Precipitation Pattern Showing Back-to-Back Storms at Irvine California for a Near Average Water Year.



Stormwater On Site

Infiltration Issues

Infiltration is the primary method that is employed to retain stormwater on site. This is because, when it can be accomplished, infiltration is the method most likely to be successful. However, the authors believe that three key questions/issues need to be addressed when considering infiltration strategies if unintended, problematic consequences are to be avoided.

Key infiltration considerations include:

- Can you do it?
- Should you do it and, if so, to what extent?
- If you do employ infiltration, what factors need to be addressed to insure a desirable outcome?

Infiltration: Can You Do It?

Soil Factors

Underlying soils greatly affect the ability to infiltrate. In much of Southern California (and the West) urban areas are situated atop soils that are difficult for infiltration. Some practitioners have suggested soil amendments as a strategy for increasing infiltration. However, amending soils typically only addresses surface soils, so if underlying soils are still difficult for infiltration, soil amendments may only be increasing the storage available (vs. significantly increasing underlying infiltration rates). **Figure 3** presents a map that shows underling soils for the North Orange County, California permit area. It is expected that, in general, infiltration will only be successful in areas with A and B soil types. Of course, in mapping broader soils groups, there may be pockets where infiltration is more feasible. However, the converse is also true.

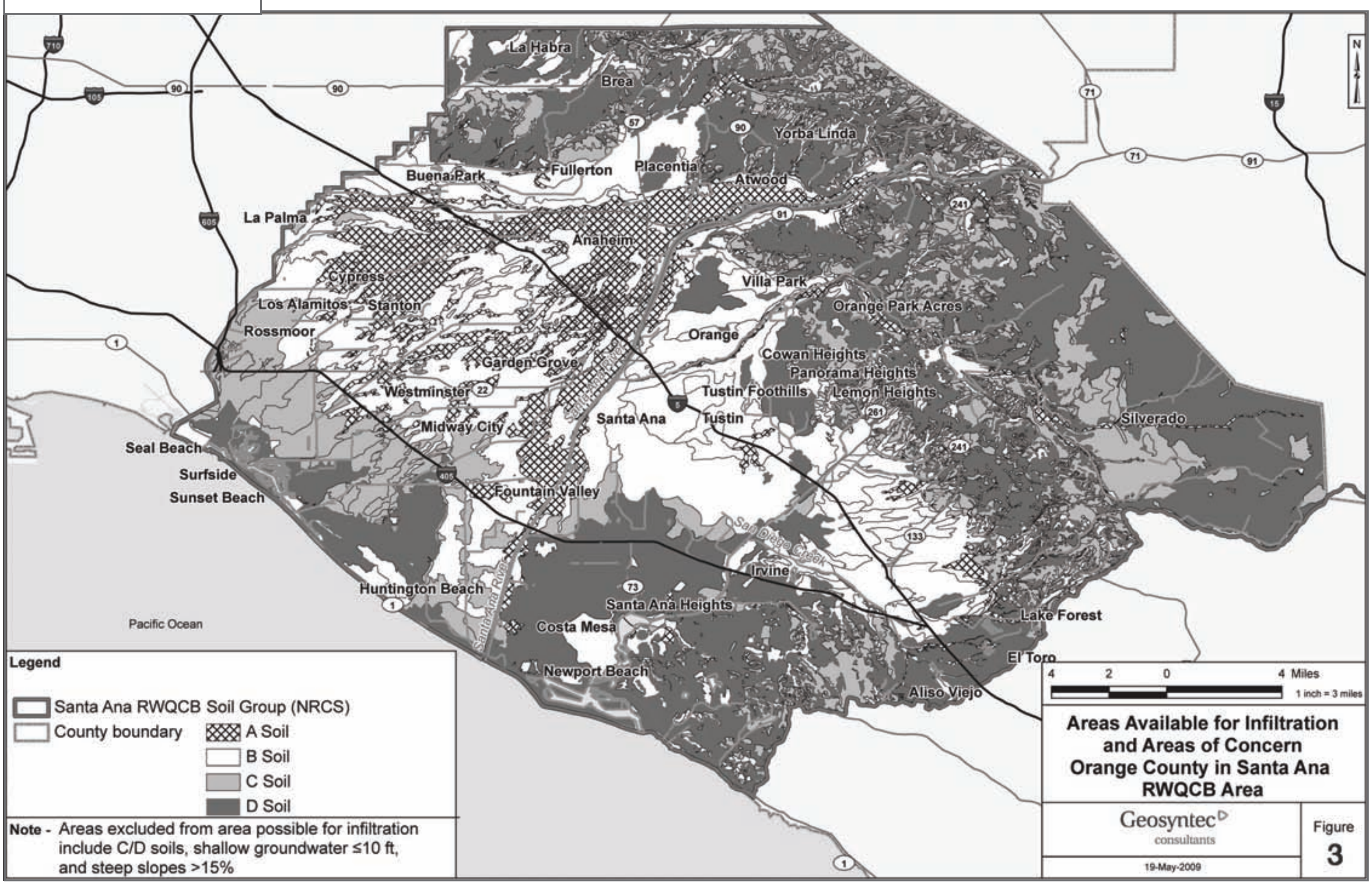
Infiltration Rates & Design

In this Orange County example, a little over 58% of the permit area has C and D soil types that would be unlikely to promote infiltration at an acceptable rate. Infiltration facilities that ignore low underlying infiltration rates in their design would tend to be full for much of the wet season, resulting in substantial bypass/overflow, thereby greatly reducing retention on site. Infiltration facilities designed with lower infiltration rates in mind would have shallower allowable ponding depths and thus require a greater amount of site area, possibly promoting sprawl. To ascertain feasibility, maps like this should be developed prior to requiring infiltration or on site stormwater retention.

Infiltration: Should You Do It?

The next question is "should you (or how much should you) infiltrate?" In many areas there are unnatural (e.g., solvent) or natural (e.g., selenium) plumes or soil contamination that infiltration could negatively impact by either moving or spreading the contaminants. Infiltration in industrial areas is often not desirable due to general concerns about groundwater contamination resulting from potentially elevated

Figure 3. Soil types for North Orange County MS4 NPDES Permit Area



Stormwater On Site

Water Balance Consequences

pollutant concentrations in industrial stormwater runoff. Geotechnical issues associated with steep slopes or expansive soils may also be an issue for infiltration. Depth to groundwater typically limits infiltration to areas with 10 or more feet of separation from the bottom of infiltration facilities to groundwater. Finally, in some locations upgradient of an ephemeral stream, increased infiltration may cause undesirable habitat type changes downstream of the site due to increased periods of base flows that result in vegetation changes (e.g. conversion of dry wash to a thickly vegetated system). There has been a lack of consideration of the overall water balance consequences that a "retention on site" requirement may have in terms of habitat.

As an example, **Figure 4** presents a map of the North Orange County permit area that shows the areas remaining with good potential for infiltration after consideration of some of the issues covered above. The area remaining within the permit area for consideration of infiltration is less than 23 percent of the permit area, even without considering habitat issues or regulated facilities (small contamination areas shown as dots). There are large urbanized areas where infiltration would not be either feasible or desirable.

Infiltration: Do It Carefully

Groundwater Quality

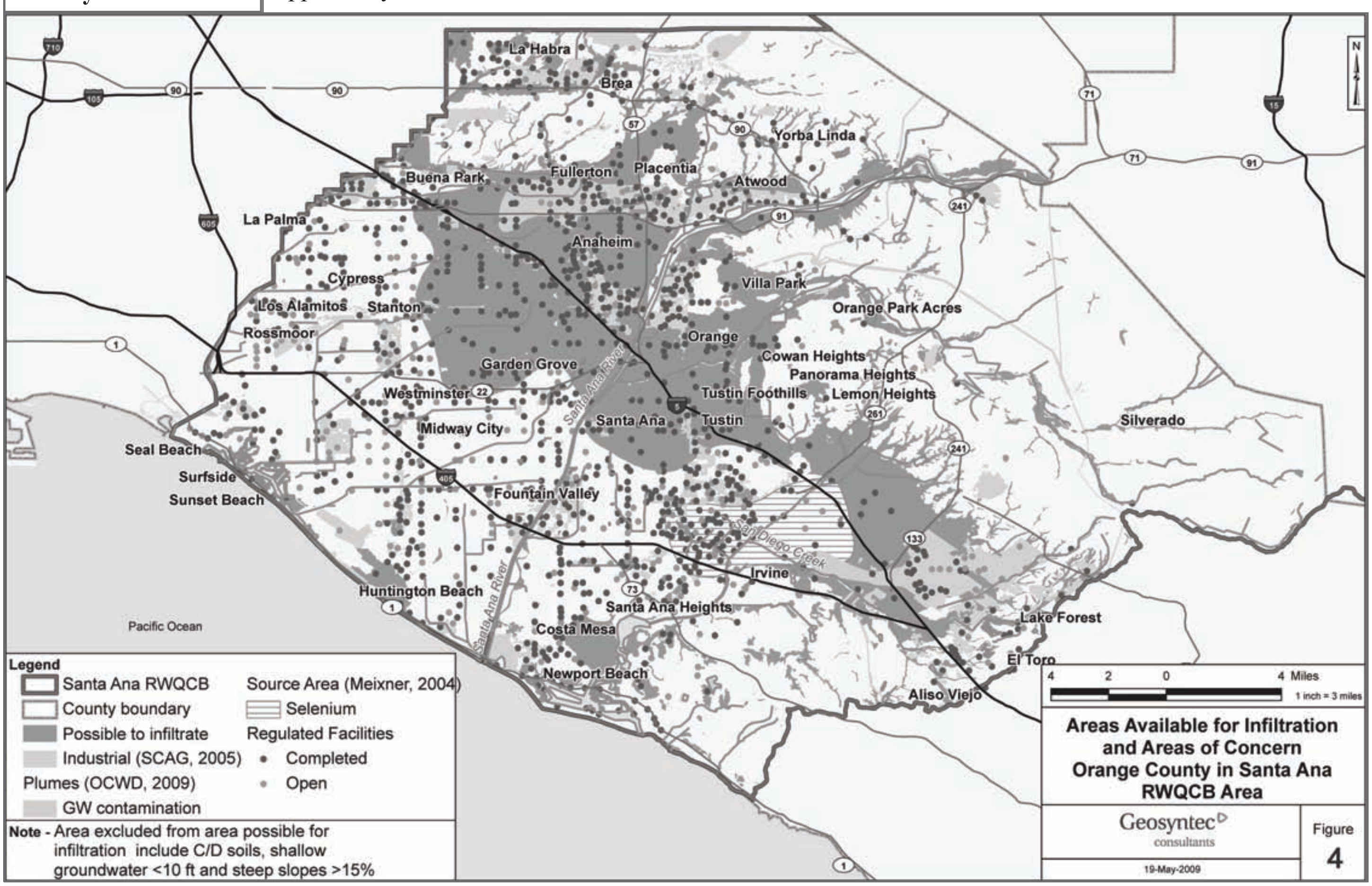
Finally, infiltration should be done carefully to ensure that groundwater quality is protected and widespread stormwater management facility failure does not occur. Proper treatment of infiltrating water should occur before this water reaches groundwater either via treatment with BMPs or ensuring that soils are adequate to provide treatment while passing infiltrating water. Infiltration facilities have often failed due to poor maintenance and operation of the facilities. One needs to think through how to design infiltration facilities to minimize maintenance issues, including whether widely-distributed infiltration facilities can be maintained as adequately as one centralized facility. Water districts that utilize groundwater should obviously be involved in decisions about where and how to infiltrate stormwater so that groundwater supplies are protected.

Maintenance Issues

Infiltration: Summary

Infiltration must be done carefully to ensure that it can be successful on a long-term basis as well as be protective of water supplies. The best opportunities for successful infiltration are in areas where groundwater is actively managed for water supply. Such areas are unlikely to face as many water balance hindrances or other issues. For example, areas along the Santa Ana River are actively managed for recharge and withdrawals by the Orange County Water District. These localities provide the best opportunity for successful infiltration.

Figure 4. Areas available for infiltration for the North Orange County Permit Area



Stormwater On Site

Development Factors

Precipitation v. ET

In Soil Storage Recovery

Water Balance

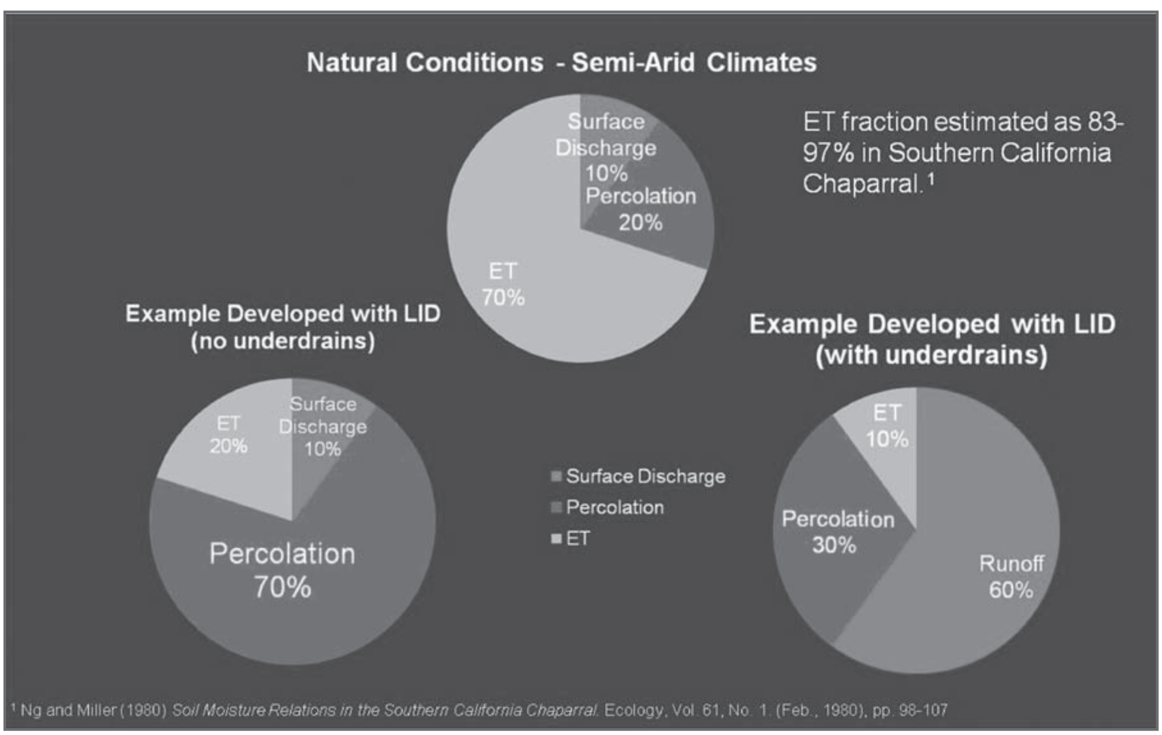
EVAPOTRANSPIRATION (ET)

After an area undergoes development there will be less available area for **e**vapo**t**ranspiration (ET)to occur. This holds true even when vegetated roofs, pervious pavements, and other "green" development practices are employed and is especially true for high density projects. Some analysts have compared monthly or seasonal ET to precipitation levels to assess the potential for ET losses as a significant retain-runoff on site measure. This is particularly inappropriate on the West Coast in light of the region's tendency for back-to-back storm events.

Refer again to **Figures 1 and 2** appearing above. **Figure 1** shows monthly normal comparisons of precipitation versus ET, while **Figure 2** shows precipitation and ET as weekly totals for an example year. While the former suggests that ET matches or exceeds precipitation on a monthly normal bases, it does not account for back-to-back storms or the fact that months with higher than normal rainfall would be the same months that correspond to lower than normal ET. **Figure 2** clearly demonstrates that ET cannot keep up with precipitation on a weekly basis in critical periods of the typical back-to-back storms of an average year. During these critical periods, the storage provided in soils would not have recovered in time for subsequent rainfall. While ET of stormwater should be maximized, it almost certainly will not be able to match pre-development levels and is likely a minor component of retaining stormwater on site (without storage and use for irrigation).

ET is a very important consideration when assessing the ability to mimic predevelopment runoff volume. **Figure 5** presents typical arid southwest water balances for: undisturbed areas; areas developed with infiltration facilities (Example Developed with LID – no underdrains); and for areas developed using LID with underdrains. Predevelopment ET can range upwards of 80 to 97 percent of the precipitation on an average annual basis. It is very unlikely that predevelopment ET will be matched by post-development ET due to reduction in vegetated open soils areas. So, the choice for development, particularly high density development, is to either have more runoff than predevelopment or more infiltration, or a combination of the two. This fact and its ramifications have not been considered during the development of on site retention requirements that are focused on surface hydrology versus overall hydrology (including sub-surface).

Figure 5. Typical Water Balance from Precipitation in Arid Southwest Climate



Stormwater On Site

Harvest Demand

Model Assumptions

Capture & Use Levels

Biofiltration Comparison

CAPTURE & USE ("RE-USE")

In most all cases where infiltration is not feasible or possible, the only option remaining to meet the retain on site requirements is to capture (harvest) and use the stormwater. In North Orange County, for example, this would be the option in about 77 percent of the permit area or more.

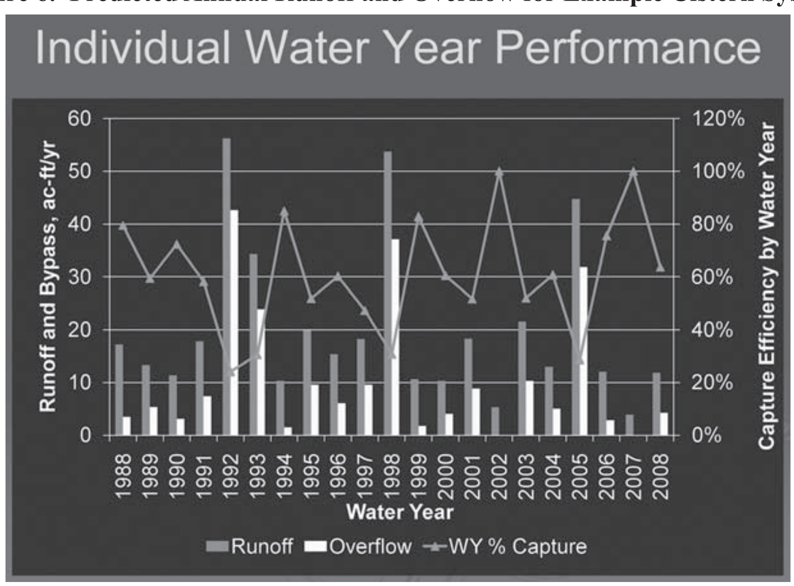
The key factor for success of capture and use of stormwater as a means to retaining water on site is the rate at which storage can be made available for subsequent events. This means having a demand for the captured water that is high enough, especially during the rainy season. The two most obvious uses for captured stormwater are for irrigation and toilet flushing. There are significant code issues with capture and use for internal non-potable demand in many jurisdictions. In addition, there are water rights issues associated with capture of stormwater in some areas (e.g., Colorado and Utah). These limitations are not the focus of this article. Other potential uses include process water for commercial or industrial purposes. A scenario for a residential development was conducted to illustrate the potential for capture and use of stormwater. This scenario is discussed next.

Capture and Use: Residential Scenario

Your authors modeled and evaluated a100-acre residential catchment with 60 percent overall impervious area using a continuous simulation model (SWMM) as an example of a capture-and-use scenario. It was assumed that infiltration losses would be minimal (due to shallow groundwater depth, poor soils for infiltration and/or other issues). A tank (above ground storage) of 1.3 million gallons (equivalent to the runoff from the catchment resulting from a 0.8 inch storm event — the water quality design storm) was evaluated with toilet flushing and irrigation uses combined. Toilet flushing assumed 65 gallons per day per dwelling unit at 4.5 units per acre. For simplicity, irrigation demands were assumed to equal the monthly average ET levels for the 30 acres of landscaped areas. It was also assumed that irrigation was always on, even during rainfall (note that irrigation demands during and after rainfall are significantly over-estimated in this analysis). A 21-year hourly long-term simulation model was run to ascertain the potential effectiveness of such a system for retaining runoff on-site. We also evaluated potential pollutant removal results as compared to biofiltration with an underdrain (surface water release).

Overall the system resulted in an estimated capture and use of stormwater of about 48% of the total runoff volume (52% bypassing with no treatment — though one could treat the bypass as well). The capture and use levels varied annually from less than 30 percent to 100 percent for the 21 water years evaluated (**Figure 6**).

Figure 6. Predicted Annual Runoff and Overflow for Example Cistern System



Using data from International BMP Database (see: www.bmpdatabase.org), a comparison of total loadings performance to a biofiltration system with underdrains was made. This comparison showed that the biofiltration system reduced **t**otal **s**uspended **s**olids (TSS) loads by about 63% compared to 48% for the cistern scenario for the 21-year simulation. So, in this case the assumption that retain on site is the most effective at reducing pollutant loadings is not valid, unless one also required treatment of the bypassed flows (in essence an additional BMP treatment requirement). Finally, the average annual potable water saved was on the order of about 10 percent of the average annual demand.

Stormwater On Site

Another scenario was run doubling the size of the cistern tank to 2.6 million gallons (equivalent to a 1.6 inch design storm). Under this scenario, the capture and use level went up to about 57 percent (so doubling the tank size resulted in another nine percent of the runoff being captured and used). Again, this emphasizes the point that being able to drain the cistern relatively rapidly is the key to success for capture and use.

Capture and Use: Limiting Factors

Evaluation Factors

As illustrated in these examples, one should evaluate carefully potential scenarios to help ensure that choices made regarding retention on site requirements actually result in the desired results. Evaluation should consider land use and density assumptions as well as assessment of local precipitation and runoff patterns, irrigation needs, and ability to use water for toilet flushing or other non-potable uses.

Rapid Storage Recovery

For capture and use to work, the storage must be quickly recovered. Irrigation typically is not an effective use for recovering storage quickly as irrigation needs during wet periods are minimal and in some cases (i.e., colder climates) there is no irrigation demand for long periods. In addition, much of the arid southwest is encouraging "xeri-scaping" (drought tolerant plants), which is likely much more effective at reducing potable demand than capture and use for irrigation. Xeriscape plant pallets typically do not like to be saturated for long periods, as would occur via over-irrigation if irrigation use was maximized. Further, use of a water-loving plant palate to maximize the use of captured runoff during normal and wet years could exert an additional demand for potable water during dry years.

Toilet Use Ratio

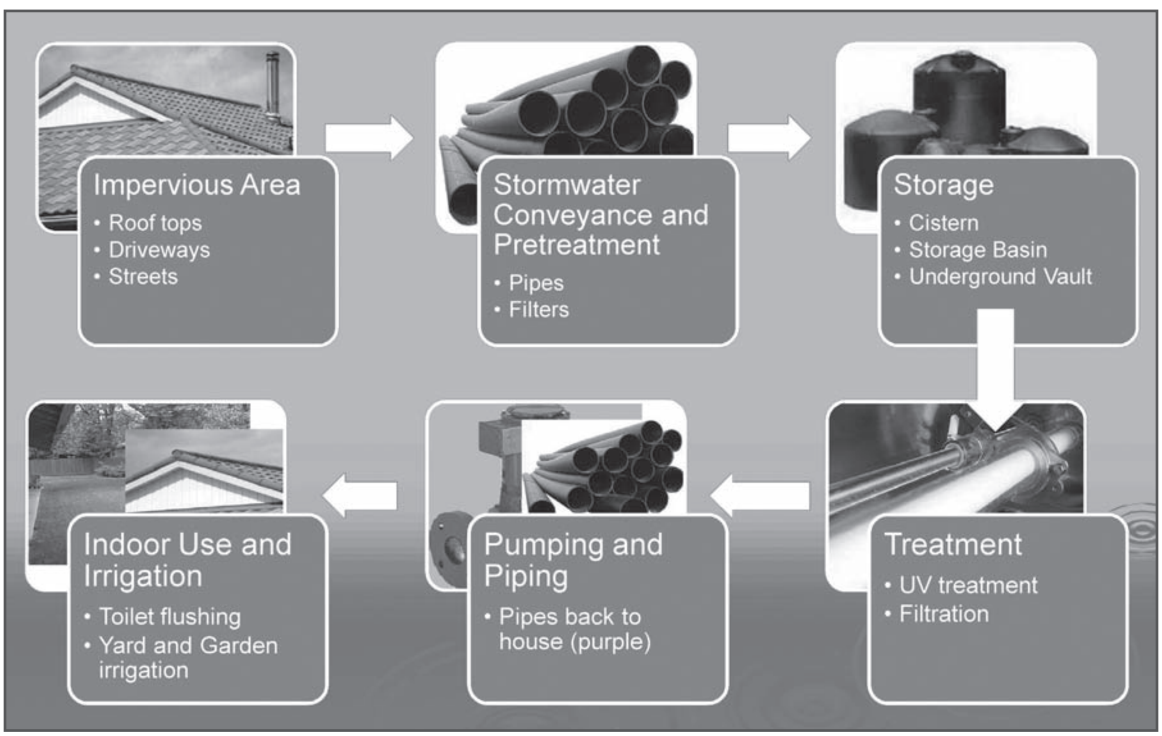
For toilet flushing to be effective, there needs to be a high enough ratio of Toilet Users To Impervious Area (TUTIA). Perhaps in high-rise condominiums, office buildings, institutional buildings, etc. this ratio would be high enough to drain the tank sufficiently fast and in these cases capture and use should be considered.

However, there would be a "competition" for reclaimed water in much of the arid west. Reclaimed water systems tend to be limited in their ability to distribute water in the wetter and colder periods of the year due to low irrigation demands. In addition, in some locations use of reclaimed water for toilet flushing is required in high density projects. One has to question if the capture and use of stormwater that may result in reclaimed water being discharged is an effective strategy. Under this scenario, the captured stormwater would not be reducing potable water demand.

Infrastructure Needs

Finally, there is significant infrastructure (**Figure 7**) that would be required to employ cistern and use on a site basis, including piping, storage, treatment, pumping, and separate piping (purple pipes). Questions about sustainability for these systems need to be explored and assessed.

Figure 7. Typical Components of a Stormwater Harvest and Use system.



Stormwater On Site

Key Considerations

Unique Factors

CONCLUSIONS

In Summary:

- Infiltration is often not broadly feasible, effective and/or desirable. While it should be maximized where appropriate, studies are needed to identify suitable areas and also identify areas where infiltration may be feasible but not appropriate.
- Precipitation/runoff patterns in California and much of the West limit the ability of evapotranspiration-based BMPs to achieve retention on site requirements. Evapotranspiration of stormwater should be maximized, but will not be a significant component of retaining stormwater on site in densely developed areas.
- Precipitation/runoff patterns coupled with landscaping and reclaimed water considerations limit the applications where capture and use of runoff can be effective. Generally, only scenarios with high indoor demand and no competing requirements to use reclaimed water can be expected to provide a complete and reliable stormwater solution. Capture and use should be maximized in these cases, but in other cases it should be carefully considered against other options such as biofiltration and discharge to determine which option is most effective in meeting stormwater management goals.
- The overall water balance should be considered when making choices on proper levels of infiltration versus surface runoff.
- There needs to be more technical vetting of "retain on site" and stormwater harvest and use before these approaches are made mandatory.

Each watershed and site has unique soils, topography, groundwater, water quality, land uses, receiving water sensitivities, wastewater strategies, etc. which should be considered when evaluating retention on site as a requirement or strategy. The authors believe that management approaches that are "one size fit all" are not appropriate and in many cases would likely lead to undesirable results.

Proper Stormwater Management Includes:

- Source controls
- Infiltration where feasible and appropriate
- Maximizing ET losses
- Harvest and use where it makes sense
- Capture and treat with effective (i.e. vegetated) BMPs where it makes sense

We believe that significant progress could be made by improving BMP selection and design guidance for all BMPs to better target unit processes (i.e. physical, biological, chemical treatment processes) to the pollutants and parameters of concern for each watershed.

For Additional Information:

Eric Strecker, Principal, GeoSyntec Consultants (Portland, OR)
503/ 222-9518 or email: estrecker@geosyntec.com
Aaron Poresky, Senior Staff Engineering Specialist, GeoSyntec Consultants (Portland, OR)
503/ 222-9518 or email: aporesky@geosyntec.com

Eric Strecker, P.E. is a Principal and Water Resources Practice Leader with Geosyntec Consultants in Portland, Oregon. He has over 25 years of stormwater management experience, including national level applied research efforts for EPA, FHWA, WERF, and NCHRP as well as state and local stormwater management, design and research projects throughout the United States. He is a Principal Investigator for the International BMP Database.

Aaron Poresky, E.I.T. has more than four years of experience in water resources and urban stormwater management. At Geosyntec, he has been involved in a variety of projects including structural BMP design and evaluation, water quality planning and impact analysis, hydromodification planning and impact analysis, stormwater policy support, and modeling methodology development. Key project areas have included stormwater retrofit planning and design for a variety of municipal and private clients, modeling methodology development and implementation, new development stormwater planning, and regulatory analysis. Mr. Poresky has been an invited speaker on the topics of modeling, BMP design, and stormwater policy.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE
ORDER NO. R9-2013-0001
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	San Diego Unified Port District
City of National City	

After the San Diego Water Board receives and considers the Orange County Copermittees' Report of Waste Discharge and makes any necessary changes to the Order, the Orange County Copermittees in Table 1b will become subject to waste discharge requirements set forth in this Order after expiration of Order No. R9-2009-0002, NPDES No. CAS0108740 on or after December 16, 2014.

Table 1b. Orange County Copermittees

City of Aliso Viejo	City of Rancho 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	

After the San Diego Water Board receives and considers the Riverside County Copermittees' Report of Waste Discharge and makes any necessary changes to this Order, the Riverside County Copermittees in Table 1c will become subject to waste discharge requirements set forth in this Order after expiration of Order No. R9-2010-0016, NPDES No. CAS0108766 on or after 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 become subject to the requirements of 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 if the Copermittees in the respective county receive a notification of coverage from the San Diego Water Board.

The term Copermittee in this Order refers to any San Diego County, Orange County, or Riverside County Copermittee covered 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, 2013**
This Order will become effective on:	**Month Day, 2013**
This Order will expire on:	**Month Day, 2018**
The Copermittees must file a Report of Waste Discharge 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, 2013.

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).

   The federal regulations make it clear that the Copermittees need only comply with permit conditions relating to discharges from the MS4s for which they are operators (40 CFR 122.26(a)(3)(vi)). This Order does not require the Copermittees to manage storm water outside of their jurisdictional boundaries, but rather to work collectively to improve storm water management within watersheds.

3. **CWA NPDES Permit Conditions.** 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), and to require other provisions as the San Diego Water Board determines are appropriate to control such pollutants. This Order prescribes conditions to assure compliance with the CWA requirements for owners and operators of MS4s to effectively prohibit non-storm water discharges into the MS4s, and require controls to reduce the discharge of pollutants in storm water from the MS4s to the MEP.

4. **CWA and CWC Monitoring Requirements.** CWA section 308(a) and 40 CFR 122.41(h),(j)-(l) and 122.48 require that NPDES permits must specify monitoring and reporting requirements. Federal regulations applicable to large and medium MS4s

Deleted: The San Diego Water Board has the legal authority to issue a regional MS4 permit pursuant to its authority under CWA section 402(p)(3)(B) and 40 CFR 122.26(a)(1)(v). The USEPA also made it clear that the permitting authority, in this case the San Diego Water Board, has the flexibility to establish system- or region-wide permits (55 Federal Register [FR] 47990, 48039-48042). The regional nature of this Order will ensure consistency of regulation within watersheds and is expected to result in overall cost savings for the Copermittees and San Diego Water Board.¶

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also specify additional monitoring and reporting requirements in 40 CFR 122.26(d)(1)(iv)(D), 122.26(d)(1)(v)(B), 122.26(d)(2)(i)(F), 122.26(d)(2)(iii)(D), 122.26(d)(2)(iv)(B)(2) and 122.42(c). CWC section 13383 authorizes the San Diego Water Board to establish monitoring, inspection, entry, reporting and recordkeeping requirements. This Order establishes monitoring and reporting requirements to implement federal and State requirements.

5. **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.

   TMDLs are numerical calculations of the maximum amount of a pollutant that a water body can assimilate and still meet water quality standards. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point sources (waste load allocations or WLAs) and non-point sources (load allocations or LAs), background contribution, plus a margin of safety. Discharges from MS4s are point source discharges. The federal regulations (40 CFR 122.44(d)(1)(vii)(B)) require that NPDES permits to incorporate water quality based effluent limitations (WQBELs) developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, consistent with the assumptions and requirements of any available WLA for the discharge. Requirements of this Order implement the TMDLs adopted by the San Diego Water Board and approved by USEPA.

6. **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)(1)) require the Copermittees to have a program to prevent illicit discharges to the MS4. The federal regulations, however, allow for specific categories of non-storm water discharges to be addressed as illicit discharges only where such discharges are identified as sources of pollutants to waters of the U.S.

7. **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

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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

8. **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 Water Quality Control Plan for the San Diego Basin (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.

9. **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.

10. **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 without BMPs will contain greater pollutant loads and have significantly greater runoff volume, velocity, and peak flow rate than pre-development runoff from the same area.

11. **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. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. 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).

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Deleted: Rivers, streams and creeks in developed areas used in this manner are part of the Copermittees' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the rivers, streams and creeks in the developed areas of the Copermittees' jurisdictions are both an MS4 and receiving water.

12. **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 (e.g., decaying vegetation, animal waste), detergents, and trash. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. These discharges may cause or contribute to a condition of pollution or a violation of water quality standards.

Deleted: By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control.

13. **Human Health and Aquatic Life Impairment.** Pollutants in runoff discharged 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.

14. **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 Biological 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.

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15. **Non-Storm Water and Storm Water Discharges.** The discharge of pollutants from the MS4 is subject to the MEP standard notwithstanding whether the pollutants are transported by stormwater or non-stormwater. Pursuant to CWA 402(p)(3)(B)(ii), non-storm water discharges into the MS4s, namely identified illicit discharges and pollutants from unlawful dumping, must be effectively prohibited.

Deleted: Non-storm water discharges from the MS4s are not considered storm water discharges and therefore are not subject to the MEP standard of CWA section 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4s.

16. **Best Management Practices.** Waste and pollutants which are deposited and accumulate in MS4 drainage structures may be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutants in storm water discharges from the MS4s can be and must 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

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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.

17. **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. Retrofitting areas of existing development with storm water pollutant control and hydromodification management BMPs may, in many cases be necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards.

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18. **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

19. **Basin Plan.** The San Diego Water Board adopted the 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).

20. **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

21. **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.

22. **National Toxics Rule and California Toxics Rule.** USEPA adopted the National Toxics Rule (NTR) on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the 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.

23. **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. State Water Board Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. State Water Board Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies.

CONSIDERATIONS UNDER FEDERAL AND STATE LAW

24. **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 source pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point source 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 fulfills 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.

25. **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 USC 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.

26. **Report of Waste Discharge Process.** The waste discharge requirements set forth in this Order are based upon the Report of Waste Discharge submitted by the San Diego County Copermittees prior to the expiration of Order No. R9-2007-0001 (NPDES No. CAS0109266). The Orange County and Riverside County Copermittees are not immediately covered by the waste discharge requirements in this Order. The San Diego Water Board understands that each municipality is unique. The Order will continue to use the Report of Waste Discharge process prior to initially making Orange County or Riverside County Copermittees subject to the requirements of this Order.

    The federal regulations (40 CFR 122.21(d)(2)) and CWC section 13376 impose a duty on the Copermittees to reapply for continued coverage through submittal of a Report of Waste Discharge no later than 180 days prior to expiration of a currently effective permit. This requirement is set forth in the Orange County Copermittees'

Deleted: although the Counties share watersheds and geographical boundaries and Riverside County Copermittees' currently effective permits at Provisions K.2.b and K.2.c, respectively. The Orange County Permit, Order No. R9-2009-0002 (NPDES No. CAS0108740) expires on December 16, 2014 and the Riverside County MS4 Permit, Order No. R9-2010-0016 (NPDES No. CAS0108766) expires on November 10, 2015.

Unless the Orange County or Riverside County Copermittees apply for and receive early coverage under this Order, the Orange County Copermittees' and the Riverside County Copermittees' respective permits will be superseded by this Order upon expiration of their respective permits, subject to any necessary revisions to the requirements of this Order made after the San Diego Water Board considers their respective Reports of Waste Discharge through the public process provided in 40 CFR 124.

27. Integrated Report and Clean Water Act Section 303(d) List. The San Diego Water Board and State Water Board submit an Integrated Report to USEPA to comply with the reporting requirements of CWA sections 303(d), 305(b) and 314, which lists the attainment status of water quality standards for water bodies in the San Diego Region. USEPA issued its *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act* on July 29, 2005, which advocates the use of a five category approach for classifying the attainment status of water quality standards for water bodies in the Integrated Report. Water bodies included in Category 5 in the Integrated Report indicate at least one beneficial use is not being supported or is threatened, and a TMDL is required. Water bodies included in Category 5 in the Integrated Report are placed on the 303(d) List.

Water bodies with available data and/or information that indicate at least one beneficial use is not being supported or is threatened, but a TMDL is not required, are included in Category 4 in the Integrated Report. Impaired surface water bodies may be included in Category 4 if a TMDL has been adopted and approved (Category 4a); if other pollution control requirements required by a local, state or federal authority are stringent enough to implement applicable water quality standards within a reasonable period of time (Category 4b); or, if the failure to meet an applicable water quality standard is not caused by a pollutant, but caused by other types of pollution (Category 4c).

Implementation of the requirements of this Order may allow the San Diego Water Board to include surface waters impaired by discharges from the Copermittees' MS4s in Category 4 in the Integrated Report for consideration during the next 303(d) List submittal by the State to USEPA.

28. Economic Considerations. The California Supreme Court has ruled that although CWC section 13263 requires the State and Regional Water Boards (collectively Water Boards) to consider factors set forth in CWC section 13241 when issuing an NPDES permit, the Water Board may not consider the factors to justify imposing pollutant restrictions that are less stringent than the applicable federal regulations require. (*City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th

613, 618, 626-627.) However, when pollutant restrictions in an NPDES permit are more stringent than federal law requires, CWC section 13263 requires that the Water Boards consider the factors described in CWC section 13241 as they apply to those specific restrictions.

As noted in the following finding, the San Diego Water Board finds that the requirements in this permit are more stringent than the minimum federal requirements. Therefore, a CWC section 13241 analysis is required for permit requirements that implement the effective prohibition on the discharge of non-storm water into the MS4 or for controls to reduce the discharge of pollutants in storm water to the MEP, or other provisions that the San Diego Water Board has determined appropriate to control such pollutants, as those requirements are mandated by federal law. The economic analysis is provided in the Fact Sheet.

29. California Environmental Quality Act. The issuance of waste discharge requirements 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

30. 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 storm water discharges from MS4s to not cause or contribute to a violation of water quality standards, which 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 will not ultimately cause or contribute to violations of water quality standards and will not create conditions of pollution, contamination, or nuisance.

31. 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. State Water Board Resolution No. 2012-0012 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

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Deleted: Notwithstanding the above, the San Diego Water Board has developed an economic analysis of the requirements in this Order.

Deleted: <#>**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: ¶

¶

<#>This Order implements federally mandated requirements under CWA section 402 (33 USC section 1342(p)(3)(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. ¶

¶

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

¶

<#>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 section 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). ¶

¶

<#>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. ¶

¶

<#>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 section 1313(d)). Once the USEPA or a state develops a TMDL, federal law requires that permits must contain water quality based effluent limitations consistent with the assumptions and requirements of any applicable wasteload allocation (40 CFR 122.44(d)(1)(vii)(B)). ¶

¶

See the Fact Sheet for further discussion of unfunded mandates.¶

were adopted to provide special protections for marine aquatic life and natural water quality in ASBS. 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 State Water Board Resolution No. 2012-0012. The Special Protections contained in Attachment B to Resolution No. 2012-0012, applicable to these discharges, are hereby incorporated into this Order as if fully set forth herein.

ADMINISTRATIVE FINDINGS

32. **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.

33. **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.

34. **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.

35. **Public Notice.** In accordance with State and federal laws and regulations, the San Diego Water Board notified the Copermittees, and interested agencies and persons of its intent to prescribe waste discharge requirements for the control of discharges into and from the MS4s 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.

36. **Public Hearing.** The San Diego Water Board held a public hearing on Month Day, 2013 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.

37. **Effective Date.** This Order serves as an NPDES permit pursuant to CWA section 401 or amendments thereto, and becomes effective fifty (50) days after the date of its adoption, provided that the Regional Administrator, USEPA, Region IX, does not object to this Order.

38. **Review by the State Water Board.** Any person aggrieved by this action of the San Diego Water Board may petition the State Water Board to review the action in accordance with CWC section 13320 and California Code of Regulations, title 23,

sections 2050, et seq. The State Water Board must receive the petition by 5:00 p.m., 30 days after the San Diego Water Board action, except that if the thirtieth day following the action falls on a Saturday, Sunday or State holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request.

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:

II. PROVISIONS

A. PROHIBITIONS AND LIMITATIONS

The purpose of this provision is to describe the conditions under which storm water from and non-storm water discharges into the MS4s are effectively prohibited or limited. The goal of the prohibitions and limitations is to protect the water quality and designated beneficial uses of waters of the state from adverse impacts caused or contributed to by MS4 discharges. This goal will be accomplished through the implementation of water quality improvement strategies and runoff management programs that effectively prohibit non-storm water discharges into the Copermittees' MS4s, and reduce pollutants in storm water 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.

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1. Discharge Prohibitions

a. Except as provided for in Provisions A.1.e or A.4, discharges 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.

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

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

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 the Copermittees' MS4s to ASBS are prohibited.

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.

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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 the list below to the extent that 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 (Provision A.4 and Attachment E). Where a TMDL has been developed and its terms have been incorporated into this Order (in a manner that is consistent with the waste load allocations set forth in the TMDL), a Permittee shall also be considered in compliance with such TMDL-related requirements provided in this Order, if it is timely and in good faith implementing the MEP-compliant control measures otherwise established by this Order.

(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;[1]

[1] State Water Board Resolution No. 68-16

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

(a) National Toxics Rule (NTR)[2] (promulgated on December 22, 1992 and amended on May 4, 1995), and

(b) California Toxics Rule (CTR).[3,4]

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

c. For receiving water limitations associated with a water body pollutant combination addressed in a TMDL in Attachment E of this Order, the affected Copermittees shall achieve compliance as outlined in Attachment E.

3. Effluent Limitations

a. Technology Based Effluent Limitations

Pollutants in storm water discharges from MS4s must be reduced to the MEP.[5]

b. Water Quality Based Effluent Limitations

This Order establishes water quality based effluent limitations (WQBELs) consistent with the assumptions and requirements of all available TMDL waste load allocations (WLAs) assigned to discharges from the Copermittees' MS4s. Each Copermittee must comply with applicable WQBELs established for the TMDLs in Attachment E to this Order, pursuant to the applicable TMDL compliance schedules.

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

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Each Copermittee must achieve compliance with Provisions A.1, A.2, and A.3 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. The Water Quality Improvement Plans required under Provision B must be designed and adapted to ultimately achieve compliance with Provisions A.1, A2, and A.3.

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a. Except as provided in Parts 4.c, 4.d, 4.e, or 4.f below, discharges from the MS4

[2] 40 CFR 131.36
[3] 65 Federal Register 31682-31719 (May 18, 2000), adding Section 131.38 to 40 CFR
[4] 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.
[5] 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 7.

for which a Permittee is responsible shall not cause or contribute to an exceedance of any applicable water quality standard.

b. Except as provided in Parts 4.c, 4.d, 4.e, or 4.f below, discharges from the MS4 of storm water, or non-storm water, for which a Permittee is responsible, shall not cause a condition of nuisance.

c. 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 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) the constituent(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) Submit a report to the Regional Water Board that:

(i) Summarizes and evaluates water quality data associated with the pollutant of concern in the context of applicable water quality objectives 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-MS4 sources can be pursued).

(iii) Describes the strategy and schedule for implementing best management practices (BMPs) and other 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 an applicable water quality standard 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 4.c.(a)(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 Regional Water Board directs an earlier submittal.

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

Deleted: <#>For exceedance(s) of a water quality standard in the process of being addressed by the Water Quality Improvement Plan, the Copermittee(s) must implement the Water Quality Improvement Plan as accepted by the San Diego Water Board, and update the Water Quality Improvement Plan, as necessary, pursuant to Provision F.2.c;¶
<#>¶
Upon a determination by either the Copermittees or the San Diego Water Board that discharges from the MS4 are causing or contributing to a new exceedance of an applicable water quality standard not addressed by the Water Quality Improvement Plan, the Copermittees must submit the following updates to the Water Quality Improvement Plan pursuant to Provision F.2.c or as part of the Annual Report required under Provision F.3.b, unless the San Diego Water Board directs an earlier submittal

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Section Break (Continuous)
Water quality improvement strategies (i.e. BMPs, retrofitting projects, stream and/or habitat rehabilitation or restoration projects, adjustments to jurisdictional runoff management programs, 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,¶
¶
Updates to the schedule for implementation of the existing and additional water quality improvement strategies, and¶
¶
Updates to the monitoring and assessment program to track progress toward achieving compliance with Provisions A.1.a, A.1.c and A.2.a of this Order;

(b) Submit any modifications to the report required by the Regional Water Board within 60 days of notification. The report is deemed approved within 60 days of its submission if no response is received from the Regional Water Board.

(c) Implement the actions specified in the report in accordance with the acceptance or approval, including the implementation schedule and any modifications to this Order.

(d) As long as the Permittee has complied with the procedure set forth above 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 Regional Water Board to develop additional BMPs.

(e) The information developed pursuant to A.4.c must be evaluated and incorporated into the Water Quality Improvement Plans and/or the Jurisdictional Runoff Management Plans, as needed.

d. 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, a Permittee that is in compliance with Attachment E (Total Maximum Daily Load Provisions) is in compliance with Parts 4.a and 4.b above. For Receiving Water Limitations associated with waterbody-pollutant combinations on the CWA 303(d) list, which are not otherwise addressed by Attachment E or other applicable pollutant-specific provision of this Order, a Permittee that is in compliance with Part 4.c is in compliance with Parts 4.a and 4.b.

e. Alternatively, a Permittee that is in compliance with Provision B (Development and Implementation of Water Quality Improvement Plans) is in compliance with Parts 4.a and 4.b above.

f. If a Permittee is found to have discharges from the MS4 for which it is responsible that causes an exceedance of an applicable water quality standard in the receiving water or causes a condition of nuisance in the receiving water, the Permittee shall be in compliance with Parts 4.a and 4.b above, if the Permittee is in compliance with Parts 4.c, 4.d, or 4.e, or requirements otherwise covered by a provision of this Order specifically addressing the constituent in question, as applicable.

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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 90 days of notification that additional modifications are required by the San Diego Water Board, or as otherwise directed

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<#>Within 90 days of the San Diego Water Board determination that the update to the Water Quality Improvement Plan meets the requirements of this Order, the applicable 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¶
¶
<#>Each Copermittee must implement the updated Water Quality Improvement Plan.¶

Deleted: The procedure set forth above to achieve compliance with Provisions A.1.a, A.1.c and A.2.a of this Order do not have to be repeated 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.

Deleted: 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.

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B. WATER QUALITY IMPROVEMENT PLANS[6]

The purpose of this provision is to develop Water Quality Improvement Plans (WQIPs) that guide the Copermittees' jurisdictional runoff management programs towards achieving the outcome of improved water quality in MS4 discharges and receiving waters. The goal of the Water Quality Improvement Plans is to address the impacts of MS4 discharges so that such discharges do not impair the 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, and 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 priority water quality conditions within a watershed and implements strategies through the jurisdictional runoff management programs 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 WQIP priorities for the applicable Watershed Management Area, if appropriate justification is provided.

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1. Watershed Management Areas

The Copermittees must develop a Water Quality Improvement Plan 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.

Table B-1. Watershed Management Areas

Hydrologic Unit(s)	Watershed Management Area	Major Surface Water Bodies	Responsible Copermittees
San Juan (901.00)	South Orange County	- Aliso Creek - San Juan Creek - San Mateo Creek - Pacific Ocean - Heisler Park ASBS	- 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 (902.00)	Santa Margarita River	- 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]

[6] Once developed and approved, the Water Quality Improvement Plan and corresponding Jurisdictional Runoff Management Plan will functionally replace the Load Reduction Plans.

Table B-1. Watershed Management Areas

Hydrologic Unit(s)	Watershed Management Area	Major Surface Water Bodies	Responsible Copermittees
San Luis Rey (903.00)	San Luis Rey River	- San Luis Rey River - San Luis Rey Estuary - Pacific Ocean	- City of Oceanside - City of Vista - County of San Diego
Carlsbad (904.00)	Carlsbad	- 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 (905.00)	San Dieguito River	- 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 (906.00)	Penasquitos	- Los Penasquitos Lagoon - Pacific Ocean	- City of Del Mar - City of Poway - City of San Diego - County of San Diego
	Mission Bay	- Mission Bay - Pacific Ocean - San Diego Marine Life Refuge ASBS	- City of San Diego
San Diego (907.00)	San Diego River	- San Diego River - Pacific Ocean	- City of El Cajon - City of La Mesa - City of San Diego - City of Santee - County of San Diego
Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)	San Diego Bay	- 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 - San Diego Unified Port District
Tijuana (911.00)	Tijuana River	- 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 covered under this Order after 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 covered under this Order after 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 is required to implement the requirements of Provision B for its jurisdiction within the Santa Margarita River Watershed Management Area until the Riverside County Copermittees have been notified of coverage under this Order.

2. Priority Water Quality Conditions

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 the following, at a minimum, to identify water quality priorities based on 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) 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 (Attachment A);

(4) The receiving water limitations of Provision A.2;

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

(6) Available, relevant, and appropriately collected and analyzed physical, chemical, and biological receiving water monitoring data, 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) Available evidence of erosional impacts in receiving waters due to accelerated flows (i.e. hydromodification);

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

(9) The potential improvements in the overall condition of the Watershed Management Area that can be achieved.

b. ASSESSMENT OF IMPACTS FROM MS4 DISCHARGES

The Copermittees must consider the following, at a minimum, to identify the potential impacts to receiving waters that may be caused or contributed to by discharges from the Copermittees' MS4s:

(1) The discharge prohibitions of Provision A.1 and effluent limitations of Provision A.3; and

(2) Available, relevant, and appropriately collected and analyzed storm water and non-storm water monitoring data from the Copermittees' MS4 outfalls;

(3) Locations of each Copermittee's MS4 outfalls that discharge to receiving waters;

(4) Locations of MS4 outfalls that are known to persistently discharge non-storm water to receiving waters likely causing or contributing to impacts on receiving water beneficial uses;

(5) Locations of MS4 outfalls that are known to discharge pollutants in storm water causing or contributing to impacts on receiving water beneficial uses; and

(6) The potential improvements in the quality of discharges from the MS4 that can be achieved.

c. IDENTIFICATION OF PRIORITY WATER QUALITY CONDITIONS

(1) The Copermittees must use the information gathered for Provisions B.2.a and B.2.b to develop a list of priority water quality conditions as pollutants, stressors 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 list must include the following information for each priority water quality condition:

(a) The beneficial use(s) associated with the priority water quality condition;

(b) The geographic extent of the priority water quality condition within the Watershed Management Area, if known;

(c) The temporal extent of the priority water quality condition (e.g., dry weather and/or wet weather);

(d) The Copermittees with MS4s discharges that may cause or contribute to the priority water quality condition; and

(e) An assessment of the adequacy of and data gaps in the monitoring data to characterize the conditions causing or contributing to the priority water quality condition, including a consideration of spatial and temporal variation.

(2) The Copermittees must identify the highest priority water quality conditions to be addressed by the Water Quality Improvement Plan, and provide a rationale for selecting a subset of the water quality conditions identified pursuant to Provision B.2.c.(1) as the highest priorities.

d. IDENTIFICATION OF MS4 SOURCES OF POLLUTANTS AND/OR STRESSORS

The Copermittees must identify and prioritize known and suspected sources of storm water and non-storm water pollutants and/or other stressors associated with MS4 discharges that cause or contribute to the highest priority water quality conditions identified under Provision B.2.c. The identification of known and suspected sources of pollutants and/or stressors that cause or contribute to the highest priority water quality conditions as identified for Provision B.2.c must consider the following:

(1) Pollutant generating facilities, areas, and/or activities within the Watershed Management Area, including:

(a) Each Copermittee's inventory of construction sites, commercial facilities or areas, industrial facilities, municipal facilities, and residential areas,

(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., Phase II MS4s, tribal lands, state lands, federal lands) that are known or suspected to be discharging to the Copermittees' MS4s;

(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 discharge monitoring,

(c) Findings from the Copermittees’ receiving water monitoring,

(d) Findings from the Copermittees’ MS4 outfall discharge and receiving water assessments, and

(e) Other available, relevant, and appropriately collected data, information, or studies related to pollutant sources and/or stressors that contribute to the highest priority water quality conditions as identified for Provision B.2.c.

(5) The adequacy of the available data to identify and prioritize sources and/or stressors associated with MS4 discharges that cause or contribute to the highest priority water quality conditions identified under Provision B.2.c.

e. NUMERIC GOALS AND SCHEDULES

The Copermittees must develop and incorporate action levels, interim and final numeric goals[7] and schedules into the Water Quality Improvement Plan. Numeric goals must be used to support Water Quality Improvement Plan implementation and measure progress towards addressing the highest priority water quality conditions identified under Provision B.2.c. Action levels and 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 water quality conditions which will be capable of demonstrating the protection of water quality standards in receiving waters;

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(2) Interim numeric goals must be based on measureable criteria or indicators capable of demonstrating incremental progress toward achieving the final numeric 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 goals required for Provisions B.2.e.(1) and B.2.e.(2). 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. 2012-0012 (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

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Final dates for achieving the final numeric goals must not initially extend more than 10 years beyond the effective date of this Order, unless a longer period of time is authorized by the San Diego Water Board Executive Officer or the schedule includes an applicable TMDL in Attachment E to this Order.

(4) The schedules for achieving the interim and final goals will be evaluated with each annual report [F.3.b.(1)(d)] and/or as a part of the ROWD development [B.5.a] to determine if they should be modified.

[7] Interim and final numeric goals may take a variety of forms such as TMDL established WQBELs, 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. Except for TMDL established WQBELs, interim and final numeric goals and corresponding schedules may be revised through the adaptive management process under Provision B.5.

3. Water Quality Improvement Strategies and Schedules

The Copermittees must develop specific water quality improvement strategies to address the highest priority water quality conditions identified within a Watershed Management Area. The water quality improvement strategies must address the highest priority water quality conditions 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 protecting the water quality standards of receiving waters.

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a. Water Quality Improvement Strategies

The Copermittees must identify and prioritize water quality improvement strategies based on their likely effectiveness and efficiency, and implement strategies to effectively prohibit non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the MEP, improve the physical, chemical, and biological receiving water conditions, and achieve the interim and final numeric goals in accordance with the schedules required for Provision B.2.e.(3). The following water quality improvement strategies must be included and described in the Water Quality Improvement Plan:

(1) Specific strategies and/or activities that may be implemented by one or more Copermittees within their jurisdictions through the jurisdictional runoff management programs that will address the highest priority water quality conditions within the Watershed Management Area, in accordance with the following requirements:

(a) Strategies and/or activities must, at a minimum, be described for each jurisdictional runoff management program component where strategies to address the highest priority water quality conditions are required under Provision E;

(b) The Water Quality Improvement Plan must describe the circumstances or conditions when and where the strategies or/activities should be or will be implemented, but specific details about how each Copermittee will implement the strategies and/or activities within its jurisdiction are not required; and

(c) Descriptions of strategies and/or activities must include any monitoring, information collection, special studies, and/or data analysis that is necessary to assess the effectiveness of the strategy and/or activity toward addressing the highest priority water quality conditions.

(2) Additional strategies and/or activities that may be implemented within the Watershed Management Area on a jurisdictional, sub-watershed, or watershed scale by one or more Copermittees, not specifically required under Provision E, which are designed to achieve the interim and final numeric goals identified in Provisions B.2.e.(1) and B.2.e.(2);

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 under Provision B.2.e.(1) and B.2.e.(2). Schedules must be developed for both the water quality improvement strategies implemented by each Copermittee within its jurisdiction and for strategies that the 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 Program

a. The Copermittees in each Watershed Management Area must develop and incorporate an integrated monitoring and assessment program into the Water Quality Improvement Plan that assesses: 1) the progress toward achieving the numeric goals and schedules, 2) the progress toward addressing the highest priority water quality conditions for each Watershed Management Area, and 3) each Copermittee's overall efforts to implement the Water Quality Improvement Plan.

b. The monitoring and assessment program must incorporate the monitoring and assessment requirements of Provision D, which may allow the Copermittees to modify the program to be consistent with and focus on the highest priority water quality conditions for each Watershed Management Area.

c. For Watershed Management Areas with applicable TMDLs, the monitoring and assessment program must incorporate the specific monitoring and assessment requirements of Attachment E.

d. For Watershed Management Areas with any ASBS, the water quality monitoring and assessment program must incorporate the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-0012 (see Attachment A).

5. Iterative Approach and Adaptive Management Process

The Copermittees in each Watershed Management Area must implement the iterative approach pursuant to Provision A.4 to adapt the Water Quality Improvement Plan, monitoring and assessment program, and jurisdictional runoff management programs to become more effective toward achieving compliance with Provisions A.1, A.2, and A.3, and must include the following:

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a. RE-EVALUATION OF PRIORITY WATER QUALITY CONDITIONS

The priority water quality conditions, and numeric goals and corresponding schedules, included in the Water Quality Improvement Plan pursuant to Provisions B.2.c and B.2.e, may be re-evaluated by the Copermittees as needed during the term of this Order as part of the Annual Report. Re-evaluation and recommendations for modifications to the priority water quality conditions, and numeric goals and corresponding schedules must be provided in the Report of Waste Discharge, and must 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 priority water quality conditions in the Watershed Management Area,

(3) Progress toward achieving outcomes according to established schedules;

(4) New information developed when the requirements of Provisions B.2.a-c have been re-evaluated;

(5) New policies or regulations that may affect identified numeric goals;

(6) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality conditions and implementation strategies to address the highest priority water quality conditions;

(7) 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;

(8) San Diego Water Board recommendations; and

(9) Recommendations for modifications solicited through a public participation process.

b. ADAPTATION OF STRATEGIES AND SCHEDULES

The water quality improvement strategies and schedules, included in the Water Quality Improvement Plan pursuant to Provisions B.3, must be re-evaluated and adapted as new information becomes available to result in more effective and efficient measures to achieve the numeric goals established pursuant to Provision B.2.e. Re-evaluation of and modifications to the water quality improvement strategies must be provided in the Annual Report, and must consider the following:

(1) Modifications to the priority water quality conditions, and numeric goals and corresponding schedules based on Provision 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) New information developed when the requirements of Provisions B.2.b and B.2.d have been re-evaluated;

(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.

c. ADAPTATION OF MONITORING AND ASSESSMENT PROGRAM

The water quality improvement monitoring and assessment program, included in the Water Quality Improvement Plan pursuant to Provisions B.4, must be re-evaluated and adapted when new information becomes available. Re-evaluation and recommendations for modifications to the monitoring and assessment program, pursuant to the requirements of Provision D, may be provided in the Annual Report, but must be provided in the Report of Waste Discharge.

6. Water Quality Improvement Plan Submittal, Updates, and Implementation

a. The Copermittees must submit the Water Quality Improvement Plans in accordance with the requirements of Provision F.1.

b. The Copermittees must submit proposed updates to the Water Quality Improvement Plan for acceptance by the San Diego Water Board Executive Officer in accordance with the requirements of Provision F.2.c.

c. The Copermittees must commence with implementation of the Water Quality Improvement Plans immediately after acceptance by the San Diego Water Board, in accordance with the schedules, or subsequently updated schedules, within the Water Quality Improvement Plan.

C. ACTION LEVELS

The purpose of this provision is for the Copermittees to incorporate numeric non-stormwater action levels (NALs) and stormwater action levels (SALs) in the Water Quality Improvement Plans (WQIP) and numeric non-stormwater action levels (NALs) in the Illicit Discharge Detection and Elimination (IDDE) Program.

- For the purposes of the WQIPs, the goal of the action levels is to guide the implementation efforts and measure progress towards the protection of the high priority water quality conditions and designated beneficial uses of waters of the state from adverse impacts caused or contributed to by MS4 discharges. This goal will be accomplished through monitoring and assessing the quality of the MS4 discharges during the implementation of the Water Quality Improvement Plans.

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- For the purposes of the IDDE program, the goal of the action levels is to assist in the effective prohibition of non-stormwater discharges into the MS4.

Action levels will be developed and incorporated into the WQIP (Provision B) and the IDDE Program (Provision E). 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-stormwater and stormwater MS4 discharges using an approach approved by the Regional Board or use the default non-stormwater and stormwater action levels prescribed in C.1 and C.2 below.

The Copermittees will submit the action levels as a part of the WQIP and JURMP submittals. The action levels currently established will serve as the interim action levels until revised action levels are completed and approved. Exceedances of the action levels are not subject to enforcement or non-compliance actions under this Order.

1. Default Non-Storm Water Action Levels[8]

The following non-stormwater action levels (NALs) must be incorporated in the WQIPs and IDDE program if the Copermittees have not developed their own NALs for the identified high priority constituents using an approach approved by the Regional Board EO.

Deleted: The Copermittees must develop and incorporate numeric non-storm water action levels (NALs) into the Water Quality Improvement Plan to: 1) support the development and prioritization of water quality improvement strategies for addressing non-storm water discharges to and from the MS4s, 2) assess the effectiveness of the water quality improvement strategies toward addressing MS4 non-storm water discharges, required pursuant to Provision D.4.b.(1), and 3) support the detection and elimination of non-storm water and illicit discharges to and from the MS4, required pursuant to Provision E.2.

Deleted: [9]

a. The following NALs must be incorporated:

(1) Non-Storm Water Discharges from MS4s to Ocean Surf Zone

[8] NALs are not considered by the San Diego Water Board to be enforceable limitations.

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. The 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 saltwater "designated beach areas" and is not applicable to waterbodies that are not designated with the water contact recreation (REC-1) beneficial use.

Table C-3. Non-Storm Water Action Levels for Priority Pollutants

		Freshwater (CTR)		Saltwater (CTR)	
Parameter	Units	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)] + 0.6848)
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. The 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 with the water contact recreation (REC-1) beneficial use.

b. If not identified in Provision C.1.a, NALs must be identified, developed and incorporated in the Water Quality Improvement Plan for any pollutants or waste constituents that cause or contribute, or are threatening to cause or contribute to a condition of pollution or nuisance in waters of the state associated with the highest priority water quality conditions 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 data from MS4 outfalls collected in accordance with Provision D.2.b may be utilized to develop or revise NALs based on watershed-specific data, subject to San Diego Water Board Executive Officer approval.

Deleted: <#>For the NALs incorporated into the Water Quality Improvement Plan, the Copermittees may develop and incorporate secondary NALs specific to the Watershed Management Area at levels greater than the NALs required by Provisions C.1.a and C.1.b which can be utilized to further refine the prioritization and assessment of water quality improvement strategies for addressing non-storm water discharges to and from the MS4s, as well as the detection and elimination of non-storm water and illicit discharges to and from the MS4. The secondary NALs may be developed using an approach acceptable to the San Diego Water Board.¶
¶

2. Default Storm Water Action Levels[10]

The Copermittees must develop and incorporate numeric storm water action levels (SALs) in the Water Quality Improvement Plans to: 1) support the development and prioritization of water quality improvement strategies for reducing pollutants in storm water discharges from the MS4s, and 2) assess the effectiveness of the water quality improvement strategies toward reducing pollutants in storm water discharges, required pursuant to Provision D.4.b.(2).[11]

The following stormwater action levels (SALs) must be incorporated in the WQIPs if the Copermittees have not developed their own SALs for the identified high priority constituents using an approach approved by the Regional Board EO.

a. The following 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.

[10] SALs are not considered by the San Diego Water Board to be enforceable limitations.
[11] The Copermittees may utilize SALs or other benchmarks currently established by the Copermittees as interim SALs until the Water Quality Improvement Plans are accepted by the San Diego Water Board Executive Officer.

b. If not identified in Provision C.2.a, SALs must be identified, developed and incorporated in the Water Quality Improvement Plan for pollutants or waste constituents that cause or contribute, 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

(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 data from MS4 outfalls collected in accordance with Provision D.2.c may be used to develop or revise SALs based upon watershed-specific data, subject to San Diego Water Board Executive Officer approval.

Deleted: For the SALs incorporated into the Water Quality Improvement Plan, the Copermittees may develop and incorporate secondary SALs specific to the Watershed Management Area at levels greater than the SALs required by Provisions C.2.a and C.2.b which can be utilized to further refine the prioritization and assessment of water quality improvement strategies for reducing pollutants in storm water discharges from the MS4s. The secondary SALs may be developed based on the approaches recommended by the State Water Board's Storm Water Panel

Deleted: [12] or using an approach acceptable to the San Diego Water Board.¶
¶

D. MONITORING AND ASSESSMENT PROGRAM REQUIREMENTS

The purpose of this provision is for the Copermittees to monitor and assess the impact on the chemical, physical, and biological conditions of receiving waters caused by discharges from the Copermittees' MS4s under wet weather and dry weather conditions. The goal of the monitoring and assessment program 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 monitoring and assessing the conditions of the receiving waters, discharges from the MS4s, pollutant sources and/or stressors, and effectiveness of the water quality improvement strategies implemented as part of the Water Quality Improvement Plans.

1. Receiving Water Monitoring Requirements

The Copermittees must develop and conduct a program to monitor the condition of the receiving waters in each Watershed Management Area during dry weather and wet weather. Following acceptance of the Water Quality Improvement Plans for each Watershed Management Area, the Copermittees must conduct long-term receiving water monitoring during implementation of the Water Quality Improvement Plan to assess the long term trends and determine if conditions in receiving waters are improving. Any available monitoring data not collected specifically for this Order that meet the quality assurance criteria of the Copermittees and the monitoring requirements of this Order may be utilized by the Copermittees. The Copermittees must conduct the following receiving water monitoring procedures:

a. TRANSITIONAL RECEIVING WATER MONITORING

Until the monitoring requirements of Provisions D.1.b-e are incorporated into a Water Quality Improvement Plan that is accepted by the San Diego Water Board pursuant to Provision F.1, the Copermittees must conduct the following receiving water monitoring in the Watershed Management Area:

(1) Continue the receiving water monitoring programs required in Order Nos. R9-2007-0001, R9-2009-0002, and R9-2010-0016;

(2) Continue the monitoring in the Hydromodification Management Plans approved by the San Diego Water Board;

(3) Participate in the following regional receiving water monitoring programs, as applicable to the Watershed Management Area:

(a) Storm Water Monitoring Coalition Regional Monitoring,

(b) Southern California Bight Regional Monitoring, and

(c) Sediment Quality Monitoring;

(4) Implement the monitoring programs developed as part of any implementation plans or load reduction plans (e.g. Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) for the TMDLs in Attachment E to this Order; and

(5) For Watershed Management Areas with ASBS, implement the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-0012, included in Attachment A to this Order.

b. LONG-TERM RECEIVING WATER MONITORING STATIONS

The Copermittees must select at least one long-term receiving water monitoring station from among the existing mass loading stations, temporary watershed assessment stations, bioassessment stations, and stream assessment stations previously established by the Copermittees to be representative of the receiving water quality in the Watershed Management Area. Additional long-term receiving water monitoring stations must be selected where necessary to support the implementation and adaptation of the Water Quality Improvement Plan.

c. DRY WEATHER RECEIVING WATER MONITORING

During the term of the Order, the Copermittees must perform monitoring during at least three dry weather monitoring events at each of the long-term receiving water monitoring stations. At least one monitoring event must be conducted during the dry season (May 1 – September 30) and at least one monitoring 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 a storm event producing measureable rainfall of greater than 0.1 inch.

(1) Dry Weather Receiving Water Field Observations

For each dry weather monitoring event, the Copermittees must record field observations consistent with Table D-1 at each long-term receiving water monitoring station.

Table D-1. Field Observations for 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, sheens, odor, color) • If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, sheens, odor, color) • Station description (i.e. deposits or stains, vegetation condition, structural condition, and observable biology) • Presence and assessment of trash in and around station

(2) Dry Weather Receiving Water Field Monitoring

For each dry weather monitoring event, if conditions allow the collection of the data, the Copermittees must monitor and record the parameters in Table D-2 at each long-term receiving water monitoring station.

Table D-2. Field Monitoring Parameters for Receiving Water Monitoring Stations

Parameters
• pH • Temperature • Specific conductivity • Dissolved oxygen • Turbidity

(3) Dry Weather Receiving Water Analytical Monitoring

For each dry weather monitoring event, the Copermittees must collect and analyze samples from each long-term receiving water monitoring station as follows:

(a) Analytes that are field measured are not required to be analyzed by a laboratory;

(b) The Copermittees must implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods;

(c) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, hardness, and indicator bacteria;

(d) For all other constituents, composite samples must be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques:

(i) Time-weighted composites composed of 24 discrete hourly samples, which may be collected through the use of automated equipment, or

(ii) Flow-weighted composites collected over a typical 24-hour period, which may be collected through the use of automated equipment;

(e) Only one analysis of the composite of aliquots is required;

(f) Analysis for the following constituents is required:

(i) Constituents contributing to the highest priority water quality conditions identified in the Water Quality Improvement Plan,

(ii) Constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA section 303(d) List,

(iii) Constituents for implementation plans or load reduction plans (e.g. Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for watersheds where the Copermittees are listed responsible parties under the TMDLs in Attachment E to this Order,

(iv) Applicable NAL constituents, and

(v) Constituents listed in Table D-3.

Table D-3. Analytical Monitoring Constituents for Receiving Water Monitoring Stations

Conventionals, Nutrients	Metals (Total and Dissolved)	Pesticides	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • Total Organic Carbon • Dissolved Organic Carbon • Sulfate • Methylene Blue Active Substances (MBAS) • Total Phosphorus • Orthophosphate • Nitrite[1] • Nitrate[1] • Total Kjeldhal Nitrogen • Ammonia	• Arsenic • Cadmium • Chromium • Copper • Iron • Lead • Mercury • Nickel • Selenium • Thallium • Zinc	• Organophosphate Pesticides • Pyrethroid Pesticides	• 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 Total Coliform at inland receiving water monitoring stations.

Deleted: Fecal

(4) Dry Weather Receiving Water Toxicity Monitoring

For each dry weather monitoring event, the Copermittees must collect grab or composite samples from each long-term receiving water monitoring station to be analyzed for toxicity in accordance with Table D-4:

Table D-4. Dry Weather Toxicity Testing for Receiving Water Monitoring Stations

Freshwater Organism	Test Approach	USEPA Protocol[2]
Pimephales promelas	1 acute 1 chronic[1]	EPA-821-R-02-012
Hyalella Azteca	1 acute 1 chronic[1]	EPA-821-R-02-012
Psuedokirchneriella subcapitata	1 acute 1 chronic[1]	EPA-821-R-02-013

Notes:
1. Chronic toxicity testing is not required at receiving water monitoring stations located at mass loading stations if the channel flows are diverted year-round during dry weather conditions to the sanitary sewer for treatment.
2. USEPA protocols must be utilized for toxicity testing unless alternate toxicity testing protocols have been approved by the San Diego Water Board.

(5) Dry Weather Receiving Water Bioassessment Monitoring

Bioassessment monitoring for each long-term receiving water monitoring station is required at least once during the term of this Order. The Copermittees must conduct bioassessment monitoring during at least one dry weather monitoring event at each long-term receiving water monitoring station 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;[13]

(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;[14] and

(iii) Freshwater algae samples must be collected in accordance with the

[13] 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
[14] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

SWAMP Standard Operating Procedures for Collecting Algae Samples.[15] 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 Biological Integrity (IBI) for macroinvertebrates for each monitoring station where bioassessment monitoring was conducted, based on the most current calculation method;[16] and

(ii) An IBI for algae for each monitoring station where bioassessment monitoring was conducted, when a calculation method is developed.[17]

(c) In lieu of the requirements of Provision D.1.c.(5)(a), the Copermittees may conduct the bioassessment monitoring in accordance with the "Triad" assessment approach[18] to calculate the IBIs required for Provision D.1.c.(5)(b). The Copermittees must conduct sampling, analysis, and reporting of specified in-stream biological and habitat data according to the protocols specified in the SCCWRP Technical Report No. 539, or subsequent protocols, if developed.

(6) Dry Weather Receiving Water Hydromodification Monitoring

In addition to the hydromodification monitoring conducted as part of the Copermittees' Hydromodification Management Plans, hydromodification monitoring for each long-term receiving water monitoring station is required at least once during the term of this Order. The Copermittees must collect the following hydromodification monitoring observations and measurements within an appropriate domain of analysis during at least one dry weather monitoring event for each long-term receiving water monitoring station:

(a) Channel conditions, including:

(i) Channel dimensions,

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[15] Fetscher et al. 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California.

[16] 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.

[17] When a calculation method is developed, IBIs must be calculated for all available and appropriate historical data.

[18] Stormwater Monitoring Coalition Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. Technical Report #419. August 2004.

(ii) Hydrologic and geomorphic conditions, and

(iii) Presence and condition of vegetation and habitat;

(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.

d. WET WEATHER RECEIVING WATER MONITORING

During the term of the Order, the Copermittees must perform monitoring during at least three wet weather monitoring events at each long-term receiving water monitoring station. At least one wet weather monitoring event must be conducted during the first wet weather event of the wet season (October 1 – April 30), and at least one wet weather monitoring event during a wet weather event that occurs after February 1.

(1) Wet Weather Receiving Water Field Observations

For each wet weather monitoring event, the following narrative descriptions and observations must be recorded at each long-term receiving water 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 Receiving Water Field Monitoring

For each wet weather monitoring event, the Copermittees must monitor and record the parameters in Table D-2 at each long-term receiving water monitoring station.

(3) Wet Weather Receiving Water Analytical Monitoring

For each wet weather monitoring event, the Copermittees must collect and analyze samples from each long-term receiving water monitoring station as follows:

(a) Analytes that are field measured are not required to be analyzed by a laboratory;

(b) The Copermittees must implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods;

(c) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, hardness, and indicator bacteria;

(d) For all other constituents, composite samples must be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques:

(i) Time-weighted composites composed of 24 discrete hourly samples, which may be collected through the use of automated equipment, or

(ii) Flow-weighted composites collected over the length of the storm event or a typical 24-hour period, which may be collected through the use of automated equipment;

(e) Only one analysis of the composite of aliquots is required;

(f) Analysis for the following constituents is required:

(i) Constituents contributing to the highest priority water quality conditions identified in the Water Quality Improvement Plan,

(ii) Constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA section 303(d) List,

(iii) Constituents for implementation plans or load reduction plans (e.g. Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for watersheds where the Copermittees are listed responsible parties under the TMDLs in Attachment E to this Order,

(iv) Applicable SAL constituents, and

(v) Constituents listed in Table D-3.

(4) Wet Weather Receiving Water Toxicity Monitoring

For each wet weather monitoring event, the Copermittees must collect grab or composite samples from each long-term receiving water monitoring station to be analyzed for toxicity in accordance with Table D-5:

Table D-5. Wet Weather Toxicity Testing for Receiving Water Monitoring Stations

Freshwater Organism	Test Approach	USEPA Protocol[1]
Pimephales promelas	1 acute	EPA-821-R-02-012
Hyalella Azteca	1 acute	EPA-821-R-02-012
Psuedokirchneriella subcapitata	1 acute	EPA-821-R-02-013

Notes:
1. USEPA protocols must be utilized for toxicity testing unless alternate toxicity testing protocols have been approved by the San Diego Water Board.

e. OTHER RECEIVING WATER MONITORING REQUIREMENTS

(1) Regional Monitoring

The Copermittees must participate in the following regional receiving waters monitoring programs, as applicable to the Watershed Management Area:

(a) Storm Water Monitoring Coalition Regional Monitoring; and

(b) Southern California Bight Regional Monitoring.

(2) Sediment Quality Monitoring

The Copermittees must perform sediment monitoring 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 in conformance with the monitoring requirements set forth in the State Water Board Sediment Quality Control Plan.

(3) <u>ASBS Monitoring</u>

For Watershed Management Areas with ASBS, the Copermittees must implement the monitoring requirements of Attachment B to State Water Board Resolution No. 2012-0012, included in Attachment A to this Order.

f. ALTERNATIVE WATERSHED MONITORING REQUIREMENTS

The San Diego Water Board may direct the Copermittees to participate in an effort to develop alternative watershed monitoring with other regulated entities, other interested parties, and the San Diego Water Board to refine, coordinate, and implement 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.

<u>In lieu of the Receiving Water Monitoring Program requirements specified in 1.a to 1.d, the Copermittees may participate in the development and implementation of monitoring for the collaborative receiving waters monitoring program. It is expected that a regional monitoring will allow for a more effective and efficient receiving waters monitoring program. The regional monitoring plan must be submitted to the Executive Officer for review and approval. Documentation of participation and monitoring shall be included in the annual report.</u>

2. MS4 Outfall Discharge Monitoring Requirements

The Copermittees must develop and conduct a program to monitor the discharges from the MS4 outfalls in each Watershed Management Area during dry weather and wet weather. Following acceptance of the Water Quality Improvement Plans for each Watershed Management Area, the Copermittees must conduct MS4 outfall discharge monitoring during implementation of the Water Quality Improvement Plan to assess the effectiveness of their jurisdictional runoff management programs toward effectively prohibiting non-storm water discharges and reducing pollutants in storm water discharges to and from their MS4s. Any available monitoring data not collected specifically for this Order that meet the quality assurance criteria of the Copermittees and the monitoring requirements of this Order may be utilized by the Copermittees. The Copermittees must conduct the following MS4 outfall monitoring procedures:

a. TRANSITIONAL MS4 OUTFALL DISCHARGE MONITORING

Until the monitoring requirements of Provisions D.2.b-c are incorporated into a Water Quality Improvement Plan that is accepted by the San Diego Water Board pursuant to Provision F.1, the Copermittees must conduct the following MS4 outfall discharge monitoring in the Watershed Management Area:

(1) MS4 Outfall Discharge Monitoring Station Inventory

Each Copermittee must identify all major MS4 outfalls that discharge directly to receiving waters within its jurisdiction and geo-locate those outfalls on a map of the MS4 pursuant to Provision E.2.b.(1). This information must be compiled into a MS4 outfall discharge monitoring station inventory, and must include the following information:

(a) Latitude and longitude of MS4 outfall point of discharge;

(b) Watershed Management Area;

(c) Hydrologic subarea;

(d) Outlet size;

(e) Accessibility (i.e. safety and without disturbance of critical habitat);

(f) Approximate drainage area; and

(g) Classification of whether the MS4 outfall is known to have persistent dry weather flows, transient dry weather flows, no dry weather flows, or unknown dry weather flows.

(2) Transitional Dry Weather MS4 Outfall Discharge Field Screening Monitoring

Until the monitoring requirements of Provision D.2.b are incorporated into a Water Quality Improvement Plan that is accepted by the San Diego Water Board pursuant to Provision F.1, each Copermittee must perform dry weather MS4 outfall field screening monitoring to identify non-storm water and illicit discharges within its jurisdiction in accordance with Provision E.2.c, to determine which discharges are transient flows and which are persistent flows, and prioritize the dry weather MS4 discharges that will be investigated and eliminated in accordance with Provision E.2.d. Each Copermittee must conduct the following dry weather MS4 outfall discharge field screening monitoring within its jurisdiction:

(a) Transitional Dry Weather MS4 Outfall Discharge Field Screening Monitoring Frequency

Each Copermittee must field screen the MS4 outfalls in its inventory developed pursuant to Provision D.2.a.(1) as follows:

(i) For Copermittees with less than 125 major MS4 outfalls that discharge to receiving waters within a Watershed Management Area, at least 80 percent of the outfalls must be visually inspected two times per year during dry weather conditions.

(ii) For Copermittees with 125 major MS4 outfalls or more, but less than or equal to 500, that discharge to receiving waters within a Watershed Management Area all the outfalls must be visually inspected at least annually during dry weather conditions.

(iii) For Copermittees with more than 500 major MS4 outfalls that discharge to receiving waters within a Watershed Management Area, at least 500 outfalls must be visually inspected at least annually during dry weather conditions. Copermittees with more than 500 major MS4 outfalls within a Watershed Management Area must identify and prioritize at least 500 outfalls to be inspected considering the following:

[a] Assessment of connectivity of the discharge to a flowing receiving water;
[b] Reported exceedances of NALs in water quality monitoring data;
[c] Surrounding land uses;
[d] Presence of constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA section 303(d) List; and
[e] Flow rate.

(iv) For Copermittees with more than 500 major MS4 outfalls within its jurisdiction that are located in more than one Watershed Management Area, at least 500 major MS4 outfalls within its inventory must be visually inspected at least annually during dry weather conditions. Copermittees with more than 500 major MS4 outfalls in more than one Watershed Management Area must identify and prioritize at least 500 outfalls to be inspected considering the following:

[a] Assessment of connectivity of the discharge to a flowing receiving water;
[b] Reported exceedances of NALs in water quality monitoring data;
[c] Surrounding land uses;
[d] Presence of constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA section 303(d) List; and
[e] Flow rate.

(v) Inspections of major MS4 outfalls conducted in response to public reports and staff or contractor reports and notifications may count toward the required visual inspections of MS4 outfall discharge monitoring stations.

(b) Transitional Dry Weather MS4 Outfall Discharge Field Screening Visual Observations

(i) An antecedent dry period of at least 72 hours following any storm event producing measurable rainfall greater than 0.1 inch is required prior to conducting field screening visual observations during a field screening monitoring event.

(ii) During the field screening monitoring event, each Copermittee must record visual observations consistent with Table D-6 at each MS4 outfall discharge monitoring station inspected.

Table D-6. Field Screening Visual Observations for MS4 Outfall Discharge 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, sheens, odor, color) - Flow source(s) suspected or identified from non-storm water source investigation - 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, sheens, odor, color) - 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

(iii) Each Copermittee must implement the requirements of Provisions E.2.d.(2)(c)-(e) based on the field observations.

(iv) Each Copermittee must evaluate field observations together with existing information available from prior reports, inspections and monitoring results to determine whether any observed flowing, pooled, or ponded waters are likely to be transient or persistent flow.[19]

(c) Transitional Dry Weather MS4 Outfall Discharge Field Screening Monitoring Records

[19] Persistent flow is defined as the presence of flowing, pooled, or ponded water more than 72 hours after a measureable rainfall event of 0.1 inch or greater during three consecutive monitoring and/or inspection events. All other flowing, pooled, or ponded water is considered transient.

Based upon the results of the transitional dry weather MS4 outfall discharge field screening monitoring conducted pursuant to Provisions D.2.a.(2)(a)-(b), each Copermittee must update its MS4 outfall discharge monitoring station inventory, compiled pursuant to Provision D.2.a.(1), with any new information on the classification of whether the MS4 outfall produces persistent flow, transient flow, or no dry weather flow.

(3) Transitional Wet Weather MS4 Outfall Discharge Monitoring

Until the monitoring requirements of Provision D.2.c are incorporated into a Water Quality Improvement Plan that is accepted by the San Diego Water Board pursuant to Provision F.1, the Copermittees must conduct the following wet weather MS4 outfall discharge monitoring within the Watershed Management Area:

(a) Transitional Wet Weather MS4 Outfall Discharge Monitoring Stations

The Copermittees must select at least five wet weather MS4 outfall discharge monitoring stations from the inventories developed pursuant to Provision D.2.a.(1) that are representative of storm water discharges from areas consisting primarily of residential, commercial, industrial, and typical mixed-use land uses present within the Watershed Management Area.

(b) Transitional Wet Weather MS4 Outfall Discharge Monitoring Frequency

Each wet weather MS4 outfall discharge monitoring station selected pursuant to Provision D.2.a.(3)(a) must be monitored twice during the wet season (October 1 – April 30). One wet weather monitoring event must be conducted during the first wet weather event of the wet season, and one wet weather monitoring event at least a month after the first wet weather event of the wet season.

Transitional wet weather MS4 outfall discharge monitoring may begin in year 2 of the transitional period once the MS4 outfall discharge monitoring stations have been inventoried and evaluated pursuant to Provision D.2.a.(1)

(c) Transitional Wet Weather MS4 Outfall Discharge Field Observations

For each wet weather monitoring event, the following narrative descriptions and observations must be recorded at each wet weather MS4 outfall discharge 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; and

(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.

(d) Transitional Wet Weather MS4 Outfall Discharge Field Monitoring

For each wet weather monitoring event, the Copermittees must monitor and record the parameters in Table D-2 at each wet weather MS4 outfall discharge monitoring station.

(e) Transitional Wet Weather MS4 Outfall Discharge Analytical Monitoring

For each wet weather monitoring event, the Copermittees must collect and analyze samples from each wet weather MS4 outfall discharge monitoring station as follows:

(i) Analytes that are field measured are not required to be analyzed by a laboratory;

(ii) The Copermittees must implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods;

(iii) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, and indicator bacteria;

(iv) For all other constituents, composite samples must be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques:

[a] Time-weighted composites collected over the length of the storm event or the first 24 hour period, whichever is shorter, composed of discrete samples, which may be collected through the use of automated equipment, or

[b] Flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter, which may be collected through the use of automated equipment, or

[c] If automated compositing is not feasible, a composite sample may be collected using a minimum of 4 grab samples, collected during

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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;

(v) Only one analysis of the composite of aliquots is required;

(vi) The samples must be analyzed for the following constituents:

[a] Constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA section 303(d) List with the exception of toxicity[20],
[b] Constituents for implementation plans or load reduction plans (e.g. Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for watersheds where the Copermittees are listed responsible parties under the TMDLs in Attachment E to this Order, and
[c] Constituents listed in in Table D-7.
[e] The Copermittee may be relieved of analytical monitoring requirements [a] to [c] if supporting information can be provided or has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary.

[20] Copermittees may provide an alternate approach to evaluate and identify the cause of toxicity currently affecting receiving waters and to iteratively adapt the monitoring program to address these chemical stressors in their MS4 outfall discharges in the monitoring plan which is subject to Regional Board approval.

Table D-7. Analytical Monitoring Constituents for Wet Weather MS4 Outfall Discharge Monitoring Stations

Conventionals, Nutrients	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • Total Organic Carbon • Dissolved Organic Carbon • Sulfate • Methylene Blue Active Substances (MBAS) • Total Phosphorus • Orthophosphate • Nitrite[1] • Nitrate[1] • Total Kjeldhal Nitrogen • Ammonia	• Arsenic • Cadmium • Chromium • Copper • Iron • Lead • Nickel • Selenium • Thallium • 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 Total Coliform for dishcarges to inland surface waters.

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(f) Other Transitional Wet Weather MS4 Outfall Discharge Monitoring

The San Diego County Copermittees must continue the wet weather MS4 outfall monitoring program developed under Order No. R9-2007-0001, as approved by the San Diego Water Board, through its planned completion.

b. DRY WEATHER MS4 OUTFALL DISCHARGE MONITORING

Each Copermittee must perform dry weather MS4 outfall monitoring to identify non-storm water and illicit discharges within its jurisdiction pursuant to Provision E.2.c, and to prioritize the dry weather MS4 discharges that will be investigated and eliminated pursuant to Provision E.2.d. Each Copermittee must conduct the following dry weather MS4 outfall discharge monitoring within its jurisdiction:

(1) Dry Weather MS4 Outfall Discharge Field Screening Monitoring

Each Copermittee must continue to perform the dry weather MS4 outfall discharge field screening monitoring in accordance with the requirements of Provision D.2.a.(2). The Copermittee may adjust the field screening monitoring frequencies and locations for the MS4 outfalls in its inventory, as needed, to identify and eliminate sources of persistent flow non-storm water discharges in accordance with the highest priority water quality conditions identified in the Water Quality Improvement Plan, provided the number of visual inspections performed is equivalent to the number of visual inspections required under Provision D.2.a.(2)(a).

(2) Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring

Each Copermittee must perform non-storm water persistent flow MS4 outfall discharge monitoring to determine which persistent non-storm water discharges contain concentrations of pollutants below NALs, and which persistent non-storm water discharges impact receiving water quality during dry weather. Each Copermittee must conduct the following non-storm water persistent flow MS4 outfall discharge monitoring within its jurisdiction:

(a) Prioritization of Non-Storm Water Persistent Flow MS4 Outfalls

Based upon the dry weather MS4 outfall discharge field screening monitoring records developed pursuant to Provision D.2.a.(2)(c), each Copermittee must identify and prioritize the MS4 outfalls with persistent flows based on the highest priority water quality conditions identified in the Water Quality Improvement Plan and any additional criteria developed by the Copermittee, which may include historical data and data from sources other than what the Copermittee collects.

(b) Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring Frequency

(i) Based on the prioritization of major MS4 outfalls developed under Provision D.2.b.(2)(a), each Copermittee must identify, at a minimum, the 10 highest priority major MS4 outfalls with non-storm water persistent flows that the Copermittee will monitor within each Watershed Management Area within its jurisdiction. The location of the highest priority non-storm water persistent flow MS4 outfall monitoring stations must be identified on the map required pursuant to Provision E.2.b.(1).

(ii) Each of the highest priority non-storm water persistent flow MS4 outfall monitoring stations identified pursuant to Provision D.2.b.(2)(b)(i) must be monitored under dry weather conditions at least semi-annually until one of the following occurs:

[a] The non-storm water discharges have been effectively eliminated (i.e. no flowing, pooled, or ponded water) for three consecutive dry weather monitoring events; or

[b] The source(s) of the persistent flows has been identified as a category of non-storm water discharges that does not require an NPDES permit and does not have to be addressed as an illicit discharge because it was not identified as a source of pollutants (i.e. constituents in non-storm water discharge do not exceed NALs), and the persistent flow can be re-prioritized to a lower priority; or

[c] The constituents in the persistent flow non-storm water discharge do not exceed NALs, and the persistent flow can be re-prioritized to a lower priority; or

[d] The source(s) of the persistent flows has been identified as a non-storm water discharge authorized by a separate NPDES permit.

(iii) Where the criteria under Provision D.2.b.(2)(c)(ii) are not met, but the threat to water quality has been reduced by the Copermittee, the highest priority persistent flow MS4 outfall monitoring stations may be reprioritized accordingly for continued dry weather MS4 outfall discharge field screening monitoring required pursuant to Provision D.2.b.(1).

(iv) Each Copermittee must document removal or re-prioritization of the highest priority persistent flow MS4 outfall monitoring stations identified under Provision D.2.b.(2)(b) in the Annual Report. Persistent flow MS4 outfall monitoring stations that have been removed must be replaced with the next highest prioritized MS4 major outfall in the Watershed Management Area within its jurisdiction, unless there are no remaining qualifying major MS4 outfalls within the Copermittee's jurisdiction in the Watershed Management Area.

(c) Non-Storm Water Persistent Flow MS4 Outfall Discharge Field Observations

During each semi-annual monitoring event, each Copermittee must record field observations consistent with Table D-6 at each of the highest priority persistent flow MS4 outfall monitoring stations within its jurisdiction.

(d) Non-Storm Water Persistent Flow MS4 Outfall Discharge Field Monitoring

During each semi-annual monitoring event, if conditions allow the collection of the data, each Copermittee must monitor and record the parameters in Table D-2 at each of the highest priority persistent flow MS4 outfall monitoring stations within its jurisdiction.

(e) Non-Storm Water Persistent Flow MS4 Outfall Discharge Analytical Monitoring

During each semi-annual monitoring event in which measurable flow is present, each Copermittee must collect and analyze samples from each of the highest priority persistent flow MS4 outfall monitoring stations within its jurisdiction as follows:

(i) Analytes that are field measured are not required to be analyzed by a laboratory;

(ii) The Copermittees must implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods;

(iii) Collect grab or composite samples to be analyzed for the following constituents:

[a] Constituents contributing to the highest priority water quality conditions identified in the Water Quality Improvement Plan,
[b] Constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA section 303(d) List with the exception of toxicity[21],
[c] Constituents for implementation plans or load reduction plans (e.g. Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for watersheds where the Copermittees are listed responsible parties under the TMDLs in Attachment E to this Order,
[d] Applicable NAL constituents, and
[e] Constituents listed in Table D-8, unless the Copermittee has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary.
[f] The Copermittee may be relieved of analytical monitoring requirements if supporting information can be provided or has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary.

Table D-8. Analytical Monitoring Constituents for Persistent Flow MS4 Outfall Discharge Monitoring Stations

Conventionals, Nutrients	Metals (Total and Dissolved)	Indicator Bacteria
• Total Dissolved Solids • Total Suspended Solids • Total Hardness • Total Phosphorus • Orthophosphate • Nitrite[1] • Nitrate[1] • Total Kjeldhal Nitrogen • Ammonia	• 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 Total Coliform for discharges to inland surface waters.

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[21] Copermittees may provide an alternate approach to evaluate and identify the cause of toxicity currently affecting receiving waters and to iteratively adapt the monitoring program to address these chemical stressors in their MS4 outfall discharges in the monitoring plan which is subject to Regional Board approval.

(iv) If the Copermittee identifies and eliminates the source of the persistent flow non-storm water discharge, analysis of the sample is not required.

c. WET WEATHER MS4 OUTFALL DISCHARGE MONITORING

The Copermittees must perform wet weather MS4 outfall monitoring to identify sources of pollutants in storm water discharges from the MS4s in the Watershed Management Area. The Copermittees must conduct the following wet weather MS4 outfall discharge monitoring within the Watershed Management Area:

(1) Wet Weather MS4 Outfall Discharge Monitoring Stations

The Copermittees may adjust the wet weather MS4 outfall discharge monitoring locations and frequencies in the Watershed Management Area, as needed, to identify sources of pollutants in storm water discharges from MS4s in the Watershed Management Area in accordance with the highest priority water quality conditions identified in the Water Quality Improvement Plan, provided the number of stations is at least equivalent to the number of stations required under Provision D.2.a.(3)(a).

(2) Wet Weather MS4 Outfall Discharge Monitoring Frequency

The Copermittees must monitor the wet weather MS4 outfall discharge monitoring stations in the Watershed Management Area at an appropriate frequency to identify sources of pollutants in storm water discharges from the MS4s causing or contributing to the highest priority water quality conditions identified in the Water Quality Improvement Plan.

(3) Wet Weather MS4 Outfall Discharge Field Observations

For each wet weather monitoring event, the following narrative descriptions and observations must be recorded at each wet weather MS4 outfall discharge 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; and

(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.

(4) Wet Weather MS4 Outfall Discharge Field Monitoring

For each wet weather monitoring event, the Copermittees must monitor and record the parameters in Table D-2 at each wet weather MS4 outfall discharge monitoring station.

(5) Wet Weather MS4 Outfall Discharge Analytical Monitoring

For each wet weather monitoring event, the Copermittees must collect and analyze samples from each wet weather MS4 outfall discharge monitoring station as follows:

(a) Analytes that are field measured are not required to be analyzed by a laboratory;

(b) The Copermittees must implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods;

(c) Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, hardness, and indicator bacteria;

(d) For all other constituents, composite samples must be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques:

(i) Time-weighted composites collected over the length of the storm event or the first 24 hour period, whichever is shorter, composed of discrete samples, which may be collected through the use of automated equipment, or

(ii) Flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter, which may be collected through the use of automated equipment, or

(iii) 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.

(e) Only one analysis of the composite of aliquots is required;

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(f) Analysis for the following constituents is required:

(i) Constituents contributing to the highest priority water quality conditions identified in the Water Quality Improvement Plan,

(ii) Constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA section 303(d) List, with the exception of toxicity[22],

(iii) Constituents for implementation plans or load reduction plans (e.g. Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for watersheds where the Copermittees are listed responsible parties under the TMDLs in Attachment E to this Order, and

(iv) Applicable SAL constituents.

(v) The Copermittee may be relieved of analytical monitoring requirements if supporting information can be provided or has historical data that can demonstrate or provide justification that the analysis of the constituent is not necessary.

[22] Copermittees may provide an alternate approach to evaluate and identify the cause of toxicity currently affecting receiving waters and to iteratively adapt the monitoring program to address these chemical stressors in their MS4 outfall discharges in the monitoring plan which is subject to Regional Board approval.

3. Special Studies

a. Within the term of this Order, the Copermittees must develop and implement the following special studies:

(1) At least three special studies in each Watershed Management Area to address pollutant and/or stressor data gaps and/or develop information necessary to more effectively address the pollutants and/or stressors that cause or contribute to highest priority water quality conditions identified in the Water Quality Improvement Plan.

(2) At least two special studies for the San Diego Region to address pollutant and/or stressor data gaps and/or develop information necessary to more effectively address the pollutants and/or stressors that are impacting receiving waters on a regional basis in the San Diego Region.

(3) One of the three special studies in each Watershed Management Area may be replaced by a special study implemented pursuant to Provision D.3.a.(2).

b. The special studies must, at a minimum, be in conformance with the following criteria:

(1) The special studies must be related to the highest priority water quality conditions identified by the Copermittees in the Watershed Management Area and/or for the entire San Diego Region;

(2) The special studies developed pursuant to Provision D.3.a.(1) must:

(a) Be implemented within the applicable Watershed Management Area, and

(b) Require some form of participation by all the Copermittees within the Watershed Management Area;

(3) The special studies developed pursuant to Provision D.3.a.(2) must:

(a) Be implemented within the San Diego Region, and

(b) Require some form of participation by all Copermittees covered under the requirements of this Order.

c. Special studies developed to identify sources of pollutants and/or stressors should be pollutant and/or stressor specific and based on historical monitoring data and monitoring performed pursuant to Provisions D.1 and D.2. Development of source identification special studies should include the following:

(1) A compilation of known information on the specific pollutant and/or stressor, including data on potential sources and movement of the pollutant and/or

stressor within the watershed. Data generated by the Copermittees and others, as well as information available from a literature research on the pollutant and/or stressor should be compiled and analyzed as appropriate.

(2) An identification of data gaps, based on the compiled information generated on the specific pollutant and/or stressor in Provision D.3.d.(1). Source identification special studies should be developed to fill identified data gaps.

(3) A monitoring plan that will collect and provide data the Copermittees can utilize to do the following:

(a) Quantify the relative loading or impact of a pollutant and/or stressor from a particular source or pollutant generating activity;

(b) Improve understanding of the fate of a pollutant and/or stressor in the environment;

(c) Develop an inventory of known and suspected sources of a pollutant and/or stressor in the Watershed Management Area; and/or

(d) Prioritize known and suspected sources of a pollutant and/or stressor based on relative magnitude in discharges, geographical distribution (i.e., regional or localized), frequency of occurrence in discharges, human health risk, and controllability.

d. Special studies initiated prior to the acceptance of the Water Quality Improvement Plan that meet the requirements of Provision D.3.b and are completed during the term of this Order may be utilized to fulfill the special study requirements of Provision D.3.a.

e. The Copermittees must submit the monitoring plans for the special studies in the Water Quality Improvement Plans required pursuant to Provision F.1.

f. The Copermittees are encouraged to share the results of the special studies regionally among the Copermittees to provide information useful in improving and adapting the management of non-storm water and storm water runoff through the implementation of the Water Quality Improvement Plans.

4. Assessment Requirements

Each Copermittee must evaluate the data collected pursuant to Provisions D.1, D.2 and D.3, and information collected during the implementation of the jurisdictional runoff management programs required pursuant to Provision E, to assess the progress of the water quality improvement strategies in the Water Quality Improvement Plan toward achieving compliance with Provisions A.1.a, A.1.c and A.2.a. Assessments must be performed as described in the following provisions:

a. RECEIVING WATERS ASSESSMENTS

(1) The Copermittees must assess and report the conditions of the receiving waters in the Watershed Management Area as follows:

(a) Based on data collected pursuant to Provision D.1.a, the assessments under Provision D.4.a.(2) must be included in the first Annual Report required pursuant to Provision F.3.b.(1).

(b) Based on the data collected pursuant to Provisions D.1.a-e, the assessments required under Provision D.4.a.(2) must be included in the Report of Waste Discharge required pursuant to Provision F.5.b.

(2) The Copermittees must assess the status and trends of receiving 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 in each Watershed Management Area the Copermittees must:

(a) Determine whether or not the conditions of the receiving waters are protective of the designated beneficial uses;

(b) Identify the most critical beneficial uses that must be protected to ensure overall health of the receiving water;

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(c) Determine whether or not those critical beneficial uses are being protected;

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(d) Identify short-term and/or long-term improvements or degradation of those critical beneficial uses;

(e) Identify data gaps in the monitoring data necessary to assess Provisions D.4.a.(2)(a)-(d).

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b. MS4 OUTFALL DISCHARGES ASSESSMENTS

(1) Non-Storm Water Discharges Reduction Assessments

(a) Each Copermittee must assess and report the progress of its illicit discharge detection and elimination program, required to be implemented pursuant to Provision E.2, toward effectively prohibiting non-storm water and illicit discharges into the MS4 within its jurisdiction as follows:

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(i) Based on data collected pursuant to Provisions D.2.a.(2), the assessments under Provision D.4.b.(1)(b) must be included in the first Annual Report required pursuant to Provision F.3.b.(1).

(ii) Based on the data collected pursuant to Provisions D.2.b, the assessments required under Provision D.4.b.(1)(c) must be included in the first Annual Report required pursuant to Provision F.3.b.(1), and annually thereafter.

(iii) Based on the data collected pursuant to Provisions D.2.b, the assessment required under Provision D.4.b.(1)(c) must be included in the Report of Waste Discharge required pursuant to F.5.b.

(b) Based on the transitional dry weather MS4 outfall discharge field screening monitoring required pursuant to Provision D.2.a.(2), each Copermittee must assess and report the following:

(i) Identify the known and suspected controllable sources (e.g. facilities, areas, land uses, pollutant generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area;

(ii) Identify sources of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area that have been reduced or eliminated; and

(iii) Identify modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.(1).

(c) Based on the dry weather MS4 outfall discharge field screening monitoring required pursuant to Provision D.2.b, each Copermittee must assess and report the following:

(i) The assessments required pursuant to Provision D.4.b.(1)(b);

(ii) Based on the data collected and applicable NALs in the Water Quality Improvement Plan, rank the MS4 outfalls in the Copermittee's jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action to update the Water Quality Improvement Plan, with the goal of eliminating persistent flow non-storm water discharges and/or pollutant loads in order of the ranked priority list through targeted programmatic actions and source investigations;

(iii) For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identify the known and suspected sources within the Copermittee's jurisdiction in the Watershed Management Area that may cause or contribute to the NAL exceedances;

(iv) Each Copermittee must analyze the data collected pursuant to Provision D.2.b, and utilize a model or other method, to calculate or estimate the non-storm water volumes and pollutant loads discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually. Each Copermittee must calculate or estimate:

[a] Annual non-storm water volumes and pollutant loads discharged from the Copermittee's major MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each known and suspected source for each MS4 outfall;

[b] Annual non-storm water volumes and pollutant loads from areas or facilities subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters.

(v) Each Copermittee must review the data collected pursuant to Provision D.2.b and findings from the assessments required pursuant to Provision D.4.b.(1)(c)(i)-(iv) on an annual basis to:

[a] Identify reductions and progress in achieving reductions in non-storm water and illicit discharges to the Copermittee's MS4 in the Watershed Management Area;

[b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction, with an estimate, if possible, of the non-storm water volume and/or pollutant load reductions attributable to specific water quality strategies implemented by the Copermittee; and

[c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittee in the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction.

(vi) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(2)(c)(i)-(v).

(2) <u>Storm Water Pollutant Discharges Reduction Assessments</u>

(a) The Copermittees must assess and report the progress of the water quality improvement strategies, required to be implemented pursuant to Provisions B and E, toward reducing pollutants in storm water discharges from the MS4s within the Watershed Management Area as follows:

(i) Based on data collected pursuant to Provisions D.2.a.(3), the assessments under Provision D.4.b.(2)(b) must be included in the first Annual Report required pursuant to Provision F.3.b.(1).

(ii) Based on the data collected pursuant to Provisions D.2.c, the assessments required under Provision D.4.b.(2)(c) must be included in the first Annual Report required pursuant to Provision F.3.b.(1), and annually thereafter.

(iii) Based on the data collected pursuant to Provisions D.2.c, the assessment required under Provisions D.4.b.(2)(c)-(d) must be included in the Report of Waste Discharge required pursuant to F.5.b.

(b) Based on the transitional wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.a.(3) the Copermittees must assess and report the following:

(i) The Copermittees must analyze the monitoring data collected pursuant to Provision D.2.a.(3), and utilize a watershed model or other method, to calculate or estimate storm water volumes and pollutant loads discharged from the MS4s in each Copermittee's jurisdiction within the Watershed Management Area. The Copermittees must calculate or estimate the following for each monitoring year:

[a] The average storm water runoff coefficient for each land use type within the Watershed Management Area;
[b] The volume of storm water discharged from the Copermittee's major MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch;
[c] The pollutant loads discharged from the Copermittee's major MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch; and
[d] The percent contribution of storm water volumes and pollutant loads discharged from each land use type within the drainage basin to the Copermittee's major MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch.

(ii) Identify modifications to the wet weather MS4 outfall discharge monitoring locations and/or frequencies necessary to identify sources pollutants in storm water discharges from the MS4s in the Watershed Management Area pursuant to Provision D.2.c.(1).

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(c) Based on the wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.c the Copermittees must assess and report the following:

(i) The assessments required pursuant to Provision D.4.b.(2)(b);

(ii) Based on the data collected and applicable SALs in the Water Quality Improvement Plan, rank the MS4 outfalls in the Watershed Management Area according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action to update the Water Quality Improvement Plan;

(iii) The Copermittees must review the data collected pursuant to Provision D.2.c and findings from the assessments required pursuant to Provisions D.4.b.(2)(c)(i)-(ii) on an annual basis to:

[a] Identify reductions or progress in achieving reductions in pollutant concentrations and/or pollutant loads from different land uses and/or drainage areas discharging from the Copermittees' MS4s in the Watershed Management Area;

[b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters within the Watershed Management Area to the MEP, with an estimate, if possible, of the pollutant load reductions attributable to specific water quality strategies implemented by the Copermittees; and

[c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittees in the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters in the Watershed Management Area to the MEP.

(iv) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(2)(c)(i)-(iii).

(d) The Copermittees must evaluate all the data collected pursuant to Provision D.2.c, and incorporate new outfall monitoring data into time series plots for each long-term monitoring constituent for the Watershed Management Area, and perform statistical trends analysis on the cumulative long-term wet weather MS4 outfall discharge water quality data set.

c. Special Studies Assessments

The Copermittees must annually evaluate the results and findings from the special studies developed and implemented pursuant to Provision D.3, and assess their relevance to the Copermittees' efforts to characterize receiving water conditions, understand sources of pollutants and/or stressors, and control

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and reduce the discharges of pollutants from the MS4 outfalls to receiving waters in the Watershed Management Area. The Copermittees must report the results of the special studies assessments applicable to the Watershed Management Area, and identify any necessary modifications or updates to the Water Quality Improvement Plan based on the results in the Annual Reports required pursuant to Provision F.3.b.

d. INTEGRATED ASSESSMENT OF WATER QUALITY IMPROVEMENT PLAN

As part of the iterative approach and adaptive management process required for the Water Quality Improvement Plan pursuant to Provision B.5, the Copermittees in each Watershed Management Area must integrate the data collected pursuant to Provisions D.1-D.3, the findings from the assessments required pursuant to Provisions D.4.a-c, and information collected during the implementation of the jurisdictional runoff management programs required pursuant to Provision E to assess the effectiveness of, and identify necessary modifications to, the Water Quality Improvement Plan as follows:

(1) The Copermittees must re-evaluate the priority water quality conditions and numeric goals for the Watershed Management Area, as needed, during the term of this Order pursuant to Provision B.5.a. The re-evaluation and recommendations for modifications to the priority water quality conditions, and/or numeric goals and corresponding schedules may be provided in the Annual Reports required pursuant to Provision F.3.b, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The priority water quality conditions and numeric goals for the Watershed Management Area must be re-evaluated as follows:

(a) Re-evaluate the receiving water conditions in the Watershed Management Area in accordance with Provision B.2.a;

(b) Re-evaluate the impacts on receiving waters in the Watershed Management Area from MS4 discharges in accordance with Provision B.2.b;

(c) Re-evaluate the identification of MS4 sources of pollutants and/or stressors in accordance with Provision B.2.d;

(d) Identify beneficial uses of the receiving waters that are protected in accordance with Provision D.4.a;

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(e) Evaluate the progress toward achieving the interim and final numeric goals for protecting beneficial uses in the receiving waters.

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(2) The Copermittees must re-evaluate the water quality improvement strategies for the Watershed Management Area during the term of this Order pursuant to Provision B.5.b. The re-evaluation and recommendations for modifications

to the water quality improvement strategies and schedules must be provided in the Annual Reports required pursuant to Provision F.3.b, and provided in the Report of Waste Discharge pursuant to Provision F.5.b. The water quality improvement strategies for the Watershed Management Area must be re-evaluated as follows:

(a) Identify the non-storm water and storm water pollutant loads from the Copermittees' MS4 outfalls in the Watershed Management Area, calculated or estimated pursuant to Provisions D.4.b;

(b) Identify the 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 interim and final numeric goals for protecting beneficial uses in the receiving waters;

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(c) Identify the non-storm water and storm water pollutant load reductions, or other improvements to the quality of MS4 discharges, that are 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 receiving water limitations;

(d) Evaluate the progress of the water quality improvement strategies toward achieving the interim and final numeric goals for protecting beneficial uses in the receiving waters.

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(3) The Copermittees must re-evaluate and adapt the water quality monitoring and assessment program for the Watershed Management Area when new information becomes available to improve the monitoring and assessment program pursuant to Provision B.5.c. The re-evaluation and recommendations for modifications to the monitoring and assessment program may be provided in the Annual Reports required pursuant to Provision F.3.b, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. Modifications to the water quality monitoring and assessment program must be consistent with the requirements of Provision D.1-D.3. The re-evaluation of the water quality monitoring and assessment program for the Watershed Management Area must consider the data gaps identified by the assessments required pursuant to Provisions D.4.a-b, and results of the special studies implemented pursuant to Provision D.4.c.

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 non-stormwater discharges into and stormwater discharges from the MS4 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 goal of the jurisdictional runoff management programs is to implement strategies and actions that effectively prohibit non-storm water discharges into the MS4 and reduce the discharge of pollutants in storm water to the MEP. This goal will be accomplished through implementing the jurisdictional runoff management programs in accordance with the water quality priorities and strategies identified in the Water Quality Improvement Plans.

Each Copermittee must update its jurisdictional runoff management program document, in accordance with Provision F.2.a, to incorporate the requirements of Provision E consistent with the highest water quality priorities as identified in the corresponding Water Quality Improvement Plan. 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) Effectively prohibit 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[23];

(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 the contribution of pollutants from one portion of the MS4 to another portion of the MS4;

(5) Control, by coordinating and cooperating with other owners of the MS4 such

[23] The Copermittees 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).

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Deleted: , 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 as Caltrans, the U.S. federal government, or sovereign Native American Tribes through interagency agreements, where possible, the contribution of pollutants from their portion of the MS4 to the portion of the MS4 within the Copermittee's jurisdiction;

(6) 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) Require the use of BMPs to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP;

(8)

(9) Utilize enforcement mechanisms to require compliance with its statutes, ordinances, permits, contracts, orders, or similar means; and

(10) 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 pursuant to 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 be implemented in accordance with the strategies identified in the Water Quality Improvement Plan. 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 and strategies as identified in the corresponding Water Quality Improvement Plan(s).

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Comment [K1]: It is recommended that this Provision (2.e) be moved to Provision 2.a

a. Strategies to Address the Highest Priority Water Quality Conditions

Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented as part of the illicit discharge detection and elimination program to address illicit discharges and connections that the Copermittee has identified as potential sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:

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(1) Provide specific details about how the strategies and/or activities will be implemented (e.g. designate BMPs, focus education, and/or increase/decrease frequency of inspections in specific areas); and

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(2) The strategies and/or activities must be consistent with the requirements of Provisions E.2.a-d and the strategies identified in the Water Quality Improvement Plan.

b. Non-Storm Water Discharges

Each Copermittee must address 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 the discharge is either identified as a discharge authorized by a separate NPDES permit, or identified as a category of non-storm water discharges that must be addressed pursuant to the following requirements:

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(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 NPDES Permit No. CAG 679001 (Order No. R9-2010-0003, or subsequent order). This category 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.

Deleted: <#>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: ¶
¶
<#>Uncontaminated pumped ground water;¶
¶
Discharges from foundation drains;

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¶
<#>Water from crawl space pumps; and¶
¶
<#>Water from footing drains.[19]¶
¶

(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) Uncontaminated pumped ground water;

(e) Discharges from foundation drains;[25]

(f) Springs;

(g) Water from crawl space pumps;

(h) Water from footing drains;[24]

(i) Flows from riparian habitats and wetlands;

(j) Discharges from potable water sources;

(k) Discharges from foundation drains;[26] and

(l) Discharges from footing drains.[26]

(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 be directed to landscaped areas or other pervious surfaces where feasible.

(b) Individual residential vehicle washing

(i) The 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

[25] Provision E.2.a.(1) only applies to this category on non-storm water if the system is designed to be located at or below the highest historical groundwater table to actively or passively extract groundwater during any part of the year.

[26] Provision E.2.a.(3) only applies to this category of non-storm water discharge if the system is designed to be located above the highest historical groundwater table at all times of the year, and the system is only expected to discharge non-storm water under unusual circumstances.

with individual residential vehicle washing from entering the MS4.

(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, or other pervious surfaces that can accommodate the volume of water, unless the saline swimming pool water can be discharged via a pipe or concrete channel directly to a naturally saline water body (e.g. Pacific Ocean).

(4) Firefighting discharges to the MS4 must continue to be addressed by the Copermittees 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 (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

(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.

c. 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 the field screening required pursuant to Provision E.2.c. The MS4 map must be included as part of the jurisdictional runoff management program document. Any geographic information system (GIS)

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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 should not interfere with immediate emergency response operations or impact public health and safety.¶

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(7) Each Copermittee must, where feasible, reduce or eliminate non-storm water discharges listed under Provisions E.2.a.(1)-(4) into its MS4 whether or not the non-storm water discharge has been identified as an illicit discharge, unless a non-storm water discharge is identified as a discharge authorized by a separate NPDES permit.

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;

(f) Locations of the MS4 outfalls, identified pursuant to Provision D.2.a.(1), within its jurisdiction; and

(g) Locations of the non-storm water persistent flow MS4 outfall discharge monitoring stations, identified pursuant to Provision D.2.b.(2)(b), 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 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, including the following methods for public reporting:

(a) Operate a public hotline, which can be Copermittee-specific or shared by the Copermittees, and must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week; and

(b) Designate an e-mail address for receiving electronic reports from the public, which can be Copermittee-specific or shared by the Copermittees, and must be prominently displayed on the Copermittee's webpage and the Regional Clearinghouse required pursuant to Provision F.4.

(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 its jurisdiction from any source. The Copermittee must coordinate, to the extent possible, 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 agencies.

(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.

(6) Each Copermittee must coordinate, when necessary, with upstream Copermittees and/or entities to prevent illicit discharges from upstream sources into the MS4 within its jurisdiction.

d. FIELD SCREENING

Each Copermittee must conduct field screening (i.e. visual observations, field testing, and/or analytical testing) of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections to the MS4 in accordance with the dry weather MS4 outfall discharge monitoring requirements in Provisions D.2.a.(2) and D.2.b.(1).

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e. 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 prioritizing investigations must consider 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 an 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, field screening, or other appropriate information, indicate a reasonable potential of receiving, containing, or discharging pollutants due to illicit discharges or illicit connections. The procedures must include the following:

(a) Each Copermittee must develop criteria to:

(i) Assess the validity of each report or notification received; and

(ii) Prioritize the response to each report or notification received.

(b) Each Copermittee must prioritize and respond to each valid report or notification (e.g., public reports, staff or contractor reports and notifications, etc.) of an incident in a timely manner.

(c) Each Copermittee must investigate and seek to identify the source(s) of illicit discharges or illicit connections observed into and from the MS4 during the field screening required pursuant to Provision D.2.b.(1) as follows:

(i) Obvious illicit discharges must be immediately investigated to identify the source(s);

(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; and

(iii) The investigation may include follow-up field investigations and/or reviewing Copermittee inventories and other land use data to identify potential sources of the discharge.

(d) Each Copermittee must maintain records and a database of the following information:

(i) Location of incident, including hydrologic subarea, portion of MS4 receiving the illicit discharge or connection, and point of discharge or potential discharge from MS4 to receiving water;

(ii) Source of information initiating the investigation (e.g., public reports, staff or contractor reports and notifications, field screening, etc.);

(iii) Date the information used to initiate the investigation was received;

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(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.

(e) Each Copermittee must track and seek to identify the source(s) of illicit discharges or connections from the MS4 where there is evidence of illicit discharges or connections having been discharged into or from the MS4 (e.g., pooled water), in accordance with MS4 outfall discharge monitoring requirements in Provisions D.2.a.(2) and D.2.b.

(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 responses:

(a) Each Copermittee must enforce its legal authority, as required under Provision E.1, to eliminate illicit discharges and connections to the MS4.

(b) If the Copermittee identifies the source as a controllable source, 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.

(c) 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 is in exceedance of the NALs, then the Copermittee must determine if: (1) this is an isolated incident or set of circumstances that will be addressed through its Enforcement Response Plan pursuant to Provision E.6, or (2) 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).

(d) If the Copermittee suspects the source of the illicit discharge or connection as natural in origin (i.e. non-anthropogenically influenced) and in conveyance into the MS4, then the Copermittee must document and provide the data and evidence necessary to demonstrate to the San Diego Water Board that it is natural in origin and does not require further investigation.

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(e) If the Copermittee is unable to identify and document the source of a recurring illicit discharges or connections into or from the MS4, then the Copermittee must address the discharge and update its jurisdictional runoff management program to address the common and suspected sources of the discharge within its jurisdiction in accordance with the Copermittee's priorities.

(4) Each Copermittee must submit a summary of the 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 and planning authorities to implement a development planning program in accordance with the strategies identified in the Water Quality Improvement Plan. 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 and strategies as identified in the corresponding Water Quality Improvement Plan(s).

a. Strategies to Address the Highest Priority Water Quality Conditions

Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented as part of the development planning program to address development and redevelopment projects that may become sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:

(1) Provide specific details about how the strategies and/or activities will be implemented (e.g. designate BMPs, focus education, increase frequency of verifications and/or inspections, alternative compliance options);

(2) Each Copermittee must identify areas within its jurisdiction where Priority Development Projects may be allowed or should be encouraged to implement or contribute toward the implementation of alternative compliance retrofitting and/or stream, channel, or habitat rehabilitation projects;

(3) Each Copermittee should collaborate and cooperate with other Copermittees and/or entities in the Watershed Management Area to identify regional alternative compliance projects that Priority Development Projects may be allowed or should be encouraged to implement or participate in implementing; and

(4) The strategies and/or activities must be consistent with the requirements of Provisions E.3.b-d and E.3.f-g and the strategies identified in the Water Quality Improvement Plan.

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<#>Strategies to Address the Highest Priority Water Quality Conditions ¶
¶
Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented as part of the illicit discharge detection and elimination program to address non-storm water and illicit discharges and connections that the Copermittee has identified as potential sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:¶
¶
<#>Provide specific details about how the strategies and/or activities will be implemented (e.g. designate additional BMPs, focus education, and/or increase/decrease frequency of inspections in specific areas); and¶
¶
<#>The strategies and/or activities must be consistent with the requirements of Provisions E.2.a-d and the strategies identified in the Water Quality Improvement Plan.¶

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Comment [K2]: It is recommended that this Provision (3.g) be moved to Provision 3.a

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b. 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 local 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) Onsite 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; and

(b) Structural 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:

(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);[27]

[27] 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 discharging 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 the MS4 and 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.

c. 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); 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

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Deleted: (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) development, and the existing development was not subject to Priority Development Project requirements, the performance requirements of Provisions E.3.c.(1) and E.3.c.(2) 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 requirements of Provisions E.3.c.(1) and E.3.c.(2) 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, 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 internal combustion 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, bicycle lanes, driveways, parking lots, or trails that meet the following criteria:

(i) Designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas; OR

(ii) Designed and constructed to be hydraulically disconnected from paved streets or roads; OR

(iii) Designed and constructed with permeable pavements or surfaces in accordance with USEPA Green Streets guidance.[28]

(b) Any 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 Streets1to the MEP. ;

(c) Single-family residential projects that are not part of a larger development or proposed subdivision.

[32] This volume is not a single volume to be applied to all areas covered by this Order. The size of the 85^{th} percentile storm event is different for various parts of the San Diego Region. The Copermittees are encouraged to calculate the 85^{th} 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 85^{th} percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85^{th} percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its BMP Design Manuals.

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¶
<#>Must be a retrofitting project implemented as part of an alternative compliance project option under Provision E.3.c.(3)(b)(v) to achieve the performance requirements of Provisions E.3.c.(1) and/or E.3.c.(2) for a Priority Development Project; AND¶
¶
<#>Designed and constructed in accordance with the USEPA Green Streets guidance.[29]¶

Deleted: New single family residences that meet the following criteria:

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Deleted: <#>Must not be constructed as part of a larger development or proposed subdivision; AND¶
¶
<#>Designed and constructed to be certified under the U.S. Green Building Council (USGCB) Leadership in Energy and Environmental Design (LEED) for Homes green building certification program, receiving at least four (4) Surface Water Management credits under the Sustainable Sites category;[30] OR¶
¶
<#>Designed and constructed with structural BMPs that will achieve the performance requirements of Provisions E.3.c.(1) and E.3.c.(2) onsite.¶

Deleted: [28] See "Managing Wet Weather with Green Infrastructure – Municipal Handbook: Green Streets" (USEPA, 2008).¶

(d) Flood control and stream restoration projects.

(e) 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

d. PRIORITY DEVELOPMENT PROJECT STRUCTURAL BMP PERFORMANCE 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 requirements below. If watershed-specific performance requirements are developed as part of a Water Quality Improvement Plan; these requirements would take precedence over the general performance requirements below. The watershed-specific requirement must provide at least equal protection as the general performance requirements below.

(1) On-site Storm Water Pollutant Control Structural BMP Requirements

Each Copermittee must require each Priority Development Project to implement onsite structural BMPs to control pollutants in storm water that may be discharged from a project as follows:

(a) Each Priority Development Project must be required to implement LID BMPs that are designed to retain (i.e. intercept, store, infiltrate, evaporate, and evapotranspire) onsite the pollutants contained in the design capture volume. The design capture volume is equivalent to:

(i) The volume of storm water runoff produced from a 24-hour 85th percentile storm event;[32] OR

(ii) The average annual volume of storm water runoff that would be retained onsite annually if the site was fully undeveloped and naturally vegetated, as determined using continuous simulation modeling or other techniques based on site-specific soil conditions and typical native vegetative cover.

(b) A Priority Development Project may be allowed to utilize alternative compliance under Provision E.3.c.(3) to comply with the storm water

[32] 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.

Deleted: Redevelopment of existing single family residences that meet the following criteria:

Deleted: Designed and constructed to be certified under the USGCB LEED for Homes green building certification program, receiving at least four (4) Surface Water Management credits under the Sustainable Sites category;

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¶
Designed and constructed with structural BMPs that will achieve the performance requirements of Provisions E.3.c.(1) and E.3.c.(2) onsite

pollutant control BMP performance requirements of Provision E.3.c.(1)(a).

(c) If a Priority Development project is allowed to utilize alternative compliance pursuant to Provisions E.3.c.(1)(b), flow-thru conventional treatment control BMPs must be implemented to treat the portion of the design capture volume that is not retained onsite. Additionally, project applicants must mitigate for the portion of the pollutant load in the design capture volume that is not retained onsite through one or more alternative compliance options under Provision E.3.c.(3). Conventional treatment control BMPs must be sized and designed to:

(i) Remove pollutants from storm water to the MEP;

(ii) 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 Priority Development Project's most significant pollutants of concern. Conventional 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 conventional 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) On-site Hydromodification Management Structural BMP Requirements

Each Copermittee must require each Priority Development Project to implement onsite structural BMPs to manage hydromodification to ensure that storm water runoff discharged from a project does not cause adverse hydromodification impacts in the downstream receiving waters.

The Copermittees in each Watershed Management Area may establish, as part of the WQIP, watershed specific requirements that will apply to priority development projects based on the susceptibility of the receiving waters to hydromodification impacts and historic receiving water changes from development. If watershed specific requirements are developed they will supersede requirements in the HMP. The watershed specific requirements must include the following:

(a) Post-project runoff flow rates and durations must not exceed the performance standard for runoff flow rates and durations to be determined as part of the development of the WQIPs for each Watershed Management Area by more than 10 percent (for the range of flows that

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result in increased potential for erosion, or degraded instream habitat 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) The Copermittees may use monitoring results collected pursuant to Provision D.1.a.(2) to re-define the range of flows resulting in increased potential for erosion, or degraded instream habitat 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) A Priority Development Project may be allowed to utilize alternative compliance under Provision E.3.c.(3) to comply with the performance requirements of Provisions E.3.c.(2)(a)-(b).

(d) Exemptions

Each Copermittee has the discretion to exempt a Priority Development Project from the hydromodification management BMP performance requirements of Provisions E.3.c.(2)(a)-(b) where the project:

(i) Discharges storm water runoff into existing 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 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 updates to the Copermittees' HMPs.

(v) Flood control and stream restoration projects.

Deleted: <#>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.¶

(vi) Is a redevelopment Priority Development Project that meets the alternative compliance requirements of Provision E.3.c.(3)(b)(ii); or

(vii) Discharges storm water runoff into other areas identified by the San Diego Water Board as exempt from the requirements of Provisions E.3.c.(2)(a)-(b).

If the Copermittees in a Watershed Management Area select not to develop watershed specific requirements, development projects will be subject to the current Copermitee HMPs inclusive of the exemptions identified in Section E.3.c.(2)(d) that will integrated into updated Copermittee HMPs.

(3) Alternative Compliance to Onsite Structural BMP Performance Requirements

(a) Applicability

At the discretion of each Copermittee, Priority Development Projects may be allowed to utilize an alternative option to comply with the onsite structural BMP performance requirements of Provisions E.3.c.(1) and E.3.c.(2) under the following conditions:

(i) The Copermittee must determine that implementation of the alternative compliance option will have a greater overall water quality benefit for the Watershed Management Area than fully complying with the performance requirements of Provisions E.3.c.(1) and E.3.c.(2) onsite;

(ii) The alternative compliance options must be designed by a registered professional engineer, geologist, architect, or landscape architect;

(iii) The alternative compliance options must be implemented within the same hydrologic unit as the Priority Development Project, and preferably within the same hydrologic subarea;

(iv) Receiving waters must not be utilized to convey storm water runoff to the alternative compliance options;

(v) The pollutants in storm water runoff from the Priority Development Project must be treated to the MEP by the alternative compliance options prior to being discharged to receiving waters;

(vi) Unless otherwise allowed by Provision E.3.c.(3)(b), the alternative compliance options must have a net result of at least the same level of pollutant removal as would have been achieved if the Priority Development Project had fully complied with the storm water pollutant control BMP performance requirements of Provision E.3.c.(1) onsite;

(vii) Unless otherwise allowed by Provision E.3.c.(3)(b), the alternative compliance options must have a net result of at least the same level of protection from potential downstream and upstream erosion in the receiving water as would have been achieved if the Priority Development Project had fully complied with the hydromodification management BMP performance requirements of Provision E.3.c.(2) onsite; and

(viii) The alternative compliance options utilized by the Priority Development Project to comply with the performance requirements of Provisions E.3.c.(1) and E.3.c.(2) must have reliable sources of funding for operation and maintenance.

(b) Alternative Compliance Project Options

The Copermittee may allow implementation of one or more of the following project options as part of an alternative approach to complying with the onsite structural BMP performance requirements of Provisions E.3.c.(1) and E.3.c.(2):

(i) *Onsite LID Biofiltration Treatment Control BMPs*

The Copermittee may allow Priority Development Projects to utilize onsite LID biofiltration treatment control BMPs to comply with the storm water pollutant control BMP performance requirements of Provision E.3.c.(1). Onsite LID biofiltration treatment control BMPs must be sized and designed to:

[a] Remove pollutants from storm water to the MEP; AND
[b] Have an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP; AND
[c] Biofilter up to the design capture volume that is not reliably retained onsite, and if necessary, mitigate for the portion of the pollutant load in the design capture volume not retained onsite through one or more alternative compliance project, in-lieu fee and/or water quality credit system options below.

(ii) *Watershed-Based Planned Development Projects*

The Copermittee may allow Priority Development Projects 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) to comply with the onsite structural BMP performance requirements of Provisions E.3.c.(1) and E.3.c.(2). The Priority Development Project must comply with the following conditions:

[a] The Priority Development Project was planned utilizing watershed and/or subwatershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the performance and location criteria of

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[c] Biofilter at least 1.5 times the design capture volume that is not reliably retained onsite; OR

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Deleted: <#>*LEED Certified Redevelopment Projects*¶
¶
The Copermittee may allow redevelopment Priority Development Projects to comply with the hydromodification management BMP performance requirements of Provision E.3.c.(2) where the project is designed and constructed to be certified under the USGCB LEED for New Construction and Major Renovations green building certification program. The Priority Development Project must receive at least one (1) Site Design credit and two (2) Stormwater Design credits under the Sustainable Sites category.[33] In addition, the existing and future configuration of the receiving water must not be unnaturally altered or adversely impacted by storm water flow rates and durations discharged from the site.¶

this Order and acceptable to the San Diego Water Board;

[b] Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the design capture volume defined in Provision E.3.c.(1)(a)(i) and that such controls are located upstream of receiving waters;

[c] 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 capture volume;

[d] Any portion of the design capture volume that is not retained by the regional BMPs must be treated using biofiltration BMPs; and

[e] Where regional BMPs are demonstrated to the Copermittee as technically infeasible to retain the entire design capture volume, any volume up to and including the design capture volume not retained by regional BMPs, nor treated by biofiltration BMPs, must be treated using conventional treatment control BMPs and the project applicant must implement additional alternative compliance project, in-lieu fee and/or water quality credit system options below.

(iii) *Offsite Regional BMPs*

[a] The Copermittee may allow Priority Development Projects to utilize offsite regional BMPs to comply with the storm water pollutant control BMP performance requirements of Provision E.3.c.(1) if the offsite regional BMPs have the capacity to receive and retain the design capture volume that is not reliably retained onsite.

[b] The Copermittee may allow Priority Development Projects to utilize offsite regional BMPs to comply with the hydromodification management BMP performance requirements of Provision E.3.c.(2) if the offsite regional BMPs have the capacity to manage the storm water flows rates and durations from the site such that the receiving waters are protected from the potential for increased erosion that would be caused if the unmanaged portion of the runoff was discharged from the site.

(iv) *Offsite Retrofitting Projects*

The Copermittee may allow Priority Development Projects to utilize offsite retrofitting projects to comply with the storm water pollutant control and hydromodification management BMP performance requirements of Provisions E.3.c.(1) and E.3.c.(2) if the retrofitting projects have been identified within the strategies included in the Water Quality Improvement Plan, or identified as potential retrofitting projects by the Copermittee pursuant to Provision E.5.

(v) *Offsite Channel, Stream, or Habitat Rehabilitation Projects*

The Copermittee may allow Priority Development Projects to utilize

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offsite channel, stream, or habitat rehabilitation projects to comply with the hydromodification management BMP performance requirements of Provision E.3.c.(2) if the rehabilitation projects have been identified within the strategies included in the Water Quality Improvement Plan, or identified as potential channel rehabilitation projects by the Copermittee pursuant to Provision E.5. The channel, stream, or habitat rehabilitation project cannot be utilized for pollutant treatment except where artificial wetlands are constructed and located upstream of receiving waters.

(vi) *Offsite Regional Water Supply Augmentation Projects*

The Copermittee may allow Priority Development Projects to utilize offsite regional water supply augmentation projects (i.e. groundwater recharge, recycled water, storm water harvesting) to comply with Provisions E.3.c.(1) and E.3.c.(2) if the projects have been identified within the strategies included in the Water Quality Improvement Plan.

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(vii) *Project Applicant Proposed Alternative Compliance Projects*

The Copermittee may allow one or more Priority Development Project applicant(s) to propose and implement alternative compliance projects to comply with Provisions E.3.c.(1) and E.3.c.(2) if the alternative compliance projects are consistent with, and will address the highest water quality priorities of the Water Quality Improvement Plan, and comply with the requirements of Provision E.3.c.(3)(a).

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(c) Alternative Compliance In-Lieu Fee Option

The Copermittee may develop and implement an alternative compliance in-lieu fee option, individually or with other Copermittees and/or entities, as a means for designing, developing, constructing, operating and maintaining offsite alternative compliance projects under Provision E.3.c.(3)(b). Priority Development Projects allowed to utilize the alternative compliance in-lieu fee option must comply with the following conditions:

(i) The in-lieu fee should be collected and held in accordance with the Mitigation Fee Act and all other applicable development fee laws.

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(ii) If the in-lieu fee is applied to the development, design and construction of offsite alternative compliance projects, the following conditions must be met:

[a] The offsite alternative compliance projects must allow the Priority Development Project to comply with the onsite BMP performance requirements of Provisions E.3.c.(1) and E.3.c.(2);

[b] The offsite alternative compliance projects must be constructed

as soon as possible, but no later than 4 years after the certificate of occupancy is granted for the first Priority Development Project that contributed funds toward the construction of the offsite alternative compliance projects, unless a longer period of time is authorized by the San Diego Water Board Executive Officer;

[c] The in-lieu fee for the Priority Development Project must include mitigation of the pollutant loads and increased storm water flow rates and durations that are allowed to discharge from the site before the offsite alternative compliance projects are constructed; and

[d]

Deleted: The in-lieu fee must also include the cost to operate and maintain the offsite alternative compliance projects.

(iii) If the in-lieu fee is applied to the operation and maintenance of offsite alternative compliance projects that have already been constructed, the offsite alternative compliance projects must allow the Priority Development Project to comply with the onsite structural BMP performance requirements of Provisions E.3.c.(1) and E.3.c.(2).

(d) Alternative Compliance Water Quality Credit System Option

The Copermittee may develop and implement an alternative compliance water quality credit system option, individually or with other Copermittees and/or entities. Any credit system that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance as part of the Water Quality Improvement Plan.

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(4) 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.

(5) Infiltration and Groundwater Protection

(a) Structural 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 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 BMPs are to be used;

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

(iv) The vertical distance from the base of any infiltration 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 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 BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(b) The Copermittee may develop, individually or with other Copermittees, alternative mandatory design criteria to that listed above for infiltration 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.

e. BMP DESIGN MANUAL UPDATE

Each Copermittee must update its BMP Design Manual[34] pursuant to Provision F.2.b. Until the Copermittee has updated its BMP Design Manual with the requirements of Provisions E.3.a-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:

[34] The BMP 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.

(1) Updated procedures to determine the nature and extent of storm water requirements applicable to a potential development or redevelopment projects. 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, structural 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 the CWA section 303(d) List);

(b) Pollutants, stressors, and/or receiving water conditions that cause or contribute to the highest priority water quality conditions 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 requirements to be consistent with the requirements of Provision E.3.c for all structural BMPs listed in the BMP Design Manual;

(4) Long-term maintenance criteria for each structural BMP listed in the BMP Design Manual; and

(5) Alternative compliance criteria, in accordance with the requirements under Provision E.3.c.(3), if the Copermittee elects to allow Priority Development Projects within its jurisdiction to utilize alternative compliance.

f. PRIORITY DEVELOPMENT PROJECT BMP IMPLEMENTATION AND OVERSIGHT

Each Copermittee must implement a program that requires and confirms 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 require and confirm that for all Priority Development Project applications that have not received prior lawful approval by the Copermittee by 18 months after the commencement of coverage under this Order, the requirements of Provision E.3 are implemented. For project applications that have received prior lawful approval by 18 months after the commencement of coverage under this Order, 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 require and confirm 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 require and confirm that prior to occupancy and/or intended use of any portion of the Priority Development Project, each structural BMP is inspected to verify that it has been constructed and is operating in compliance with all of its specifications, plans, permits, ordinances, and the requirements of this Order.

(2) <u>Priority Development Project Inventory and Prioritization</u>

(a) Each Copermittee must develop, maintain, and update at least annually, a watershed-based database to track and inventory all Priority Development Projects and associated structural BMPs within its 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 use of an automated database system, such as GIS, is highly recommended. 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) <u>Structural BMP Maintenance Verifications and Inspections</u>

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.

g. 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.

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Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented as part of the development planning program to address development and redevelopment projects that may become sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:¶

¶

<#>Provide specific details about how the strategies and/or activities will be implemented (e.g. designate additional BMPs, focus education, increase frequency of verifications and/or inspections, alternative compliance options);¶

¶

<#>Each Copermittee must identify areas within its jurisdiction where Priority Development Projects may be allowed or should be encouraged to implement or contribute toward the implementation of alternative compliance retrofitting and/or stream, channel, or habitat rehabilitation projects;¶

¶

<#>Each Copermittee should collaborate and cooperate with other Copermittees and/or entities in the Watershed Management Area to identify regional alternative compliance projects that Priority Development Projects may be allowed or should be encouraged to implement or participate in implementing; and¶

¶

<#>The strategies and/or activities must be consistent with the requirements of Provisions E.3.a-c and E.3.e-f and the strategies identified in the Water Quality Improvement Plan.¶

4. Construction Management

Each Copermittee must implement a construction management program in accordance with the strategies identified in the Water Quality Improvement Plan. 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 and strategies as identified in the corresponding Water Quality improvement Plan(s).

Deleted: and includes, at a minimum, the following requirements:

a. Strategies to Address the Highest Priority Water Quality Conditions

Comment [K3]: It is recommended that this Provision (4.f) be moved to Provision 4.a

Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented as part of the construction management program to address construction sites that the Copermittee has identified as potential sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:

(1) Provide specific details about how the strategies and/or activities will be implemented (e.g. designate BMPs, focus education, and/or increase/decrease frequency of inspections for specific types of sites and/or activities); and

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(2) The strategies and/or activities must be consistent with the requirements of Provisions E.4.c-e and the strategies identified in the Water Quality Improvement Plan.

b. Project Approval Process

Prior to issuance of any local permit(s) that allows the commencement of construction projects that involve ground disturbance or soil disturbing activities that can potentially generate pollutants in storm water runoff, each Copermittee must:

(1) Require a site-specific pollution control, construction BMP, and/or erosion and sediment control plan, to be submitted by the project applicant to the Copermittee;

(2) Confirm the pollution control, construction BMP, and/or erosion and sediment control plan, complies with the local grading ordinance, other applicable local ordinances, and the requirements of this Order;

(3) Confirm the pollution control, construction BMP, and/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 the Construction General Permit.

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c. CONSTRUCTION SITE INVENTORY AND TRACKING

(1) Each Copermittee must maintain, and update at least quarterly, a watershed-based inventory of all construction projects issued a local permit that allows ground disturbance or soil disturbing activities that can potentially generate pollutants in storm water runoff. The use of an automated database system, such as GIS, is highly recommended. The inventory must include:

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(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 accepted and/or approved the site-specific pollution control, construction BMP, and/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. The designation of construction sites as high threat to water quality must consider the following:

(a) Sites located within a hydrologic subarea where sediment is known or suspected to contribute to the highest priority water quality conditions identified in the Water Quality Improvement Plan;

(b) Sites located within the same hydrologic subarea and tributary to a water body segment listed as impaired for sediment on the CWA section 303(d) List;

(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 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 from construction sites into the MS4. These BMPs must be site specific, seasonally appropriate, and construction phase appropriate. BMPs 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 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 require and confirm compliance with its local 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 require and confirm site compliance with its local permits and applicable local ordinances, and the requirements of this Order.

(2) <u>Inspection Content</u>

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 local 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 corrections are needed, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.

(3) <u>Inspection Tracking and Records</u>

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 condition 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

Each Copermittee must implement an existing development management program in accordance with the strategies identified in the Water Quality Improvement Plan. 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 and strategies as identified in the corresponding Water Quality improvement Plan(s).

a. STRATEGIES TO ADDRESS THE HIGHEST PRIORITY WATER QUALITY CONDITIONS

Each Copermittee must implement the water quality improvement strategies, where necessary, to address areas of existing development within its jurisdiction that are identified as sources of pollutants and/or stressors contributing to the highest priority water quality conditions in the Watershed Management Area. For the existing development management program, the following strategies must be implemented:

(1) Specific Existing Development Management Program Strategies

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Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented as part of the construction management program to address construction sites that the Copermittee has identified as potential sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:¶
¶
<#>Provide specific details about how the strategies and/or activities will be implemented (e.g. designate additional BMPs, focus education, and/or increase/decrease frequency of inspections for specific types of sites and/or activities); and¶
¶
<#>The strategies and/or activities must be consistent with the requirements of Provisions E.4.c-e and the strategies identified in the Water Quality Improvement Plan.¶

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Comment [K4]: It is recommended that this Provision (5.e) be moved to Provision 5.a

Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented within its jurisdiction to address areas of existing development that the Copermittee has identified as sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:

(a) Provide specific details about how the strategies and/or activities will be implemented (e.g. designate BMPs, focus education, and/or increase/decrease frequency of inspections for specific types of facilities, areas and/or activities);

(b) The facilities and/or areas within the Copermittee's jurisdiction where the strategies and/or activities will be implemented; and

(c) The strategies and/or activities must be consistent with the requirements of Provisions E.5.b-d and the strategies identified in the Water Quality Improvement Plan.

a. EXISTING DEVELOPMENT INVENTORY AND TRACKING

Each Copermittee must maintain, and update at least annually, a watershed-based inventory of the existing development within its jurisdiction that may discharge a high priority 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, evaluate and include the following if identified as a source of a high priority pollutant:

(1) Name, location (hydrological subarea and address, if applicable) of the following types of existing development with its jurisdiction:

(a) Commercial facilities or areas;

(b) Industrial facilities;

(c) Municipal facilities, including:

(i) MS4 and related structures,[35]

(ii) Roads, streets, and highways,

(iii) Parking facilities,

(iv) Municipal airfields,

(v) Parks and recreation facilities,

[35] The inventory may refer to the MS4 map required to be maintained pursuant to Provision E.2.b.(1).

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(vi) Flood management projects and flood control devices and structures,

(vii) Operating or closed municipal landfills,

(viii) Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewer collection systems,

(ix) Corporate yards, including maintenance and storage yards for materials, waste, equipment, and vehicles,

(x) Hazardous waste collection facilities,

(xi) Other treatment, storage or disposal facilities for municipal waste, and

(xii) Other municipal facilities that the Copermittee determines may contribute a significant high priority pollutant load to the MS4; and

(d) Residential areas, which may be designated by one or more of the following:

(i) Residential management area,

(ii) Drainage basin or area,

(iii) Land use (e.g., single family, multi-family, rural),

(iv) Neighborhood,

(v) Common Interest Area,

(vi) Home Owner Association,

(vii) Mobile home park, and/or

(viii) Other designations accepted by the San Diego Water Board Executive Officer.

(2) A description of the facility or area, including the following information:

(a) Classification as commercial, industrial, municipal, or residential;

(b) Status of facility or area as active or inactive;

(c) Identification if a business is a mobile business;

(d) SIC Code or NAICS Code, if applicable;

(e) Industrial General Permit NOI and/or WDID number, if applicable;

(f) Identification if a residential area is or includes a Common Interest Area / Home Owner Association, or mobile home park;

(g) Identification of the high priority pollutants potentially generated by the facility or area;

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(h) Whether the facility or area is adjacent to an ESA;

(i) Whether the facility or area is tributary to and within the same hydrologic subarea as a water body segment listed as impaired on the CWA section 303(d) List and generates pollutants for which the water body segment is impaired; and

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<#>Whether the facility or area contributes or potentially contributes to the highest priority water quality conditions identified in the Water Quality Improvement Plan.¶

(3) An annually updated map showing the location of inventoried existing development, watershed boundaries, and water bodies.

b. EXISTING DEVELOPMENT BMP IMPLEMENTATION AND MAINTENANCE

Each Copermittee must designate a set of BMPs required for all inventoried existing development, including special event venues. The designated BMPs must be specific to the identified high priority facility or area types and high priority pollutant generating activities, as appropriate.

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(1) <u>Commercial, Industrial, and Municipal Facilities and Areas</u>

(a) Pollution Prevention

Each Copermittee must require the use of pollution prevention methods by the commercial, industrial, and municipal facilities and areas in its inventoried existing development.

(b) BMP Implementation

Each Copermittee must implement, or require the implementation of, designated BMPs at commercial facilities and areas, industrial facilities, and municipal facilities in its inventoried existing development.

(c) BMP Operation and Maintenance

(i) Each Copermittee must properly operate and maintain, or require the proper operation and maintenance of designated BMPs at commercial facilities and areas, industrial facilities, and municipal facilities in its inventoried existing development.

(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 designed to reduce pollutants (including floatables) in storm water discharges to or from its MS4s and related drainage structures. Operation and maintenance activities may include, but is not limited to, the following:

[a] Inspections of the MS4 and related structures;
[b] Cleaning of the MS4 and related structures; and
[c] Proper disposal of materials removed from cleaning of the MS4 and related structures.

(iii) Each Copermittee must implement a schedule of operation and maintenance for public streets, unpaved roads, paved roads, and paved highways and freeways within its jurisdiction to minimize pollutants that can be discharged in storm water.

(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 must coordinate with sewering agencies to 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.

(d) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must implement BMPs, or require the implementation of BMPs, to reduce pollutants in storm water discharges to the MEP and effectively prohibit non-storm water discharges associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from commercial facilities and areas, industrial facilities, and municipal facilities in its inventoried existing development. Such BMPs must include, as appropriate, educational activities, permits, certifications and other measures for applicators and distributors.

(2) <u>Residential Areas</u>

(a) Pollution Prevention

Each Copermittee must promote and encourage the use of pollution prevention methods, where appropriate, by the residential areas in its inventoried existing development.

(b) BMP Implementation

Each Copermittee must promote and encourage the implementation of designated BMPs at residential areas in its inventoried existing development.

(c) BMP Operation and Maintenance

Each Copermittee must properly operate and maintain, or require the proper operation and maintenance of designated BMPs at residential areas in its inventoried existing development.

(d) Pesticides, Herbicides, and Fertilizers BMPs

Each Copermittee must promote and encourage the implementation of BMPs to reduce pollutants in storm water discharges to the MEP and effectively prohibit non-storm water discharges associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from residential areas in its inventoried existing development.

c. 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 in accordance with the following requirements:

(i) At a minimum, inventoried existing development must be inspected once every five years utilizing one or more of the following methods:

[a] Drive-by inspections by Copermittee municipal and contract staff,
[b] Onsite inspections by Copermittee municipal and contract staff, and/or
[c] Inspections by volunteer monitoring or patrol programs trained by the Copermittee;

(ii) The frequency of inspections must be appropriate to confirm that BMPs are being implemented to reduce the discharge of pollutants in storm water from the MS4 to the MEP and effectively prohibit non-storm water discharges into the MS4;

(iii) The frequency of inspections must be based on the potential for a facility or area to discharge non-storm water and pollutants in storm water, and should reflect the priorities set forth in the Water Quality Improvement Plan;

(iv) Each Copermittee must annually perform onsite inspections of an equivalent of at least 20 percent of the commercial facilities and areas, industrial facilities, and municipal facilities in its inventoried existing development;[36] and

(v) Inventoried existing development must be inspected by the Copermittee, as needed, in response to valid public complaints and findings from the Copermittee's municipal and contract staff or volunteer monitoring or patrol program inspections.

(b) Based upon inspection findings, each Copermittee must implement all follow-up actions (i.e. education and outreach, re-inspection, enforcement) necessary to require and confirm compliance with its applicable local ordinances and permits and the requirements of this Order, in accordance with its Enforcement Response Plan pursuant to Provision E.6.

(2) Inspection Content

(a) Inspections of existing development by the Copermittee or volunteer monitoring or patrol programs must include, at a minimum:

(i) Visual inspections for actual non-storm water discharges;

(ii) Visual inspections for actual or potential discharge of pollutants;

(iii) Visual inspections for actual or potential illicit connections; and

(iv) Verification that the description of the facility or area in the inventory, required pursuant to Provision E.5.a.(2), has not changed.

(b) Onsite inspections of existing development by the Copermittee must include, at a minimum:

(i) Assessment of compliance with its applicable local ordinances and permits related to non-storm water and storm water discharges and runoff;

(ii) Assessment of the implementation of the designated BMPs;

(iii) Verification of coverage under the Industrial General Permit, when applicable; and

(iv) If any problems or violations are found, inspectors must take and document appropriate actions in accordance with the Enforcement Response Plan pursuant to Provision E.6.

[36] If any commercial, industrial, or municipal facilities or areas require multiple onsite inspections during any given year, those additional inspection may count toward the total annual inspection requirement. This requirement excludes linear municipal facilities (i.e., MS4, streets, roads and highways).

(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 include, at a minimum:

(a) Name and location of facility or area (address and hydrologic subarea) consistent with the inventory name and location, pursuant to Provision E.5.a.(1);

(b) Inspection and re-inspection date(s);

(c) Inspection method(s) (i.e. drive-by, onsite);

(d) Observations and findings from the inspection(s);

(e) For onsite inspections of existing development by Copermittee municipal or contract staff, the records must also include, as applicable:

(i) Description of any problems or violations found during the inspection(s),

(ii) Description of enforcement actions issued in accordance with the Enforcement Response Plan pursuant to Provision E.6, and

(iii) The date problems or violations were resolved.

d. 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.

e. RETROFITTING AREAS OF EXISTING DEVELOPMENT

(2) Retrofitting Areas of Existing Development

Each Copermittee must describe in its jurisdictional runoff management program document, a program to retrofit areas of existing development within its jurisdiction to address identified sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area. The program must be implemented as follows:

(a) Each Copermittee must identify areas of existing development as candidates for retrofitting, focusing on areas where retrofitting will address

Deleted: STRATEGIES TO ADDRESS THE HIGHEST PRIORITY WATER QUALITY CONDITIONS

Deleted: Each Copermittee must implement the water quality improvement strategies, where necessary, to address areas of existing development within its jurisdiction that are identified as sources of pollutants and/or stressors contributing to the highest priority water quality conditions in the Watershed Management Area. For the existing development management program, the following strategies must be implemented:¶
¶
<#>Specific Existing Development Management Program Strategies¶
¶
Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented within its jurisdiction to address areas of existing development that the Copermittee has identified as sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:¶
¶
<#>Provide specific details about how the strategies and/or activities will be implemented (e.g. designate additional BMPs, focus education, and/or increase/decrease frequency of inspections for specific types of facilities, areas and/or activities); ¶
¶
<#>The facilities and/or areas within the Copermittee's jurisdiction where the strategies and/or activities will be implemented; and¶
¶
<#>The strategies and/or activities must be consistent with the requirements of Provisions E.5.b-d and the strategies identified in the Water Quality Improvement Plan.¶
¶

pollutants and/or stressors that contribute to the highest priority water quality conditions identified in the Water Quality Improvement Plan;

(b) Candidates for retrofitting projects may be utilized to reduce pollutants that may be discharged in storm water from areas of existing development, and/or address storm water runoff flows and durations from areas of existing development that cause or contribute to hydromodification in receiving waters;

(c) Each Copermittee must develop a strategy to facilitate the implementation of retrofitting projects in areas of existing development identified as candidates;

(d) Each Copermittee should identify areas of existing development where Priority Development Projects may be allowed or should be encouraged to implement or contribute toward the implementation of alternative compliance retrofitting projects; and

(e) Where retrofitting projects within specific areas of existing development are determined to be infeasible to address the highest priority water quality conditions in the Water Quality Improvement Plan, the Copermittee should collaborate and cooperate with other Copermittees and/or entities in the Watershed Management Area to identify, develop, and implement regional retrofitting 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.

(3) Stream, Channel and/or Habitat Rehabilitation in Areas of Existing Development

Each Copermittee must describe in its jurisdictional runoff management program document, a program to rehabilitate streams, channels, and/or habitats in areas of existing development within its jurisdiction or just downstream of its jurisdiction to address the highest priority water quality conditions in the Watershed Management Area. The program must be implemented as follows:

(a) Candidates for stream, channel, and/or habitat rehabilitation projects may be utilized to address storm water runoff flows and durations from areas of existing development that cause or contribute to hydromodification in receiving waters, rehabilitate channelized or hydromodified streams, restore wetland and riparian habitat, restore watershed functions, and/or protect beneficial uses of receiving waters;

(b) Each Copermittee must develop a strategy to facilitate the implementation of stream, channel, and/or habitat rehabilitation projects in areas of

Deleted: <#>Each Copermittee must identify streams, channels, and/or habitats in areas of existing development as candidates for rehabilitation, focusing on areas where stream, channel, and/or habitat rehabilitation projects will address the highest priority water quality conditions identified in the Water Quality Improvement Plan;¶

Deleted: restore

existing development identified as candidates;

(c) Each Copermittee should identify areas of existing development where Priority Development Projects may be allowed or should be encouraged to implement or contribute toward the implementation of alternative compliance stream, channel, and/or habitat rehabilitation projects; and

(d) Where stream, channel, and/or habitat rehabilitation projects within specific areas of existing development are determined to be infeasible to address the highest priority water quality conditions in the Water Quality Improvement Plan, the Copermittee should collaborate and cooperate with other Copermittees and/or entities in the Watershed Management Area to identify, develop, and implement regional stream, channel, and/or habitat rehabilitation projects (i.e. projects that can receive storm water from one or more areas of existing development and will result in a net benefit to water quality and the environment).

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 approaches and options to enforce its legal authority established pursuant to Provision E.1, as necessary, to achieve compliance with the requirements of this Order. 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 Plan must include and/or address the following individual components:

(1) Illicit Discharge Detection and Elimination Enforcement Component;

(2) Development Planning Enforcement Component;

(3) Construction Management Enforcement Component; and

(4) Existing Development Enforcement Component.

b. Enforcement Response Approaches and Options

Each component of the Enforcement Response Plan must describe the enforcement response approaches that the Copermittee will implement to compel compliance with its statutes, ordinances, permits, contracts, orders, or similar means, and the requirements of this Order. The description must include the protocols for implementing progressively stricter enforcement responses. The enforcement response approaches must include appropriate sanctions to compel compliance, including, at a minimum, the following tools or their equivalent:

(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 the violations within 30 calendar days after the violations are discovered, or prior to the next predicted rain event, whichever is sooner.

(2) If more than 30 calendar days are required to achieve compliance, then a rationale must be recorded in the applicable electronic database or tabular system used to track violations.

d. PROGRESSIVE ENFORCEMENT

(1) The Enforcement Response Plan must include a definition of "progressive enforcement". Progressive enforcement must include a series of enforcement actions that match the severity of the violations and include distinct, progressive steps. Progressive enforcement may be defined differently for development planning, construction sites, commercial facilities or areas, industrial facilities, municipal facilities, and/or residential areas.

(2) Where the Copermittee determines progressive enforcement is not required, a rationale must be recorded in the applicable electronic database or tabular system used to track violations.

(3) Progressive enforcement actions must continue to increase in severity, as necessary, to compel compliance as soon as possible.

e. REPORTING OF NON-COMPLIANT SITES

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(1) Each Copermittee must notify the San Diego Water Board in writing within 2 working 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 by email.

(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

Each Copermittee must implement, individually or with other Copermittees, a public education and participation program in accordance with the strategies identified in the Water Quality Improvement Plan to promote and encourage the development of programs, management practices, 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 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 and strategies as identified in the corresponding Water Quality improvement Plan(s).

a. Strategies to Address the Highest Priority Water Quality conditions

Comment [K5]: It is recommended that this Provision (7.c) be moved to Provision 7.a

Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented within its jurisdiction, as applicable, to educate the public and encourage public participation to address potential sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:

(1) The target audiences and/or areas within the Copermittee's jurisdiction where the strategies and/or activities will be implemented;

(2) Provide specific details about how the strategies and/or activities will be implemented (e.g. educational topics, materials and/or activities, public outreach and participation programs and/or opportunities);

(3) Each Copermittee should collaborate and cooperate with other Copermittees and/or entities in the Watershed Management Area to identify and implement regional public education and participation activities, programs and opportunities;

(4) Each Copermittee must incorporate a mechanism for evaluating and assessing educational and other public outreach activities, as needed, to identify progress and incorporate modifications necessary to increase the effectiveness of the public education and participation program.

B. Public Education

The public education program component implemented within the Copermittee's jurisdiction may include the following:

(1) Educational activities, public information activities, and other appropriate outreach activities intended to reduce pollutants associated with the highest priority water quality conditions identified in the Water Quality Improvement Plan;

(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 specific target audiences, such as construction site operators, residents, underserved target audiences and school-aged children, as determined and prioritized by the Copermittee(s) by jurisdiction and/or watershed, based on high risk behaviors and pollutants of concern.

C. Public Participation

The public participation program component implemented within the Copermittee's jurisdiction must include, at a minimum, the following:

(1) A process for members of the public to participate in updating the highest priority water quality conditions, numeric goals, and water quality improvement strategies in the Water Quality Improvement Plan.

(2) Opportunities for members of the public to participate in providing the Copermittee recommendations for improving the effectiveness of the water quality improvement strategies implemented within its jurisdiction.

(3) Opportunities for members of the public to participate in programs and/or activities that can result in the prevention or elimination of non-storm water discharges to the MS4, reduction of pollutants in storm water discharges from the MS4, and/or protection of the quality of receiving waters.

8. Fiscal Analysis

a. Each Copermittee must secure the resources necessary to meet all the

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<#>Strategies to Address the Highest Priority Water Quality Conditions¶
¶
Each Copermittee must describe in its jurisdictional runoff management program document the strategies and/or activities that will be implemented within its jurisdiction, as applicable, to educate the public and encourage public participation to address potential sources of pollutants and/or stressors that contribute to the highest priority water quality conditions in the Watershed Management Area as follows:¶
¶
<#>The target audiences and/or areas within the Copermittee's jurisdiction where the strategies and/or activities will be implemented; ¶
¶
<#>Provide specific details about how the strategies and/or activities will be implemented (e.g. educational topics, materials and/or activities, public outreach and participation programs and/or opportunities);¶
¶
<#>Each Copermittee should collaborate and cooperate with other Copermittees and/or entities in the Watershed Management Area to identify and implement regional public education and participation activities, programs and opportunities;¶
¶
<#>Each Copermittee must incorporate a mechanism for evaluating and assessing educational and other public outreach activities, as needed, to identify progress and incorporate modifications necessary to increase the effectiveness of the public education and participation program.¶

requirements of this Order.

b. Each Copermittee must conduct an annual fiscal analysis of its jurisdictional runoff management program in its entirety. The fiscal analysis must include the following:

(1) Identification of the various categories of expenditures necessary to implement the requirements of this Order, including a description of the specific capital, operation and maintenance, and other expenditure items to be accounted for in each category of expenditures;

(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) for the current fiscal year; 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, for the current fiscal year and next fiscal year.

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 reporting 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 the Water Quality Improvement Plan in accordance with the following requirements:

a. WATER QUALITY IMPROVEMENT PLAN DEVELOPMENT

Each Water Quality Improvement Plan must be developed in accordance with the following process:

(1) Priority Water Quality Conditions and Numeric Goals

(a) The Copermittees must implement a public participation process to solicit data and information to be utilized in the development and identification of the priority water quality conditions for the Watershed Management Area.

(b) The Copermittees are encouraged to involve the public and key stakeholders as early and often as possible during the development of the priority water quality conditions and numeric goals to be included in the Water Quality Improvement Plan.

(c) Within 6 months after the commencement of coverage under this Order, the Copermittees must develop and submit the Water Quality Improvement Plan requirements of Provision B.2 to the San Diego Water Board. 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.

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(d) Within 30 days of receiving the public comments, the Copermittees must revise the priority water quality conditions and numeric goals based on comments received and/or recommendations or direction from the San Diego Water Board Executive Officer.

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(2) Water Quality Improvement Strategies and Schedules

(a) The Copermittees are encouraged to involve the public and key stakeholders as early and often as possible during the development of the water quality improvement strategies and schedules to be included in the Water Quality Improvement Plan.

(b) Within 3 months after the development of the priority water quality conditions and numeric goals, the Copermittees must develop and submit the Water Quality Improvement Plan requirements of Provision B.3 to the San Diego Water Board. 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.

(c) Within 30 days of receiving the public comments, the Copermittees must revise the water quality improvement strategies and schedules based on comments received and/or recommendations or direction from the San Diego Water Board Executive Officer.

b. WATER QUALITY IMPROVEMENT PLAN SUBMITTAL

(1) Within 18 months after the commencement of coverage under this Order, the Copermittees for each Watershed Management Area must submit a complete Water Quality Improvement Plan in accordance with the requirements of Provision B to the San Diego Water Board. 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.

(2) 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 within 6 months 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.

(3) Within 60 days of receiving comments, the Copermittees must revise the Water Quality Improvement Plan based on comments received and/or recommendations or direction from the San Diego Water Board Executive Officer.

(4) The Water Quality Improvement Plan must be made available on the Regional Clearinghouse required pursuant to Provision F.4 within 30 days of the finalization of the Water Quality Improvement Plan and acceptance by the San Diego Water Board.

2. Updates

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATES

Each Copermittee must update its jurisdictional runoff management program document in accordance with the following requirements:

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(1) Each Copermittee is encouraged to involve the public and key stakeholders as early and often as possible to solicit recommendations for updates to its jurisdictional runoff management program document.

(2) Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E no later than 6 months after the completion of the corresponding Water Quality Improvement Plan and acceptance of the Water Quality Improvement Plan by the San Diego Water Board.

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(3) Each Copermittee must submit updates to its jurisdictional runoff management program, with a rationale for the modifications, either in the Annual Report required pursuant to Provision F.3.b, and/or as part of the Report of Waste Discharge required pursuant to Provision F.5.b. The requested updates are considered accepted by the San Diego Water Board if no response is provided to the Copermittee after 3 months of submitting the request.

(4) The Copermittee must revise the modifications as directed by the San Diego Water Board Executive Officer.

(5) Updated jurisdictional runoff management program documents must be made available on the Regional Clearinghouse required pursuant to Provision F.4 within 30 days of completing the updates ~~submitting the Annual Report~~.

D. BMP Design Manual Updates

Each Copermittee must update its BMP Design Manual in accordance with the following requirements:

(1) Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provisions E.3.a-d no later than 18 months after the commencement of coverage under this Order.

(2) Subsequent updates must be consistent with the requirements of Provisions E.3.a-d and must be submitted as part of the Annual Reports required pursuant to Provision F.3.b, and/or as part of the Report of Waste Discharge required pursuant to Provision F.5.b. The requested updates are considered accepted by the San Diego Water Board if no response is provided to the Copermittee after 3 months of submitting the request.

(3) Updated BMP Design Manuals must be made available on the Regional Clearinghouse required pursuant to Provision F.4 within 30 days of completing the updates.

E. WATER QUALITY IMPROVEMENT PLAN UPDATES

The Water Quality Improvement Plans must be updated in accordance with the following process:

(1) The Copermittees must implement a public participation process to solicit data and information to be utilized in updating the Water Quality Improvement Plan.

(2) The Copermittees are encouraged to involve the public and key stakeholders as early and often as possible during the updates to the Water Quality Improvement Plan.

(3) The Copermittees for each Watershed Management Area must submit requested updates to the Water Quality Improvement Plan, with the public input received and the rationale for the requested updates, either in the Annual Reports required pursuant to Provision F.3.b, and/or as part of the Report of Waste Discharge required pursuant to Provision F.5.b. The requested updates are considered accepted by the San Diego Water Board if no response is provided to the Copermittee after 3 months of submitting the request.

(4) The Copermittees must revise the requested updates as directed by the San Diego Water Board Executive Officer.

(5) Updated Water Quality Improvement Plans must be made available on the Regional Clearinghouse required pursuant to Provision F.4 within 30 days of acceptance of the requested updates by the San Diego Water Board.

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) Transitional Period JRMP Reports: Each Copermittee must complete and submit a Jurisdictional Runoff Management Program Annual Report no later than October 31 of each year prior to the implementation of updated JRMP programs pursuant to F.2.a. Each Copermittee must submit the information on the Jurisdictional Runoff Management Program specific to the area within its jurisdiction in each Watershed Management Area.

(2) Transitional Period Monitoring Report: The transitional period monitoring conducted pursuant to D.1.a and D.2.a. shall be reported in a single report that covers the entire reporting period from the initiation of the transitional period monitoring (as described in D.1.a and D.2.a.), through September 30th following approval of the Water Quality Improvement Plan. The Transitional Period Monitoring Report shall include the assessments required per D.4.a.(1)(a), D.4.b.(1)(a) and D.4.b.(2)(a); and be submitted by January 31st following completion of the above mentioned transitional period.

(3) Post-Transitional Annual Reports – Following the initial transitional period after enrollment into this Order, the Copermittees for each Watershed Management Area must submit a combined Annual Report for each reporting period no later than January 31 of the following year. The annual reporting period consists of two periods: 1) July 1 to June 30 of the following year for the jurisdictional runoff management programs, 2) October 1 to September 30 of the following year for the monitoring and assessment programs. 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 receiving water and MS4 outfall discharge 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 Provision 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 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 the water quality improvement strategies, with public input received and rationale for the proposed modifications,

(iv) Previously proposed modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's

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Deleted: The first Annual Report must be prepared for the reporting period beginning July 1 after commencement of coverage under this Order, 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 for the jurisdictional runoff management programs, and September 30 in the following year for the monitoring and assessment programs.

jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area, and

(v) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;

(e) For each Water Quality Improvement Plan, the progress of implementing the corresponding Jurisdictional Urban Runoff Management Programs. Each Copermittee should report on the items listed below. The individual JRMP annual reports may be included as attachments to the corresponding WQIP annual report. The JRMP annual report should include, but not be limited to, the following:

(i) 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,

(ii) Proposed modifications to the water quality improvement strategies, with public input received and rationale for the proposed modifications,

(iii) Previously proposed modifications or updates incorporated into 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 each Copermittee's jurisdictional runoff management program document;

(4) Until the Copermittees have updated their jurisdictional runoff management programs consistent with Provision F.2.a, the Copermittees must continue to utilize the current jurisdictional runoff management program annual reporting format. Each Copermittee must submit the information on the Jurisdictional Runoff Management Program Annual Report Form specific to the area within its jurisdiction in each Watershed Management Area.

(5) 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).[37] Any monitoring and assessment data utilized in developing the Annual Report must be provided on the Regional Clearinghouse required

Deleted: <#>A completed Jurisdictional Runoff Management Program Annual Report Form (Attachment D or accepted revision) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative. ¶
¶
Each Copermittee must complete and submit a Jurisdictional Runoff Management Program Annual Report Form (Attachment D or accepted revision) no later than October 31 of each year

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[37] 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.

pursuant to Provision F.4.

F. REGIONAL MONITORING AND ASSESSMENT REPORT

4. Regional Clearinghouse

The Copermittees must develop, update, and maintain an internet-based Regional Clearinghouse that is made available to the public no later than 18 months after the effective date of this Order. The Copermittees may elect to develop and maintain the clearinghouse(s) provided by other Copermittees or agencies.

a. The Copermittees, through the Regional Clearinghouse, must make the following documents and data available, organized by Watershed Management Area, which may be linked to other internet-based data portals and databases where the original documents are stored:

(1) Water Quality Improvement Plan for the Watershed Management Area, and all updated versions with date of update;

(2) Annual Reports for the Watershed Management Area;

(3) Jurisdictional Runoff Management Program document for each Copermittee within the Watershed Management Area, and all updated versions with date of update;

(4) BMP Design Manual for each Copermittee within the Watershed Management Area, and all updated versions with date of update;

(5) Reports from special studies (e.g. source identification, BMP effectiveness assessment) conducted in the Watershed Management Area;

(6) Monitoring data collected pursuant to Provision D for each Watershed Management Area must be uploaded to CEDEN,[38] with links to the uploaded data; and

(7) Available GIS data, layers, and/or shapefiles used to develop the maps generated and maintained by the Copermittees for the Water Quality Improvement Plans, Annual Reports, and jurisdictional runoff management program documents.

b. The Copermittees, through the Regional Clearinghouse, must make the following information and documents available:

[38] 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.

Comment [K6]: This was moved from F.5.c since it is a part of the ROWD.

Deleted: <#>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 Report of Waste Discharge required pursuant to Provision F.5.b. The Copermittees must review the receiving water and MS4 outfall discharge monitoring data collected pursuant to Provisions D.1 and D.2, and findings from the assessments required pursuant to Provision D.4, to assess the following:¶
¶
<#>The beneficial uses of the receiving waters within the San Diego Region that are protected or must be restored;¶
¶
<#>The progress toward restoring impacted beneficial uses in the receiving waters within the San Diego Region; and¶
¶
<#>Pollutants or conditions of emerging concern that may impact beneficial uses in the receiving waters within the San Diego Region.¶
¶
<#>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.¶
¶
<#>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.¶
¶
¶

(1) Contact information (point of contact, phone number, email address, and mailing address) for each Copermittee;

(2) Public hotline number for reporting non-storm water and illicit discharges for each Copermittee;

(3) Email address for reporting non-storm water and illicit discharges for each Copermittee;

(4) Link to each Copermittee's website, if available, where the public may find additional information about the Copermittee's storm water management program and for requesting records for the implementation of its program;

(5) Information about opportunities for the public to participate in programs and/or activities that can result in the prevention or elimination of non-storm water discharges to the MS4, reduction of pollutants in storm water discharges from the MS4, and the protection of the quality of receiving waters; and

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(6) Reports from regional monitoring programs in which the Copermittees participate (e.g. Southern California Monitoring Coalition, Southern California Coastal Water Research Project Bight Monitoring);

(7) Regional Monitoring and Assessment Reports; and

(8) Any other information, data, and documents the Copermittees determine as appropriate for making available to the public.

5. Report of Waste Discharge

a. The Orange County Copermittees and the Riverside County Copermittees are required to submit a complete Report of Waste Discharge pursuant to the requirements of their current Orders. The San Diego Water Board will review and consider the Reports of Waste Discharge to determine whether modification to this Order, pursuant to the requirements of Provision H, will be required prior the Orange County Copermittees and/or Riverside County Copermittees becoming covered under this Order. The current Orders for the Orange County Copermittees and Riverside County Copermittees are rescinded upon notification of coverage under this Order except for enforcement purposes.

b. The Copermittees subject to the requirements of this Order must submit to the San Diego Water Board a complete Report of Waste Discharge as an application for the re-issuance of this Order and NPDES permit. The Report of Waste Discharge must be submitted no later than 180 days in advance of the expiration date of this Order. The Report of Waste Discharge 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;

(6) Any information to be included as part of the Report of Waste Discharge pursuant to the requirements of this Order; and

(7) Any other information required by federal regulations for NPDES permit reissuance.

c. 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 Copermittees must review the receiving water and MS4 outfall discharge monitoring data collected pursuant to Provisions D.1 and D.2, and findings from the assessments required pursuant to Provision D.4, to assess the following:

Comment [K7]: This was moved from F.3.c to this section since it is a part of the ROWD.

Deleted: The Regional Monitoring and Assessment Report may be submitted as part of the Report of Waste Discharge required pursuant to Provision F.5.b.

(a) The beneficial uses of the receiving waters within the San Diego Region that are protected;

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(b) The progress toward protecting the impacted beneficial uses in the receiving waters within the San Diego Region; and

Deleted: restoring

(c) Pollutants or conditions of concern that may impact beneficial uses in the receiving waters within the San Diego Region.

Deleted: emerging

(1) 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.

(2) 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.

PROVISION F: REPORTING
F.6. Application for Early Coverage
F.7. Reporting Provisions

6. Application for Early Coverage

a. The Orange County Copermittees, collectively, or Riverside County Copermittees, collectively, may apply for early coverage under this Order by submitting a Report of Waste Discharge Form 200, with a written request for early coverage under this Order and identification of the necessary changes to this Order, if any, that the Copermittees are recommending based on the ROWD submittal.

b. The San Diego Water Board will review the application for early coverage and will make any necessary changes to this Order. A notification of coverage under this Order will be issued to the Copermittees in the respective county by the San Diego Water Board upon completion of the early coverage application requirements and consideration of any necessary changes to this Order. The effective coverage date will be specified in the notification of coverage. The Copermittees in the respective county are authorized to have MS4 discharges pursuant to the requirements of this Order starting on the effective coverage date specified in the notification of coverage. The existing Order for the respective county is rescinded upon the effective coverage date specified in the notification of coverage except for enforcement purposes.

c. The timelines specified within this Order will be initiated based on the effective coverage date (as specified within the notification of coverage).

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 to the Order that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

4. The San Diego Water Board may re-open and modify this Order at any time prior to its expiration, after opportunity for public comment and a public hearing, if the State Water Board determines that revisions are warranted to those provisions of the Order addressing compliance with water quality standards in the receiving water and/or those provisions of the Order establishing an iterative process for implementation of management practices to assure compliance with water quality standards in the receiving water.

5. The San Diego Water Board will review any applications received for early coverage under this Order (Provision F.6) as well as any general applications received for coverage under this Order and will consider any necessary changes to this Order based on the newly-obtained information and/or reports received as a part of the application process. Within the applications for coverage under this Order, the Copermittees shall identify the changes that are proposed to this Order.

6. Modifications of the Order shall be initiated to incorporate provisions as a result of future amendments to the Basin Plan, such as a new or revised water quality objectives or the adoption or reconsideration of a TMDL, including the program of implementation. As soon as practicable, but no later than 6 months of the effective date of a revised TMDL where the revisions warrant a change to the provisions of this Order, the Regional Water Board shall modify this Order consistent with the assumptions and requirements of the revised WLA(s), including the program of implementation.

7. Modification to the Order shall be considered 18 months prior to the compliance date for WQBELs where the compliance mechanism is based upon numeric effluent limitations. The intent of the reconsideration is to evaluate the inclusion of provisions or modifications to WQBELs in Attachment E of this Order prior to the final compliance deadlines that would allow an action-based, BMP compliance demonstration approach with regard to final WQBELs.

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 AND SPECIAL PROTECTIONS

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 2012-0012

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.

    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) (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.

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.

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 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.

(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)]

(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)]

(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)]

(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 50th day after 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 supersedes Order Nos. R9-2009-0002 and R9-2010-0016 upon their expiration or earlier notice of coverage.

(2) *Expiration*. This Order and NPDES permit expires five years after its effective date. [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

ATTACHMENT C

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
ESAs	Environmentally Sensitive Areas
GIS	Geographic Information System
IBI	Index of Biological Integrity
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NAL	Non-Storm Water Action Level
NAICS	North American Industry Classification System
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.

Beneficial Uses - The uses of water necessary for the survival or wellbeing 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.

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.

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 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/or 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 – A permittee to a NPDES permit that is only responsible for permit conditions relating to the discharge for which it is operator [40 CFR 122.26(b)(1)]. For the purposes of this Order, a Copermittee may include the following jurisdictions: 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 San Diego Unified Port District.

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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 –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, 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 man-made conveyance or drainage system through which the discharge of any pollutant to the stormwater drainage system occurs or may occur.

Illicit Discharge - Any discharge to a MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) 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 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

Deleted: Any connection to the MS4 that conveys an illicit discharge.

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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) <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 – October 1 to September 30

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. R9-2013-0001 (NPDES No. CAS0109266)

Persistent Flow - Persistent flow is defined as the presence of flowing, pooled, or ponded water more than 72 hours after a measureable rainfall event of 0.1 inch or greater during three consecutive monitoring and/or inspection events. All other flowing, pooled, or ponded water is considered transient.

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.

Pre-Development Runoff Conditions – Runoff conditions that existed onsite before the existing development was constructed, or exists onsite before planned development activities occur.

Priority Development Projects - New development and redevelopment projects defined under Provision E.3.b of Order No. R9-2012-0011.

Progressive Enforcement -. A series of enforcement actions that increase in severity commensurate with the violation. Such enforcement actions may include verbal and written notices of violation, fines, stop work orders, administrative penalties, criminal penalties, etc.

Rainy Season (aka Wet Season) –October 1 to April 30

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 requirements of CWA section 402(p)(3)(B).

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.

Regional Clearinghouse – A central location for the collection, classification, and distribution of information including, but not limited to, plans, reports, manuals, data, contact information, and/or links to such documents and information. The clearinghouse(s) may be organized by the following regions: Watershed Management Areas, County jurisdictions, and/or the San Diego Regional Water Quality Control Board jurisdiction.

Reporting Period – The period of information that is reported in the Annual Report. The reporting period consists of two components: 1) July 1 to June 30, consistent with the fiscal year, for the implementation of the jurisdictional runoff management programs, and 2) October 1 to September 30, consistent with the monitoring year for the monitoring and assessment programs. Together, these two time periods constitute the reporting year for the Annual Report due January 31 following the end of the monitoring year.

Retain –Keep or hold in a particular place, condition, or position without discharge to surface waters.

Retrofitting – Storm water management practice put into place after development has occurred in watersheds where the practices previously did not exist. Retrofitting of developed areas is intended to improve water quality, protect downstream channels, reduce flooding, or meet other specific objectives. Retrofitting developed areas may include, but is not limited to replacing roofs with green roofs, disconnecting downspouts or impervious surfaces to drain to pervious surfaces, replacing impervious surfaces with pervious surfaces, installing rain barrels, installing rain gardens, and trash area enclosures.

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.

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.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage.

Deleted: Surface runoff and drainage pertains to runoff and drainage resulting from precipitation events.

Stream, Channel, or Habitat Rehabilitation – Measures or activities for the purpose of improving or restoring the environmental health (i.e. physical, chemical and biological integrity) of streams, channels, or river systems. Rehabilitation techniques may include, but are not limited to, riparian zone restoration, constructed wetlands, bank stabilization, channel reconfiguration, and daylighting drainage systems.

Structural BMPs - A subset of BMPs which details, retains, filters, removes, or prevents the release of pollutants to surface waters from development projects in perpetuity, after construction of a project is completed.

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 surface water or groundwater, 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.

Deleted: water,

Deleted: underground

Deleted: regardless of circumstances or condition

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) –October 1 to April 30

Wet Weather – Weather is considered wet if there is a storm event of 0.1 inches and greater preceded by 72 hours of dry weather, unless otherwise defined by another regulatory mechanism, such as a TMDL.

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ATTACHMENT D

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM

Comment [K8]: It is recommended that this form be deleted and that the Copermittees use their existing reporting format and structure until the WQIPs and corresponding JRMPs are developed and/or updated.

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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. R9-2013-0001?	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. R9-2013-0001?	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 escalated enforcement actions issued		
V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	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 allowed alternative compliance		
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 escalated 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. R9-2013-0001?	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 escalated enforcement actions issued	

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM				
Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?				YES ☐ NO ☐
	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory				
Number of existing development inspections				
Number of follow-up inspections				
Number of violations				
Number of enforcement actions issued				
Number of escalated enforcement actions issued				

VIII. PUBLIC EDUCATION AND PARTICIPATION	
Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES ☐ NO ☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES ☐ NO ☐
IX. FISCAL ANALYSIS	
Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	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

ATTACHMENT E

SPECIFIC PROVISIONS FOR TOTAL MAXIMUM DAILY LOADS APPLICABLE TO ORDER NO. R9-2013-0001

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)

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, 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 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 to support the achievement of 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 any BMPs implemented to address this TMDL with Caltrans as possible.

c. Compliance Schedule

The Responsible Copermittees are required to achieve their respective WLAs 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

(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.

(2) The Responsible Copermittees must monitor the effluent of the MS4 outfalls for diazinon within the Chollas Creek watershed, and calculate or estimate the annual diazinon loads, in accordance with the requirements of Provisions D.2, D.4.b.(1), and D.4.b.(2) 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.

e. COMPLIANCE DETERMINATION

Compliance with WQBELs of Specific Provision 1.b may be demonstrated via one of the following methods:

(1) There is no direct or indirect discharge from the Responsible Copermittees' MS4s to the receiving water;

(2) There are no exceedances of the applicable receiving water limitations under Specific Provision 1.b.(1) in the receiving water at, or downstream of the Responsible Copermittees' MS4 outfalls; OR

(3) There are no violations of the applicable effluent limitations under Specific Provision 1.b.(2) at the Responsible Copermittees' MS4 outfalls.

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 Diegot

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for Shelter Island Yacht Basin 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	Receiving Water 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 to support the achievement of the WQBELs under Specific Provision 2.b for Shelter Island Yacht Basin

c. Compliance Schedule

The Responsible Copermittee is required to achieve the MS4 WLA by 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.2, D.4.b.(1), and D.4.(b)(2)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.

e. Compliance Determination

Compliance with WQBELs of Specific Provision 2.b may be demonstrated via one of the following methods:

(1) There is no direct or indirect discharge from the Responsible Copermittee's MS4s to the receiving water;

(2) There are no exceedances of the applicable receiving water limitations under Specific Provision 2.b.(1) in the receiving water at, or downstream of the Responsible Copermittee's MS4 outfalls; OR

(3) There are no violations of the applicable effluent limitations under Specific Provision 2.b.(2) at the Responsible Copermittee's MS4 outfalls.

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 to support the achievement of the WQBELs under Specific Provision 3.b for Rainbow Creek.

(b) The Responsible Copermittee should coordinate any BMPs implemented to address this TMDL with Caltrans and other sources as possible.

c. COMPLIANCE SCHEDULE

(1) Compliance Date

The Responsible Copermittee 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	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.

e. COMPLIANCE DETERMINATION

(1) Compliance with interim compliance requirements of Specific Provision 3.c.(2) may be demonstrated via one of the following methods:

(a) There is no direct or indirect discharge from the Responsible Copermittee's MS4s to the receiving water;

(b) There are no exceedances of the applicable receiving water limitations under Specific Provision 3.b.(1) in the receiving water at, or downstream of the Responsible Copermittee's MS4 outfalls;

(c) There are no violations of the applicable effluent limitations under Specific Provision 3.b.(2)(a) at the Responsible Copermittee's MS4 outfalls;

(d) The pollutant loads from given land uses discharging to and from the MS4s do not exceed the applicable effluent limitations under Specific Provision 3.b.(2)(b); OR

(e) The Responsible Copermittee has submitted and is fully implementing a Water Quality Improvement Plan, accepted by the San Diego Water Board, which provides reasonable assurance that the interim compliance requirements will be achieved by the interim compliance dates.

(2) Compliance with WQBELs of Specific Provision 3.b may be demonstrated via one of the following methods:

(a) There is no direct or indirect discharge from the Responsible Copermittee's MS4s to the receiving water;

(b) There are no exceedances of the applicable receiving water limitations under Specific Provision 3.b.(1) in the receiving water at, or downstream of the Responsible Copermittee's MS4 outfalls;

(c) There are no violations of the applicable effluent limitations under Specific Provision 3.b.(2)(a) at the Responsible Copermittee's MS4 outfalls; OR

(d) The pollutant loads from given land uses discharging to and from the MS4s do not exceed the applicable effluent limitations under Specific Provision 3.b.(2)(b).

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, 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 4.1
Receiving Water Limitations as Concentrations in Chollas Creek

Constituent	Exposure Duration	Receiving Water 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 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 Copermittees must implement BMPs to support the achievement of the WQBELs under Specific Provision 4.b for Chollas Creek.

(b) The Responsible Copermittees should coordinate any BMPs implemented to address this TMDL with Caltrans and the U.S. Navy as possible.

c. Compliance Schedule

(1) WLA Compliance Date

The Responsible Copermittees are 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

(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 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.2, D.4.b.(1), and D.4.b.(2)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.

e. COMPLIANCE DETERMINATION

(1) Compliance with interim compliance requirements of Specific Provision 4.c.(2) may be demonstrated via one of the following methods:

(a) There is no direct or indirect discharge from the Responsible Copermittees' MS4s to the receiving water;

(b) There are no exceedances of the applicable receiving water limitations under Specific Provision 4.b.(1) in the receiving water at, or downstream of the Responsible Copermittees' MS4 outfalls;

(c) There are no violations of the applicable effluent limitations under Specific Provision 4.b.(2) at the Responsible Copermittees' MS4 outfalls; OR

(d) The Responsible Copermittees have submitted and is fully implementing a Water Quality Improvement Plan, accepted by the San Diego Water Board, which provides reasonable assurance that the interim compliance requirements will be achieved by the interim compliance dates.

(2) Compliance with WQBELs of Specific Provision 4.b may be demonstrated via one of the following methods:

(a) There is no direct or indirect discharge from the Responsible Copermittees' MS4s to the receiving water;

(b) There are no exceedances of the applicable receiving water limitations under Specific Provision 4.b.(1) in the receiving water at, or downstream of the Responsible Copermittees' MS4 outfalls; OR

(c) There are no violations of the applicable effluent limitations under Specific Provision 4.b.(2) at the Responsible Copermittees' MS4 outfalls.

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	- San Diego Unified Port District

b. WATER QUALITY BASED EFFLUENT LIMITATIONS

The WQBELs for segments or areas of the water bodies listed in Table 5.0[39] consist of the following:

(1) Interim WQBELs – Effluent Limitations

The Responsible Copermittees for MS4 discharges to Baby Beach must comply with the following interim WQBELs by the interim compliance dates identified in Provision 5.d.(1)(b):

Table 5.1
Interim Effluent Limitations as Loads in MS4 Discharges to Baby Beach

	Effluent Limitation	
Constituent	**Dry Weather Interim Effluent Limitation (Billion MPN/day)**	**Wet Weather Interim Effluent Limitation (Billion MPN/30 days)**
Total Coliform	4.50	NA
Fecal Coliform	0.50	NA
Enterococcus	0.40	
		150.5

(2) Final WQBELs - Effluent Limitations

(a) Discharges from the MS4s must not exceed the following mass-based effluent limitations by the end of the compliance schedules under Specific Provision 5.d.(1)(a) to demonstrate the discharge is not causing or contributing to a violation of receiving water quality standards:

Table 5.2
Effluent Limitations as Mass-Based limits in MS4 Discharges to the Water Body

	Effluent Limit	
Constituent	**Dry Weather Billion MPN/Day**	**Wet Weather Billon MPN/30 days**
Total Coliform	0.86	3,254
Fecal Coliform	0.17	112
Enterococcus	0.03	114

(b) If the final WQBELs are not met in the MS4 discharges, the Responsible Copermittees must demonstrate that the discharges from the MS4s are

[39] Per Resolution R9-2008-0027, the interim and final WQBELs only apply to waterbodies that remain on the 303(d) list for REC-1 water quality objectives due to impacts from controllable sources of bacteria. If waterbodies are put back on the list or delisted in subsequent iterations, the San Diego Water Board will revise the current NPDES requirements and/or issue additional waste discharge requirements to be consistent with these TMDLs.

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¶
<#>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¶ ...

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not causing or contributing to the exceedance of receiving water limitations. Such demonstration may be achieved by (1) demonstrating the attainment of the Receiving Water Limitations in Provision 5.c.(1), or (2) demonstrating that 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.

(3) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 5.0 must incorporate the Bacteria Load Reduction Plan (BLRP) required to be developed pursuant to Resolution No. R9-2008-0027.

(b) The Responsible Copermittee must implement BMPs to support the achievement of the WQBELs under Specific Provision 5.b for the segments or areas of the water bodies listed in Table 5.0

Deleted: Interim effluent limitations expressed as pollutant loads are given in the compliance schedule under Specific Provision 5.c.

c. RECEIVING WATER LIMITATIONS

The Receiving Water Limitations for segments or areas of the water bodies listed in Table 5.0[40] consist of the following:

(1) 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.d.(1)(a):

Table 5.3
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.

(2) 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 exceedance of receiving water

[40] Per Resolution R9-2008-0027, the Receiving Water Limitations only apply to waterbodies that remain on the 303(d) list for REC-1 water quality objectives due to impacts from controllable sources of bacteria. If waterbodies are put back on the list or delisted in subsequent iterations, the San Diego Water Board will revise the current NPDES requirements and/or issue additional waste discharge requirements to be consistent with these TMDLs.

limitations. Such demonstration may be achieved by demonstrating the attainment of the final WQBELs in Provision 5.b.(2).

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(3) Best Management Practices

(c) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 5.0 must incorporate the Bacteria Load Reduction Plan (BLRP) required to be developed pursuant to Resolution No. R9-2008-0027.

(d) The Responsible Copermittee must implement BMPs to support the achievement of the Receiving Water Limitations under Specific Provision 5.0 for the segments or areas of the water bodies listed in Table 5.0

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d. COMPLIANCE SCHEDULE

(1) Baby Beach in Dana Point Harbor

(a) Final Compliance Dates

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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 5.4
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 Dates

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The Responsible Copermittees for MS4 discharges to Baby Beach must comply with the following interim WQBELs by the interim compliance date:

Table 5.5
Compliance Schedule Dates to Achieve Interim WQBELs

Constituent	Interim Dry Weather Compliance Date	Interim Wet Weather Compliance Date
Total Coliform	September 15, 2012	NA
Fecal Coliform		NA
Enterococcus		September 15, 2016

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September 15, 2012¶
September 15, 2012

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¶
Table 5.4¶
Interim Effluent Limitations as Loads in MS4 Discharges to Baby Beach¶
Constituent ...

(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.

e. SPECIFIC MONITORING AND ASSESSMENT REQUIREMENTS

The BLRPs to be submitted by the Responsible 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 Stations

(a) Monitoring locations should consist of, at a minimum, the same locations used to collect data required pursuant to Order Nos. R9-2007-0001 and R9-2009-0002, and beach monitoring for Health and Safety Code section 115880.41 If sources of bacteria from the MS4 persist at levels that exceed the applicable receiving water limitations, additional monitoring locations and/or other source identification methods shall be implemented to identify the controllable sources causing the chronic contamination.

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(b) If natural and background sources appear to be the sole source of the impairment, Responsible Copermittees may select collect and provide additional data and the application of the NSEA to revise the TMDLs may be appropriate. Such revisions would be made to the TMDL via a Basin Plan Amendment and then subsequently incorporated into this Order consistent with Provision H.5.

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(2) Monitoring Procedures

(a) The Responsible Copermittees must conduct the dry and wet weather monitoring consistent with the monitoring and reporting program developed as part of the BLRP. Dry weather samples collected from additional monitoring stations established to support application of the NSEA must be collected at an appropriate frequency to demonstrate bacteria loads from the identified controllable anthropogenic sources have been addressed and do not indicate a health risk.

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(b) The Responsible Copermittees must collect wet weather monitoring samples within the first 24 hours of a storm event[42] of the rainy season (i.e. October 1 through April 30). Wet weather samples collected from receiving water stations and any additional monitoring stations established to support the application of the NSEA must be collected at an appropriate frequency to demonstrate bacteria loads from the identified sources have

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[41] Commonly referred to as AB 411 monitoring

[42] 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)].

been addressed and do not indicate a health risk.

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(c) 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 Annual Reports required under Provision F.3.b of this Order.

f. Compliance Determination

(1) Compliance with interim compliance requirements of Specific Provision 5.(b)(1) may be demonstrated via one of the following methods:

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(a) There is no discharge from the Responsible Copermittees' MS4s to the receiving water; OR

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(b) There are no exceedances of the applicable receiving water limitations under Specific Provision 5.c in the receiving water at, or downstream of the Responsible Copermittees' MS4 outfalls; OR

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(c) There are no violations of the applicable effluent limitations under Specific Provision 5.b.(2) at the Responsible Copermittees' MS4 outfalls; OR

(d) The pollutant loads discharging from the Responsible Copermittees' MS4 outfalls do not exceed the applicable effluent limitations under Specific Provision 5.b.(2); OR

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(e) The Responsible Copermittees can demonstrate that exceedances of the applicable receiving water limitations under Specific Provision 5.c. in the receiving water are due to loads from natural sources, AND pollutant loads from the Copermittees' MS4 are not causing or contributing to the exceedances; OR

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(f) The Responsible Copermittees have submitted and are fully implementing a Water Quality Improvement Plan, accepted by the San Diego Water Board, which provides reasonable assurance that the interim compliance requirements will be achieved by the interim compliance dates.

(g) Upon the effective date of this Order, a Copermittee's full compliance with all of the following requirements shall constitute a Copermittee's compliance with provisions pertaining to interim WQBELs with compliance deadlines occurring prior to approval of a WQIP.

(i) Meets all interim and final deadlines for development of a WQIP,

(ii) Targets implementation of watershed control measures in its existing storm water management program, including watershed control measures to eliminate non-storm water discharges of pollutants through the MS4 to receiving waters, to address known contributions of pollutants from MS4 discharges that cause or contribute to the impairment(s) addressed by the TMDL(s), and

(iii) Receives final approval of its WQIP from the Regional Board.

(2) Compliance with final WQBELs of Specific Provision 5.b.(2) may be demonstrated via one of the following methods:

(a) There is no discharge from the Responsible Copermittees' MS4s to the receiving water;

(b) There are no exceedances of the applicable receiving water limitations under Specific Provision 5.c. in the receiving water at, or downstream of the Responsible Copermittees' MS4 outfalls;

(c) There are no violations of the applicable effluent limitations under Specific Provision 5.b.(2) at the Responsible Copermittees' MS4 outfalls;

(d) The pollutant loads discharging from the Responsible Copermittees' MS4 outfalls do not exceed the applicable effluent limitations under Specific Provision 5.b.(2); OR

(e) The Responsible Copermittees can demonstrate that exceedances of the applicable receiving water limitations under Specific Provision 5.c in the receiving water are due to loads from natural sources, AND pollutant loads from the Copermittees' MS4 are not causing or contributing to the exceedances.

(f) The Responsible Copermittees have submitted and are fully implementing a Water Quality Improvement Plan, accepted by the San Diego Water Board, which provides reasonable assurance that the final compliance requirements will be achieved by the final compliance dates. A Responsible Copermittee that does not implement its WQIP in accordance with the milestones and compliance schedules shall demonstrate compliance with the final WQBELs pursuant to Provision 5.f(2)(a – e).

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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[1]	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

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 San Marcos -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 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	
		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	

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 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

1 These TMDL provisions do not apply to waterbodies, segments, or areas removed from the 303(d) list for REC-1 indicator bacteria numeric objectives, consistent with the assumptions and requirements of the Basin Plan Amendment. If the waterbodies are subsequently placed back on the 303(d) list for exceedances of the REC-1 indicator bacteria numeric objectives, all TMDL provisions will apply to those waterbodies and the Responsible Copermittees for those waterbodies.

b. Water Quality Based Effluent Limitations[43]

The WQBELs for segments or areas of the water bodies listed in Table 6.0 consist of the following:

(1) Final Dry Weather WQBELs – Effluent Limitations

Table 6.1
Final Dry Weather WQBELs Expressed as Mass-Based Limits

Waterbody	Effluent Limitation Total Coliform Billion MPN/month	Fecal Coliform Billion MPN/month	Enterococcus Billion MPN/month
San Joaquin Hills/ Laguna Hills HSAs (901.11 and 901.12)	1,134	227	40
Aliso HSA (901.13)	1,208	242	40
Dana Point HSA (901.14)	462	92	16

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[43] The Water Quality Based Effluent Limitations, both interim and final, do not apply to the waterbodies and the associated Responsible Copermittees for that waterbody if the waterbody segment in Table 6.0 is not on the 303(d) list for exceedances of the REC-1 numeric objectives for indicator bacteria. If the waterbody is subsequently placed back on the 303(d) for exceedances of the REC-1 numeric objectives for indicator bacteria, the WQBELs, both interim and final, will apply to the associated Responsible Copermittees for that waterbody.

Lower San Juan HSA (901.27)	8,342	1,665	275
San Clemente HA (901.30)		192	

(2) Final Wet Weather WQBELs – Effluent Limitations

Table 6.2
Final Wet Weather WQBELs Expressed as Mass-Based Limits

	Effluent Limitation		
Waterbody	**Total Coliform Billion MPN/year**	**Fecal Coliform Billion MPN/year**	**Enterococcus Billion MPN/year**
San Joaquin Hills/ Laguna Hills HSAs (901.11 and 901.12)	880,652	37,167	66,417
Aliso HSA (901.13)	8,923,264	477,069	735,490
Dana Point HSA (901.14)	3,404,008	152,446	219,528
Lower San Juan HSA (901.27)	16,093,160	1,156,419	1,385,094
San Clemente HA (901.30)	3,477,739	192,653	295,668

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(3) Best Management Practices

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 6.0 must incorporate the Bacteria Load Reduction Plans (BLRPs) or Comprehensive Load Reduction Plans (CLRPs) required to be developed pursuant to Resolution No. R9-2010-0001. For segments or areas in Table 6.0 that have been delisted from the Clean Water Act Section 303(d) List of Water Quality Limited Segments, a BLRP and/or CLRP is not required.

(b) The Responsible Copermittee must implement BMPs to support the achievement of the WQBELs under Specific Provision 6. for the segments or areas of the water bodies listed in Table 6.0.

(c) The Responsible Copermittees should coordinate any BMPs implemented to address this TMDL with Caltrans and owners/operators of small MS4s as possible.

c. RECEIVING WATER LIMITATIONS

(1) Interim Dry Weather 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 available monitoring data collected between January 1, 1996 and December 31, 2002. “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 Receiving Water Limitation for the segments or areas of the water bodies listed in Table 6.0[44]. A 50 percent reduction in the "existing" exceedance frequency is equivalent to half of the "existing" exceedance frequency of the 30-day geometric mean final Receiving Water Limitations.

The "existing" exceedance frequencies and the interim dry weather allowable exceedance frequencies (i.e. interim dry weather Receiving Water Limitations) calculated by the Responsible Copermittees must be included in the Water Quality Improvement Plans for the applicable Watershed Management Areas. Consistent with the assumptions and requirements of the Basin Plan Amendment, the Responsible Copermittees may provide evidence that indicates another controllable or uncontrollable source is responsible for the exceedances in the receiving waters. Responsible Copermittees may therefore include such demonstrations (including but not limited to reference system exceedance frequencies, natural source exclusion approach) as part of the "existing" exceedance frequency calculation.

The schedule for attaining the interim Receiving Water Limitations is specified in Provision 6.d.(3).

(2) Interim Wet Weather Receiving Water Limitations

The Responsible Copermittees must achieve a 50 percent reduction in the "existing" exceedance frequency of the applicable wet weather Receiving Water Limitation for the segments or areas of the water bodies listed in Table 6.0Error! Bookmark not defined.. A 50 percent reduction in the "existing" exceedance frequency is equivalent to half of the "existing" exceedance frequency of the applicable final Receiving Water Limitations. The exceedance frequency estimated to be equivalent to a 50 percent reduction in the "existing" exceedance frequency is shown in Table 6.4. Unless the Responsible Copermittees calculate a revised "existing" exceedance frequency that is part of an approved WQIP, the allowable existing exceedance frequencies in Table 6.3 shall apply.

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[44] The interim Receiving Water Limitations requirements do not apply to waterbodies that are not on the 303(d) list for exceedances of the REC-1 indicator bacteria numeric objectives. Consistent with the assumptions and requirements of the Basin Plan Amendment, no further action is required for these waterbodies. If the waterbodies are subsequently placed back on the 303(d) list for exceedances of the REC-1 indicator bacteria numeric objectives, all TMDL provisions will apply to these waterbodies and the Responsible Copermittees for those waterbodies.

As the wet weather Receiving Water Limitations include an allowable exceedance frequency, the 50 percent reduction shall not require Responsible Permittees to attain an exceedance frequency less than the final allowable exceedance frequency.

Where Responsible Copermittees elect to calculate a revised "existing" exceedance frequency, the "existing" exceedance frequencies and the interim wet weather allowable exceedance frequencies (i.e. interim wet weather Receiving Water Limitations) calculated by the Responsible Copermittees must be included in the Water Quality Improvement Plans for the applicable Watershed Management Areas. Consistent with the assumptions and requirements of the Basin Plan Amendment, the Responsible Copermittees may provide evidence that indicates another controllable or uncontrollable source is responsible for the exceedances in the receiving waters. Responsible Copermittees may therefore include such demonstrations (including but not limited to reference system antidegradation approach or natural source exclusion approach) as part of the "existing" exceedance frequency calculation.

The schedule for attaining the interim Receiving Water Limitations is specified in Provision 6.d(3).

Table 6.3

Interim Wet Weather Receiving Water Limitations Expressed as Interim Wet Weather Allowable Exceedance Frequencies[45]

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			

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[45] Responsible Copermittees may submit interim wet weather allowable exceedance frequencies as part of the WQIP. Upon approval of the WQIP, the interim allowable exceedance frequencies shall supersede the applicable exceedance frequencies in Table 6.3.

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	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 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	36%	36%	36%

Table 6.3 (Cont'd)
Interim Wet Weather Receiving Water Limitations 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	at Poche Beach	35%	35%	36%

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	Ocean Shoreline	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	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%

(3) Final Receiving Water Limitations[46]

(a) Discharges from the MS4s must not cause or contribute to the violation of the receiving water limitations in Table 6.4 by the end of the compliance schedules under Specific Provision 6.d.(2), unless the Responsible Copermittees provide evidence that indicates another controllable or

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[46] The Final Receiving Water Limitations requirements do not apply to waterbodies that are not on the 303(d) list for exceedances of the REC-1 indicator bacteria numeric objectives. Consistent with the assumptions and requirements of the Basin Plan Amendment, no further action is required for these waterbodies. If the waterbodies are subsequently placed back on the 303(d) list for exceedances of the REC-1 indicator bacteria numeric objectives, all TMDL provisions will apply to these waterbodies and the Responsible Copermittees for those waterbodies.

uncontrollable source is responsible for the exceedances in the receiving waters (a described in E.6.(3)(b)).

Table 6.4

Final 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[7]	10,000	22% / 0%	1,000	0%
Fecal Coliform	400	22% / 0%	200	0%
Enterococcus	104[4, 6] / 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. (the geometric mean does not apply to wet weather days)
2. During dry weather days, only the 30-day geometric mean receiving water limitations are required to be achieved (the single sample maximum does not apply to dry weather days)..
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.
6. A wet weather receiving water limitation 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 receiving water limitation of 61 MPN/100mL for Enterococcus will be used to assess compliance with the wet weather allowable exceedance frequency.
7. Total Coliform Receiving Water Limitations only apply to the Pacific Ocean Shoreline segments listed in Table 6.0 and do not apply to the creeks or creek mouths listed in Table 6.0.

(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. Such demonstration may be achieved by (1) demonstrating that the discharges from the MS4s are meeting the effluent limitations under Specific Provision 6.b.(1) for dry weather discharges and Specific Provision 6.b.(2) for wet weather discharges, (2) through the attainment of the final WQBELs in Specific Provision 6.b.(1) for dry weather discharges and Specific Provision 6.b.(2) for wet weather discharges, (3) by providing data from their discharge points to the receiving waters, (4) by providing data collected at jurisdictional boundaries, and/or (5) by using other methods accepted by the San Diego Water Board, which may include but are not limited to the reference system antidegradation approach (RSAA) or natural sources exclusion approach (NSEA)[47]..

(4) Best Management Practices

[47] Resolution R9-2008-0028

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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¶ ...

(a) The Water Quality Improvement Plans for the applicable Watershed Management Areas in Table 6.0 must incorporate the Bacteria Load Reduction Plans (BLRP) or Comprehensive Load Reduction Plans (CLRPs) required to be developed pursuant to Resolution No. R9-2010-0001. For segments or areas in Table 6.0 that have been delisted from the Clean Water Act Section 303(d) List of Water Quality Limited Segments, a BLRP and/or CLRP is not required.

(b) The Responsible Copermittee must implement BMPs to support the achievement of the Receiving Water Limitations under Specific Provision 6.c for the segments or areas of the water bodies listed in Table 6.0.

(c) The Responsible Copermittees should coordinate any BMPs implemented to address this TMDL with Caltrans and owners/operators of small MS4s as possible.

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d. COMPLIANCE SCHEDULE

(1) WQBELs Compliance Dates

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The Responsible Copermittees for MS4 discharges to a segment or area of the water bodies listed in Table 6.0[48] are required to achieve the Wasteload Allocations (WLAs) defined as the WQBELs under Specific Provision 6.b, according to the following compliance schedule:

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Table 6.5

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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		

* Total coliform receiving water limitations only apply to segments or areas of Pacific Ocean Shoreline listed in Table 6.0.

(2) Final Receiving Water Limitations Compliance Requirements

The Responsible Copermittees for MS4 discharges to a segment or area of the water bodies listed in Table 6.0[49] are required to achieve the Final

[48] The WQBELs (WLAs) do not apply to waterbodies that are not on the 303(d) list for exceedances of the REC-1 indicator bacteria numeric objectives. Consistent with the assumptions and requirements of the Basin Plan Amendment, no further action is required for these waterbodies. If the waterbodies are subsequently placed back on the 303(d) list or delisted in subsequent iterations, the San Diego Water Board will revise the current NPDES requirements and/or issue additional waste discharge requirements to be consistent with these TMDLs.

[49] The WQBELs (WLAs) do not apply to waterbodies that are not on the 303(d) list for exceedances of the REC-1 indicator bacteria numeric objectives. Consistent with the assumptions and requirements of the Basin Plan Amendment, no further action is required for these waterbodies. If the waterbodies are subsequently placed back on the 303(d) list for exceedances of the REC-1 indicator bacteria numeric

Receiving Water Limitations according to the following compliance schedule:

Table 6.6
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		

* Total coliform receiving water limitations only apply to segments or areas of Pacific Ocean Shoreline listed in Table 6.0.

(3) Interim Receiving Water Limitations Compliance Requirements

The Responsible Copermittees must comply with the Interim Receiving Water Limitations by the interim compliance dates specified within the Regional Board approved CLRPs or BLRPs.

(4) 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 implementation of the reference system antidegradation approach (RSAA), the natural sources exclusion approach (NSEA), reference watershed monitoring and beneficial use usage frequency.

e. Specific Monitoring and Assessment Requirements

(1) Monitoring and Assessment Requirements for Beaches

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.

Waterbodies that have been delisted are not required to develop and/or implement a BLRP or CLRP, including additional monitoring. Therefore, the monitoring requirements of this provision do not apply to delisted waterbodies. Delisted waterbodies shall continue monitoring consistent with Provision D.

(a) Monitoring Stations

For beaches addressed by the TMDL, monitoring locations should consist

objectives, all TMDL provisions will apply to these waterbodies and the Responsible Copermittees for those waterbodies.

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<#>Interim Dry Weather Receiving Water Limitations¶
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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 available monitoring data collected between January 1, 1996 and December 31, 2002. "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.¶
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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.¶
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<#>Interim Wet Weather Receiving Water Limitations¶
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The Responsible Copermittees must achieve the interim wet weather receiving water limitations 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 Receiving Water Limitations Expressed as ¶
Interim Wet Weather Allowable Exceedance Frequencies¶
Watershed ...

of, at a minimum, the same locations used to collect data required pursuant to Order Nos. R9-2007-0001 and R9-2009-0002, and beach monitoring for Health and Safety Code section 115880.[50] If exceedances of the applicable interim or final 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 must also be used to demonstrate that the bacteria loads from the identified anthropogenic 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. Dry weather samples collected from additional monitoring stations established to identify sources must be collected at an appropriate frequency to demonstrate bacteria loads from the identified sources have been addressed and are no longer causing exceedances in the receiving waters.

(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[51] of the rainy season (i.e. October 1 through April 30). Wet weather samples collected from receiving water stations and any additional monitoring stations established to identify sources must be collected at an appropriate frequency to demonstrate bacteria loads from the identified sources have been addressed and are no longer in exceedance of the allowable exceedance frequencies in the receiving waters.

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(iii) 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

[50] Commonly referred to as AB 411 monitoring

[51] 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.

(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

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.

Waterbodies that have been delisted are not required to develop and/or implement a BLRP or CLRP, including additional monitoring. Therefore, the monitoring requirements of this provision do not apply to delisted waterbodies. Delisted waterbodies shall continue monitoring consistent with Provision D.

(a) Monitoring Stations

For creeks addressed by the TMDL, 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 Station). If exceedances of the applicable interim or final 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 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 in accordance with the requirements of Provision D.

(ii) The Responsible Copermittees must collect wet weather monitoring samples from the receiving water monitoring stations within 24 hours of the end of a storm event[52] of the rainy season (i.e. October 1 through April 30).

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[52] 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) 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 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.

(iii) The monitoring and assessment results must be submitted as part of the Annual Reports required under Provision F.3.b of this Order.

f. COMPLIANCE DETERMINATION

(1) Compliance with interim compliance requirements of Specific Provision 6.c.(1) and Provision 6.c.(2) may be demonstrated via one of the following methods:

(a) There is no direct or indirect discharge from the Responsible Copermittees' MS4s to the receiving water; OR

(b) There are no exceedances of the applicable receiving water limitations under Specific Provision 6.c.(1) or Provision 6.c.(2) in the receiving water at, or downstream of the Responsible Copermittees' MS4 outfalls; OR

(c) There are no violations of the applicable effluent limitations under Specific Provision 6.b.(1) or Provision 6.b.(2) at the Responsible Copermittees' MS4 outfalls; OR

(d) There are no exceedances of the applicable interim receiving water limitations under Specific Provision 6.c.(1) or Provision 6.c.(2) in the receiving water at, or downstream of the Responsible Copermittees' MS4 outfalls; OR

(e) The Responsible Copermittees can demonstrate that exceedances of the applicable interim or final receiving water limitations under Specific Provision 6.c. in the receiving water are due to loads from natural sources, AND pollutant loads from the Copermittees' MS4 are not causing or contributing to the exceedances; OR

(f) The Responsible Copermittees have submitted and are fully implementing a Water Quality Improvement Plan, accepted by the San Diego Water Board, which provides reasonable assurance that the interim compliance requirements will be achieved by the interim compliance dates. OR

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(g) Upon the effective date of this Order, a Copermittee's full compliance with all of the following requirements shall constitute a Copermittee's compliance with provisions pertaining to interim WQBELs with compliance deadlines occurring prior to approval of a WQIP.

(i) Meets all interim and final deadlines for development of a WQIP,

(ii) Targets implementation of watershed control measures in its existing storm water management program, including watershed control measures to eliminate non-storm water discharges of pollutants through the MS4 to receiving waters, to address known contributions of pollutants from MS4 discharges that cause or contribute to the impairment(s) addressed by the TMDL(s), and

(iii) Receives final approval of its WQIP from the Regional Board.

(2) Compliance with WQBELs of Specific Provision 6.b may be demonstrated via one of the following methods:

(a) There is no direct or indirect discharge from the Responsible Copermittees' MS4s to the receiving water; OR

(b) There are no exceedances of the applicable receiving water limitations under Specific Provision 6.c.(3) in the receiving water at, or downstream of the Responsible Copermittees' MS4 outfalls; OR

(c) There are no violations of the applicable effluent limitations under Specific Provision 6.b.(1) at the Responsible Copermittees' MS4 outfalls; OR

(d) The Responsible Copermittees can demonstrate that exceedances of the applicable final receiving water limitations under Specific Provision 6.c.(3) in the receiving water are due to loads from natural sources, AND pollutant loads from the Copermittees' MS4 are not causing or contributing to the exceedances, OR

(e) The Responsible Copermittees have submitted and are fully implementing a Water Quality Improvement Plan, accepted by the San Diego Water Board, which provides reasonable assurance that the final compliance requirements will be achieved by the final compliance dates. A Responsible Copermittee that does not implement its WQIP in accordance with the milestones and compliance schedules shall demonstrate compliance with the final WQBELs pursuant to Provisions 6.f(2)(a-d).

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