



THE CITY OF SAN DIEGO

April 8, 2013

Electronic Delivery: lhonma@waterboards.ca.gov

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

Subject: TMDLs for Toxic Pollutants in Sediment at the Mouths of Paleta, Chollas, and Switzer Creeks in San Diego Bay

Dear Ms. Honma:

The City of San Diego appreciates the opportunity to provide comments on the proposed Total Maximum Daily Loads (TMDLs) for the mouths of Paleta, Chollas, and Switzer Creeks in San Diego Bay. These TMDLs and the associated Basin Plan Amendment address sediment toxicity impairments caused by elevated concentrations of PAHs, PCBs, and chlordane.

Recognizing the importance of these TMDLs, the City provided technical support and funding to facilitate an accurate assessment of watershed conditions and loading. This support included an extensive storm drain characterization and storm water monitoring study that included these watersheds (and additional areas that drain to San Diego Bay), TMDL model improvements and enhancements, technical support during development of the revised sediment numeric targets, and support of regional studies including Southern California Bight monitoring that were used to derive TMDL numeric targets. The City successfully collaborated with the San Diego Regional Board over the past several years to identify important data gaps for these TMDLs and to provide the information needed to better understand the linkage between storm water, pollutant transport, and sediment concentration in these areas. As a result, significant improvements were incorporated in the TMDL technical analysis to provide increased confidence in the results and future implementation actions that may be needed to address these impairments.

The City has carefully reviewed the proposed Basin Plan Amendment and supporting documentation and has identified several areas where changes to the TMDLs are warranted.

Transportation & Storm Water Department

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1. Human Health-Based Targets Are Not Justified.

These shoreline (creek mouth) areas were included on California's 303(d) List of Water Quality Limited Segments because of toxic conditions to aquatic life and degraded benthic community conditions. Previous TMDL development efforts focused on addressing these aquatic life impairments and associated beneficial uses. In addition to aquatic life, the current draft TMDLs include numeric targets, monitoring requirements, and compliance actions that also address potential human health concerns for the pollutants of concern (PAHs, PCBs, and chlordane). Additional information is needed to better understand the need to include human health-based targets and associated TMDL requirements given the limited spatial extent of these creek mouth areas and complex interactions with San Diego Bay. The potential for human health impacts is extremely low due to limited (or no) public access to these areas and industrial/military activities along the shoreline that prevent access in many cases. In addition, more information is needed to better understand how the fish tissue target relates to concentrations within the proposed test organism (Macoma). Furthermore, designing an implementation strategy that focuses on achieving human health criteria in these small areas would be much less efficient and effective than a strategy focused on achieving these important beneficial uses across San Diego Bay. The TMDL states that adoption of a San Diego Bay PCBs in Fish TMDL would negate these requirements.

Considering these issues and the need to develop a cost-effective and targeted implementation program, the City recommends that these TMDLs only address the listed aquatic life impairments which are related to local water and sediment quality issues, rather than focusing on potential human health impacts which are best addressed through comprehensive regulation of the San Diego Bay. If human health requirements are included in the final TMDL, the City recommends revisiting these targets as part of a broader Bay-wide TMDL in the future.

2. Atmospheric Deposition Is Not Adequately Addressed.

Indirect atmospheric deposition is a significant pollutant source that was not explicitly addressed or quantified in these TMDLs. Atmospheric deposition is the greatest source of PAHs and primarily originates from vehicle engine combustion within and outside of these watersheds. Other PAH sources to the atmosphere include the combustion of fuel from airplanes and ships, wood burning activities and forest fires, power plants, and other sources that can be hundreds or thousands of miles away. An accurate accounting of the contribution of atmospheric deposition to these impairments is especially important given the extremely limited ability of the City and other local agencies to control this source. The City is currently working with leading scientists in the region and nationally to conduct an atmospheric deposition study to help quantify this source using state-of-the-art monitoring equipment at several locations in downtown San Diego. The results of this study will be provided to the San Diego Regional Board to help improve the understanding of atmospheric deposition processes and develop future recommendations on how to comprehensively address this source.

For these TMDLs, the City recommends that atmospheric deposition in the watershed be included as a separate source given that MS4s have no ability to control this source and considering its ubiquitous nature. The TMDL states atmospheric deposition is an uncontrollable source, therefore it will be important to include as a separate source category that can be refined later through studies such as the one the City is currently developing. In addition, the City recommends that the California Air Resources Board and San Diego Air Pollution Control Board be listed as responsible parties for this source. This recommendation is consistent with language in the TMDL that states the San Diego Regional Board will send a letter to these agencies requesting that they address issues related to air deposition of toxic organic pollutants in the San Diego Bay airshed.

3. Remediation of Legacy Sediment Contamination Should Not Be Included in the TMDL Implementation Plan.

Cleanup of legacy sediment contamination is outside the scope of the Regional Board's TMDL authority and should not be included in the TMDL implementation plan. The Regional Board's authority to establish TMDLs comes from Clean Water Act section 303(d)(1)(C), which sets forth that a TMDL is the maximum amount of a pollutant that may be added to a listed water body daily from all sources. TMDLs are implemented through pollutant source control via wasteload allocations from point sources and load allocations from non-point sources. 40 C.F.R. § 130.2(i). Thus, TMDL authority does not include addressing remediation of legacy sediment contamination.

The Regional Board must undertake the sediment cleanup effort through some other regulatory authority besides this TMDL, such as a Cleanup and Abatement Order (CAO). This distinction is important because the responsible parties for the TMDL, who are the public agencies and other NPDES permittees that discharge storm water into the San Diego Bay, likely are not the same responsible parties for the legacy sediment contamination cleanup. The NPDES permittees' compliance with the TMDL should not be dependent on the status or ultimate success of the sediment cleanup, which may be beyond their control. Through the CAO process, the Regional Board will determine the parties responsible for remediation as well as the appropriate cleanup levels, which may or may not be equivalent to the TMDL sediment numeric target, as acknowledged on page 119 of the Draft Technical Report. Elsewhere in the Draft Technical Report, however, it is clear that the TMDL compliance points are based on a modeling assumption that sediment will be cleaned up to the TMDL numeric target (pages 84-85). The City requests deletion of any references to sediment remediation as an implementation action in the draft Tentative Resolution and Basin Plan Amendment. Keeping the TMDL and sediment cleanup separate would be consistent with similar efforts elsewhere in California, including the San Francisco Bay PCB TMDL and the Santa Monica Bay DDT and PCB TMDL, which were approved by the U.S. Environmental Protection Agency in 2010 and 2012, respectively. To the extent that the water column and sediment numeric targets are dependent on future remediation action to a certain cleanup level, the TMDL should include a reopener provision to allow for adjustment of the compliance schedule and targets if remediation is delayed or if cleanup levels are set above the TMDL sediment numeric target.

4. The Compliance Schedule Should Be Modified.

The TMDL compliance schedule should include flexibility in meeting the final milestones and targets given the complexities of San Diego Bay and watershed interactions that affect local water and sediment quality conditions. Also, atmospheric deposition is a significant source of organic pollutants in the region that has not been quantified and is considered uncontrollable. An extension of the 20-year compliance schedule may be needed considering these factors, as well as the implications of potentially meeting human health-based targets as part of these TMDLs (note the difficulties and recommendations listed above). At a minimum, the possible need for an extension of the schedule should be noted based on activities completed and trends in improvements. The schedule should also be updated to reflect a more realistic BMP implementation timeframe and associated watershed load reductions. The current schedule does not take into consideration the planning needs of the responsible parties to identify and implement BMPs necessary to improve water quality and sediment conditions. The City recommends following a compliance schedule similar to the one that was included in the Los Penasquitos Lagoon Sediment TMDL. This compliance schedule provides a phased BMP implementation schedule that is more consistent with the timing required to plan for and implement BMPs using an adaptive management approach. In particular, the compliance requirements at years 8 and 10 are overly aggressive considering a 20-year compliance schedule and municipal planning and funding challenges. We recommend 20% compliance in year 5, 40% compliance in year 9, 60% compliance in year 13, 80% compliance in year 17, and 100% compliance in year 20.

5. A Reopener Provision Should Be Included.

The City recommends explicitly including a TMDL reopener provision in the compliance schedule, as was done for the Los Penasquitos Lagoon Sediment TMDL. A reopener will likely be needed in the near future to incorporate the findings from the City's atmospheric deposition monitoring study, address any changes in the anticipated sediment remediation project that affect the assumptions in this TMDL, and potential future development of a Bay-wide TMDL for PCBs. A commitment by the San Diego Regional Board to participate in a TMDL reopener should be clearly reflected in these TMDLs, consistent with other recently adopted TMDLs.

6. The Monitoring Requirements Should Be Modified.

The City recommends the following changes to the monitoring requirements:

(A) The numeric targets for water column concentrations provided in Table 7 (Numeric Targets for Toxic Pollutants at the Creek Mouths of Paleta, Chollas, and Switzer Creeks) are much lower than current method reporting limits (MRLs) for standard analytical methods. For example using Method 8270C to analyze for Benzo(a)pyrene, the standard MRL is 0.1 µg/L and the numeric target is 0.049 µg/L.

(B) Specific details of the Special Studies outlined in Section C of the TMDL Implementation Plan (pg. B-29) should be removed to allow the responsible parties to develop the Special Studies as advocated by the Monitoring Framework approved by the San Diego Regional Board during the December 2012 Board Hearing.

(C) The Basin Plan Amendment should only require development of a Quality Assurance Project Plan (QAPP) for TMDL Compliance Monitoring, as opposed to developing both a Monitoring and Reporting Plan (MRP) and a QAPP. The QAPP may be modified to include all the components detailed in a MRP, thereby streamlining the planning process. The QAPP should also be compliant with the Surface Water Ambient Monitoring Program (SWAMP) and consistent with the state Bioaccumulation Policy when adopted.

(D) The City acknowledges that the Storm Water Effluent Monitoring provisions are consistent with the requirements of the current Draft MS4 NPDES Permit but requests that samples be collected at representative outfalls throughout the watershed and not individual jurisdictions. This will allow the jurisdictions to pool their limited resources since the monitoring will serve dual purposes (NPDES permit and TMDL compliance).

(E) If the Regional Board requires specific special studies as part of this Basin Plan Amendment, the City agrees with the assignment of responsible parties for the fish tissue (Macoma) special study on page B-30 of the Basin Plan Amendment, which states that the Phase I MS4s will be named only if results from the Intertidal Segments Study find that the MS4s are contributing a PCB source load to the creek mouth impairments.

7. Comprehensive Load Reduction Plan (CLRP) Development.

The current Draft MS4 NPDES Permit includes requirements for developing a Water Quality Improvement Plan (WQIP) which will satisfy the TMDL requirements for development of a CLRP. The City recommends noting that development of a WQIP will satisfy these requirements. For consistency with MS4 permit requirements and to avoid duplicative planning efforts, the City recommends that Table 7 on page B-34 of the Basin Plan be revised to set the due date for the CLRP at 18 months (instead of 12) from the effective date of the Basin Plan Amendment, or the due date for the next WQIP annual update, whichever is later.

The City also requests clarification on the language on page B-28 and in Table 7 of the Basin Plan Amendment that states that CLRPs “must be implemented . . . no later than 6 months after submittal.” The CLRPs necessarily will contain many long-term actions that cannot be implemented within 6 months.

8. The TMDL and List of Responsible Parties Should Be Updated to Reflect the New Small MS4 Permit.

The Draft Technical Report references the 2003 Small MS4 Permit at pages 35 and 38, although it was recently superseded by the new permit adopted by the State Board on February 5, 2013. The 2013 Small MS4 Permit includes a list of non-traditional permittees in Attachment B that should be referenced in this TMDL. Specifically, the City is aware that Metropolitan Transit District, which is listed in Attachment B, operates within the Switzer Creek watershed.

On the other hand, the school districts listed on page 38 are not enrolled in the 2013 Small MS4 Permit although the Draft Technical Report recognizes that they are a potential source of pollutants. The City requests that the Tentative Resolution and Basin Plan Amendment be revised to include the listed school districts as responsible parties to the TMDLs, since they will no longer be responsible parties by reason of their enrollment in the Small MS4 Permit.

9. The Economic Analysis Substantially Underestimates the Cost of Compliance.

Section 21159(c) of the California Environmental Quality Act (CEQA) requires that the Regional Board consider a reasonable range of economic factors when adopting a Basin Plan Amendment. The analysis in Appendix H, Section H3.3, is not adequate because it substantially underestimates the cost of compliance.

The first problem is that Appendix H assumes vegetated swales may be a primary method of compliance with the TMDL. The City doubts whether this is an accurate assumption given that BMPs with higher pollutant removal potential likely will be necessary to achieve compliance. A cost estimate for the Bannock Avenue Streetscape Enhancement, which treats runoff from about 19.5 acres in the Tecolote watershed, is attached as Exhibit 1. This project is estimated to cost over \$1.7 million, for a cost of \$88,249 per acre treated.

Second, the cost estimates for vegetated swales and bioretention systems are far too low. Appendix H estimates that a half-acre vegetated swale could be constructed for \$15,000, and a 1,250 square foot bioretention basin could be constructed for \$19,000. In the City's recent experience, these estimates would not even be sufficient to cover design and permitting costs. Applying the typical costs in the City's Low Impact Development Design Manual, construction of a half-acre swale would cost \$2.80 per square foot, for a total of \$61,118 (Exhibit 2). When costs for planning, design, and project management are included, the total cost rises to \$110,025. Regarding bioretention costs, the City recently built a 4,800 square foot bioretention basin at 43rd Street and Logan Avenue, which treats runoff from a 0.83-acre area. The total cost was \$338,074 (Exhibit 3). This project is representative of a typical cost for a bioretention facility.

Third, the estimates in Appendix H do not include land acquisition costs that are reasonably likely to be incurred based on the Regional Board's estimate of the land area needed to construct treatment control BMPs sufficient to achieve compliance with the TMDLs. Appendix H estimates that 3,956 half-acre vegetated swales, or 14,030 1,250-square-foot bioretention units would be required to treat the 19,780 acres of impervious surfaces in the three watersheds. This would result in 1,978 acres dedicated to swales or 402 acres dedicated to bioretention basins. In 2009, the City conducted a parcel evaluation for BMP implementation in the Chollas Creek watershed. This study identified only twenty-two City-owned sites suitable for BMPs in the entire watershed (Exhibit 4). The City and other responsible parties may have to purchase significant acreage to construct the anticipated treatment control BMPs, and the Regional Board should include land acquisition costs in its economic analysis.

Based on the City's recent experience designing and constructing treatment control BMPs, the cost of compliance in Appendix H appears to be off by an order of magnitude even when land acquisition costs are excluded. The City expects that the cost of compliance will be in the billions of dollars, not millions. The City recommends revising Appendix H to comply with CEQA section 21159(c) and provide accurate disclosure of the economic impact of this TMDL to the decision makers and the public.

10. The MS4 Permit Requirements Incorrectly Insert the Numeric Targets as Water Quality Based Effluent Limitations.

Attachment J includes specific TMDL provisions "recommended to be incorporated in whole at the end of Attachment E in the Regional MS4 Permit." It is not appropriate for the Regional Board to adopt permit language as part of this Basin Plan Amendment because the permit must be reopened and amended through a separate process that gives the Copermittees an opportunity to comment and a hearing on the proposed language. 40 C.F.R. § 124.10(b). A Basin Plan Amendment is a quasi-legislative process, not a quasi-judicial process like a permit revision. These two actions cannot be combined in this proceeding.

The City reserves its right to comment further on the proposed permit language when the permit amendment process is initiated, but would like to bring the following comments to the Regional Board's attention now. The proposed permit language in Attachment J is substantially similar to the language in Attachment E to the Draft Tentative Order for the Regional MS4 permit, dated October 31, 2012. The City and other Copermittees have submitted extensive comments requesting modification of this language because it inappropriately inserts TMDL receiving water numeric targets into the permit as Water Quality Based Effluent Limitations (WQBELs). A WQBEL is a restriction on the quantity of pollutant that may be discharged from a point source into a receiving water. 40 C.F.R. § 122.44(d). A WQBEL is not a concentration of pollutants in the receiving water or sediment, which is how the TMDL numeric targets are expressed. Categorizing the numeric targets as WQBELs is inconsistent with federal regulations and standard permitting practices and could subject the Copermittees to Mandatory Minimum Penalties.

The Chollas/Paletta/Switzer TMDLs are different from the other TMDLs incorporated into the Regional MS4 Permit because they assign individual Waste Load Allocations (WLAs) to the responsible parties. The Clean Water Act requires that if WQBELs are included in permits, then those WQBELs must be consistent with the assumptions underlying the WLAs. 40 C.F.R. § 122.44(d)(1)(vii)(B). A one-size-fits all approach to WQBELs is not appropriate where individual WLAs have been established.

We look forward to reviewing the Regional Board's responses to these comments. If you have additional questions, please contact Ruth Kolb at (858) 541-4328 or at rkolb@sandiego.gov.

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L. Honma
April 8, 2013

Sincerely,



Kris McFadden
Deputy Director

KM\rk

Enclosures: Exhibit 1: Bannock Avenue Streetscape Enhancements Engineering Estimates
Exhibit 2: San Diego Low Impact Design Manual
Exhibit 3: 43rd Street and Logan Avenue Costs
Exhibit 4: Parcel Evaluation for BMP Implementation Study Final Report

cc: Allen Jones, Deputy Chief of Staff
Garth K. Sturdevan, Director, Transportation & Storm Water Department
Ruth Kolb, Program Manager, Transportation & Storm Water Department
Drew Kleis, Program Manager, Transportation & Storm Water Department
Heather Stroud, Deputy City Attorney

EXHIBIT 1

BANNOCK AVENUE STREETScape ENHANCEMENTS

City of San Diego
 Engineer's Estimate of Probable Cost
 Final Submittal - July 27, 2011

Item	Quantity	Unit	Specs.	DESCRIPTION	Unit Price	Total Cost
1	1	LS	9-3.5	Field Orders	\$75,000.00	\$75,000
2	3,006	CY	300-2.9	Unclassified Excavation	\$8.25	\$24,800
3	8,888	SF	300-3.6	ASTM C-33 Concrete Sand (2")	\$0.50	\$4,444
4	4,524	SF	300-3.6	ASTM C-33 Concrete Sand (6")	\$1.50	\$6,786
5	8,888	SF	300-3.6	No. 8 Stone (2")	\$0.50	\$4,444
6	1,789	CY	300-3.6	No. 57 Stone	\$54.00	\$96,606
7	705	SF	300-11.4	River Rock (6" thick, 3" to 6" rock diameter)	\$4.26	\$2,996
8	48	EA	301-1.7	Water Meter Adjustment	\$750.00	\$36,000
9	24	EA	301-1.7	Water Meter Box	\$450.00	\$10,800
10	2,281	SF	301-2.4	Aggregate Base (5")	\$0.60	\$1,369
11	9,881	SF	301-2.4	Aggregate Base (9")	\$1.00	\$9,881
12	1,166	SF	302-5.9	AC Pavement (up to 8")	\$2.40	\$2,798
13	7,324	SF	302-5.9	AC Pavement (8" - 12")	\$2.75	\$20,141
14	1,391	SF	302-5.9	AC Pavement (15" +)	\$3.25	\$4,521
15	3,264	SF	303-5.9	Driveways (Remove and Replace)	\$13.60	\$44,390
16	960	LF	303-5.9	Concrete Curb and Gutter, Type G	\$22.00	\$21,120
17	1,218	LF	303-5.9	Concrete Curb (0" tall, 6"x24")	\$13.20	\$16,078
18	97	SF	303-5.9	Cross Gutter	\$13.20	\$1,280
19	116	SF	303-5.9	Concrete Sidewalk (4")	\$4.00	\$464
20	120	EA	303-5.9	Curb Opening with Grate	\$350.00	\$42,000
21	14	EA	303-5.9	Curb Opening without Grate	\$150.00	\$2,100
22	214	SF	303-5.9	Walkways Crossing Bioretention Areas	\$350.00	\$74,900
23	2,307	LF	303-5.9	1' Wide Concrete Pedestrian Strip	\$26.50	\$61,136
24	12	EA	303-5.10.2	Concrete Curb Ramp, Type C1	\$394.00	\$4,728
25	2	EA	303-5.10.2	Concrete Curb Ramp, Type B	\$452.00	\$904

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Item	Quantity	Unit	Specs.	DESCRIPTION	Unit Price	Total Cost
26	3	EA	303-5.10.2	Concrete Curb Ramp, Type D	\$512.00	\$1,536
27	6,246	SF	303-8.9	Pervious Portland Cement Concrete Pavement (7")	\$20.60	\$128,668
28	43	EA	303-9.4	Check Dam	\$100.00	\$4,300
29	10	EA	304-5	Street Sign Removal and Reinstallation	\$100.00	\$1,000
30	5	EA	306-1.6	Storm Drain Cleanout, Type A	\$7,200.00	\$36,000
31	15	EA	306-1.6	Underdrain Cleanout (8" PVC, in traffic area)	\$633.00	\$9,495
32	24	EA	306-1.6	Underdrain Cleanout (8" PVC, in landscape)	\$125.00	\$3,000
33	1,058	LF	306-1.6	8" PVC Drain Pipe	\$56.35	\$59,618
34	403	LF	306-1.6	18" RCP Storm Drain	\$129.70	\$52,269
35	5	EA	306-1.6	Connect to Existing Storm Drain	\$320.00	\$1,600
36	320	LF	306-1.6	HDPE Sleeve Sewer Crossings	\$140.00	\$44,800
37	2,805	LF	306-10.4	8" PVC Perforated Underdrain Pipe	\$56.35	\$158,062
38	49,028	SF	306-26.4	30 mil Plastic Liner	\$0.60	\$29,417
39	153	EA	306-26.4	Pipe Penetration (Pipe Sealant) at Utility Crossings	\$100.00	\$15,300
40	54	EA	306-26.4	Pipe Penetration (Pipe Sealant) for Underdrains	\$250.00	\$13,500
41	40	LF	306-26.4	18" PVC Pipe (C900)	\$75.00	\$3,000
42	239	CY	308-7	Bioretention Soil Media, Type A	\$50.00	\$11,950
43	284	CY	308-7	Bioretention Soil Media, Type B	\$50.00	\$14,200
44	136	CY	308-7	Bioretention Soil Media, Type C	\$75.00	\$10,200
45	83	CY	308-7	Finely Shredded Hardwood Mulch (3")	\$55.00	\$4,565
46	1	LS	308-8	Plant Establishment and Maintenance Program	\$64,000.00	\$64,000
Theme A Landscaping						
47	24	EA	308-7	Tree - Western Redbud	\$165.00	\$3,960
48	18	EA	308-7	Tree - Desert Willow	\$165.00	\$2,970
49	122	EA	308-7	Shrub - Fuchsia	\$3.80	\$464
50	255	EA	308-7	Shrub - Yarrow	\$3.80	\$969



BANNOCK AVENUE STREETScape ENHANCEMENTS

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Item	Quantity	Unit	Specs.	DESCRIPTION	Unit Price	Total Cost
51	286	EA	308-7	Grass - Gray Rush	\$3.25	\$930
52	106	EA	308-7	Grass - Deer Grass	\$3.25	\$345
Theme B Landscaping						
53	18	EA	308-7	Tree - Western Redbud	\$165.00	\$2,970
54	9	EA	308-7	Tree - Desert Willow	\$165.00	\$1,485
55	2,523	EA	308-7	Grass - Buffalo	\$4.10	\$10,344
56	168	EA	308-7	Grass - Field Sedge	\$4.10	\$689
Theme C Landscaping						
57	20	EA	308-7	Tree - Western Redbud	\$165.00	\$3,300
58	16	EA	308-7	Tree - Desert Willow	\$165.00	\$2,640
59	45	EA	308-7	Shrub - Marsh Elder	\$3.00	\$135
60	113	EA	308-7	Shrub - Coffeeberry	\$4.55	\$514
61	305	EA	308-7	Grass - Gray Rush	\$3.25	\$991
62	40	EA	308-7	Grass - Deer Grass	\$3.25	\$130

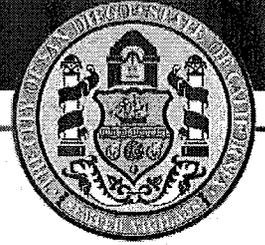
Subtotal	\$1,194,000
Mobilization (10% subtotal)	\$119,400
Traffic Control (5% of subtotal)	\$59,700
CGP Compliance (2% of subtotal)	\$23,880
CGP Permit Fees	\$1,500
Construction Contingencies (20% of subtotal)	\$238,800
Escalation(7% of subtotal)	\$83,580
Construction Total	\$1,720,860

Notes:

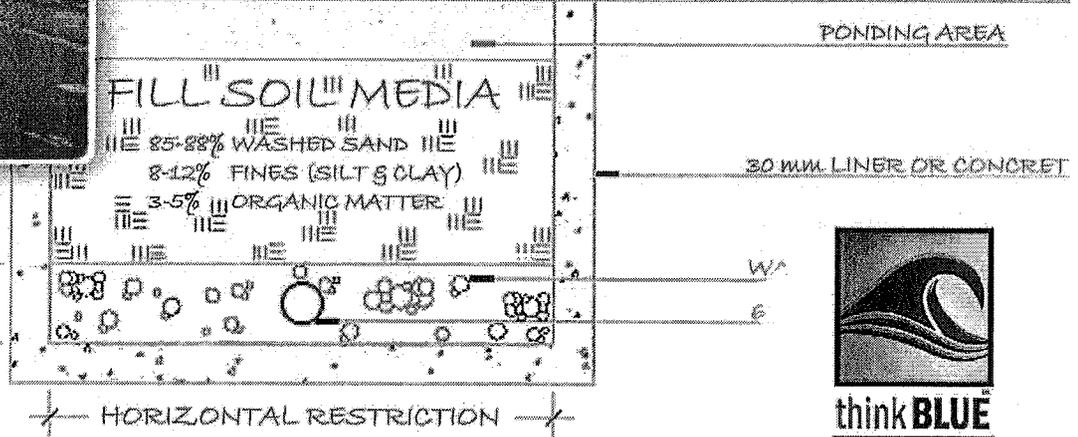
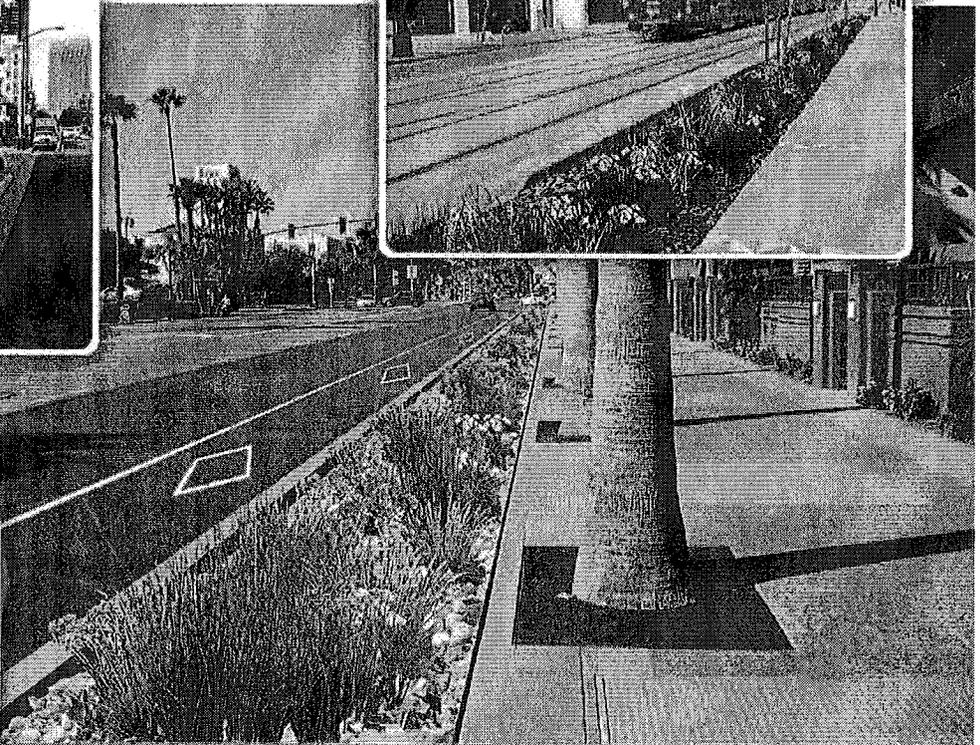
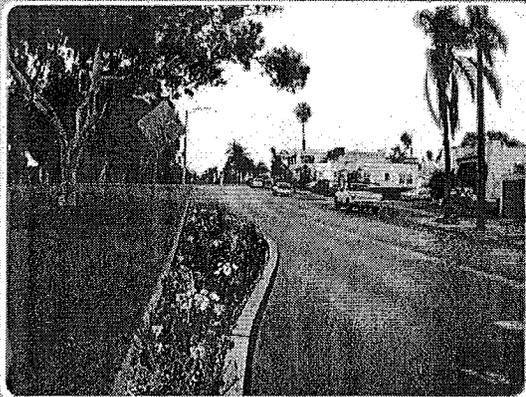
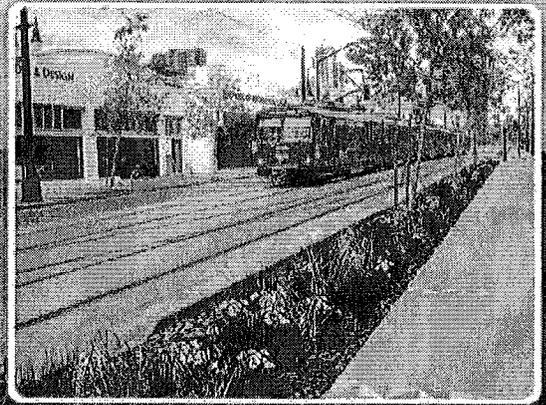
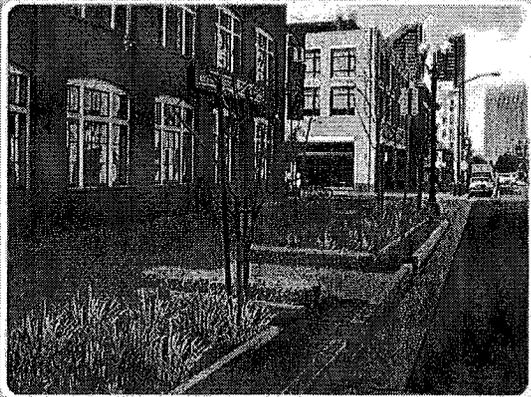
- 1 Costs do not include construction management, inspection, geotechnical, testing, environmental mitigation, permitting, or administration.
- 2 These estimates represent Tetra Tech's judgment as a design professional and are supplied for the general guidance of the City of San Diego. It is important to note that factors such as the cost of labor and materials, competitive bidding and market conditions, over which Tetra Tech has no control, may affect bids or actual costs of the construction.
- 3 Tetra Tech used the following resources for pricing the construction items:
 City of San Diego, Development Services Department, Unit Price List, January 2009
 RS Means 2008
 CalTrans Contract Cost Database (<http://sv08data.dot.ca.gov/contractcost/index.php>)



EXHIBIT 2



San Diego Low Impact Development Design Manual



TETRA TECH



think **BLUE**
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11 Costs Estimates

Planning-level cost estimates were developed for each BMP type on the basis of labor cost estimates provided by the City and estimates from local vendors. Estimates for each cost component were developed on the basis of the design standards provided in the previous sections. Costs are based on local information and recommendations compiled from local vendors and actual costs from current and previous projects for each individual type of BMP. The range in cost estimates reflects the recommended ranges in the design specifications for the specific components. For example, a range in media depth of 2 to 3 feet results in a cost range of \$2.90 to \$4.30 per square foot. The following tables summarize component cost estimates for each BMP type.

Common cost consideration in LID planning and design

Common cost elements	
Planning	10% of total project costs
Design	40% of total project costs
Mobilization	10% of total project costs
Contingency	20% of total project costs
Site Preparation	
Clearing and grubbing	\$0.72/ft ²
Asphalt removal	\$3.35/ft ²
Concrete removal	\$3.35/ft ²
Sidewalk removal	\$2.00/ft ²

The project manager must refine these numbers throughout the phases of design to prepare a more accurate project construction estimate for bidding purposes. The inclusion of various sizes of projects in the maintenance costs attempts to include those costs in which an economy of scale has been observed. The sizes selected for this analysis were:

- Large LID BMP systems = 4000 ft²,
- Medium LID BMP system = 2000 ft², and
- Small LID BMP system = 500 ft².

These categories are based on typically sized LID BMPs. As the LID BMP area represent systems, the area can include the application of multiple LID BMPs. Detailed information on costs based on the frequency and type of maintenance required, such as routine maintenance (costs associated with maintenance required monthly up to every 2 years), intermediate maintenance (costs associated with maintenance required every 6 to 10 years) and replacement maintenance (costs associated with replacement of the system; estimated as a service life of 20 years) are presented below. This will assist in providing full lifecycle cost analyses for these LID BMPs.

Detailed cost estimates of LID installation by practice type



Installation and maintenance activities	LID practice type								
	Bioretention	Bioswale	Permeable pavement	Infiltration trench	Planter boxes	Sand filter	Vegetated filter strip	Vegetated swale	Cisterns/ rain barrels
Installation									
Excavation			\$1.35/ft ² to \$2.65/ft ²		\$5.90/ft ² to \$7.20/ft ²			\$1.32/ft ³	
Without underdrains	\$4.00/ft ² to \$5.25/ft ²	\$4.00/ft ² to \$5.25/ft ²		\$4.00/ft ² to \$5.25/ft ²					
With underdrains	\$5.90/ft ² to \$7.20/ft ²	\$5.90/ft ² to \$7.20/ft ²		\$5.90/ft ² to \$7.20/ft ²		\$4.60/ft ² to \$6.00/ft ²			
2 feet (minimum) to 3 feet						\$2.65/ft ² to \$4.00/ft ²			
Fine Grading								\$0.34/ft ²	
Soil Media						\$2.25/ft ² to \$3.70/ft ²			
Recommended mix	\$2.90/ft ² to \$4.30/ft ²	\$2.90/ft ² to \$4.30/ft ²		\$2.90/ft ² to \$4.30/ft ²	\$2.90/ft ² to \$4.30/ft ²				
With engineered media	\$3.60/ft ² to \$5.40/ft ²	\$3.60/ft ² to \$5.40/ft ²		\$3.60/ft ² to \$5.40/ft ²	\$3.60/ft ² to \$5.40/ft ²				
Soil Media Barrier									
Geotextile	\$0.50/ft ²	\$0.50/ft ²		\$0.50/ft ²	\$0.50/ft ²	\$0.50/ft ²			
Washed sand (2-inch layer)	\$0.25/ft ²	\$0.25/ft ²		\$0.25/ft ²	\$0.25/ft ²	\$0.25/ft ²			
No. 8 aggregate (min 2 inches thick)	\$0.30/ft ²	\$0.30/ft ²		\$0.30/ft ²	\$0.30/ft ²	\$0.30/ft ²			
Underdrain Pipe (includes drainage stone, assumes 5-foot spacing)	\$3.75/ft ²	\$3.75/ft ²		\$3.75/ft ²	\$3.75/ft ²	\$3.75/ft ²			
Curb and Gutter	\$22/ft	\$22/ft		\$22/ft	\$22/ft				
Mulch (ranges from mixed hardwood to gorilla hair)	\$0.25/ft ² to \$0.5/ft ²	\$0.25/ft ² to \$0.5/ft ²			\$0.25/ft ² to \$0.5/ft ²				
Hydraulic Restriction Layer									
Filter fabric	\$0.50/ft ²	\$0.50/ft ²		\$0.50/ft ²					
Clay	\$0.65/ft ²	\$0.65/ft ^{2v}		\$0.65/ft ^{2v}					
30-mil liner	\$0.40/ft ²	\$0.40/ft ²		\$0.40/ft ²	\$0.40/ft ²	\$0.40/ft ²			
Concrete barrier	\$16.00/ft ²	\$16.00/ft ²		\$16.00/ft ²	\$16.00/ft ²	\$16.00/ft ²			
Vegetation	\$0.40/ft ² to \$4.00/ft ²	\$0.40/ft ² to \$4.00/ft ²			\$0.40/ft ² to \$4.00/ft ²				
Sod							\$0.42/ft ²	\$0.42/ft ²	
Seeding							\$0.33/ft ²	\$0.33/ft ²	
Permeable Pavement Materials									
Pervious asphalt			\$2.00/ft ²						
Pervious concrete			\$6.00/ft ²						



Installation and maintenance activities	LID practice type								
	Bioretention	Bioswale	Permeable pavement	Infiltration trench	Planter boxes	Sand filter	Vegetated filter strip	Vegetated swale	Cisterns/rain barrels
PICP			\$4.00/ft ²						
Plastic grid pavers			\$2.80 ea						
Bedding Layer									
Washed sand (2-inch layer)			\$0.25/ft ²						
No. 8 aggregate (min 2 inches thick)			\$0.30/ft ²						
No. 57 stone (min 6 inches to 1 foot)			\$1.00/ft ² to \$2.00/ft ²						
Tanks/Cisterns									\$0.75/gallon
Filter									\$35.00 to \$360.00
Foundation									
Gravel (assume 6-inch depth)									\$1.00/ft ²
Concrete (assume 6-inch depth)									\$16.00/ft ²

Maintenance	LID practice type								
	Bioretention	Bioswale	Permeable Pavement	Infiltration trench	Planter boxes	Sand filter	Vegetated filter strip	Vegetated swale	Cisterns/rain barrels
Maintenance									
Routine Maintenance (maintenance required monthly to every 2 years)									
Routine (small)	\$6.07/ft ²	\$6.07/ft ²	\$1.80/ft ²	\$2.63/ft ²	\$6.07/ft ²	\$2.63/ft ₂	\$5.26/ft ²	\$5.26/ft ²	
Routine (medium)	\$2.28/ft ²	\$2.28/ft ²	\$0.57/ft ²	\$0.88/ft ²	\$2.28/ft ²	\$0.88/ft ₂	\$1.97/ft ²	\$1.97/ft ²	
Routine (large)	\$1.66/ft ²	\$1.66/ft ²	\$0.28/ft ²	\$0.44/ft ²	\$1.66/ft ²	-	\$1.43/ft ²	\$1.43/ft ²	
Intermediate Maintenance (maintenance required every 6 to 10 years)									
Intermediate (small)	\$7.36/ft ²	\$7.36/ft ²	\$1.00/ft ²	\$3.37/ft ²	\$7.36/ft ²	\$3.37/ft ₂			
Intermediate (medium)	\$3.58/ft ²	\$3.58/ft ²	\$1.00/ft ²	\$1.62/ft ²	\$3.58/ft ²	\$1.62/ft ₂			
Intermediate (large)	\$2.95/ft ²	\$2.95/ft ²	\$1.00/ft ²	\$1.18/ft ²	\$2.95/ft ²	-			
Replacement (Service Life of 20 years)									
Replacement (small)	\$11.08/ft ²	\$11.08/ft ²	\$10.36/ft ²	\$8.19/ft ²	\$11.08/ft ²	\$8.19/ft ₂	\$4.48/ft ²	\$4.48/ft ²	
Replacement (medium)	\$10.59/ft ²	\$10.59/ft ²	\$10.36/ft ²	\$6.43/ft ²	\$10.59/ft ²	\$6.43/ft ₂	\$1.68/ft ²	\$1.68/ft ²	
Replacement (large)	\$10.51/ft ²	\$10.51/ft ²	\$10.36/ft ²	\$5.99/ft ²	\$10.51/ft ²	-	\$1.21/ft ²	\$1.21/ft ²	

Small System = 500 ft²; Medium System = 2000 ft²; Large System = 4000 ft²

EXHIBIT 3

The City had incurred the following actual costs in building BMPs at 43rd Street and Logan Avenue as part of a Watershed Activity. Some in-house costs for various internal activities such as obtaining Council approval or providing legal review of agreements are not included.

Bioretention Basin

Below are total costs incurred for designing, managing and constructing the bioretention basin which treats runoff from a 0.83 acre area. The cost per acre treated is \$407,318. We avoided land acquisition costs by agreeing to provide ongoing landscaping maintenance in exchange for a drainage easement for the 4,800 square foot bioretention facility.

Item	Cost
Design Consultant Costs	\$ 40,000
In-house Project Management	\$ 38,000
Construct Bioretention Basin	\$ 42,257
Construct Drainage Structures	\$ 7,466
Install Landscaping & Irrigation	\$ 124,526
Construct Misc. Site Improvements	\$ 12,635
Traffic Control, SWPPP, etc.	\$ 6,705
Bonds & Field Orders	\$ 14,485
Change Orders	\$ 12,000
Field Engineering Costs (Survey, inspect)	\$ 40,000
Total	\$ 338,074

Curbside Filtration (similar to “Flow-Through Planters”)

Below are total costs incurred for construction of designing, managing and constructing 255 linear feet of curbside filtration units within the 5 ft wide section of street parkway between the curb and the sidewalk. These treat 5.1 acres. The cost per acre treated is \$58,064.

Item	Cost
Design Consultant Costs	\$ 40,000
In-house Project Management	\$ 38,000
Construct Filtration Units	\$ 159,937
Traffic Control, SWPPP, etc.	\$ 6,705
Bonds & Field Orders	\$ 14,485
Change Orders	\$ 12,000
Field Engineering Costs (Survey, inspect)	\$ 25,000
Total	\$ 296,127

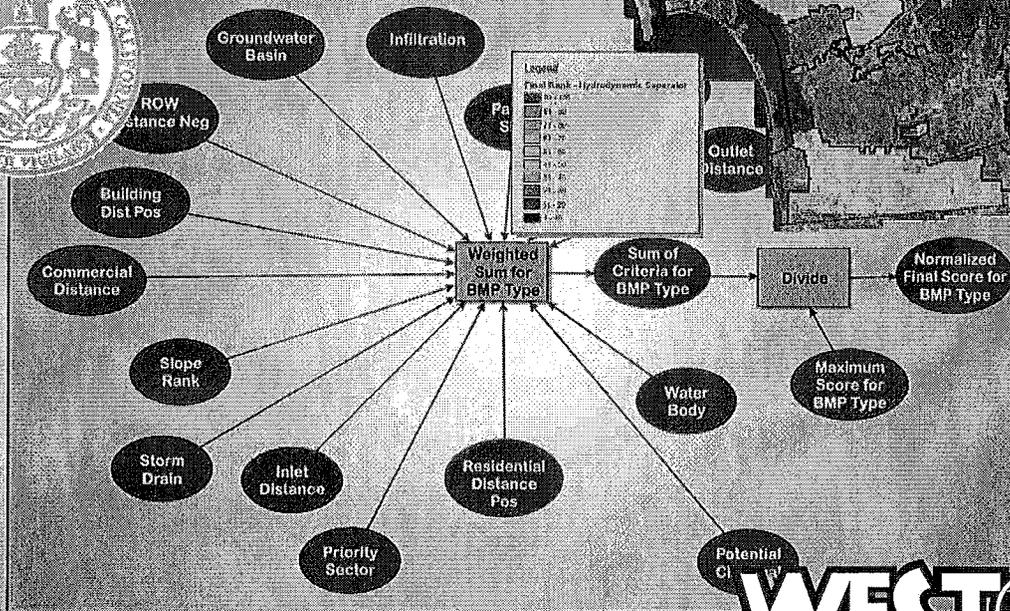
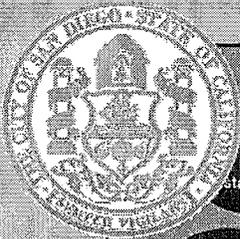
EXHIBIT 4

Parcel Evaluation for BMP Implementation Study

Final Report

Prepared For:

City of San Diego
1970 B Street, MS 27A
San Diego, CA 92102



February 13, 2009



Table 4. Field Evaluated Sites – Chollas Creek Watershed

Site Number	General Ranking	Rank Order	Address	Description	Site Recon	Thomas Guide	Potential BMP Type
521	73.4	1	4077 N Harbor Dr	Sewer Pump Station #02	Could not locate	1288-E2	*
486	72.5	2	4002 Federal Blvd	Police, Trailer, Canine & Swat Admin	Site looked at for large LID but not appropriate – potential Green Mall site	1289-J2	Green Mall
487	72.5	3	4008 Federal Blvd	Police, Clubhouse, Pistol Range	Site looked at for large LID but not appropriate – potential Green Mall site	1289-H2	Green Mall
207	70.6	4	811 S 28th St	Library, Logan Heights	potential Green lot Site	1289-D6	Green Lot
597	70.3	5	Chollas Pkwy & Euclid Ave	Chollas Parkway and Euclid Ave	Site could work for Bacteria Treatment Train System but this watershed was not designated for Bacteria Treatment Train System placement	1270 A-7	Treatment Train System
479	69.9	6	2850 Pershing Dr	Nursery, Headhouse #2	Potential for a multiple range of projects.	1289-D1	Large Infiltration Projects
310	69.2	7	570 S 65th Street	George Steven Senior Center	Potential for multiple projects	1290-D5	Multiple Projects
309	68.7	8	6512 Akins St	65th & Herrick Water Pump Station	Potential for Green project	1290-D3	Green Lot/ Green Street
566	68.6	9		CANON ST DRAIN	Could not identify	1288 A-2	*
477	68.5	10		Showmobile, Portable Stage, Small, Li	Potential for Green project in combination with adjacent city properties.		Multiple Projects
365	68.4	11	2825 Pershing Dr	Mount Hope Cemetery Administration	Topography of site is too high for large LID. Site as site is natural vegetation	1289-G4	*
588	68.4	12	Chollas LF	Trailer, Flare Station (Serial #21105)	Not a suitable site for infiltration projects	1270-C7	*
391	68.3	13	4011 32nd St	Fire Station #14	Potential for rain barrel and small Green project	1289-E5	Small Green Lot/ Rain Barrel
513	68.3	14	6715 Imperial Ave	Comfort Station, Marie Widman	Could not identify	1290-E-3	*
445	67.9	15	4069 30th Street	Mid-City Multi Service Center (L)	Potential for Green Mall	1289-E5	Green Mall
212	67.4	16	26th & A Street	Shelter & Shuffleboard, Senior Center	Potential for Rain barrel and Green Lot projects	1289-D3	Green Lot/ Rain Barrel
311	67.3	17	619 68th St	Water Pump Station, 68th St	Potential for Green Lot	1290-D4	Green Lot
190	67.2	18	721 San Pasqual St	Library, Beckwourth	Potential for Green Lot	1289-H5	Green Lot
213	67.2	19	3120 Talbot St	Park, Elementary School, Cabrillo	Potential for a good capture reuse project. Serves a large drainage area	1288-B3	Large Capture Reuse project
340	67.2	20	811 25th St	Auto Service Gutierrez (L)(Future Com	Potential for adjacent Green Street project	1289-D3	Green Street
	64.70		641 South Boundary St	Mountain View Park, Recreation Center	Site appears to have potential as a large LID site	1289-H5	Large Infiltration BMP
	58.20		33rd St. & National Ave	SE corner of intersection	Site may be suitable for Bacteria Treatment Train System but this watershed was not designated for Bacteria Treatment Train System placement	1289 E-6	Treatment Train System
	61.10		Landis St	De la Cruz Park and Reek	Site appears to have potential for a large LID or Green Lot project	1289 G-6	Large Infiltration BMP
	54		54th St. & Orange Ave	Colina del Sol Park	Site appears suitable for Green Lot LID but this watershed was not designated for green lot placement	1270-A5	Green Lot
			2781 Anarita Chollas	Street division offices	Site appears suitable for Green Mall LID but this watershed was not designated for green mall placement		Green Mall
	54.10		20th St & B St	Stormwater Division truck yard	Site appears to have good potential for Green Mall LID	1289-C2	Green Mall
	59.80		4149 Newton Avenue	Park, Southcrest	Has a lot of Potential for Large LID project	1289-J6	Large Infiltration BMP

* Not Recommended for BMP Implementation after Field Evaluation