Agenda Date: 6/2/2015

TO:
Honorable Mayor and Members of the City Council

THROUGH:
Mark Danaj, City Manager

FROM:
Tony Olmos, Public Works Director
Raul Saenz, Utilities Manager

SUBJECT:
Review Draft Enhanced Watershed Management Program (EWMP) and Authorize the City Manager to Submit the Draft EWMP to the Los Angeles Regional Water Quality Control Board (Public Works Director Olmos).
AUTHORIZE REPORT SUBMITTAL

RECOMMENDATION:
Staff recommends that the City Council review the Draft EWMP and authorize the City Manager to submit the Draft EWMP to the Los Angeles Regional Water Quality Control Board (Board).

FISCAL IMPLICATIONS:
No fiscal impact associated with this action.

BACKGROUND:
On November 8, 2012, the Board adopted the fourth Los Angeles Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System Permit (Permit) under the Federal Clean Water Act for discharges within the coastal watersheds of Los Angeles County. The Permit identifies conditions, requirements and programs that municipalities must comply with to protect regional water resources from adverse effects associated with pollutants in stormwater and urban runoff.

The Cities of Hermosa Beach, Redondo Beach, Torrance and Manhattan Beach, together with the Los Angeles County Flood Control District (Beach Cities) agreed to collaborate on the development of a EWMP for the Santa Monica Bay, Dominguez Channel, and Machado Lake watershed areas within their jurisdictions (Figure 1).

EWMPs are intended to facilitate Permit compliance to ensure that discharges from covered

MS4s achieve applicable water quality targets, and that control measures are implemented to reduce the discharge of pollutants to the maximum extent practicable. The EWMP allows Permittees to collaboratively develop comprehensive watershed-specific control plans to:

- prioritize water quality issues;
- identify and implement focused strategies, control measures and Best Management Practices (BMP);
- execute an integrated monitoring and assessment program; and
- allow for modification over time.

On June 28, 2013, in compliance with the Permit, the Beach Cities submitted a Notice of Intent (NOI) to develop a EWMP to the Board. On March 27, 2014, the Beach Cities received a letter from the Board approving the NOI. On June 26, 2014, in compliance with the Permit, the Beach Cities then submitted a draft EWMP Work Plan to the Board. As the next step in the Permit compliance process, the Beach Cities developed a Draft EWMP which will be submitted to the Board no later than June 30, 2015. The Draft EWMP Executive Summary is included in this report (Attachment 1).

DISCUSSION:
As required by the Permit, the Draft EWMP comprehensively evaluates opportunities within the Beach Cities' collective watershed management area for collaboration on multi-benefit regional projects that, wherever feasible, will retain all non-storm water runoff and storm water runoff from a ¾ inch storm over a 24 hour period for the drainage areas.

Additionally, the Draft EWMP addresses required adherence to established water quality standards for each water body in its jurisdiction. Water quality standards include beneficial uses, water quality objectives and criteria that are established at levels sufficient to protect those beneficial uses, and an anti-degradation policy to prevent degrading of water resources.

Geosyntec Consultants, under the direction of Ms. Kathleen McGowen, prepared the comprehensive report in conformance with NPDES permit provisions. City staff has worked closely with the project team to assure the Draft EWMP is ready for submittal to the Board. The major components of this report have been previously presented to City Council over the course of the last year.

The following is a summary of the content of the Draft EWMP:

Section 1- Introduction - Addresses the purpose and regulatory framework of the EWMP in the context of the Permit and states that the EWMP is intended to facilitate effective, watershed-specific implementation strategies in accordance with the Permit.

The Draft EWMP summarizes the Santa Monica Bay and Dominguez Channel-specific water quality priorities identified by the Beach Cities. It outlines the program plan, including specific strategies; control measures and BMPs, necessary to achieve water quality targets and Receiving Water Limitations; and, describes the quantitative analysis completed to support target achievement and Permit compliance.

Section 2 - Santa Monica Bay Watershed, and *Section 3 - Dominguez Channel Watershed* summarize the technical aspects of the EWMP, including:

- *Water Quality Prioritization*, which characterizes the stormwater and non-stormwater discharges from the MS4 as well as receiving water bodies; prioritizes water body-pollutant combinations; and assess sources for high priority water bodies.
- *BMP Selection* objectives include preventing and/or eliminating non-stormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters; achieving all applicable interim and final water quality targets pursuant to corresponding compliance schedules; and ensuring that discharges from the MS4 do not cause or contribute to exceedances of Receiving Water Limitations.
- *Reasonable Assurance Analysis* (RAA) Approach requires that the Beach Cities' conduct a RAA for each water body-pollutant combination addressed by the EWMP. The objective of the RAA is to demonstrate the ability of EWMP to ensure that Permittees' MS4 discharges achieve applicable water quality based effluent limitations and do not cause or contribute to exceedances of Receiving Water Limitations

Section 4 - EMWP Implementation Schedules - Table 1 presents the compliance schedules necessary to meet the interim and final compliance deadlines for the Beach Cities EWMP water body pollutants.

Section 5 - Assessment and Adaptive Management Framework - EWMP updates are required at two-year cycles by the Permit. The Coordinated Integrated Management Program will gather additional data on receiving water conditions and stormwater/non-stormwater quality. This data will support adaptive management at multiple levels, including: tracking improvements in water quality over the course of EWMP implementation; and, generating data not previously available to support model updates. Over time, the experience gained through BMP implementation will provide lessons learned to support modifications to the control measures identified in the EWMP.

Section 6 - Financial Analysis - Provides an order-of-magnitude estimate of the financial resources that may be required to attain compliance with the water quality targets as well as a recommended project scheduling in order to meet Total Maximum Daily Load (TMDL) compliance deadlines and interim deadlines.

Section 7 - Potential Funding Sources and Financial Strategy - Overview of potentially available funding sources to pay for programs proposed in the EWMP. The funding sources included in this section for consideration are grants, interagency partnerships, bonds, State Revolving Funds, local funding opportunities, and public private partnerships.

Sections 8 - Legal Authority - The Beach Cities have the necessary legal authority to implement the BMPs identified in the EWMP.

POLICY ALTERNATIVES:
Development of a EWMP is regulatory driven and prescriptive, which does not allow for policy alternatives.

PUBLIC OUTREACH/INTEREST:

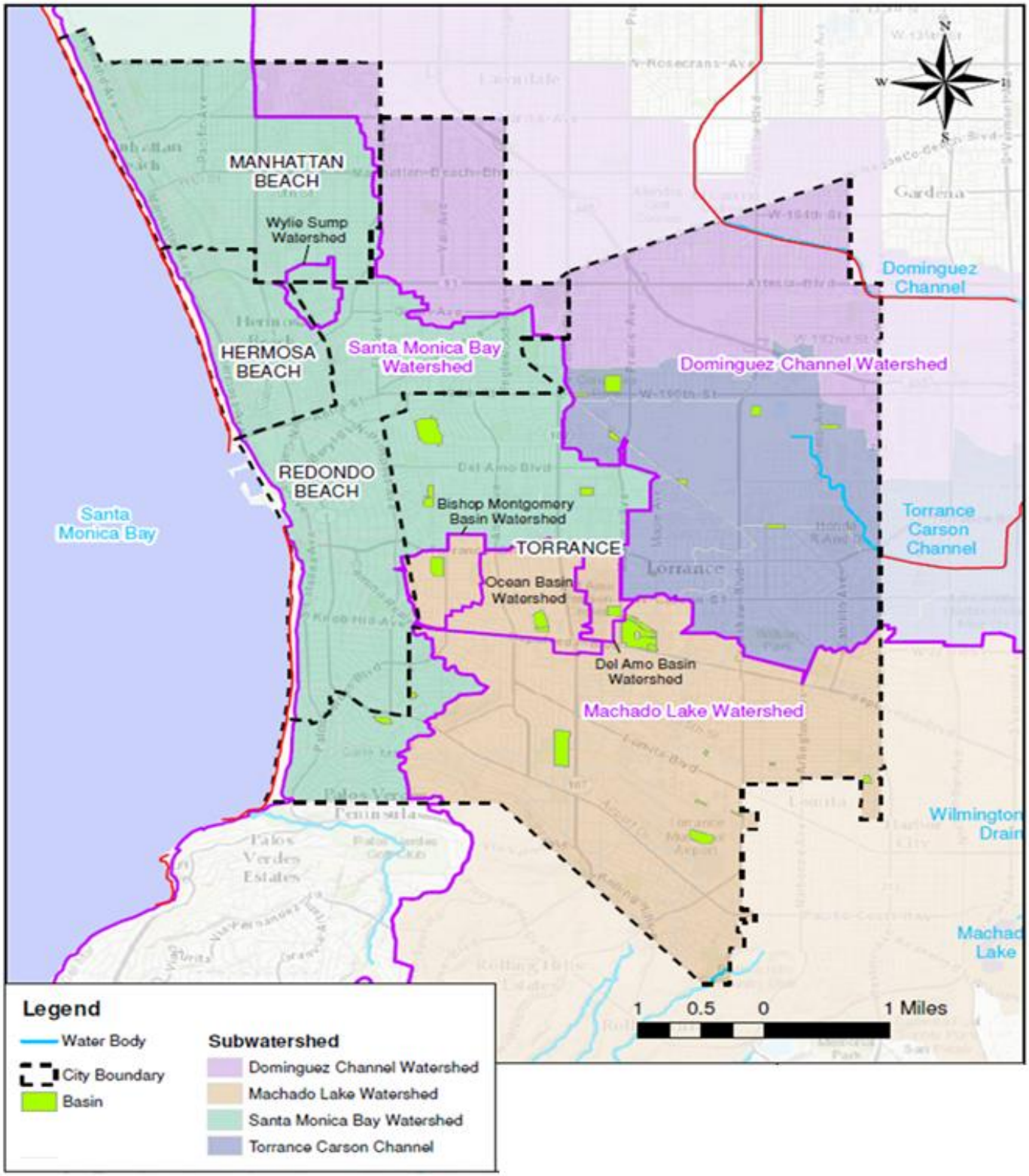
Public outreach meetings were held on May 21, 2014 and May 17, 2015 to inform and solicit input from the community regarding development of the EWMP. The presentations included an overview of regulatory requirements, general approach to meeting regulatory requirements, local context and concepts being utilized in developing the EWMP

CONCLUSION:
Staff recommends that the City Council approve the Draft EWMP and authorize the City Manager to submit the Draft EWMP to the Board.

ATTACHMENTS:

1. Figure 1 - Beach Cities Jurisdictional Areas
2. Attachment 1 - Draft EWMP Executive Summary
3. Table 1 - Implementation Time-Line
4. Attachment 2 - Draft EWMP Appenix:
    A. Notice of Intent
    B. Reasonable Assurance Analysis for Dominguez Channel Watershed Within the City of Torrance
    C. Machado Lake Work Plan
    D. Machado Lake Implementation Plan
    E. Walteria Basin Supplementary Write-Up
    F. City of Torrance ‘s Stormwater Quality Master Plan
    G. Background Information on the LACFCD
    H. Approach to Addressing Receiving Water Exceedances
    I. Land Use-Based Wet Weather Pollutant EMC s
    J. BMP Effluent Concentrations
    K. Sample TLR Calculation
    L. MCM Customization Summary
    M. LID Ordinances
    N. Green Streets Policies
    O. Structural BMP Unit Cost Tables
5. Full Draft Report (via compact disc)

Figure 1 Beach Cities Jurisdiction Areas



ATTACHMENT 1

DRAFT
EXECUTIVE SUMMARY

DRAFT ENHANCED WATERSHED MANAGEMENT PROGRAM
FOR
BEACH CITIES WATERSHED MANAGEMENT AREA

May 2015

EXECUTIVE SUMMARY

PURPOSE AND OBJECTIVES

Following adoption of the 2012 Los Angeles Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) Permit[1] (Permit), the Cities of Hermosa Beach, Manhattan Beach, Redondo Beach and Torrance, together with the Los Angeles County Flood Control District (LACFCD), collectively referred to as the Beach Cities Watershed Management Group (Beach Cities WMG) agreed to collaborate on the development of an Enhanced Watershed Management Program (EWMP) for the Santa Monica Bay (SMB), Dominguez Channel, and Machado Lake Watershed areas within their jurisdictions (referred to herein as the Beach Cities EWMP Area). This EWMP is intended to facilitate effective, watershed-specific Permit implementation strategies in accordance with Permit Part VI.C. Watershed Management Program. This EWMP:

- Summarizes watershed-specific water quality priorities identified by the Beach Cities WMG;
- Outlines the program plan, including specific strategies, control measures and best management practices (BMPs)[2], necessary to achieve water quality targets (Water Quality-Based Effluent Limitations [WQBELs] and Receiving Water Limitations [RWLs]); and
- Describes the quantitative analyses completed to support target achievement and Permit compliance.

In compliance with Section VI.C.4.b of the Permit, the Beach Cities WMG submitted to the Los Angeles Regional Water Quality Control Board (Regional Board) a Notice of Intent (NOI) (Appendix A) to develop an EWMP on June 28, 2013 with a revised NOI submitted December 17, 2013 in response to comments received from Regional Board staff. On March 27, 2014, the Beach Cities WMG received a letter from the Executive Officer of the Regional Board approving the revised NOI submittal. In compliance with Section VI.C.4.c.iv of the Permit, the Beach Cities WMG then submitted a draft EWMP Work Plan to the Regional Board on June 26, 2014. Regional Board comments were not received on the EWMP Work Plan, therefore work proceeded on EWMP development consistent with the approach outlined in the EWMP Work Plan. The Beach Cities WMG was required by Section VI.C.4.c.iv of the Permit to submit a draft EWMP no later than June 30, 2015. This document has been developed to serve as the Beach Cities Draft EWMP and is consistent with the Work Plan previously submitted to the Regional Board.

Watershed Management Programs (WMPs) are a voluntary opportunity afforded by Section VI.C.1 of the Permit for Permittees to collaboratively or individually develop comprehensive watershed-specific control plans and are intended to facilitate Permit compliance and water quality target achievement. Enhanced WMPs (EWMPS) are WMPs which comprehensively evaluate opportunities

[1] Order No. R4-2012-0175 NPDES Permit No. CAS004001 Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4.

[2] For simplification, the term "BMP" will be used to collectively refer to strategies, control measures, and/or best management practices. The Permit also refers to these measures as Watershed Control Measures, or WCMs.

for collaboration on multi-benefit regional projects that retain all non-stormwater runoff and runoff from the 85th percentile, 24 hour storm event while also achieving benefits associated with issues such as flood control and water supply. Where it is not feasible for regional projects to retain the 85th percentile 24 hour storm, the EWMP must demonstrate through a Reasonable Assurance Analysis, that applicable water quality targets are achieved. Permittees within the Beach Cities WMA have elected to prepare an EWMP. The EWMP allows Permittees to collaboratively or individually develop comprehensive watershed-specific control plans which a) prioritize water quality issues, b) identify and implement focused strategies, control measures and BMPs, c) execute an integrated monitoring and assessment program, and d) allow for modification over time. In general, WMPs and EWMPs are intended to facilitate Permit compliance and water quality target achievement and must ensure: 1) that discharges from covered MS4s achieve applicable WQBELs and RWLs and do not include prohibited non-stormwater discharges; and 2) that control measures are implemented to reduce the discharge of pollutants to the maximum extent practicable (MEP). Per Permit Section VI.C.1.e, WMPs and EWMPs are to be developed based on the Regional board's Watershed Management Areas (WMAs) or subwatersheds thereof.

Consistent with Permit requirements, this EWMP is written to:

1. Be consistent with Permit provisions for EWMPs in Part VI.C.1.a.-f and Part VI.C.5-C.8;
2. Incorporate applicable State agency input on priority setting and other key implementation issues;
3. Provide for meeting water quality standards and other Clean Water Act obligations;
4. Include multi-benefit regional projects which retain stormwater from the 85th percentile 24 hour storm where feasible;
5. Include watershed control measures which achieve compliance with all interim and final WQBELs in drainage areas where retention of the 85th percentile 24 hour storm is infeasible;
6. Maximize the effectiveness of funding;
7. Incorporate effective innovative technologies;
8. Ensure existing requirements to comply with technology based effluent limitations and core requirements are not delayed; and
9. Ensure a financial strategy is in place.

This EWMP is applicable to the Beach Cities WMG EWMP Area, which consists of all of the incorporated MS4 areas of the cities of Redondo Beach, Manhattan Beach, Hermosa Beach and Torrance and includes the infrastructure of the LACFCD within those jurisdictions (**Error! Reference source not found.**). This area includes portions of three distinct HUC-12 watersheds[3]:

[3] A HUC-12 watershed is defined by a 12-digit hydrologic unit code (HUC) delineation, which identifies the watershed area based on six levels of classification: regional, sub-region, hydrologic basin, hydrologic sub-basin, watershed, and subwatershed.

Santa Monica Bay Watershed, Dominguez Channel Watershed, and Machado Lake Watershed, as shown in **Figure ES-1** and summarized in **Table ES-1**.

- The western portion of the Beach Cities EWMP Area consists of approximately 7,840 acres of land that drains to Santa Monica Bay (SMB). This accounts for 38.4% of the total Beach Cities WMG area, and includes portions of the cities of Manhattan Beach, Redondo Beach, and Torrance, and the entirety of the City of Hermosa Beach. This portion of the study area is hereinafter referred to as the "SMB Watershed".
- The northeastern portion of the Beach Cities EWMP Area is tributary to Dominguez Channel (including Torrance Carson Channel) and is comprised of approximately 7,380 acres of land.. This watershed accounts for 36.1% of the total Beach Cities EWMP Area, and includes portions of the cities of Manhattan Beach, Redondo Beach, and Torrance. Storm drains from the Cities of Manhattan Beach and Redondo Beach drain through the City of Lawndale before discharging to Dominguez Channel. The City of Torrance's MS4 discharges directly to Dominguez Channel and Torrance Carson Channel (Torrance Lateral). Collectively, this portion of the study area is hereinafter referred to as the "Dominguez Channel Watershed".
- The southeastern portion of the Beach Cities EWMP Area is tributary to Machado Lake (including Wilmington Drain) and is comprised of approximately 5,182 acres of land. This watershed accounts for 25.5% of the total Beach Cities EWMP Area. All but 1.2 acres (0.02%) of this area is within the City of Torrance. The City of Redondo Beach owns the small remainder of the area, though no Redondo Beach-owned catch basins or storm drains are tributary to Machado Lake.

Table ES-1. Beach Cities WMG Area Distribution by Participating Agency

Participating Agency	Area (acres)			
	Santa Monica Bay Watershed	Dominguez Channel Watershed	Machado Lake Watershed	Total EWMP Area (% of total)
City of Redondo Beach	2,614	1,217	1	3,832 (19%)
City of Manhattan Beach	2,078	350	-	2,428 (12%)
City of Hermosa Beach	832	-	-	832 (4%)
City of Torrance	2,314	5,812	5,181	13,307 (65%)
Total	7,837	7,379	5,182	20,399 (100%)

The EWMP approach, including model selection, data inputs, critical condition selection (90th percentile year), calibration performance criteria, and output types is consistent with the Regional Board Reasonable Assurance Analysis Guidance Document (LARWQCB, 2014) and also leverages previous efforts where relevant models have already been developed. The individual water quality targets, BMPs, Reasonable Assurance Analyses, schedules, and costs for each of the watersheds are summarized in watershed-specific sections that follow.

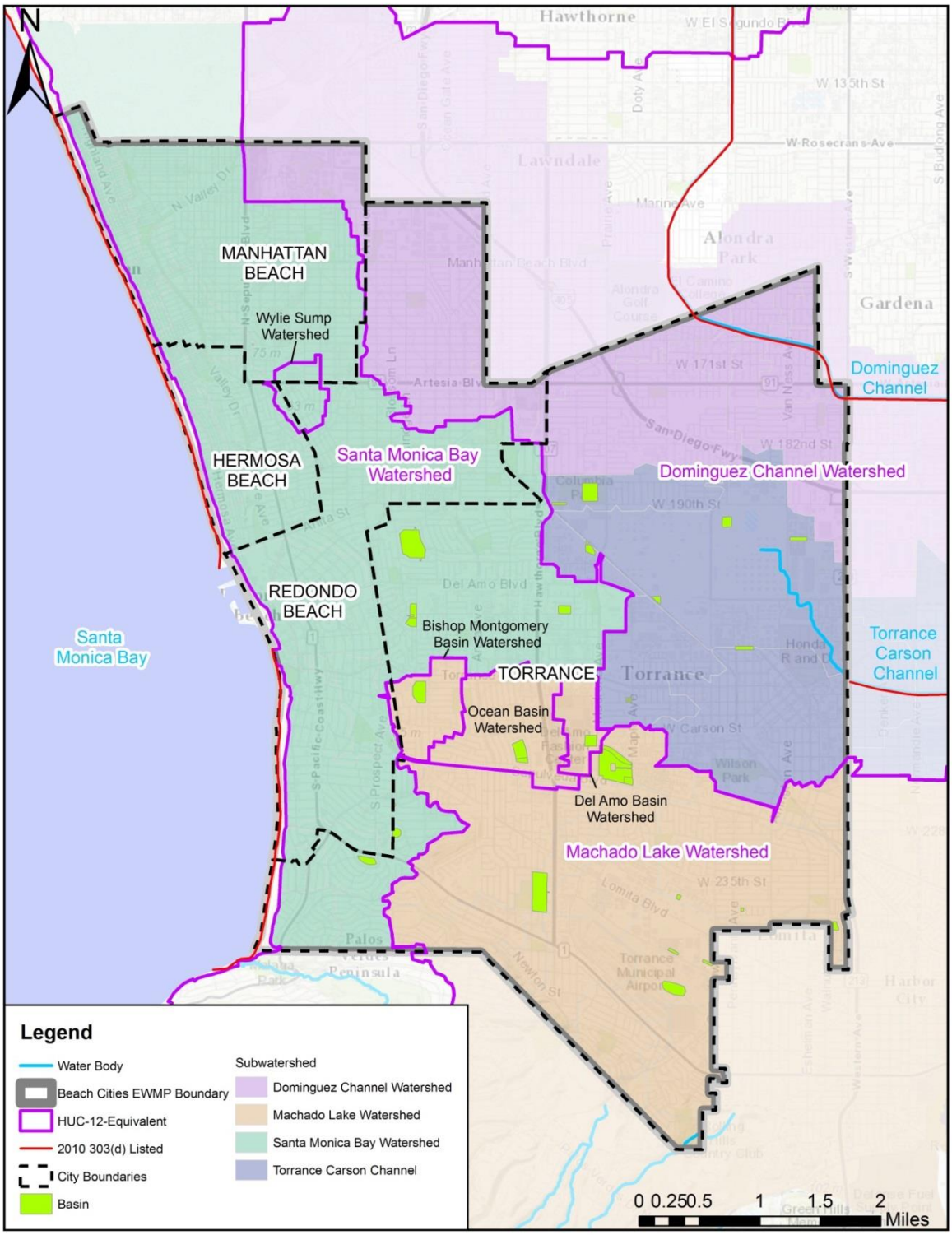


Figure ES-1. Beach Cities EWMP Area

SANTA MONICA BAY WATERSHED

Receiving waters for stormwater runoff from the Beach Cities EWMP Area were screened for water quality priorities by reviewing Total Maximum Daily Loads (TMDLs), the State's 303(d) list, and additional water quality data. Each identified water quality priority for a given receiving water body was categorized as a water body-pollutant combination (WBPC). WBPCs were classified into one of three categories, in accordance with Section VI.C.5(a).ii of the Permit. **Table ES-2** presents the prioritized WBPCs within the SMB Watershed portion of the Beach Cities EWMP Area. WBPCs categorized below are subject to change based on future data collected as part of the CIMP or other monitoring program.

Table ES-2. Water Body-Pollutant Combination Prioritization for the SMB Watershed

Category	Water Body	Pollutant	Reason/Justification
1: Highest Priority	SMB Beaches	Dry Weather Bacteria	SMB Beaches Dry Weather Bacteria TMDL
		Wet Weather Bacteria	SMB Beaches Wet Weather Bacteria TMDL
	SMB	Trash/Debris	SMB Debris TMDL
		DDTs	SMB PCBs and DDT TMDL
		PCBs	SMB PCBs and DDT TMDL
2: High Priority	N/A	None	No other 303(d) listings exist for the Beach Cities portion of SMB
3: Medium Priority	N/A	None	Outfall and receiving water monitoring data are not available for the Beach Cities portion of SMB

The Reasonable Assurance Analysis was performed on bacteria, as it was the controlling pollutant within the SMB Watershed. Bacteria targets are summarized in

Table ES-3 below.

The MS4 compliance targets for DDT and PCBs established in the Santa Monica Bay DDT & PCB TMDL were based on the assumption that the existing stormwater pollutant loads for DDT and PCBs were lower than what was needed to protect the Santa Monica Bay from these legacy pollutants (i.e., based on data used in the TMDL, no MS4 pollutant load reduction is expected to be required). Therefore, no reductions in DDT and PCB loading from the Beach Cities WMG MS4s are required to meet the TMDL and therefore, no Reasonable Assurance Analysis is required.

Trash was not modeled as part of the Reasonable Assurance Analysis, instead the Reasonable Assurance Analysis describes how the Beach Cities WMG Agencies will comply with the TMDL through their Trash Monitoring and Reporting Programs which are aimed at meeting the zero trash discharge definition in the TMDL.

Table ES-3. Water Quality Targets for the SMB Watershed

Waterbody	Pollutant	RWL/WQBEL from the Permit	Note on Modeling Assumptions
Santa Monica Bay Beaches	Fecal Coliform (modeled as surrogate for all three fecal indicator bacteria in the SMBBB TMDL)	Allowable Exceedance Days per season per year (varies by beach Compliance Monitoring Location)	Used 90th percentile rain year (based on wet days) as the critical condition. Accounted for site-specific exceedance rates and the number of discharge days modeled for each Compliance Monitoring Location.

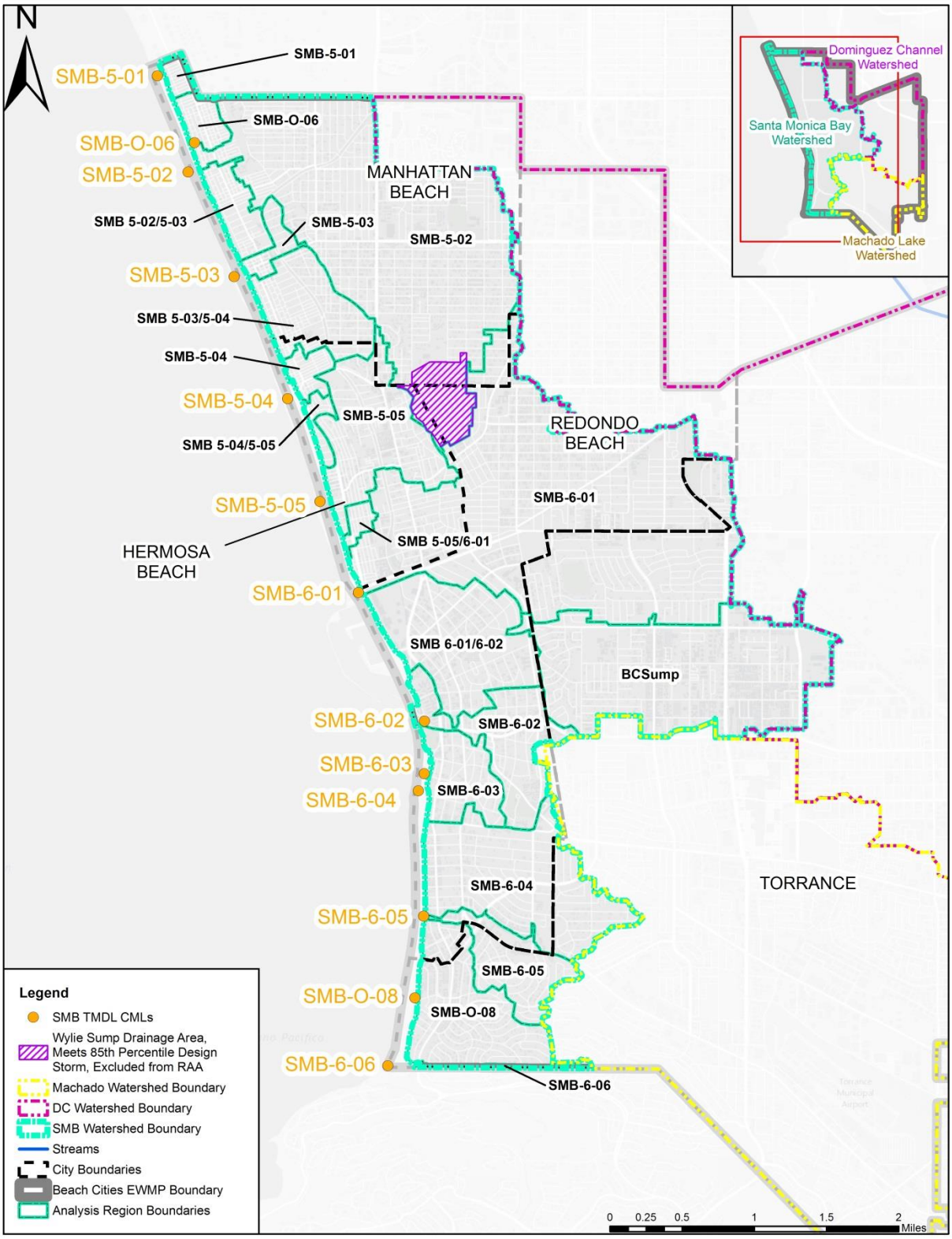


Figure ES-2. Reasonable Assurance Analysis Regions within the SMB Watershed portion of the Beach Cities EWMP Area

Targets – Santa Monica Bay

Target load reductions (TLRs) represent a numerical expression of the Permit compliance metrics that can be modeled and can serve as a basis for confirming, with reasonable assurance, that implementation of the proposed BMPs will result in attainment of the applicable TMDL-based WQBELs and RWLs in the Permit for Category 1 pollutants, or the Water Quality Objectives for Category 2 and Category 3 pollutants. For bacteria the target load reductions are expressed as Allowable Exceedance Days (AEDs) per year. TLRs for both interim and final compliance deadlines are presented for all analysis regions including both open beach and point zero compliance monitoring locations (CMLs) (**Table ES-4**). Nine CMLs were assigned zero TLRs to reflect their historic good water quality (consistent with anti-degradation-based wet weather allowable exceedance days). Although the SMBBB TMDL requires only that beach water quality at anti-degradation compliance locations be maintained, the Beach Cities EWMP will seek to implement nonstructural and LID-based BMPs within the SMB portion of their EWMP area which will protect and potentially improve water quality at these beaches and is consistent with the J5&6 Implementation Plan (Geosyntec Consultants, 2011) for the SMBBB TMDL.

Table ES-4. TLRs for Fecal Coliform in the SMB Watershed

Analysis Region	Baseline Annual Load (10^{12} MPN)	Interim Target Load Reduction		Final Target Load Reduction	
		Absolute (10^{12} MPN)	% of baseline annual load	Absolute (10^{12} MPN)	% of baseline annual load
SMB-5-01[1]	7.4	Interim target load reduction assessed on a watershed-wide basis		0	0%
SMB-O-06	23.0			0	0%
SMB-5-02	534.8			247.6	46.3%
SMB-5-02/SMB-5-03[2]	34.9			0	0%
SMB-5-03[1]	29.0			0	0%
SMB-5-03/SMB-5-04[2]	89.3			0	0%
SMB-5-04[1]	17.1			0	0%
SMB-5-04/SMB-5-05[2]	8.2			0	0%
SMB-5-05[1]	182.8			0	0%
SMB-5-05/SMB-6-01[2]	6.7			0	0%
SMB-6-01[3]	706.6			312.1	44.2%
BCSump[3]	379.4			178.0	46.9%
SMB-6-01/ SMB-6-02[2]	162.5			0	0%
SMB-6-02[1]	99.6			0	0%
SMB-6-03	62.2			0	0%
SMB-6-04	209.9			0	0%
SMB-6-05[1]	90.9			0	0%
SMB-O-08	138.9			0	0%
SMB-6-06[1]	6.7			0	0%
SMB Watershed-Wide	**3875.9**	**368.9**	**13%**	**737.7**	**26%**

[1]Anti-degradation site

[2] For the unmonitored tributary areas located in-between the CML tributary areas, TLRs were assigned from the geographically smaller of the two adjacent CML analysis regions.
[3] "BCSump" was defined as a separate analysis region for modeling purposes. The baseline load for "BCSump" analysis region was combined with the baseline load of the "SMB-6-01" analysis region to equal the total baseline load contributing to the SMB-6-01 CML ("SMB-6-01+BCSump").

BMPs – Santa Monica Bay

EWMPs offer Permittees the opportunity to identify and implement focused strategies, control measures and BMPs to achieve applicable water quality targets (water quality-based effluent limitations [WQBELs] and receiving water limitations [RWLs]) and to reduce the discharge of pollutants to the maximum extent practicable. In order to demonstrate reasonable assurance, BMPs were identified in a prioritized manner. Prioritization was based on cost (low cost BMPs were prioritized); BMP effectiveness for the pollutants of concern (BMPs that had greater treatment efficiency for the pollutant of concern in a particular analysis region were prioritized over other BMPs); and implementation feasibility as determined by the Beach Cities agencies. In general, nonstructural BMPs were prioritized over structural BMPs due to their lower relative cost, and then structural BMPs were identified that would likely result in the greatest load reduction per dollar.

The Reasonable Assurance Analysis was performed according to the following steps:

1. Calculate load reductions associated with existing structural BMPs;
2. Assume a load reduction for non-modeled non-structural (or programmatic) BMPs (five percent of baseline pollutant load);
3. Calculate load reductions for public incentives for retrofits on private property (e.g., downspout disconnects) and redevelopment (e.g., low impact development requirements);
4. Calculate load reductions attributable to anticipated new permit compliance activities of non-MS4 Permittees (e.g., Industrial General Permit holders and Caltrans);
5. Calculate load reductions for proposed regional BMPs that were identified in existing plans;
6. Meet the TLR by backfilling the remaining load reduction with new regional or distributed green streets BMPs, and with green streets that address a certain percentage of specific developed land uses.

Programmatic BMPs: These source controls include a combination of BMPs such as new or enhanced pet waste controls (ordinance, signage, education/outreach, mutt mitts, etc.), Clean Bay Restaurant Program, human waste source tracking and remediation (e.g., leaking sewer investigations, etc.), enhanced street sweeping (e.g., 100% vacuum sweepers, increased frequency, etc.), increased catch basin and storm drain cleaning, and other new or enhanced nonstructural BMPs that target the pollutants addressed in this EWMP.

Public Retrofit Incentives: These BMPs include programs directed at incentivizing the public to decrease the amount of stormwater runoff from their property, specifically via downspout disconnection programs that redirect roof runoff to vegetated or otherwise pervious areas.

Redevelopment: Beginning in 2001, redevelopment projects were required by the Permit (via the Standard Urban Stormwater Management Program (SUSMP)) to incorporate stormwater treatment BMPs into their projects if their project size exceeded specified thresholds. The 2001 MS4 Permit SUSMP redevelopment requirements were applied between 2003 (the point at which the Bacteria TMDL was implemented) and 2015 for the SMB EWMP area. Additionally, the 2012 MS4 Permit established new criteria for redevelopment projects, requiring certain sized projects to capture, retain, or infiltrate the 85th percentile design storm or the 0.75-inch design storm, whichever is greater, via the implementation of LID BMPs. These were taken into account as well.

Non-MS4 Permitted Parcels or Areas: In general, this BMP assumes that regulated parcels/areas would be in compliance with the NPDES Statewide Storm Water Permit Waste Discharge Requirements (WDRs) from State of California Department of Transportation (Order No. 2012-0011-DWQ, NPDES No. CAS000003) and the California NPDES General Permit for Storm Water Discharges Associated with Industrial Activities (Industrial General Permit [IGP], Order 2014-0057-DWQ).

Structural BMPs: Both existing and proposed regional and distributed structural BMPs are included in this EWMP to address water quality targets in the SMB Watershed. Because bacteria were identified as the controlling pollutant of concern, infiltration BMPs were prioritized as they are most effective for addressing bacteria. General design criteria for proposed structural BMPs are summarized in

Table ES-5.

Table ES-5. Proposed Structural BMPs in the SMB Watershed

Analysis Region	Project Name	Description	Storage Volume (cf)	Tributary Area (acres)
SMB-5-02	Manhattan Beach Infiltration Trench	Located along the coast of Manhattan Beach, the sub-surface trench has a potential surface area of 2 ac, an average depth of 2 ft with a diversion rate of 160 cfs and an infiltration rate under the trench of 13 in/hr.	198,000	1,475[1]
SMB-5-02	Polliwog Park Infiltration Gallery	Located on Herrin Ave., the sub-surface infiltration gallery has a potential surface area of 1 ac, an average depth of 4 ft, a diversion flowrate of 11 cfs, and an infiltration rate of 0.74 in/hr.	148,100	470
SMB-5-02	Distributed Green Streets – Alternative 1	The distributed green streets are assumed to have 6 in of ponding, 1.5 ft of amended soil, 3 in of mulch, and an infiltration rate of 0.15 in/hr.	205,500	66
SMB-5-02	Distributed Green Streets – Alternative 2	The distributed green streets are assumed to have 6 in of ponding, 1.5 ft of amended soil, 3 in of mulch, and an infiltration rate of 0.15 in/hr.	142,100	45
SMB-6-01	Hermosa Beach Infiltration Trench	Located along the coast of Hermosa Beach, the sub-surface trench has a potential surface area of 0.2 ac, an average depth of 1.7 ft, a diversion flowrate of 25 cfs, and an infiltration rate of 12.5 in/hr.	13,300	2,000[1]
SMB-6-01	Hermosa Beach Greenbelt Infiltration	Located between Valley Dr. and Ardmore Ave., the sub-surface trench has a potential surface area of 1.5 ac, an average depth of 5 ft, a diversion flowrate of 48 cfs, and an assumed infiltration rate of 12 in/hr.	319,000	1,800[1]
SMB-6-01	Park #3	Located northwest of Blossom Lane and 190th street, the sub-surface infiltration basin has a potential surface area of 0.5 ac, an average depth of 5ft , a diversion flowrate of 13 cfs, and an infiltration rate of 1 in/hr.	87,000	1,430[1]
SMB-6-01	Distributed Green Streets	The distributed green streets are assumed to have 6 in of ponding, 1.5 ft of amended soil, 3 in of mulch, and an infiltration rate of 0.15 in/hr.	605,200	190

[1]This includes upstream BMPs and associated tributary drainage areas

Distributed green streets BMPs are proposed and were modeled as part of the Reasonable Assurance Analysis within select analysis regions, at analysis region-specific implementation levels (e.g., runoff from 14% of single family residential, multi-family residential, and commercial land uses would be treated by green streets BMPs). It should be noted that if at any time in the future, specific distributed green streets or regional/centralized BMPs are found to be infeasible for implementation, alternative BMPs or operational changes will be planned within the same subwatershed and within the same timeline, to meet an equivalent subwatershed load reduction. In addition, if monitoring data indicate that more easily implementable, alternative BMPs can provide equivalent (or superior) load reductions, these alternative BMPs may be implemented at the discretion of the WMG Agencies.

Demonstration of Compliance – Santa Monica Bay

To demonstrate wet weather compliance, a Reasonable Assurance Analysis was conducted in which the following steps were taken:

1. For each analysis region, develop target load reductions (TLRs) for 90th percentile year based on Permit requirements and Regional Board guidance;
2. Identify structural and non-structural BMPs that were either implemented after applicable TMDL effective dates or are planned for implementation in the future;
3. Evaluate the performance of these BMPs in terms of annual pollutant load reductions;
4. Compare these estimates with the TLRs; and
5. Revise the BMP implementation scenario until TLRs are met.

Results of the Reasonable Assurance Analysis for each analysis region in the SMB watershed are presented in **Table ES-6** below. The values provided correspond to the load reductions attributable to the BMP types following the applicable final and interim compliance deadlines. As shown, the final TLR is met in all SMB watershed analysis regions with varying applications of non-structural and regional BMPs. The interim 50% TLR is met through a combination of nonstructural and existing regional BMPs.

For dry weather bacteria compliance, a qualitative analysis was conducted to show compliance at each of the CMLs. Many CMLs have an effective diversion such that they are consistently operational, well maintained, and properly sized so that they are effectively eliminating discharges to the surf zone during year-round dry weather days. For the remaining smaller outfalls a systematic screening conducted in 2002 demonstrated that there was no discharge to the wave wash during summer dry weather from these storm drains. Rescreening of outfalls will be conducted as part of the Non-Stormwater Screening and Monitoring in the Coordinated Integrated Monitoring Program and will include both summer dry weather and winter dry weather screening.. For the CMLs in the SMB Watershed that have anti-degradation based allowed exceedance days for both winter-dry and summer-dry weather, reasonable assurance is assumed to be demonstrated through the basis that the TMDL established their allowed exceedance days based on historic conditions (i.e., no water quality improvements were necessary).

Table ES-6. Santa Monica Bay Watershed – Fecal Coliform RAA Results – Final Compliance Date (2021)

Analysis Region	TLR	Implementation Benefits (average load reduction as % of baseline load for critical year)							Compliance (TLR Met)?
		Non-Structural BMPs (Non-Modeled)	Public Retrofit Incentives + Redevelopment	Non-MS4	Regional BMPs	Distributed Green Streets BMPs	*Distributed Implementation Level*	Estimated Load Reduction	
SMB-5-01	0%	5%	2%	0%	0%	0%	*N/A*	7%	Yes
SMB-O-06	0%	5%	2%	0%	0%	0%	*N/A*	7%	Yes
SMB-5-02	46%	5%	4%	2%	36%	3%	*5% MFR/COM/SFR*	50%	Yes
SMB-5-02/5-03	0%	5%	3%	0%	0%	0%	*N/A*	8%	Yes
SMB-5-03	0%	5%	3%	0%	0%	0%	*N/A*	8%	Yes
SMB-5-03/5-04	0%	5%	4%	0%	5%	0%	*N/A*	15%	Yes
SMB-5-04	0%	5%	5%	0%	1%	1%[2]	*N/A*	12%	Yes
SMB-5-04/5-05	0%	5%	4%	0%	2%	0%	*N/A*	11%	Yes
SMB-5-05	0%	5%	4%	5%	3%	0%	*N/A*	18%	Yes
SMB-5-05/6-01	0%	5%	3%	0%	2%	0%	*N/A*	10%	Yes
SMB-6-01+ BCSump[1]	45%	5%	3%	3%	33%	2%	*25% MFR/COM/SFR*	46%	Yes
SMB-6-01/6-02	0%	5%	2%	4%	0%	0%	*N/A*	11%	Yes
SMB-6-02	0%	5%	3%	1%	4%	0%	*N/A*	13%	Yes
SMB-6-03	0%	5%	3%	5%	10%	0%	*N/A*	23%	Yes
SMB-6-04	0%	5%	4%	3%	0%	0%	*N/A*	12%	Yes
SMB-6-05	0%	5%	3%	6%	0%	0%	*N/A*	15%	Yes
SMB-O-08	0%	5%	2%	0%	0%	0%	*N/A*	7%	Yes
SMB-6-06	0%	5%	5%	0%	0%	0%	*N/A*	10%	Yes
Final Compliance Deadline (2021)	**26%**	**5%**	**3%**	**3%**	**21%**	**1%**	***N/A***	**33%**	**Yes**
Interim Compliance Deadline (2018)	**13%**	**2.5%**	**0.8%**	**1.5%**	**9.6%**	**0%**	***N/A***	**14.4%**	**Yes**

[1] "BCSump" was defined as a separate analysis region for modeling purposes. The baseline load for "BCSump" analysis region was combined with the baseline load of the "SMB-6-01" analysis region to equal the total baseline load contributing to the SMB-6-01 CML ("SMB-6-01+BCSump").
[2] Existing distributed BMP

Schedule – Santa Monica Bay

Table ES-7 summarizes the existing and proposed interim and final implementation actions and dates within the Santa Monica Bay Watershed to address the targets for the identified WBPCs.

Table ES-7. Compliance Schedule for the SMB Watershed

Category	Pollutant	Date	Action
1: Highest Priority	Dry Weather Bacteria	N/A	All compliance deadlines have passed
	Wet Weather Bacteria	7/15/2018	Interim: 50% single sample ED reduction
		7/15/2021	Final: Geometric Mean [GM] targets met Final: Single sample AED targets met
	Trash/Debris	3/20/2016	Interim: 20% load reduction
		3/20/2017	Interim: 40% load reduction
		3/20/2018	Interim: 60% load reduction
		3/20/2019	Interim: 80% load reduction
		3/20/2020	Final: 100% load reduction
	DDTs	N/A	Since the TMDL effectively implements an anti-degradation approach (i.e., historic low MS4 concentrations or loads must be kept the same or lower), and the Beach Cities EWMP Agencies are currently presumed to be achieving the WLAs (thus negating the need for Reasonable Assurance Analysis), no compliance schedule is proposed.
	PCBs	N/A	
2: High Priority	N/A	N/A	N/A
3: Medium Priority	N/A	N/A	N/A

In order to meet the compliance deadlines for the WBPCs discussed above based on load reduction projections in the Reasonable Assurance Analysis, the proposed structural BMPs within the SMB Watershed would be implemented per the timeline provided in **Table ES-8**.

Table ES-8. Proposed Project Sequencing in the SMB Watershed

Project Name	Timeline						
	2015	2016	2017	2018	2019	2020	2021
Catch basin retrofits							
Hermosa Beach Infiltration Trench							
Manhattan Beach Infiltration Trench, Alternative 1*							
Green Streets Application in SMB-5-02, Alternative 1*							
Manhattan Beach Infiltration Trench, Alternative 2*							
Polliwog Park Infiltration Gallery, Alternative 2*							
Green Streets Application in SMB-5-02, Alternative 2*							
Hermosa Beach Greenbelt Infiltration							
Park #3							
Green Streets Application in SMB-6-01							

*Potential alternatives

DOMINGUEZ CHANNEL WATERSHED

Within the Dominguez Channel Watershed, WBPCs were classified into one of three categories, in accordance with Section VI.C.5(a).ii of the Permit. **Table ES-9** presents the prioritized WBPCs within the Dominguez Channel Watershed portion of the Beach Cities EWMP Area. WBPCs categorized below are subject to change based on future data collected as part of the CIMP or other monitoring program.

Table ES-9. Water Body-Pollutant Prioritization for the Dominguez Channel Watershed

Category	Water Body	Pollutant	Reason for Categorization
1: Highest Priority	Dominguez Channel (including Torrance Lateral)	Toxicity	Dominguez Channel Toxics TMDL
		Total Copper	Dominguez Channel Toxics TMDL
		Total Lead	Dominguez Channel Toxics TMDL
		Total Zinc	Dominguez Channel Toxics TMDL
2: High Priority	Dominguez Channel (including Torrance Lateral)	Indicator Bacteria	303(d) List
3: Medium Priority	Dominguez Channel (including Torrance Lateral)	Cyanide	Historic exceedances of the CTR continuous concentration water quality objective (5.2 ug/L)
		pH	Historic exceedance of the Basin Plan Objective (6.5 – 8.5)
		Selenium	Historic exceedances of the CTR continuous concentration water quality objective (5.0 ug/L)
		Mercury	Historic exceedances of the CTR human health criterion for organisms only (0.051 ug/L)
		Cadmium	Historic exceedances of the CTR continuous concentration water quality objective (2.2 ug/L)

For the purposes of the wet weather Reasonable Assurance Analysis, the EWMP area draining to Dominguez Channel was combined into a single analysis region to establish TLRs and into two analysis regions, one including the portion of the Cities of Redondo Beach and Manhattan Beach (DC – RB/MB) and one including the portion of the City of Torrance (DC – Torrance), to evaluate the performance of BMPs. For the purposes of the dry weather Reasonable Assurance Analysis for which bacteria are the only WBPC, the EWMP area draining to Dominguez Channel was combined into the same single analysis region. The Dominguez Channel watershed analysis regions are shown in **Figure ES-3.**

The wet weather Reasonable Assurance Analysis was performed on copper, lead, zinc, and bacteria (fecal coliform) within the Dominguez Channel Watershed. Water quality targets were identified for Dominguez Channel watershed in the same manner as in SMB Watershed. The water quality targets for prioritized Category 1 WBPCs are summarized in **Table ES-10** below.

Table ES-10. Water Quality Targets for the Dominguez Channel Watershed

Waterbody	Pollutant	RWL/WQBEL from the Permit or Assumed Based on Other Similar Los Angeles Region TMDLs	Approach for Applying the Critical Period
Dominguez Channel	Fecal Coliform	19% allowed exceedance of the REC-1 water quality objective, (400 MPN/100mL) on non-high flow suspension days	90th percentile year (based on wet days) was used as the critical condition. Allowable number of wet weather exceedance days for the critical year was set to 19% of non-high flow suspension wet days, rounding down.
	Total Copper	WQBEL=9.7 ug/L WLA= Concentration*Daily Volume	90th percentile daily load during wet weather was used as the critical condition. This calendar day was identified for each metal by ranking daily loads for metal wet days between 2003 and 2012.
	Total Lead	WQBEL=42.7 ug/L WLA= Concentration*Daily Volume	
	Total Zinc	WQBEL=69.7 ug/L WLA= Concentration*Daily Volume	

Although toxicity was identified as a Category 1 WBPC, it was not modeled for Dominguez Channel and the Torrance Lateral since it is not a wet weather parameter that can be modeled using currently available Reasonable Assurance Analysis tools for the Los Angeles Region. Instead, the Reasonable Assurance Analysis qualitatively describes how the Beach Cities WMG Agencies will comply with the TMDL WQBELs. Toxicity will continue to be monitored under the Beach Cities' CIMP. Although ammonia was identified as a Category 2 WBPC, monitoring data since 2003 show that all water quality samples at monitoring locations S28 and TS19 meet the freshwater Basin Plan Objective for ammonia, and as a result, ammonia was not modeled as part of the Beach Cities' Reasonable Assurance Analysis. Similarly, the Category 3 WBPCs cyanide, pH, selenium, mercury, and cadmium, all within the Torrance Lateral, were not modeled either due to a lack of demonstrated MS4 linkage or due to model limitations. These parameters will be monitored under the Beach Cities' CIMP and if future monitoring data suggest that the Beach Cities' MS4s may cause

or contribute to cadmium exceedances in the receiving water, the EWMP will be revised to address these pollutants.

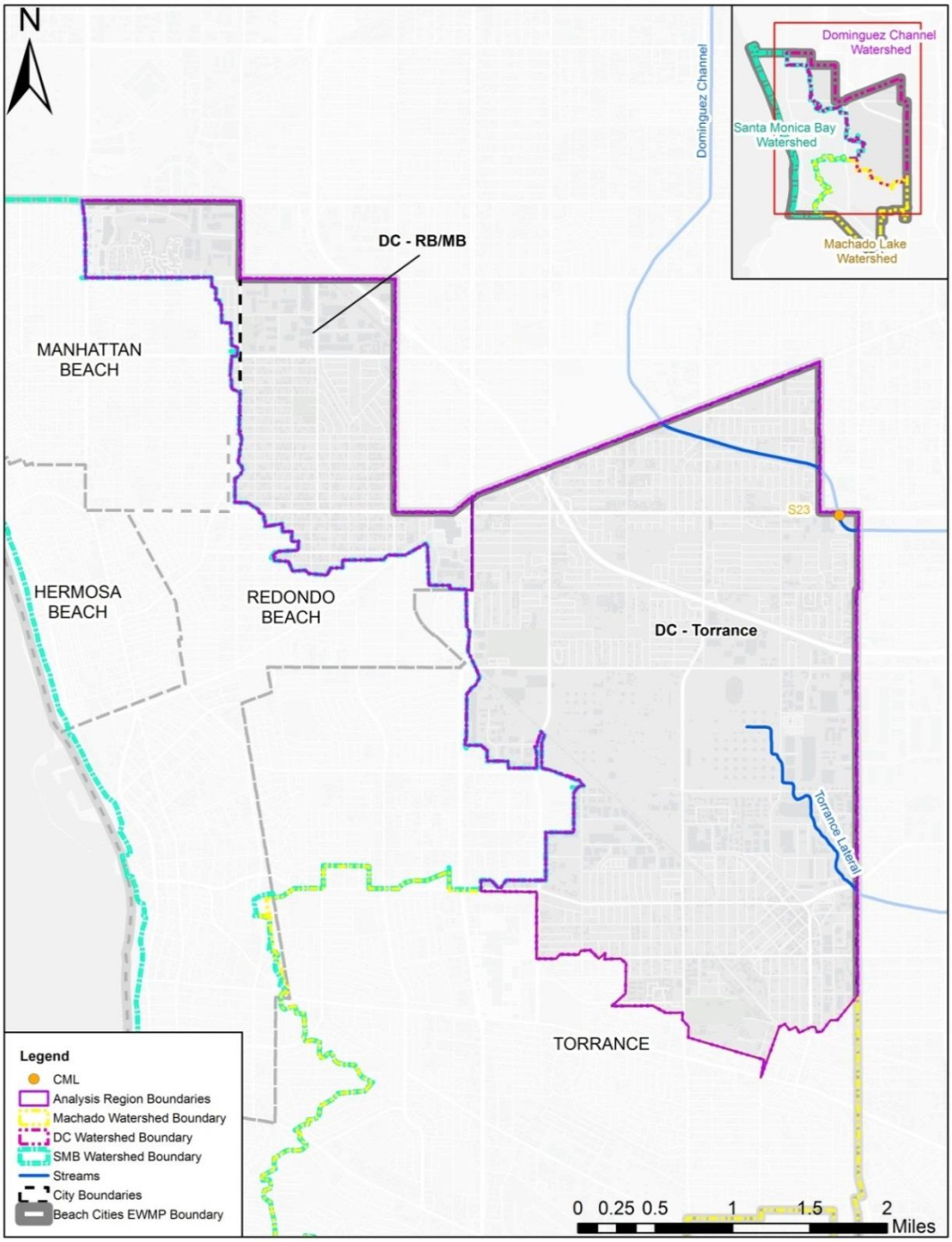


Figure ES-3. Analysis Regions within the Dominguez Channel Watershed portion of the Beach Cities EWMP Area

Targets – Dominguez Channel

As discussed previously, TLRs represent a numerical expression of the Permit compliance metrics (e.g., bacteria AEDs per year for wet weather) that can be modeled and can serve as a basis for confirming, with reasonable assurance, that implementation of the proposed BMPs will result in attainment of the applicable TMDL-based WQBELs and RWLs in the Permit for Category 1 pollutants, or the Water Quality Objectives for Category 2 and Category 3 pollutants. TLRs were developed for the single combined analysis region (**Table ES-11**).

Table ES-11. TLRs for the Dominguez Channel Watershed

Pollutant	Compliance Deadline	Units	Baseline Annual Load	Interim Target Load Reductions		Final Target Load Reductions	
				Absolute	% of baseline annual load	Absolute	% of baseline annual load
Copper	2032	Lb	21	N/A		13	62%
Lead	2032	Lb	8.7			0	0%
Zinc	2032	Lb	230			175	76%
Fecal coliform	2017	10^{12} MPN	1,498	49	3.3%	-	-
	2022	10^{12} MPN	1,498	124	8.3%	-	-
	2027	10^{12} MPN	1,498	255	17%	-	-
	2032	10^{12} MPN	1,498	-	-	493	33%

BMPs – Dominguez Channel

Similar to the approach described for the SMB Watershed, the Reasonable Assurance Analysis was performed according to the following steps:

1. Calculate load reductions associated with existing structural BMPs;
2. Assume a load reduction for non-modeled non-structural (or programmatic) BMPs (five percent of baseline pollutant load);
3. Calculate load reductions for public incentives for private retrofit (e.g., downspout disconnects) and redevelopment;
4. Calculate load reductions attributable to anticipated new permit compliance activities of non-MS4 entities (e.g., Industrial General Permit holders and Caltrans);
5. Calculate load reductions for proposed regional BMPs that were identified in existing plans;
6. Meet the TLR by backfilling the remaining load reduction with new regional or distributed green streets BMPs, with green streets modeled by assuming treatment of runoff from a percentage of specific developed land uses. Within the DC-Torrance analysis region, an estimated load reduction attributable to distributed catch basin inlet filters was derived

from a review of literature/studies on their performance (Appendix B). If the estimated performance is supported by monitoring data, these filters may be used as alternative BMPs in other portions of the Dominguez Channel Watershed.

Both existing and proposed regional and distributed BMPs are included in this EWMP to address water quality targets in the Dominguez Channel Watershed. Distributed green streets BMPs are proposed and were modeled as part of the Reasonable Assurance Analysis within the DC-RB/MB analysis region, at an implementation level of 14% (i.e., runoff from 14% of single family residential, multi-family residential, commercial, and industrial land uses would be treated by green streets BMPs). General design criteria for proposed structural BMPs are summarized in **Table ES-12**.

Table ES-12. Proposed Structural BMPs in the Dominguez Channel Watershed

Analysis Region	Project Name	Description	Storage Volume (cf)	Tributary Area (acres)
DC – MB/RB	Powerline Easement Infiltration	Located along powerline easements and/or adjacent to Marine Avenue and Manhattan Beach Boulevard, the sub-surface biofilter has a potential surface area of 7.2 ac, an average depth of 5 ft, a diversion flowrate of 132 cfs, and a negligible infiltration rate.	N/A (Flow-through BMP)	1,500
DC – MB/RB	Artesia Blvd. and Hawthorne Blvd. Filtration	Located near the intersection of Artesia Blvd. and Hawthorne Blvd., the sub-surface biofilter has a potential surface area of 1 ac, an average depth of 5 ft, a diversion flowrate of 13.6 cfs, and a negligible infiltration rate.	N/A (Flow-through BMP)	130
DC-MB/RB	Distributed Green Streets	The distributed green streets are assumed to have 6 in of ponding, 1.5 ft of amended soil, 3 in of mulch, and an infiltration rate of 0.15 in/hr.	636,300	200
DC-Torrance	Catch Basin Inlet Filters	The City of Torrance plans to retrofit 200 of 643 catch basins with inlet filters.	N/A	5,760

It should be noted that if at any time specific distributed green streets or regional/centralized BMPs are found to be infeasible for implementation, alternative BMPs or operational changes will be planned within the same subwatershed and within the same timeline, to meet an equivalent subwatershed load reduction. The performance of the proposed catch basin inlet filters within the City of Torrance will also be evaluated as potential alternatives to the proposed structural BMPs within the Cities of Redondo Beach and Manhattan Beach.

Demonstration of Compliance

To demonstrate wet weather compliance, a Reasonable Assurance Analysis was conducted in which the following steps were taken:

1. For each analysis region, develop TLRs for 90th percentile year based on Permit requirements and Regional Board guidance;
2. Identify structural and non-structural BMPs that were either implemented after applicable TMDL effective dates or are planned for implementation in the future;
3. Evaluate the performance of these BMPs in terms of annual pollutant load reductions;
4. Compare these estimates with the TLRs; and
5. Revise the BMP implementation scenario until TLRs are met.

Results of the wet weather Reasonable Assurance Analysis for each analysis region are presented in **Table ES-13** below. The values provided correspond to the load reductions attributable to the BMP types following the applicable compliance deadline. As shown, the TLRs are predicted to be met in the DC-RB/MB analysis region for metals and fecal coliforms with varying applications of non-structural and regional BMPs as described previously. Within the DC-Torrance analysis region, the TLRs are predicted to be met based upon the referenced load reductions attributable to catch basin inlet filters. However, since the inlet filters are not planned for 100% of catch basins in this analysis region (200 of 643 are currently planned), the estimated load reduction cannot be applied to the entire analysis region. Therefore, adaptive management will be strongly employed to evaluate the achieved load reductions prior to each of the compliance deadlines, installing additional filters as needed.

In the Dominguez Channel watershed, bacteria is the only applicable pollutant during dry weather, and it is not currently subject to a TMDL.

The dry weather load reduction in the City of Torrance will focus on non-structural source control and pollution prevention measures that are designed to reduce the amount of pollutants and understand the effect of pollutants entering runoff though education, enforcement and behavioral modification programs. The City plans to continue and extend the dry weather flow diversion program to the Dominguez Channel. This program will reduce runoff and pollutant loads by diverting non-storm water discharges to the sanitary sewer system and/or vegetated areas for infiltration.

The Cities of Redondo Beach and Manhattan Beach have not proposed low flow diversions, however, the implementation of the two regional BMPs at both outlets from this analysis region to address wet weather pollutants will also control dry weather flows by capturing the small flows in the pre-treatment volume and either retaining them or treating them in the media filter.

The cities each have established water conservation ordinances and water efficient landscape ordinances which also have the effect of reducing dry weather runoff. By controlling dry weather flows from entering Dominguez Channel using the proposed BMPs, reasonable assurance of achievement of the dry weather bacteria WQO is assured.

Table ES-13. Dominguez Channel Watershed – RAA Results

Pollutant	Date	TLR	Implementation Benefits (average load reduction as % of baseline for the critical condition[1])							Compliance (TLR Met)?
			Non-Structural BMPs (Non-Modeled)	Public Retrofit Incentives + Redevelopment	Non-MS4	Regional BMPs	Distributed Green Streets BMPs	*Distributed Implementation Level*	Estimated Load Reduction	
Analysis Region DC-RB/MB										
Zinc	2032 (Final)	76%	5%	9%	6%	39%	20%	*14% SFR, MFR, COM, IND*	79%	Yes
Copper	2032 (Final)	62%	24%[2]	0%	5%	30%	26%		85%	Yes
Fecal coliform	2017 (Interim)	3.3%	0.6%	0.7%	0.2%	0%	2%	*1.4% SFR, MFR, COM, IND*	3.5%	Yes
	2022 (Interim)	8.3%	2.1%	1.5%	0.7%	0%	4.1%	*3% SFR, MFR, COM, IND*	8.4%	Yes
	2027 (Interim)	17%	3.5%	2.4%	1.3%	0%	10%	*7% SFR, MFR, COM, IND*	17%	Yes
	2032 (Final)	33%	5%	3.2%	1.8%	45%	20%	*14% SFR, MFR, COM, IND*	74%	Yes
Analysis Region DC-Torrance										
Zinc	2032 (Final)	76%	5%	0%	0%	0%	75%	*Catch basin inlet filters*	80%	See note 3
Copper	2032 (Final)	62%	14%[2]	0%	0%	0%	75%	*Catch basin inlet filters*	89%	See note 3
Fecal coliform	2017 (Interim)	3.3%	0.6%	0%	0%	0%	22%	*Catch basin inlet filters*	22.6%	See note 3
	2022 (Interim)	8.3%	2.1%	0%	0%	0%	33%	*Catch basin inlet filters*	35.1%	See note 3
	2027 (Interim)	17%	3.5%	0%	0%	0%	33%	*Catch basin inlet filters*	36.5%	See note 3
	2032 (Final)	33%	5%	0%	0%	0%	33%	*Catch basin inlet filters*	38%	See note 3

[1] The critical condition is TMDL year 1995 for fecal coliform, 11/30/2007 for copper, 2/5/2010 for lead, and 2/26/2006 for zinc.

[2] Load reduction attributable to copper brake pad phase-out, after accounting for other BMPs, up to 55%.

[3] Estimated load reduction attributable to catch basin inlet filters is not applicable to the entire analysis region, as only 200 of 643 catch basins are planned to be retrofitted at this time. Therefore, the achieved load reduction will be evaluated through adaptive management, with additional filters to be installed as necessary to meet the TLRs by the compliance deadlines.

Schedule – Dominguez Channel

Table ES-14 summarizes the existing and proposed implementation actions and dates with the Dominguez Channel Watershed to address the targets for the identified WBPCs.

Table ES-14. Compliance Schedule for the Dominguez Channel Watershed

Category	Pollutant(s)	Wet/ Dry Weather	Date	Implementation Action
1: Highest Priority	Toxicity Total Copper Total Lead Total Zinc	Wet	Current	Interim: Comply with the interim water quality-based effluent limitations as listed in the TMDL
			March 2032	Final: Comply with the final water quality-based effluent limitations as listed in the TMDL
2: High Priority	Indicator Bacteria	Dry	December 2023	Interim: Achieve 50% of the TLR
			December 2025[4]	Final: 100% compliance may be demonstrated by the Permittee in one of three ways: 1. Meeting the allowed exceedance days (5 days during the dry weather period); or 2. Meet the allowed exceedance percentage (1.6% during a dry weather period) within the total drainage area served by the MS4.
		Wet	December 2016	Document planned green streets implementation to treat runoff from 1.4% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach. Document installation of 80 catch basin inlet filters in the DC-Torrance analysis region.
			December 2017	Interim Milestone: Achieve 10% of the TLR through the implementation of proposed non-structural BMPs and green streets designed to treat runoff from 1.4% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach. Document installation of 120 catch basin inlet filters in the DC-Torrance analysis region.
			December 2018	Document planned green streets implementation to treat runoff from 3% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach. Document installation of 160 catch basin inlet filters in the DC-Torrance analysis region.
			December 2019	Begin construction on planned green streets implementation to treat runoff from 3% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach

[4] The final compliance date for dry weather bacteria was selected to be consistent with the draft TMDL for indicator bacteria in the San Gabriel River, Estuary and Tributaries, adopted by the LARWQCB in 2015, which requires that compliance is achieved with applicable MS4 WLAs 10 years after the effective date of the TMDL. (http://www.waterboards.ca.gov/losangeles/board_decisions/basin_plan_amendments/technical_documents/111_new/DraftBPA_SGR.pdf)

Category	Pollutant(s)	Wet/ Dry Weather	Date	Implementation Action
				and Manhattan Beach. Document installation of 200 catch basin inlet filters in the DC-Torrance analysis region.
			December 2020	Develop concept reports for regional BMPs in the cities of Redondo Beach and Manhattan Beach.
			December 2021	Submit grant application for any one of the three proposed regional projects in the cities of Redondo Beach and Manhattan Beach.
			December 2022	Interim Milestone: Achieve 25% of the TLR through the implementation of proposed non-structural BMPs and green streets designed to treat runoff from 3% of SFR, MFR, COM, and IND land uses in the cities of Redondo Beach and Manhattan Beach.
			December 2023	Document planned green streets implementation to treat runoff from 7% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach.
			December 2024	Begin construction on planned green streets implementation to treat runoff from 7% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach.
			December 2025	Release Request for Proposals for regional BMP designs in Redondo Beach and/or Manhattan Beach
			December 2026	Complete construction on planned green streets implementation to treat runoff from 7% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach.
			December 2027	Interim Milestone: Achieve 50% of the TLR through the implementation of proposed non-structural BMPs and green streets designed to treat runoff from 7% of SFR, MFR, COM, and IND land uses in the cities of Redondo Beach and Manhattan Beach.
			December 2028	Produce regional BMP design reports; document planned green streets implementation to treat runoff from 14% of SFR, MFR, COM, and IND land uses in the cities of Redondo Beach and Manhattan Beach.
			December 2029	Begin regional BMP permitting process for project in Redondo Beach or Manhattan Beach.
			December 2030	Begin construction on planned green streets implementation to treat runoff from 14% of SFR, MFR, COM, and IND land uses in the cities of Redondo Beach and Manhattan Beach.
			December 2031	Begin regional BMP construction of project in Redondo Beach or Manhattan Beach.
			December 2032[5]	Final Milestone: 100% compliance may be demonstrated by the Permittee in one of three ways:

[5] The final compliance date for wet weather bacteria was selected to be consistent with the Dominguez Channel and Greater Los Angeles and Long Beach Harbor waters Toxic Pollutants TMDL (RWQCB, 2011).

Category	Pollutant(s)	Wet/ Dry Weather	Date	Implementation Action
				1. Meeting the allowed exceedance days (10 days during a wet weather period, plus high flow suspension days) 2. Meeting the target load reduction (33%); or 3. Meeting the allowed exceedance percentage (19% during a wet weather period) within the total drainage area served by the MS4.
3: Medium Priority	Cyanide pH Selenium Mercury Cadmium	N/A	N/A	As required by the Permit, monitoring for these pollutants will occur under the CIMP. If monitoring data suggest that the Beach Cities Agencies' MS4s may cause or contribute to exceedances of these pollutants in the receiving water,[6] these contributions will be addressed through modifications to the EWMP as a part of the adaptive management process, as described in Permit section VI.C.2.a.iii.

In order to meet the compliance deadlines for the WBPCs discussed above based on load reduction projections in the Reasonable Assurance Analysis, the proposed structural BMPs within the Dominguez Channel Watershed would be implemented per the timeline provided in **Table ES-15**.

[6] This will be assumed to be the case if monitoring data show that outfall concentrations and receiving water concentrations are in excess of the applicable water quality criteria for the same monitoring event.

Table ES-15. Proposed Project Sequencing in the Dominguez Channel Watershed

Project Name	Timeline																	
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Catch basin inlet filters in DC-Torrance																		
Green Streets Application in DC-RB/MB																		
Powerline Easement*																		
Manhattan Beach Boulevard Infiltration*																		
Artesia Boulevard and Hawthorne Boulevard Filtration*																		

*Potential alternatives

MACHADO LAKE WATERSHED

The portion of the Machado Lake Watershed within the Beach Cities EMWP area totals 5,182 acres, nearly all of which is within the City of Torrance (about 0.2% of the watershed is made up of the City of Redondo Beach, which flows to a City of Torrance catch basin). The City of Torrance developed a Special Study Work Plan for the Machado Lake Nutrient TMDL (City of Torrance, 2011) (**Appendix C**), which was approved by the Regional Board. In October of 2014, the City of Torrance developed a BMP Implementation Plan for the Machado Lake Nutrient and Toxics TMDL (City of Torrance, 2014). The Implementation Plan is described briefly below and attached to this EWMP as **Appendix D** and serves as the EWMP for the Machado Lake Subwatershed. It is not addressed in the main body of the EWMP but is summarized briefly as follows. A brief write-up on the Walteria Basin is also attached as **Appendix E**.

Targets – Machado Lake

The requirements of the Machado Lake Eutrophic, Algae, Ammonia, and Odors TMDL (Machado Lake Nutrient TMDL) were established in Regional Board's Resolution R08-006. The Machado Lake Nutrient TMDL allows for the establishment of annual mass-based waste load allocations that were incorporated as WQBELs into the MS4 Permit for Total Phosphorus (TP) and Total Nitrogen (TN) equivalent to monthly average concentrations of 0.1 milligram per liter (mg/L) TP and 1.0 mg/L TN, based on approved flow conditions.

Machado Lake is also listed as impaired for chlordane, Chem-A, DDT, Dieldrin and PCBs as addressed by the Machado Lake Toxics Total TMDL (LARWQCB, 2010). These pollutants are associated with suspended sediments. The WQBELs for Pesticides and PCBs assigned to Municipal Separate Storm Sewer Systems (MS4) permittees are concentration-based allocations expressed as a concentration in sediment filtered from the discharge. Since pesticides and PCBs are associated with suspended solids as carriers, the removal of these pollutants is calculated as a fraction of suspended sediments removed by stormwater treatment devices. The MS4 Permit requires compliance with these WQBELs by September 30, 2019.

The Machado Lake Trash TMDL became effective in March 2008. The trash monitoring and reporting plan (TMRP) was submitted to the Regional Board in September 2008, and conditionally approved in December 2008. The Trash TMDL is already being addressed by existing and/or funded projects.

Table ES-16 summarizes the TLRs for each of the pollutants of concern.

Table ES-16. TLRs for the Machado Lake Watershed

Pollutant	Units	Baseline Load	Final Target Load Reductions	
			Absolute	% of baseline annual load
Total nitrogen	kg/yr	4,365	1,357	31
Total phosphorus	kg/yr	653	352	54
Total PCBs	g/yr	10.74	0.00	8
Total DDT	g/yr	0.83	0.00	0
Dieldrin	g/yr	0.66	0.12	18
Chlordane	g/yr	0.36	0.05	14

Proposed BMPs – Machado Lake

BMPs targeted for the watershed are designed to treat both wet and dry weather flows and were selected based on the prioritization of pollutant loadings by sub area and potential pollutant sources. Meeting WLAs for the TMDL Implementation Area will take advantage of the pollutant reduction benefits provided by the nonstructural BMPs, but structural solutions are anticipated to provide the majority of the required load reduction. Nonstructural solutions in the Machado Lake Watershed include pollution prevention actions and source control activities to prevent or minimize pollution entering urban runoff. Several existing nonstructural BMPs were evaluated to determine if enhancements could be made to support TMDL implementation, including education, enforcement, and source control BMPs. Potential new and enhanced nonstructural BMPs to address TMDL pollutants include the following:

Enhancements to Existing BMPs

- Storm drain stenciling audit;
- Increase frequency of catch basin cleanout;
- Additional fats, oils, and grease outreach;
- Increased rate of illicit connection removal;
- More in-depth training for inspectors and staff that addressed nutrient and toxics specific BMPs;
- Smart Gardening Program enhancements;
- TMDL-Specific Stormwater Training;
- Targeted pet waste outreach; and
- Increased street sweeping frequency.

New BMP

- Reduction of irrigation return flow;
- Downspout disconnect program;
- Green waste outreach program;
- Horse manure outreach; and
- Oil pump outreach.

Identification and assessment of opportunities for structural BMPs were focused on publicly owned land in the TMDL Implementation Area. Both distributed and structural BMPs were considered. Two major categories of distributed structural BMPs were identified, which were based on site characteristics and the types of BMPs determined feasible: 1) catch basin distributed BMPs and 2) other distributed BMPs on public land (storage, infiltration, and treatment BMPs).

Centralized structural BMPs recommended to meet the TLRs in Machado Lake Watershed are summarized in **Table ES-17** and further detailed in the Machado Lake BMP Implementation Plan.

Table ES-17. Proposed Structural BMPs in the Machado Lake Watershed

Sub Area	Project Type	Total Drainage Area Treated (ac)	Percent Imperviousness (%)	Water Quality Volume (ac-ft)	Water Quality Flow (cfs)	BMP Capacity (ac-ft)
Airport - AS2	Storage/ infiltration	86	45	1.5	10.8	12.0
Airport - AS3	Storage/ infiltration	640	59	28.3	97.6	32.8
Airport - Walteria	Flood control basin	391	60	20.5	-	22.4
Walnut Sump – Option 1	Storage/ infiltration	742	61	39.5	111	50
Walnut Sump – Option 2	150 catch basin inserts	922	62	-	-	-
Baseball Field – Option 1	Storage/ infiltration	39	63	0.67	6.0	2.9
Baseball Field – Option 2	Storage/ infiltration + 23 full capture filter screens	148	65	2.54	22.8	6.0

Demonstration of Compliance – Machado Lake

Section 6 of the Implementation Plan discusses the demonstration of compliance with the wet weather TLRs.

Sampling results indicated that dry weather flows were insignificant and therefore were not modeled or analyzed further.

Schedule – Machado Lake

The nutrient TMDL implementation schedule consists of a phased approach, with interim WLAs to be met by March 11, 2014 and full compliance by September 11, 2018. To comply with the Toxics TMDL, 75% of the total drainage area must effectively meet the WLA for sediment by March 22, 2017 and 100% must meet the WLA for sediment by March 22, 2021. The Nutrient TMDL also contains a phased compliance schedule, with interim limits effective in the first quarter of 2014 and final allocations effective the third quarter of 2018. The Machado Lake Implementation Plan further details the estimated schedules for proposed structural and nonstructural BMPs.

COSTS

EWMP cost opinions were developed for the proposed structural BMPs in addition to programmatic costs. Costs approximated for structural BMPs include "hard" costs for tangible assets and "soft" costs, which include considerations such as design and permitting. **Table ES-18** summarizes the total 20-year life-cycle costs for each proposed structural BMP, which are composed of the cost to construct or implement each structural BMP plus the associated annual O&M costs over 20 years. In order to account for possible variations in BMP design, BMP configurations, and site-specific constraints, as well as for uncertainties in available BMP unit costs from literature or estimated BMP unit costs, a range of costs is presented. These cost opinions are provided for information only, and it is recognized that should monitoring information demonstrate that alternative, less-expensive BMPs are equally (or superior) to those described herein, that these alternative BMPs may be implemented at the discretion of the WMG agencies.

Cost estimates of the Machado Lake Implementation Plan are presented at a level of detail necessary for planning and strategic decision-making. With an assumed 3% inflation rate of nonstructural cost estimates, the total annual cost of nonstructural BMP programs for the Machado Lake Implementation Area is $7,450,000. The total cost of the structural BMPs in the Machado Lake Watershed is approximately $11,400,000. The structural BMP cost estimates do not include engineering design, permitting, construction, building materials, or O&M. Table 8.3 of the Machado Lake Implementation Plan summarizes the schedule for implementation to achieve the TMDL WLA.

Table ES-18. Estimated Costs for Proposed Structural BMPs in Santa Monica Bay and Dominguez Channel Watersheds

Analysis Region	Project Name	Construction Cost		Annual O&M		Total 20-Year Life-Cycle[1]	
		Low	High	Low	High	Low	High
SMB-5-02 Alt. 1	Manhattan Beach Infiltration Trench	$3.7M	$6.8M	$140K	$190K	$6.5M	$11M
	Distributed Green Streets	$2.4M	$6.5M	$110K	$220K	$4.6M	$11M
	Subtotal	**$6.1M**	**$13M**	**$250K**	**$410K**	**$11M**	**$22M**
SMB-5-02 Alt. 2	Manhattan Beach Infiltration Trench	$3.0M	$5.8M	$110K	$160K	$5.2M	$9.0M
	Polliwog Park Infiltration Gallery	$2.9M	$4.4M	$43K	$50K	$3.8M	$5.4M
	Distributed Green Streets	$1.7M	$4.5M	$73K	$150K	$3.2M	$7.5M
	Subtotal	**$7.6M**	**$15M**	**$230K**	**$360K**	**$12M**	**$22M**
SMB-6-01	Hermosa Beach Infiltration Trench	$500K	$1.1M	$18K	$32K	$860K	$1.7M
	Hermosa Beach Greenbelt Infiltration	$5.5M	$8.0M	$81K	$90K	$7.1M	$9.8M
	Park #3	$1.9M	$3.0M	$28K	$33K	$2.5M	$3.7M
	Distributed Green Streets	$7.0M	$19M	$310K	$640K	$13M	$32M
	Subtotal	**$15M**	**$31M**	**$440K**	**$800K**	**$23M**	**$47M**
DC-RB/MB	Powerline Easement Infiltration	$11M	$16M	$160K	$180K	$14M	$20M
	Artesia Blvd Infiltration	$2.0M	$3.1M	$30K	$35K	$2.6M	$3.8M
	Distributed Green Streets	$7.4M	$20M	$330K	$670K	$14M	$33M
	Subtotal	**$20M**	**$39M**	**$520K**	**$890K**	**$31M**	**$57M**
DC-Torrance	Catch Basin Inlet Filters	$240K		$130K		$2.8M	
	Subtotal	**$240K**		**$130K**		**$2.8M**	
N/A	City of Hermosa Beach - Catch basin inserts	$160K	$430K	$50K	$64K	$1.1M	$1.7M
N/A	City of Redondo Beach – Catch basin inserts	$1.1M	$3.1M	$360K	$460K	$8.3M	$12M
N/A	City of Manhattan Beach – Catch basin inserts	$590K	$1.7M	$210K	$270K	$4.8M	$7.1M
Combined Costs of all Proposed Structural BMPs		**$51M**	**$100M**	**$2.2M**	**$3.4M**	**$94M**	**$172M**

M = Million Dollars, K = Thousand Dollars

[1] Life-cycle costs include construction costs and 20 years of annual O&M (in 2015 dollars) and are not discounted.

FINANCING DISCUSSION

The availability of funds will be critical for the implementation of the EWMP. The complete EWMP provides an overview of potentially available funding sources to pay for programs proposed in the EWMP. Examples show that a multi-pronged funding strategy using multiple sources rather than rely on a single storm drain fee may be the most prudent approach. A list of potential fees and charges has been developed, which can be further considered and explored by the Beach Cities WMG in the future:

Vehicle license and vehicle rental fees

Solid waste management surcharge

Water service surcharge (under AB850)

Property assessment

Fines (not a stable source, it is an exemption under Proposition 26)

Financial subsidy to encourage private sector participation to develop local and district projects

One time capital recovery fee

Dedicated storm drain fee

Taxes (e.g. fuel taxes)

A TMDL fee / tax could be developed based on the pollutant contribution from polluters / activities

In addition, Public Private Partnerships and alternative delivery and financing methods may facilitate and streamline implementation, and could result in program cost reductions.

LIMITATIONS AND JURISDICTIONAL OUTLOOK

TABLE 1
EWMP IMPLEMENTATION SCHEDULE

SANTA MONICA BAY

Category	Pollutant	Date	Action
1: Highest Priority	Dry Weather Bacteria	N/A	All compliance deadlines have passed
	Wet Weather Bacteria	7/15/2018	Interim: 50% single sample ED reduction
		7/15/2021	Final: Geometric Mean [GM] targets met Final: Single sample AED targets met
	Trash/Debris	3/20/2016	Interim: 20% load reduction
		3/20/2017	Interim: 40% load reduction
		3/20/2018	Interim: 60% load reduction
		3/20/2019	Interim: 80% load reduction
		3/20/2020	Final: 100% load reduction
	DDTs	N/A	Since the TMDL effectively implements an anti-degradation approach (i.e., historic low MS4 concentrations or loads must be kept the same or lower), and the Beach Cities EWMP Agencies are currently presumed to be achieving the WLAs (thus negating the need for RAA), no compliance schedule is proposed.
	PCBs	N/A	
2: High Priority	N/A	N/A	N/A
3: Medium Priority	N/A	N/A	N/A

DOMINGUEZ CHANNEL

Category	Pollutant(s)	Wet/Dry Weather	Date	Implementation Action
1: Highest Priority	Toxicity Total Copper Total Lead Total Zinc	Wet	Current	Interim: Comply with the interim WQBELs as listed in the TMDL
			March 2032	Final: Comply with the final WQBELs as listed in the TMDL
2: High Priority	Indicator Bacteria	Dry	December 2023	Interim: Achieve 50% of the TLR
			December 2025[1]	Final: 100% compliance may be demonstrated by the Permittee in one of three ways: 1. Meeting the allowed exceedance days (5 days during the dry weather period); or 2. Meet the allowed exceedance percentage (1.6% during a dry weather period) within the total drainage area served by the MS4.
		Wet	December 2016	Document planned green streets implementation to treat runoff from 1.4% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach. Document installation of 80 catch basin inlet filters in the DC-Torrance analysis region.
			December 2017	Interim Milestone: Achieve 10% of the TLR through the implementation of proposed non-structural BMPs and green streets designed to treat runoff from 1.4% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach. Document installation of 120 catch basin inlet filters in the DC-Torrance analysis region.
			December 2018	Document planned green streets implementation to treat runoff from 3% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach. Document installation of 160 catch basin inlet filters in the DC-Torrance analysis region.
			December 2019	Begin construction on planned green streets implementation to treat runoff from 3% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach. Document installation of 200 catch basin inlet filters in the DC-Torrance analysis region.
			December 2020	Develop concept reports for regional BMPs
			December 2021	Submit grant application for any one of the three proposed regional

TABLE 1
EWMP IMPLEMENTATION SCHEDULE

Category	Pollutant(s)	Wet/Dry Weather	Date	Implementation Action
				projects
			December 2022	Interim Milestone: Achieve 25% of the TLR through the implementation of proposed non-structural BMPs and green streets designed to treat runoff from 3% of SFR, MFR, COM, and IND land uses in the cities of Redondo Beach and Manhattan Beach.
			December 2023	Document planned green streets implementation to treat runoff from 7% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach.
			December 2024	Begin construction on planned green streets implementation to treat runoff from 7% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach.
			December 2025	Release Request for Proposals for regional BMP designs
			December 2026	Complete construction on planned green streets implementation to treat runoff from 7% of SFR, MFR, COM, and IND land uses in cities of Redondo Beach and Manhattan Beach.
			December 2027	Interim Milestone: Achieve 50% of the TLR through the implementation of proposed non-structural BMPs and green streets designed to treat runoff from 7% of SFR, MFR, COM, and IND land uses in the cities of Redondo Beach and Manhattan Beach.
			December 2028	Produce regional BMP design reports; document planned green streets implementation to treat runoff from 14% of SFR, MFR, COM, and IND land uses in the cities of Redondo Beach and Manhattan Beach.
			December 2029	Begin regional BMP permitting process
			December 2030	Begin construction on planned green streets implementation to treat runoff from 14% of SFR, MFR, COM, and IND land uses in the cities of Redondo Beach and Manhattan Beach.
			December 2031	Begin regional BMP construction
			December 2032[2]	Final Milestone: 100% compliance may be demonstrated by the Permittee in one of three ways: 1. Meeting the allowed exceedance days (10 days during a wet weather period, plus high flow suspension days) 2. Meeting the target load reduction (33%); or 3. Meeting the allowed exceedance percentage (19% during a wet weather period) within the total drainage area served by the MS4.
3: Medium Priority	Cyanide pH Selenium Mercury Cadmium	N/A	N/A	As required by the Permit, monitoring for these pollutants will occur under the CIMP. If monitoring data suggest that the Beach Cities Agencies' MS4s may cause or contribute to exceedances of these pollutants in the receiving water[3], these contributions will be addressed through modifications to the EWMP as a part of the adaptive management process, as described in Permit section VI.C.2.a.iii.

Appendix A

Notice of Intent

NOTICE OF INTENT

Enhanced Watershed Management Program & Coordinated Integrated Monitoring Program

~~June 28, 2013~~
December 17, 2013

Beach Cities
Watershed Management Group
City of Redondo Beach
City of Manhattan Beach
City of Hermosa Beach
City of Torrance
Los Angeles County Flood Control District

1. Introduction

The Cities of Redondo Beach, Manhattan Beach, Hermosa Beach, and Torrance and the Los Angeles County Flood Control District (LACFCD), collectively the Beach Cities Watershed Management Group (Beach Cities WMG), respectfully submit this Notification of Intent (NOI) to develop an Enhanced Watershed Management Program (EWMP) per Part VI.C.4.b. of Order No. R4-2012-0175 (MS4 Permit). Additionally, this NOI includes a statement of the Beach Cities WMG agencies' intent to follow a Coordinated Integrated Monitoring Program (CIMP) approach.

The Beach Cities WMG has determined to jointly develop an EWMP and CIMP to address both the Santa Monica Bay and Dominguez Channel Watershed areas within their jurisdictions. The development of the Work Plan, CIMP, and EWMP will be a collaborative process between the Beach Cities WMG agencies, coordinated with the Technical Advisory Committee as well as with Beach Cities watershed stakeholders.

The information provided in the following sections satisfies the EWMP requirements for NOI submittal as provided by Section VI.C.4.b of the MS4 Permit and the CIMP notification requirement as provided by Attachment E Section IV.C.1. Each of the following section headings includes the permit reference to the NOI requirement being addressed by that particular section.

2. Notification of Intent (Section VI.C.4.b.i and Attachment E Section IV.C.1.)

The Beach Cities WMG hereby notifies the Los Angeles Regional Water Quality Control Board (LARWQCB) of its intention to collaboratively develop an EWMP for the Santa Monica Bay and Dominguez Channel Watershed areas within their jurisdictions, and request submittal of the final Work Plan no later than 18 months after the effective date of the MS4 Permit (June 28, 2014) and submittal of the draft EWMP Plan no later than 30 months after the effective date of the MS4 Permit (June 28, 2015).

Additionally, the Beach Cities WMG agencies hereby notify the LARWQCB by this NOI of their intention to collaboratively develop a CIMP to address all of the monitoring elements required by the MS4 Permit for its jurisdictions and request submittal of the Draft CIMP 18 months after the effective date of the MS4 Permit (no later than June 28, 2014).

3. Interim and final TDML compliance deadlines (Section VI.C.4.b.ii)

Table 1 lists the TMDLs that are applicable within the Beach Cities WMG EWMP.

Table 1. TMDLs applicable within Beach Cities WMG.

TMDL	LARWQCB Resolution Number	Effective Date
Santa Monica Bay Beaches Bacteria TMDL	2002-004 and 2002-022 amended by R12-007	07/15/2003 R12-007 not yet effective
Machado Lake Trash TMDL [1]	2007-006	03/06/2008
Machado Lake Nutrient TMDL [2]	2008-006	03/11/2009
Machado Lake Toxics TMDL [3]	R10-008	03/20/2012
Los Angeles and Long Beach Harbors Toxics & Metals TMDL [4]	R11-008	03/23/2012
Santa Monica Bay Nearshore Debris TMDL [5]	R10-010	03/20/2012
Santa Monica Bay DDT and PCB TMDLs [6]	USEPA Region IX	03/26/2012

[1] Responsible agencies: Redondo Beach, Torrance, LACFCD
[2] Responsible agencies: Redondo Beach, Torrance, LACFCD
[3] Responsible agencies: Redondo Beach, Torrance, LACFCD
[4] Responsible agencies: Redondo Beach, Torrance, LACFCD, Manhattan Beach
[5] Responsible agencies: Redondo Beach, Torrance, LACFCD, Manhattan Beach, Hermosa Beach
[6] Responsible agencies: Redondo Beach, Torrance, LACFCD, Manhattan Beach, Hermosa Beach

Interim and final trash TMDL deadlines and final TMDL deadlines occurring prior to the anticipated approval date of the EWMP (April 28, 2016) are included in Table 2.

Table 2. Interim (trash) and final TMDL compliance deadlines prior to EWMP approval

TMDL	Milestone	Interim/Final	Deadline
Santa Monica Bay Beaches Bacteria Summer Dry Weather TMDLs	WLAs	Final	07/15/2006
Santa Monica Bay Beaches Bacteria Winter Dry Weather TMDLs	WLAs	Final	07/15/2009
Santa Monica Bay Nearshore Debris TMDL	20% of baseline load	Interim	3/20/2016
Machado Lake Trash TMDL	20% reduction of baseline load	Interim	03/06/2012
	40% reduction of baseline load	Interim	03/06/2013
	60% reduction of baseline load	Interim	03/06/2014
	80% reduction of baseline load	Interim	03/06/2015
	100% reduction of baseline load	Final	03/06/2016

The Beach Cities WMG will continue the implementation of watershed control measures concurrently with the EWMP development to meet these interim and/or final milestones. These control measures being implemented to meet the requirements of the interim and final trash water quality based effluent limits (WQBELs) and all other final WQBELs include but are not limited to the following:

Santa Monica Bay Beaches Bacteria TMDL – Dry Weather

All storm drains discharging at point zero shoreline monitoring locations within the Beach Cities EWMP subwatersheds have been diverted through cooperation with LACFCD and the Sanitation Districts of Los Angeles. A total of seven low flow diversions are operational within the subwatersheds as follows:

- Two low flow diversions operated by the LACFCD within the 28th Street storm drain system which outfalls at the zero point of SMB 5-2—one of the diversions is at the outfall, and the other is on a major catchment within the City of Manhattan Beach.
- A low flow diversion is operated at the outfall of the Manhattan Beach Pier drain by the City of Manhattan Beach and serves SMB 5-3.
- Hermosa Strand Infiltration Trench, a joint project of the City of Hermosa Beach and LACFCD started up in April 2010 and has been diverting both dry weather and wet weather flows from the Pier Avenue storm drain in Hermosa Beach and serves SMB 5-5.
- Herondo low flow diversion installed by the LACFCD diverts runoff from the Herondo storm drain which outfalls at the zero point of SMB 6-1.

- A low flow diversion installed by the City of Redondo Beach on the outlet to SMB-6-3 diverts dry weather flow to a biofiltration system before being infiltrated into the ground.
- A low flow diversion installed by the LACFCD on the outlet to SMB-6-5 diverts dry weather flows to the sanitary sewer system.

Santa Monica Bay Nearshore and Offshore Debris TMDL

Each of the Beach Cities WMG incorporated cities has individually submitted a Trash Monitoring and Reporting Plan to the LARWQCB describing an approach and schedule for meeting the interim and final deadlines for reductions in trash waste load allocation from baseline for point source discharges from the MS4. The Beach Cities WMG agencies are individually responsible for meeting those deadlines for point source discharges from the MS4.

Machado Lake Trash TMDL TMRPs

Only the cities of Redondo Beach and Torrance within the Beach Cities WMG are tributary to the Machado Lake subwatershed within the Dominguez Channel Watershed. The City of Redondo Beach accounts for only 0.02% of the Machado Lake Watershed and there are no catch basins within the City of Redondo Beach tributary to Machado Lake—the first catch basin which receives runoff for that area of Redondo Beach is in the City of Torrance. Therefore, the City of Torrance's plans to address the Machado Lake TMDLs are inclusive of the City of Redondo Beach. The City of Torrance submitted a Trash Monitoring and Reporting Plan to describe the approach and schedule for meeting the interim and final deadlines for reductions in trash waste load allocations from baseline for point source discharges from the MS4.

4. Geographic Scope (Section VI.C.4.b.iii.(1))

The geographic scope of the Beach Cities WMG EWMP encompasses all of the incorporated MS4 areas of the cities of Redondo Beach, Manhattan Beach, Hermosa Beach and Torrance and includes the infrastructure of the LACFCD within those jurisdictions.

The County of Los Angeles does own and operate 172 acres of beach area within the jurisdiction-s of the Beach Cities. These beach areas do not have any storm drain infrastructure that collects and discharges beach runoff directly to the receiving water and should therefore be considered non-point sources and would not be subject to the MS4 permit or EWMP requirements. The storm drains that outlet at the beaches are collecting and discharging drainage from upstream land areas. The City of Hermosa Beach owns the beach above the mean high tide line along its coastline and, like the County-owned beaches, the beaches of Hermosa Beach are non-point sources, not equipped with storm drain infrastructure, and as such are not subject to the MS4 Permit or EWMP requirements.

The Hermosa Beach Pier is not equipped with an MS4 infrastructure, rather the surface of the pier is slightly sloped so that stormwater sheet-flows off the pier laterally. Similarly, the Manhattan Beach Pier is not equipped with an MS4 infrastructure or stormwater conveyance system--rainfall sheet flows off the pier through multiple openings along its length which, depending on location along the pier, either falls onto the beach or into the ocean. Accordingly, the Hermosa Beach and Manhattan Beach piers are

not part of the MS4; they are non-point sources excluded from the MS4 Permit scope and therefore the EWMP.

The Redondo Beach Pier including the King Harbor Marina are included in the geographic scope of the Beach Cities WMG EWMP as these areas are equipped with MS4 infrastructures.

Attachment 1 provides a map of the watershed boundaries and the delineations of the land areas of the incorporated cities within the watershed. The breakdown of the Beach Cities WMG EWMP area by watershed and incorporated city is provided in Table 3.

Table 3. Beach Cities WMG EWMP watershed land area distribution and EWMP participation

Participation Agency	Santa Monica Bay Watershed Management area (acres)	Dominguez Channel Watershed Management area (acres)	Total EWMP Area (acres)	Total EWMP Percentage
City of Redondo Beach	2,613.50	1,217.61	3,831.11	19%
City of Manhattan Beach	2,078.37	350.07	2,428.44	12%
City of Hermosa Beach	831.51	0	831.51	4%
City of Torrance	2,313.76	11,056.79	13,370.55	65%
LACFCD	N/A	N/A		N/A
Area of Beach Cites WMG EWMP:	**7,837.14**	**12,624.47**	**20,461.61**	**100%**

5. Plan Concept (Section VI.C.4.b.iii.(1))

Based on studies and work done to date, the Beach Cities WMG has previously identified opportunities for regional projects within two high priority subwatersheds and anticipates that significant opportunities exist within the collective jurisdictional areas for collaboration on additional multi-benefit projects that will meet the intent of the EWMP approach. The Beach Cities WMG strong preference is to address both watersheds to which they are tributary within one EWMP.

Santa Monica Bay Watershed

The agencies of the Beach Cities have been working together since 2004 to implement the previously developed Jurisdictional Groups 5 and 6 Implementation Plan for the Santa Monica Bay Beaches Bacteria Total Maximum Daily Load (TMDL), including a Structural Best Management Practice (BMP) Siting Study and Dry Weather Source Characterization and Control Study for two high priority subwatersheds, along with joint implementation of programmatic solutions. Since 2004 the Beach Cities have also been jointly funding receiving water monitoring consistent with the Coordinated Shoreline Monitoring Plan for the Santa Monica Bay Beaches Bacteria (SMBBB) TMDL along the shoreline of the Beach Cities WMG. These ongoing efforts by the Beach Cities WMG to comply with the SMBBB TMDL will provide an effective springboard for the development of an EWMP.

Additionally, the agencies have submitted individual Trash Monitoring and Reporting Plans (TMRPs) for the Santa Monica Bay Debris TMDL.

Dominguez Channel Watershed

The cities of Redondo Beach, Manhattan Beach, Torrance and the LACFCD facilities within these cities are also tributary to the Dominguez Channel watershed. With the exception of the development of the City of Torrance Stormwater Quality Master Plan, there has not been extensive work to address the pollutants of the Dominguez Channel primarily because the TMDLs for Dominguez Channel were only recently approved by the State Water Resources Control Board. The EWMP for the Beach Cities WMG will leverage elements of the City of Torrance Stormwater Quality Master Plan to address the Dominguez Channel Watershed aspects of the Beach Cities EWMP. Due to the strong working relationship established among these agencies to implement the Santa Monica Bay Beaches Bacteria TMDLs, collaboration among these agencies to develop an EWMP that also addresses the Dominguez Channel Watershed is likely to yield a successful partnership.

The cities of Redondo Beach, Torrance and the LACFCD facilities within the Beach Cities Watershed Management Group are also tributary to the Machado Lake watershed within the Dominguez Channel Watershed. The City of Redondo Beach accounts for only 0.02% of the Machado Lake Watershed and storm drains within the City of Torrance receive runoff from this small area of Redondo Beach. Therefore, the City of Torrance's plans to address the Machado Lake TMDLs are inclusive of the City of Redondo Beach. To date, the City of Torrance has submitted a Special Study #3 Report for Machado Lake Nutrient TMDL monitoring. The City of Torrance is also preparing a BMP Implementation Plan to address Machado Lake Nutrient and Toxics TMDLs. The LACFCD has also submitted the "Machado Lake Nutrient & Toxics TMDL Monitoring & Reporting Plan. The Beach Cities WMG EWMP will incorporate the Machado Lake BMP Implementation Plans prepared by the City of Torrance and LACFCD as an appendix to the EWMP.

6. Cost estimate for plan development (Section VI.C.4.b.iii.(2))

The Beach Cities WMG agencies collaboratively prepared a scope of work and requested proposals for development of the EWMP Work Plan, the CIMP and the draft and final EWMP. Based on the response to the request for proposals, the Beach Cities WMG is developing a cost sharing agreement for the memorandum of agreement based on an estimate of $760,000 which includes $90,000 for the Work Plan, $155,000 for the CIMP, and $439,000 for the EWMP with an additional allocation of $76,000 for project administration by the lead agency. This estimate is based on a number of assumptions including that the CIMP and EWMP will leverage the existing Santa Monica Bay Beaches Bacteria TMDL Implementation Plan and Coordinated Shoreline Monitoring Plan work to-date. An additional key assumption for this cost estimate is that the City of Torrance Machado Lake TMDL Monitoring and Implementation Plans will be incorporated as stand-alone appendices to the EWMP and CIMP so that effort for the Machado Lake subwatershed of the Dominguez Channel is excluded from the cost estimate since it is being borne individually by the City of Torrance. In addition, the Beach Cities WMG agencies will contribute several hundred thousand of dollars in staff time and in-kind services.

7. Memorandum of Understanding (Section VI.C.4.b.iii.(3))

Attachment 2 includes the final drafts of the Memoranda of Understanding between the City of Redondo Beach, as the lead agency, and the other Beach Cities WMG agencies. All agencies have

committed to the execution of the agreement as indicated by the signed letters of intent (Attachment 3). The agreement will be executed no later than December 28, 2013.

8. Interim milestones and deadlines for plan development (section VI.C.4.b.iii.(4))

Table 4 summarizes the interim milestone and deadlines for Work Plan, CIMP, and EWMP Plan development which are based on the scope of work for developing the Work Plan, CIMP, and EWMP prepared by the Beach Cities WMG. Technical memoranda supporting the development of the plans are utilized as milestones. It is expected that the draft technical memos will not be finalized; rather, the information presented in the memos will be revised based on comments and presented in the Work Plan, CIMP, and EWMP Plan.

Table 4. Proposed interim milestones and deadlines for plan development

• Milestones Deadlines
Work Plan
Draft Workplan Elements/Approach • **Identification of Water Quality Priorities** • **Existing and Potential Control Measures** • **Reasonable Assurance Analysis Approach**	• March 2014
Draft Work Plan	• April 2014
Final Work Plan submitted to the LARWQCB	**June 2014**
Coordinated Integrated Monitoring Plan
Draft Technical memos • **Outfall and receiving water monitoring approach** • **Monitoring sites selection** • **New development and redevelopment effectiveness tracking**	• March 2014
Draft CIMP	• April 2014
Final Draft CIMP submitted to the LARWQCB	**June 2014**
Enhanced Watershed Management Program
Draft Technical memos • **Approach to US EPA TMDLs, 303(d) listings, other exceedances of RWLs** • **Initial list and screening of regional projects** • **Identify Selected Watershed Control Measures and Conduct Reasonable Assurance Analysis** • **Project schedules and cost estimates**	• March 2015
Draft EWMP	• May 2015
Final Draft EWMP submitted to the LARWQCB	**June 2015**
Final EWMP submitted to the LARWQCB	**January 2016**
Approval of final EWMP by LARWQCB	**April 2016**

9. Structural BMP Implementation (Section VI.C.4.b.iii.(5))

The Beach Cities WMG commits to implement the following structural BMPs or suite of BMPs to provide meaningful water quality improvement within each watershed within 30 months of the effective date of the MS4 Permit, that is, between the MS4 Permit effective date of December 28, 2012~~3~~ and the

deadline for EWMP submittal on June 28, 2015. The Beach Cities WMG plans to implement the following structural BMPs or suite of BMPs:

Manhattan Beach Greenbelt Infiltration System

The Manhattan Beach Greenbelt Infiltration project was designed to utilize the linear greenbelt parkland which runs through the City of Manhattan Beach to intercept and infiltrate dry weather and wet weather low flows from existing storm drains that cross or abut the parkway. Low flows from a 50-acre drainage area are screened to remove trash and gross solids before flowing by gravity to a subsurface infiltration system which also provides limited storage of storm flows for subsequent percolation into the sandy soils below the greenbelt. The Greenbelt Low Flow Infiltration system was designed to effectively divert dry-weather and wet-weather low flows from the storm drain system year round. The project construction was recently completed on February 19, 2013, within the 30 month period required as discussed in Section VI.C.4.b.iii of the MS4 Permit. Monitoring of project effectiveness is currently underway and a final report on this project will be available in advance of the EWMP submittal deadline.

Torrance Stormwater Basin Recharge and Enhancement Project

The Torrance Stormwater Basin Recharge and Enhancement Project will retrofit three existing detention basins serving 1,453 acres of drainage area in total within the City of Torrance. The project will utilize a number of BMPs in order to conserve water, recharge the aquifer, create critical habitat, and improve stormwater quality that discharges into the Santa Monica Bay, and eliminate non-stormwater discharges to the Dominguez Channel. Historically, the basins have provided temporary detention for stormwater and urban runoff—during the winter period discharge from this system has been pumped to the Herondo Storm Drain which discharges to the Santa Monica Bay, while the summer period flows from the system have been pumped to a storm drain discharging to the Dominguez Channel. This Stormwater Basin Recharge and Enhancement project proposes significant advances over the current system by providing wetland treatment of stormwater and non-stormwater runoff at the detention basins, recharging vitally needed groundwater supplies, and sustaining wetland habitat during the dry season in the basins.

The Project will eliminate dry weather run off and associated load for multiple pollutants for 1,453 acres of the Santa Monica Bay watershed. The Project will treat all stormwater from 1,453 acres for multiple pollutants, including priority pollutants such as trash and sediments by a combination of wetland treatment and infiltration. The project will capture and recharge an estimated 20 acre feet per year of runoff that would have otherwise been discharged to the Santa Monica Bay.

The project will enable the elimination of all discharges from the drainage area to Dominguez Channel, will eliminate dry weather discharges to Santa Monica Bay and will reduce the ~~winter~~ wet weather discharge to the Santa Monica Bay from this system. The project budget is $4.4 million and construction is scheduled for Spring 2014~~3~~.

The scope of the project includes:

Amie Basin [463 acre tributary area]:

1. Construction of a 2-acre wetland for storm water treatment. Clearing and grubbing of non-native plants and re-planting with native and wetland-suitable plants and trees.

2. Installation of a one-horsepower, energy-efficient submersible sump pump and 500 linear feet of irrigation pipelines to circulate and oxidize the storm water, provide UV exposure to eliminate bacteria, and promote wetland growth.

3. Installation of trash screens on all catch basins in the watershed to trap and remove solid waste from flowing into the basins from the stormwater inlets.

4. Replacement of pumps and controls for the Amie Basin Pump Station.

Henrietta Basin [594 acre tributary area]:

1. The construction of a 1.5-acre wetland for storm water treatment. Clearing and grubbing of non-native plants and re-planting with native and wetland-suitable plants and trees.

2. Construction of a 1.5 acre infiltration area which will be located at the south end of the basin.

3. Installation of an energy-efficient, one-horsepower submersible sump pump and 500 linear feet of irrigation pipelines to circulate and oxidize the water, provide UV exposure to eliminate bacteria, and promote wetland growth.

4. Installation of trash screens on all catch basins in the watershed to trap and remove solid waste from flowing into the basin from the stormwater inlets.

Entradero Basin [463 acre tributary area]:

1. The construction of a 15,031-square-foot infiltration area.

2. Installation of trash screens on all catch basins in the watershed to trap and remove solid waste from flowing into the basin from the stormwater inlets.

3. Installation of the new biofiltration swale next to the dog training area to capture and treat runoff from this specific area of the public park site and pet waste stations at trail heads.

4. Installation of 1,800 linear feet of irrigation pipeline and fittings to provide recycled water irrigation to the ball fields and native landscaped areas.

Accelerated Implementation of Machado Lake Trash TMDL

The City of Torrance is conducting accelerated implementation of the Machado Lake Trash TMDL by installing 631 Automatic Retractable Screens and 2,000 'no parking' signs as well as a program of

outreach and education. The screens will prevent trash from being carried into Machado Lake from urban runoff and storm drain flows, and the 'no parking' signs are to improve the effectiveness of street sweeping operations and the effectiveness of the Automatic Retractable Screens. The project will have multiple benefits because eliminating trash and plant debris from the storm drains will reduce the growth of bacteria and enhanced street sweeping will reduce sediment and nutrients bound in plant debris from being transported through the storm drains. The project is scheduled for construction in Fall of 2013 which is 2.5 years in advance of the March 2016 deadline for achieving zero trash discharge to Machado Lake.

10. LID ordinance (Sections VI.C.4.b.iii.(6) and VI.C.4.c.iv. (1))

Table 5 summarizes the status of Low Impact Development (LID) ordinances by the various Beach Cities WMG agencies. As presented in Table 5, greater than 50% of the land area within the geographic scope of the EMWP is addressed by LID ordinances that are in draft.

Table 5. Summary of percent EWMP area addressed by LID ordinances

EWMP agency	% EWMP area	Status LID ordinance
City of Redondo Beach	19	Draft LID Ordinance
City of Manhattan Beach	12	Draft LID Ordinance
City of Hermosa Beach	4	Draft LID Ordinance
City of Torrance	65	Draft LID Ordinance
LACFCD	N/A	N/A
Total	100	

Status Descriptions:

- Draft Ordinance – Permittee has completed or will complete by June 28, 2013 the development of a draft LID Ordinance that is in compliance with the MS4 Permit for its portion in the watershed.

11. Green street polices (Sections VI.C.4.b.iii.(6) and VI.C.4.c.iv. (2))

Table 6 summarizes the status of green street policies by the various Beach Cities WMG agencies. As presented in Table 6, greater than 50% of the land area within the geographic scope of the EMWP is addressed by green streets policies that are in place or in draft.

Table 6. Summary of percent EWMP area addressed by Green Street policies

EWMP agency	% EWMP area	Status Green Street Policies
City of Redondo Beach	19	Draft policy
City of Manhattan Beach	12	Draft policy
City of Hermosa Beach	4	In Place
City of Torrance	65	Draft policy
LACFCD	N/A	N/A
Total	100	

Status Descriptions:

- In Place – Permittee has an existing policy for its portion of the watershed.

- Draft Policy – Permittee has completed or will complete by June 28, 2013 the development of a draft Green Street Policy that is in compliance with the MS4 Permit for its portion in the watershed.

Attachment 1. Beach Cities WMG EWMP Boundary and Watershed Delineation

Attachment 2. Draft Memorandum of Understanding

Attachment 3. Letters of Intent

Appendix B

Reasonable Assurance Analysis for Dominguez Channel Watershed within the City of Torrance

CITY OF TORRANCE

BEACH CITIES EWMP

TECHNICAL MEMORANDUM NO. 2

REASONABLE ASSURANCE ANALYSIS FOR DOMINGUEZ CHANNEL WATERSHED WITHIN THE CITY OF TORRANCE

DRAFT
May 2015

707 WILSHIRE BOULEVARD, SUITE 3920 • LOS ANGELES, CALIFORNIA 90071 • P. 213.489.1587 • F. 213.572.0361

CITY OF TORRANCE

BEACH CITIES EWMP

TECHNICAL MEMORANDUM
NO. 2

REASONABLE ASSURANCE ANALYSIS FOR DOMINGUEZ CHANNEL

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Technical Memorandum No. 2

REASONABLE ASSURANCE ANALYSIS FOR DOMINGUEZ CHANNEL

1.0 EXECUTIVE SUMMARY

In order to satisfy the Los Angeles Municipal Separate Storm Sewer System (MS4) Permit (Permit) requirements, the Cities of Redondo Beach, Manhattan Beach, Hermosa Beach, and Torrance, along with the Los Angeles County Flood Control District (LACFCD) agreed to collaborate on the development of an Enhanced Watershed Management Program (EWMP) for both the Santa Monica Bay Watershed and Dominguez Channel Watershed areas within their jurisdictions. This group is hereafter referred to as the Beach Cities Watershed Management Group (Beach Cities WMG).

A required element of the EWMP is the Reasonable Assurance Analysis (RAA). The Permit requires compliance with appropriate water quality standards as developed through applicable total maximum daily loads (TMDLs) and other Permit limitations including water quality based effluent limitations (WQBELs), receiving water limitations (RWLs), and water quality objectives (WQOs).

This RAA includes a qualitative analysis based on literature review to demonstrate that proposed catch basin filters would be effective in meeting the TMDL requirements. The ultimate goal is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach.

On March 25, 2014, the Los Angeles Regional Water Quality Control Board (Regional Board) issued “RAA Guidelines” (LARWQCB 2014) to provide information and guidance to assist permittees in development of the RAA. The Storm Water Management Model (SWMM) was utilized to perform the RAA for the portion of the Dominguez Channel within the City of Torrance. The portion of the Dominguez Channel watershed within the City of Torrance is referred to as DC-Torrance Watershed in this report. The pollutant combinations assessed by this RAA fall into two categories; Category 1 and Category 2. The Category 1 pollutants are copper, lead, and zinc and Category 2 pollutant is fecal coliform. The baseline load for the metals were determined using the 90th percentile wet weather (days with rainfall > 0.1”) daily load from the 10 year period from November 1, 2002 to October 31, 2012. The baseline load for fecal coliform was based on 90th percentile wet year load from November 1, 1994 to October 31, 1995. However, the target load reductions (TLRs) were established for both metals and bacteria by the South Bay Beach Cities Watershed Management Group and were used in this RAA memo to maintain consistency. The difference between the baseline load and the target load resulted in a TLR for the 90th percentile load day, which was the load reduction required to meet the allowable TMDL concentration.

Based on literature review documenting high removal efficiencies demonstrated by the catch basin filters, the City of Torrance has proposed to implement catch basin filters to meet the target load reductions (TLRs) set forth by the Dominguez Channel Toxics TMDL. All references reviewed as part of the literature review are included in Appendix B.

In addition, the City of Torrance is in the process of developing the Green Street Program and the ordinances to implement Green Street design features as part of street redevelopment. While implementing redevelopment of arterial streets, the City of Torrance would assess opportunities for Green Street design features to facilitate treatment through filtration or infiltration. Green Street elements may include infiltration trench that provides water quality treatment, reduction in peak flow discharges, and potential groundwater recharge. Other Green Street elements that may be considered include bioretention/biofiltration practices to achieve water quality treatment through filtration by vegetation and soils to remove pollutants with perforated underdrain to convey the treated runoff. The City of Torrance is committed to developing the Green Street Ordinance established and in effect by July 2015 as required by the MS4 Permit.

For bacteria, a combination of non-structural BMPs including Public Education and Outreach, reduction of irrigation return flows, and future development and implementation of Green Street design features would assist with meeting the TLRs for bacteria. In addition, the study on Optimization of Stormwater Filtration at the Urban/Watershed Interface conducted by the University of Irvine, California, Department of Environmental Health in 2005 indicated Fecal Coliform (bacteria) removal efficiency of 33% by the Grate Inlet Skimmer Box/Round Curb Inlet Basket.

These recommendations serve as goals for the Beach Cities WMG to seek opportunities for implementation over time, but strategies may change as opportunities for more cost-effective BMPs are identified throughout the schedule.

The publically available County's LSPC model, calibrated by California Watershed Engineering (CWE) in January 2015 for the Dominquez Channel Enhanced Watershed Management Program was used to calibrate the DC-Torrance SWMM model.

As part of the RAA, the metals TLRs reflect daily load reductions on the 90th percentile wet weather load days and bacteria TLRs is based on daily exceedance days.

To meet the phased WQO, RWL and TMDL implementation schedules, a combination of distributed structural (catch basin filters) and nonstructural BMPs were identified to be considered by the City of Torrance for implementation. Table ES.1 lists the new nonstructural BMPs, enhancements to existing nonstructural BMPs, and their anticipated effectiveness with the treatment of concerned pollutants.

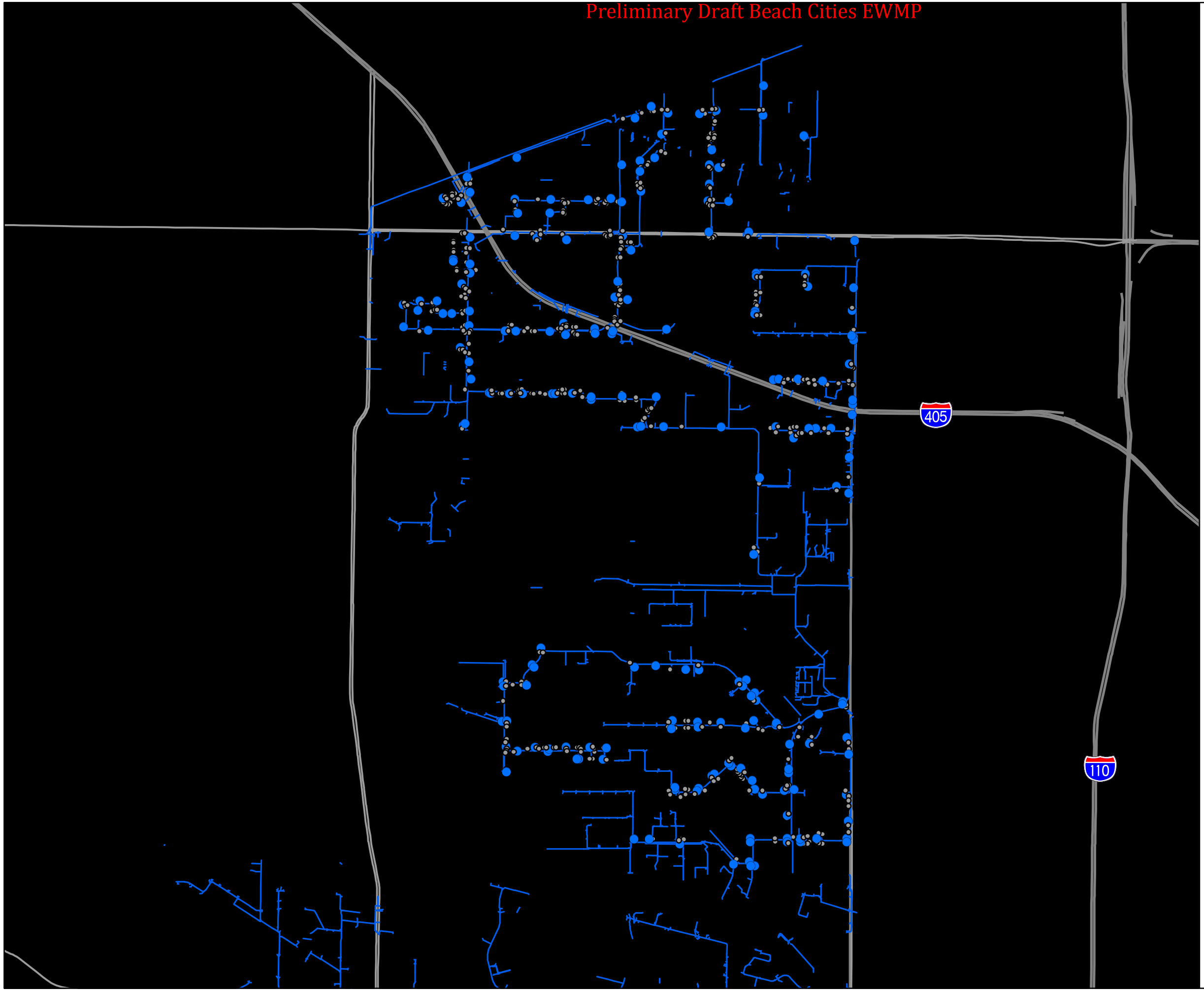
Table ES.1 Summary of Nonstructural BMPs to Support Pollutant Removal Beach Cities EWMP City of Torrance				
	Condition		Pollutants Addressed	
Nonstructural BMP	Wet Weather	Dry Weather	Bacteria	Metals
Enhancements to Existing BMPs				
Smart gardening program enhancements	√	√	◗	◗
TMDL-specific stormwater training	√	√	◗	◗
Enhancement of commercial and industrial facility inspection	√	√	◗	◗
Enhancement escalation procedures	√	√	◗	●
Improved street sweeping technology	√		◗	◗
New BMP				
Reduction of irrigation return flow	√	√	●	●
√ - applicable; ◗ - partially effective; ● - effective				

For identification of structural BMPs, distributed structural BMPs (Catch Basin filters) were considered. Distributed BMPs refer to those practices that provide the control or treatment (or both) of stormwater runoff at the site level. Table ES.2 summarizes the distributed structural BMPs (catch basin filters) identified through the RAA to address the TMDL implementation. The location of the identified distributed structural BMPs (catch basin filters) are shown on Figure ES.1.

Table ES.2 Summary of Distributed Structural BMPs to Support TMDL Implementation Beach Cities EWMP City of Torrance				
	Condition		Pollutants Addressed	
Structural BMP	Wet Weather	Dry Weather	Bacteria	Metals
Distributed BMPs				
Catch basin filters	√	√	●	●
Green Street Elements	√	√	●	●
√ - applicable; ○ - not effective; ● - effective				

For most nonstructural BMPs, quantification of benefits in terms of pollutant load reductions are challenging and often require extensive survey and monitoring information to assess performance. For the purposes of this RAA, a qualitative approach was used to evaluate the effectiveness and feasibility of the nonstructural BMPs.

Preliminary Draft Beach Cities EWMP



Legend

- Catch Basins - 643
- Catch Basin Inserts - 200/643
- Storm Drains
- Freeway
- Major Roads
- Dominguez Channel
- City Boundary
- Parcels

N

0 1 Miles

ES-1
Location of Distributed Strucure BMPs
[Catch Basin Locations
Selected for Drain Inserts]
Enhanced Watershed Management Plan
City of Torrance

Fact sheets and literature available on commercially available catch basin filters suggested that the proposed catch basin filters were effective at capturing and removing pollutants from stormwater runoff including sediments, heavy metals, and oil and grease. One of the literatures summarized the pollutant removal efficiencies provided by Grate Inlet Skimmer Box/Round Curb Inlet Basket (Schematic included in Appendix B). It included numeric pollutant reductions from various studies or independent tests between 1998 and 2007. The study on Optimization of Stormwater Filtration at the Urban/Watershed Interface conducted by the University of Irvine, California, Department of Environmental Health in 2005 was an independent test conducted to assess the pollutant removal efficiency of the Grate Inlet Skimmer Box/Round Curb Inlet Basket. This study in 2005 concluded a 99% reduction in Lead. Other studies include the field test conducted by the City of El Monte in 2002 that concluded that the Grate Inlet Skimmer Box/Round Curb Inlet Basket were effective in removing 95% of Zinc and Copper each and 87% of Lead concentrations. In addition, we also referred to the independent performance assessment conducted by the City of Los Angeles in 2005 to evaluate the performance of storm drain inlet filter devices at removing oil and grease and associated pollutants from stormwater. The study aimed at evaluating the performance (at various stages of their useable lives) of four (4) different catch basin filters currently used by the City of Los Angeles in removing and retaining used motor oil and associated pollutants from urban runoff. This study tested the performance of five (5) different types of catch basin filters at removing sediments, trash, oil and grease, and metals for a flow rate ranging between 10 and 25 gallons per minute. It involved four (4) sampling events and five study sites. The key summary points indicated that qualitatively, the results of the study found that all of the units were moderately effective at removing oil and grease, suspended solids, and heavy metals. Furthermore, the study indicated that for most insert types, inspection and maintenance should occur before and after each rain event during wet weather and monthly during dry weather to maintain their performance integrity and to minimize leaching of previously captured pollutants.

A more recent independent test conducted in 2013-2014 by the City of Lake Forest suggested that the catch basin filters were effective in a heavy metal removal of 75%. The product tested was the Ultra Filter Sock Heavy Metal Drain Filter.

Based on literature review documenting the removal efficiencies demonstrated by the catch basin filters, the proposed catch basin inserts would meet the TLRs set forth by the Dominguez Channel Toxics TMDL with 75% as the estimated target load reduction for a flow rate ranging between 10 to 25 gallons per minute.

Pollutant reductions by catch basin filters resulted from various studies/literature review are summarized in Table ES.3 and shows that the TLRs would be met for each metal. The TMDL year was determined to represent typical rainfall frequencies and magnitudes observed over the recent 25-year rainfall record. The conclusions from literature review and fact sheets show that the catch basin filters would be effective in meeting the target reduction loads set up by the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL (the Dominguez Channel Toxics TMDL).

For bacteria, a combination of non-structural BMPs including Public Education and Outreach, reduction of irrigation return flows, and future development and implementation of Green Street design features would assist with meeting the TLRs for bacteria. In addition, the study on Optimization of Stormwater Filtration at the Urban/Watershed Interface conducted by the University of Irvine, California, Department of Environmental Health in 2005 indicated Fecal Coliform (bacteria) removal efficiency of 33% by the Grate Inlet Skimmer Box/Round Curb Inlet Basket.

Table ES.3 Pollutant Reduction After Implementing Catch Basin BMPs
Beach Cities EWMP
City of Torrance

Pollutants	Existing Load	Target Load Reduction (%)	Nonstructural BMP	Distributed Structural BMPs (Catch Basin Filters)	Structural + Nonstructural BMPs
Zinc 90th Percentile Load Day - 11/08/2002					
Copper (lb/d)	36.99	62%	5%	75%	80%
Zinc (lb/d)	133.39	76%	5%	75%	80%
Critical Wet Year - 1995					
Fecal Coliform (MPN/yr) x10^14	627	53%	5%	33%	38% plus filtration/infiltration opportunities through potential Green Street Implementation in future.

No TMDL developed for fecal coliform. Target Load Reduction calculated based on REC-1 standard and high-flow suspension days.

Note:

The City of Torrance is following the adaptive management approach that would allow them to monitor the performances of proposed distributed structural (catch basin filters) and non-structural best management practices with respect to meeting the established TLR requirements.

In addition, the City of Torrance is in the process of developing the Green Street Program and the ordinances to implement Green Street design features as part of street redevelopment. While implementing redevelopment of arterial streets, the City of Torrance would assess opportunities for Green Street design features to facilitate treatment through filtration or infiltration. Green Street elements may include infiltration trench that provides water quality treatment, reduction in peak flow discharges, and potential groundwater recharge. Other Green Street elements that may be considered include bioretention/biofiltration practices to achieve water quality treatment through filtration by vegetation and soils to remove pollutants with perforated underdrain to convey the treated runoff. The City of Torrance is committed to implementing the Green Street Ordinance established and in effect by July 2015 as required by the MS4 Permit.

Based on the monitoring results, the City of Torrance would consider additional control measures if the required TLRs were not met or other improvements to existing best management practices were found necessary. This would allow changes in the number and type of best management practices selected for implementation. Through adaptive management and based on the future monitoring results, the implementation schedules may be modified to reflect the increased knowledge of the watershed. Actual schedule for Implementation of BMPs will occur as funding becomes available.

2.0 INTRODUCTION

As required by the Permit, the Beach Cities WMG has to perform a Reasonable Assurance Analysis (RAA) as part of the EWMP. The report is prepared in compliance with Part VI,C.5.b.iv.(5) of Waste Discharge Requirements for MS4 Discharges within the Coastal Watersheds of Los Angeles County, Order Number R4-2012-0175 (NPDES Permit Number CAS004001).

The SWMM model used for this RAA was calibrated to the County's LSPC model calibrated by CWE for the Dominguez Channel Enhanced Watershed Management Program. However, the target load reductions (TLRs) were established for both metals and bacteria by the South Bay Beach Cities Watershed Management Group and were used in this RAA memo to maintain consistency. The difference between the baseline load and the target load resulted in a TLR for the 90th percentile load day, which was the load reduction required to meet the allowable TMDL concentration.

The baseline critical wet conditions for fecal coliform were simulated using SWMM for the time period ranging from November 1, 1994 through October 31, 1995. The wet conditions baseline load for the metals for metals were based on simulation results from 90th percentile load day for each metal.

2.1 Physiographic Setting – DC-Torrance Watershed

The City of Torrance (City) is located about 15 miles south of Downtown Los Angeles (LA), in southern LA County, just north of the Palos Verdes Hills. The City comprises 20.5 square miles in area. The City is bounded by Redondo Beach on the west and north, Lawndale and Gardena on the north, LA on the east, Lomita to the southeast, and Rolling Hills Estates and Palos Verdes Estates on the south. The City's stormwater conveyance systems are interconnected with neighboring city systems. The neighboring cities located at generally higher elevation such as Rolling Hills Estate and Palos Verde Estate discharge stormwater into the City's and/or Los Angeles County Flood Control District's (LACFCD's) stormwater conveyance systems located within the City's boundaries. The location of the City is shown on Figure 2.1.

The DC-Torrance Watershed area is approximately 9 square miles. The drainage within the watershed is largely to the east, via storm drains and stormwater from the east side of the City is routed via the Torrance Lateral to Machado Lake. This channel replaced the Dominguez Creek and its tributaries, once a system of braided streams, marshes, and small ponds that eventually reached San Pedro Bay. The portion of the Palos Verdes Hills that borders the City is drained by several north-trending canyons, including, from east to west, Bent Spring, Sepulveda, Agua Magna, Agua Negra, and Malaga canyons, as well as numerous smaller, unnamed canyons. Carrying significant amounts of water only during the winter, these streams now flow into storm drain structures.

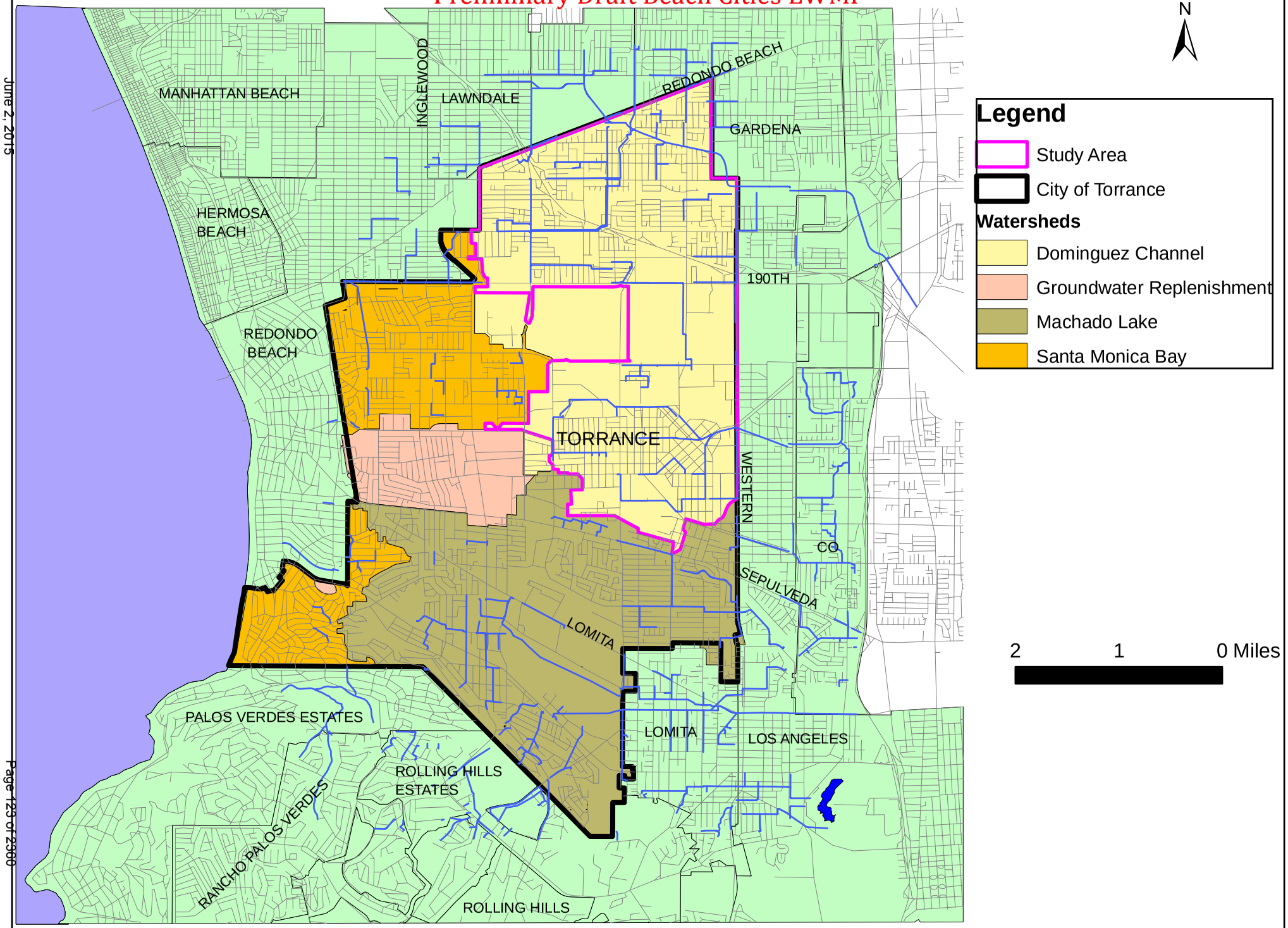


Figure 2.1 Subregional Location of City of Torrance

2.2 Climate

Like most of Southern California, Torrance has a Mediterranean climate characterized by hot, dry summers, and cool, somewhat rainy winters. Average summer temperatures range from highs in the high 80s to lows in the mid 60s (degrees Fahrenheit). Average winter temperatures range from highs in the low 70s to lows in the high 40s.

The average yearly precipitation in the Torrance area is about 13 inches whereas nearly 15 inches of precipitation fall annually in Los Angeles. Not only does rainfall vary from one location to the next, often within short distances, it is also extremely variable from year to year, ranging from one-third the normal amount to more than double the normal amount.

There are three types of storms that produce precipitation in southern California: winter storms, local thunderstorms, and summer tropical storms. Winter storms are characterized by heavy and sometimes prolonged precipitation over a large area. These storms usually occur between November and April, and are responsible for most of the precipitation recorded in southern California. Local thunderstorms can occur at any location, and usually affect relatively small areas. These storms are usually more prevalent in the higher mountains during the summer. Tropical rains are infrequent, and typically occur in the summer or early fall. These storms originate in the warm, southern waters off Baja California, in the Pacific Ocean, and move northward into southern California.

2.3 Watersheds and Storm Drains

The City is divided into four main watersheds as shown on Figure 2.1. These four main watersheds are;

1. Dominguez Channel.
2. Santa Monica Bay.
3. Groundwater Replenishment.
4. Machado Lake.

The RAA study area, DC-Torrance, includes only the portion of Dominguez Channel within the City excluding the groundwater replenishment basin. The groundwater replenishment basin does not discharge into the Santa Monica Bay or the Dominguez Channel. The ground water retention basins facilitate infiltration of stormwater and hence there are no flows exiting the basins.

The groundwater replenishment basin includes three active retention basins that are used to percolate stormwater into the groundwater basin. There are no discharges from these basins. Table 2.1 lists the three active retention basins along with volume and location. The City worked with the RWQCB to recognize the tributary areas to these basins as sub-regional BMPs for permit and TMDL compliance. Since these basins do not discharge to Section 303(d) listed impaired bodies of water, TMDLs, RWLs, and WQOs are not applicable to stormwater

discharge from the tributary areas to these basins. It should be noted that the Del Amo Center retention basin, though listed in Table 2.1, is privately owned. The relevant documentation about the groundwater replenishment basin is provided as an Appendix to the Model Calibration TM (TM01).

The DC-Torrance study area is shown on Figure 2.1. The DC-Torrance Watershed represents about 6.7 percent of the Dominguez Channel Watershed and about 44 percent of the City's total surface area. The DC-Torrance Watershed is highly urbanized and as a result, runoff is largely controlled by streets, retention basins, storm drains, and flood control channels. The main channels in the study area are the Dominguez Channel and the Torrance Lateral. The Dominguez Channel, which is maintained by the Los Angeles County Flood Control District, collects storm runoff from sections of the Cities of Hawthorne, Gardena, Lawndale, and Redondo Beach. The channel flows southerly, emptying into the Los Angeles Harbor area.

Table 2.1 Summary of Active Retention Basins
Beach Cities EWMP
City of Torrance

Basin Name	Volume (af)	Design Surface Elevation (ft-MSL)	Location
Bishop Montgomery	122	84	Palos Verdes Boulevard and Torrance Boulevard
Ocean Avenue	229	79	Ocean Avenue and Sepulveda Boulevard
Del Amo Center	86	75	Madrona Avenue and Plaza Del Amo
Total	**437**		

2.3.1 Discharge Locations

The City's stormwater system discharges into LACFCD storm drains at several locations, which are indicated on Figure 2.2. As shown on this figure, these points of discharge are primarily located along the east boundary of the City's service area. In addition, there are several discharge locations along the Dominguez Channel in the northeast portion of the City.

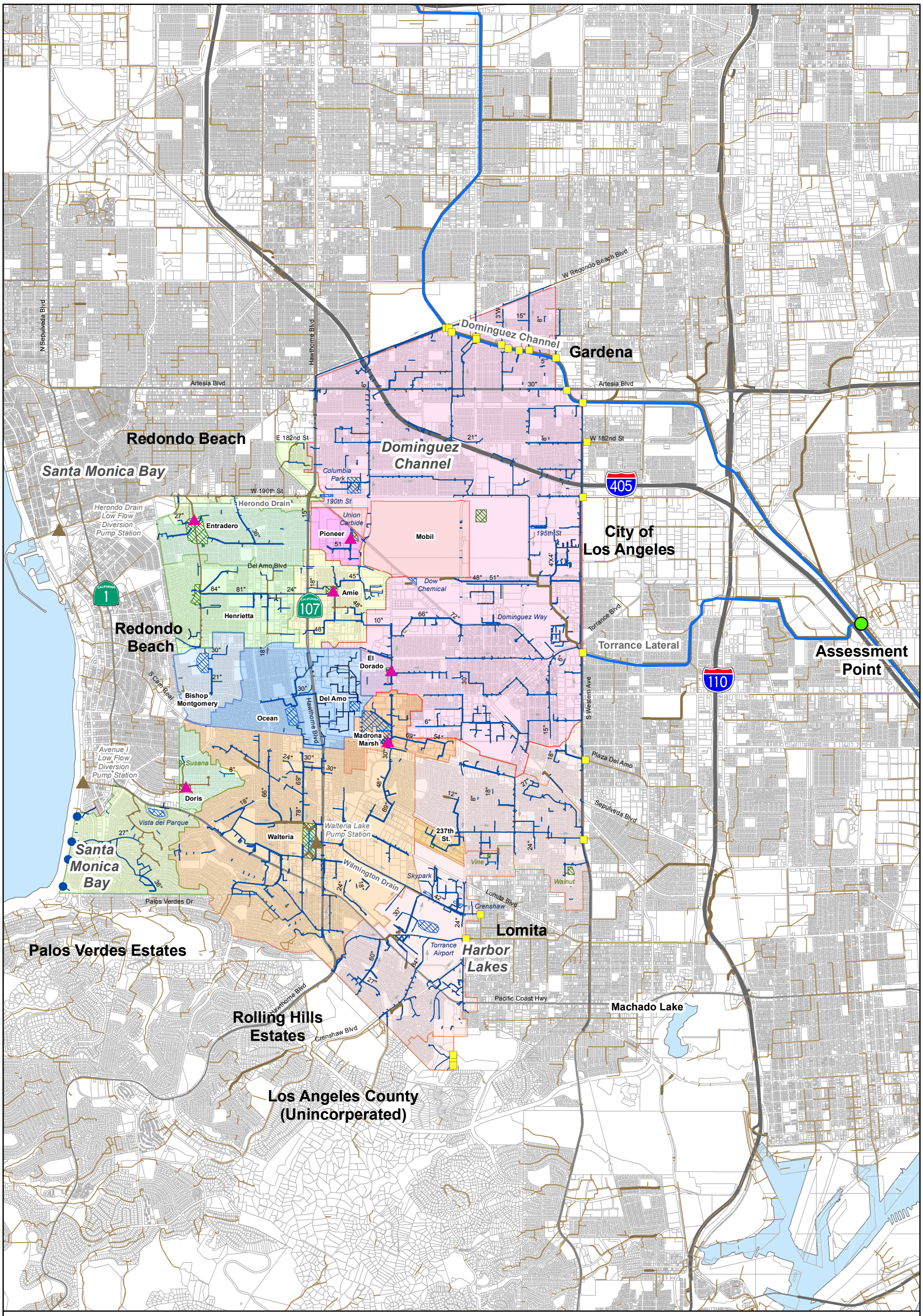


Figure 2.2
Existing Stormwater System

The stormwater collection system shown on Figure 2.2 also shows how stormwater is routed throughout the City. In general, the routing is as follows:

- Stormwater from the east side of the City is routed via the Torrance Lateral to Machado Lake.
- Stormwater from the west side of the City, stormwater discharge is routed to Santa Monica Bay.
- Stormwater from the northwest areas of the City's service area that are within the Santa Monica Bay watershed, is routed through LACFCD's Herondo Drain, which discharges stormwater into the Santa Monica Bay at the Redondo Beach King Harbor Marina and Pier. The Herondo Drain is also equipped with a low flow diversion pump station, which diverts dry weather flows into the sewer system.
- Stormwater from the southwest areas of the City's service area that are within the Santa Monica Bay watershed, is either directly discharged into Santa Monica Bay at Torrance Beach, passing through one of several Continuous Deflective Separation (CDS) units or is routed into LACFCD's storm drain network within Redondo Beach, which passes through the Avenue I Low Flow Diversion Pump Station, diverting dry weather flows to sanitary sewer.

3.0 APPLICABLE INTERIM AND FINAL REQUIREMENTS

The EWMP for Beach Cities follows the process in the Permit and identify the Water Quality Priorities (WQ Priorities) including the highest (Category 1) Water Quality Priorities, which are subject to TMDLs and WQBELs. Practically all of these TMDLs include associated compliance schedules that are considered in this RAA. Also included in this RAA is Category 2 pollutant (bacteria). There is no TMDL for bacteria; however, it is listed in the 303d list. The TMDL and EWMP milestones/compliance dates were considered while assessing the BMP options and the schedule for potential implementation. Traditionally, the approach of TMDL implementation plans has been focused on final TMDL compliance, whereas the Permit compliance paths offered to EWMPs increase emphasis on milestones. In line with the RAA Guidelines, for all final TMDL and TMDL/EWMP milestones that occur in 2032, the catch basin filters expected to result in attainment of the corresponding Permit limits are identified.

The waste load allocations (WLAs) in the Dominguez Channel Toxics TMDL are shown in Table 2.2. The Permits require the EWMP to provide reasonable assurance for the TMDL milestones that occur in the current Permit term. If applicable TMDLs do not prescribe a milestone in the current Permits, a milestone must be established. For bacteria, allowed exceedance days were set consistent with the Ballona Creek bacteria TMDL by taking 10 percent of wet days (at least 0.1 inch of rain plus following three days) that are not High Flow Suspension (HFS) days (at least 0.5 inches of rain plus the following day). An "exceedance" is defined as a sample that is above the WQO value of>4,000 MPN/100 mL fecal coliform.

Table 2.2 Summary of Schedule for Interim and Final Milestones Beach Cities EWMP City of Torrance			
	Schedule		
Pollutant	Interim (03/23/12)	Final (03/23/32)	Source
Copper	207.51 ug/L	9.7 ug/L	Automobile operation, industry, legacy pollutant
Lead	122.88 ug/L	42.7 ug/L	Vehicle brake pads, atmospheric deposition, soil erosion
Zinc	898.87 ug/L	69.7 ug/L	Vehicle tires, galvanized metal, atmospheric deposition
	REC-2 WQO		
Fecal Coliform	4000 #/100 mL[1]		Wastewater treatment plants, on-site septic systems, domestic and wild animal manure

Note:

(1) Obtained from Los Angeles Regional Water Quality Control Board (LARWQCB) Basin Plan Chapter 3 titled Water Quality Objectives, dated May 2, 2013 Section on In Waters Designated for Non-contact Water Recreation (REC-2)

4.0 WATERBODY POLLUTANT COMBINATIONS

A RAA involves providing an initial assessment of current baseline pollutant loading for water body pollutants using relevant subwatershed data and the best available representative land use and pollutant loading data collected within the last 10 years. Baseline loading estimates include modeling critical conditions that are used in the Dominguez Channel Toxics TMDL. There is only one TMDL (the Dominguez Channel Toxics TMDL) being evaluated here. As stated earlier, there is no TMDL for bacteria (Category 2) but it is being evaluated as it is listed on the 303(d) list.

Pollutant combinations assessed by a RAA fall into one of three categories:

- Category 1 (Highest Priority): Water body-pollutant combinations for which water quality based effluent limitations and/or receiving water limitations are established in Part VI.E, TMDL Provisions, and Attachments L through R of the Municipal Separate Stormwater Sewer System (MS4) Permit.
- Category 2 (High Priority): Pollutants for which data indicate water quality impairment in the receiving water according to the State Water Resources Control Board's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State's Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment.

- Category 3 (Medium Priority): Pollutants for which there is insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable water limitations contained in Order R4-2012-0175 and for which MS4 discharges may be causing or contributing to the exceedance.

The water body pollutant classifications (WBPCs) were classified into one of the three MS4 Permit categories (Category 1-3). Those WBPCs with a TMDL were classified as Category 1, those WBPCs listed on the State's 303(d) list as impairing a particular water body segment were classified as Category 2, and those remaining WBPCs without an associated TMDL or on the State's 303(d) list, but showing exceedances of water quality criteria were classified as Category 3. A summary of these categorizations is presented in Table 2.3.

As part of the EWMP plan, a RAA for the Dominguez Channel is conducted for Category 1 (Highest Priority) pollutants and Category 2 (Fecal coliform). The RAA consists of an assessment, through catch basin filter literature review, to demonstrate that the activities and control measures (i.e., catch basin filters) identified are performed to demonstrate that applicable water quality based effluent limitations and/or receiving water limitations with compliance deadlines during the permit term will be achieved.

Table 2.3 Categorized Water Body-Pollutant Combinations
Beach Cities EWMP
City of Torrance

Water Body	Category 1 (TMDL)	Category 2 (303(d) List)	Category 3 (Other)
Dominguez Channel (lined portion above Vermont Ave)	Total copper, Total Lead, Total Zinc, Toxicity	Indicator Bacteria, Ammonia, Diazinon	Cadmium(diss.), Chromium (diss.), Mercury (diss.), Thallium (diss.), Bis(2Ethylhexl) phthalate, pH, Dissolved Oxygen
Torrance Lateral	Total Copper, Total Lead, Total Zinc	Coliform Bacteria	Cadmium (diss.), Cyanide, pH, Ammonia, PCBs (sed.), DDT (sed.)

5.0 POTENTIAL SOURCES OF POLLUTANTS OF CONCERN

5.1 Copper

Dominguez Channel is designated as impaired for copper and included on the Clean Water Act Section 303(d) list of impaired waterbodies for this pollutant and prioritized under the Dominguez Channel Toxics TMDL. The source of the copper in this watershed is not well known. Possible urban sources of metal loading include runoff from light industrial, transportation, and retail/commercial land uses with critical sources from auto repair, motor

freight transportation, and auto dealerships. Other potential urban sources of metals to the watershed include wet and dry atmospheric deposition and natural background loading.

Urban sources of copper include industrial sources and vehicle brake pads. Motor vehicles are a major source of copper, a metal that originates from brake pad wear. Copper and other pollutants are deposited on roads and other impervious surfaces and then transported to aquatic habitats via stormwater runoff.

Pollutant loads of copper from urban land uses is expected to decrease due to Senate Bill (SB) 346 which was signed into law on September 25, 2010. This legislation phases out copper in vehicle brake pads over a period of years; milestones include the following dates:

- January 1, 2021: Limits the use of copper in motor vehicle brake pads to no more than five percent by weight.
- January 1, 2025: Limits the use of copper in motor vehicle brake pads to no more than 0.5 percent by weight.

Full implementation of the legislation is expected to remove approximately 61 percent of the copper from urban runoff in metropolitan Los Angeles area watershed. Although vehicle brake pad wear is not expected to contribute as much copper in DC-Torrance Watershed as in the more urbanized metropolitan Los Angeles area, a decrease in copper loading is expected from vehicles due to the law's implementation.

5.2 Lead

Dominguez Channel is designated as impaired for lead and prioritized under the Dominguez Channel Toxics TMDL. The source of lead is associated with wet weather discharges from major municipal point sources (SWRCB 2011). Sources of lead in the urban environment also include automobile operation and industries with practices that may expose metals to stormwater. Lead was formerly used as an additive in gasoline. This has caused widespread contamination of soils near highways and streets and in drainage ways in urban areas. Exhaust particulates, fluid losses, drips, spills, and mechanical wear products continue to contribute lead to street dust.

5.3 Zinc

Dominguez Channel is designated as impaired for zinc and prioritized under the Dominguez Channel Toxics TMDL. Zinc loading can occur during wet weather storm events. Road dust, contaminated by tire wear, and erosion of zinc-plated material (i.e., galvanized chain link fences) are major contributors of zinc to urban runoff.

5.4 Fecal Coliform

Fecal coliform is listed in the 303d list for Dominguez channel. Fecal Coliforms are used as indicator of possible sewage contamination because they are commonly found in human and animal feces. Although they are generally not harmful themselves, they indicate the possible presence of pathogenic (disease-causing) bacteria, viruses, and protozoans that also live in human and animal digestive systems. Therefore, their presence in streams suggests that pathogenic microorganisms might also be present and that swimming and eating shellfish might be a health risk. Since it is difficult, time-consuming, and expensive to test directly for the presence of a large variety of pathogens, water is usually tested for coliforms and fecal streptococci instead. Antroponic sources of fecal contamination to surface waters include wastewater treatment plants, on-site septic systems, domestic and wild animal manure, and storm runoff. Non-antropogenic sources of fecal coliform include soils, (sediments), vegetation, decaying organic material, biofilms/regrowth, and atmospheric deposition.

6.0 APPROACH USED FOR THE RAA

This RAA involved a pollutant load reduction plan based on a cost-effective BMP implementation strategy that begins with enhancements to existing nonstructural BMP programs and development of new programs in some cases. This step is usually followed by implementation of distributed structural BMP (Catch basin filters) to meet TMDL reduction objectives.

Based on literature review documenting the removal efficiencies demonstrated by the catch basin filters, the proposed catch basin inserts would meet the TLRs set forth by the Dominguez Channel Toxics TMDL and bacteria target load reductions.

6.1 Uncertainty Analysis

There is often great uncertainty in water quality modeling for urban drainage systems because water quality variation in systems is complex and affected by many factors. The uncertainty analysis was done to assess uncertainty in the build-up and wash-off modeling of pollutants based on a calibrated water quantity SWMM model. A total of four SWMM 5 runoff parameters were considered for uncertainty analysis. The parameters were assumed to follow uniform distribution as done in Muleta and Nicklow (2005), and lower and upper bounds (+-10%) were assigned for each parameter. Values of the parameters vary from subbasin to subbasin depending on soil, land use, imperviousness, topography and/or other characteristics of the subbasin. The four parameters considered were imperviousness, infiltration parameters, subbasin width, and slope. During the uncertainty analysis, these baseline values were altered from the calibrated parameters by multiplying the parameter by the values in lower and upper bounds. This way, the baseline values would be scaled up or down while preserving the spatial variability determined from the watershed characteristics.

Comparison of uncertainties in the pollutant build-up and wash-off in SWMM indicated that those uncertainties varied slightly. This may be a consequence of the specific characteristics of rainfall events. The uncertainty analysis of water quality parameters in SWMM is conducive to effectively evaluating model reliability.

6.2 Estimated Required Pollutant Load Reduction

Using the 90th percentile load days for metals and critical wet year for bacteria (1995), the required pollutant reductions were calculated for attainment of final limitations. Per the RAA Guidelines, the percent reduction used to determine the control measures necessary to attain the final limits are based on the 90th percentile year. Even though the average year is included in the analysis, it should be noted that the interim limits, which were effective as of March 2012, for the Dominguez Channel Toxics TMDL are based on the 95th percentile of historic monitoring data (i.e., antidegradation-based), therefore MS4 agencies are assumed to be in compliance with these limits as of the effective date.

Required load reductions were evaluated at this RAA Assessment Point located just downstream of where Torrance Lateral and Dominguez Channel meet. The RAA Assessment Point represents location where the collective discharge from all subbasins in DC-Torrance Watershed can be assessed to contribute to pollutant loads to the Dominguez Channel. Pollutant loads outside of the DC-Torrance Watershed are not considered in this loading analysis at the RAA Assessment Point.

6.3 Baseline Loading - Average and 90th Percentile Wet Years

This RAA is based on continuous simulation, and a “representative” year-long time period was selected to represent the average year and a separate wet year was selected for bacteria as depicted in Table 2.4. The year-long simulation allows the modeling to capture the variability of rainfall and storm sizes and conditions. The metals baseline loading was based 90th percentile wet weather daily load from 10 year period from November 1, 2002 to October 31, 2012.

Table 2.4 Average and 90th Percentile Years by Pollutant
Beach Cities EWMP
City of Torrance

Pollutant	Average Year	90th Percentile Daily Load
Metals	2006 - 2007	Copper – 02/05/2009 Zinc – 11/08/2002
Pollutant	**Average Year**	**90th Percentile Year**
Fecal Coliforms	2006 - 2007	1994 - 1995

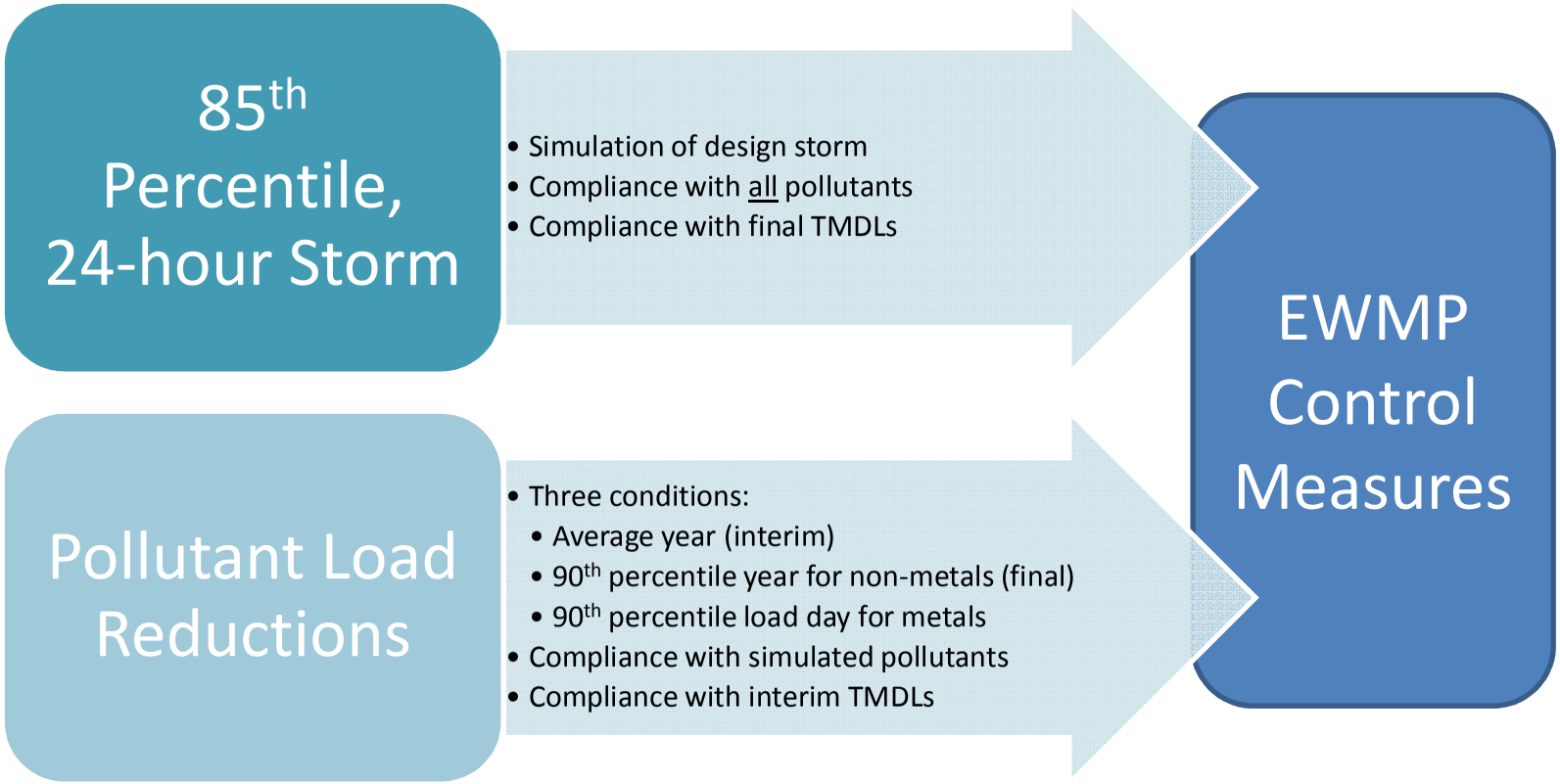
The average year and typical wet year (2002 -2003) loading results were used to prioritize the subbasins for BMP implementation. The flow conditions and loading results from the RAA for the average year and 90th percentile wet year are summarized in Tables 2.5 and 2.6. The

loading for subbasin and hydrologic subunit (HSU) on a typical wet year (2003) are summarized on Figures 2.3 and 2.4 for zinc. Similar figures have been developed for copper and fecal coliform, and are shown in Appendix A.

The typical wet year load was normalized by area for each HSU and subbasin, and then categorized into high, medium, and low groups. The rankings are shown for zinc on Figures 2.5 and 2.6. For each subbasin/HSU, classifications were based on the modeled annual pollutant loads normalized by area, which were then ranked in order from high to low and grouped into quintiles. A score of 5 indicates that the subbasin pollutant loading was in the top 20th percentile (high pollutant loading); whereas a score of 1 represents a subbasin loading in the bottom 20th percentile (low pollutant loading). Basins with ranking score between 4 and 5 were ground into high pollutant category. Medium pollutant loading category includes basin with ranking score between 3 and 4 and basins with ranking score less than 3 were characterized as low pollutant loading. Zinc was selected as the focus because of the priority in addressing metal loads. The figures show that the subbasins between 190th Street and Dominguez Street are associated with higher pollutant loading rates per unit area when compared to other subbasins.

Table 2.5 Modeled Annual Average Load (2007)
Beach Cities EWMP
City of Torrance

Subbasin	Volume (ac-ft)	Copper (lb)	Lead (lb)	Zinc (lb)	Fecal Coliform (MPN)
2019	45.96	26	5	131	3.96E+14
2020	7.83	4	1	19	6.91E+13
2021	81.39	56	14	238	1.40E+15
2022	32.55	17	4	78	6.53E+14
2037	6.46	4	1	19	2.92E+13
2038	11.62	11	3	46	1.53E+14
2049	11.81	8	2	37	4.51E+13
2051	1.57	1	0	6	9.12E+12
2047	0.83	1	0	3	1.16E+13
2042	2.20	2	1	8	2.00E+13
2050	3.07	3	1	11	2.05E+13
2044	7.81	7	2	28	8.66E+13
2046	3.05	2	1	10	1.84E+13
2043	4.09	3	1	13	1.88E+13
2045	5.25	4	1	15	1.46E+13
2048	52.15	34	9	147	9.21E+13
DC-Torrance (Assessment Point)	**277.6**	182.78	45.65	808.80	3.04E+15



TWO TYPES OF NUMERIC GOALS AND EWMP COMPLIANCE PATHS

FIGURE 2.3

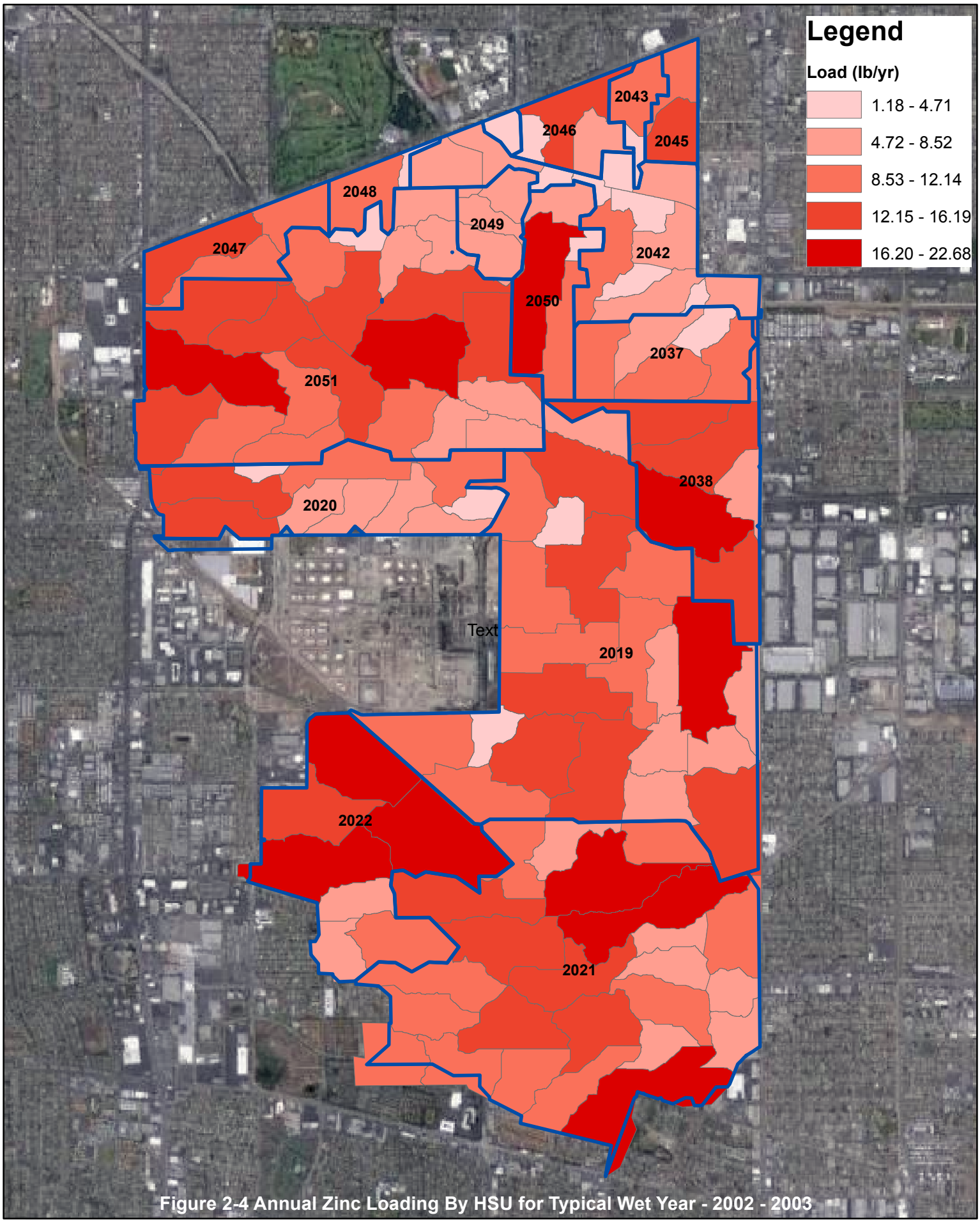


Figure 2-4 Annual Zinc Loading By HSU for Typical Wet Year - 2002 - 2003

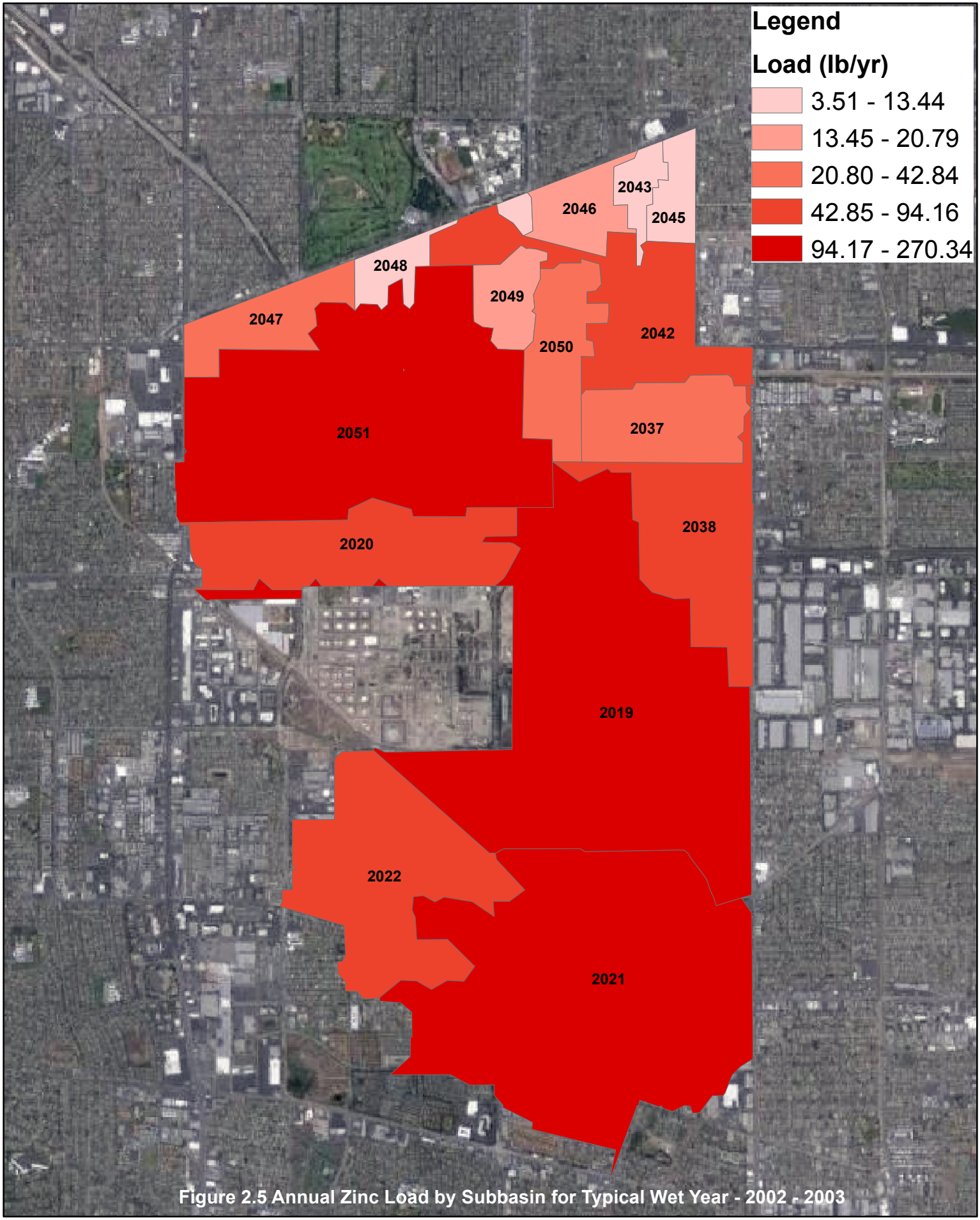


Figure 2.5 Annual Zinc Load by Subbasin for Typical Wet Year - 2002 - 2003

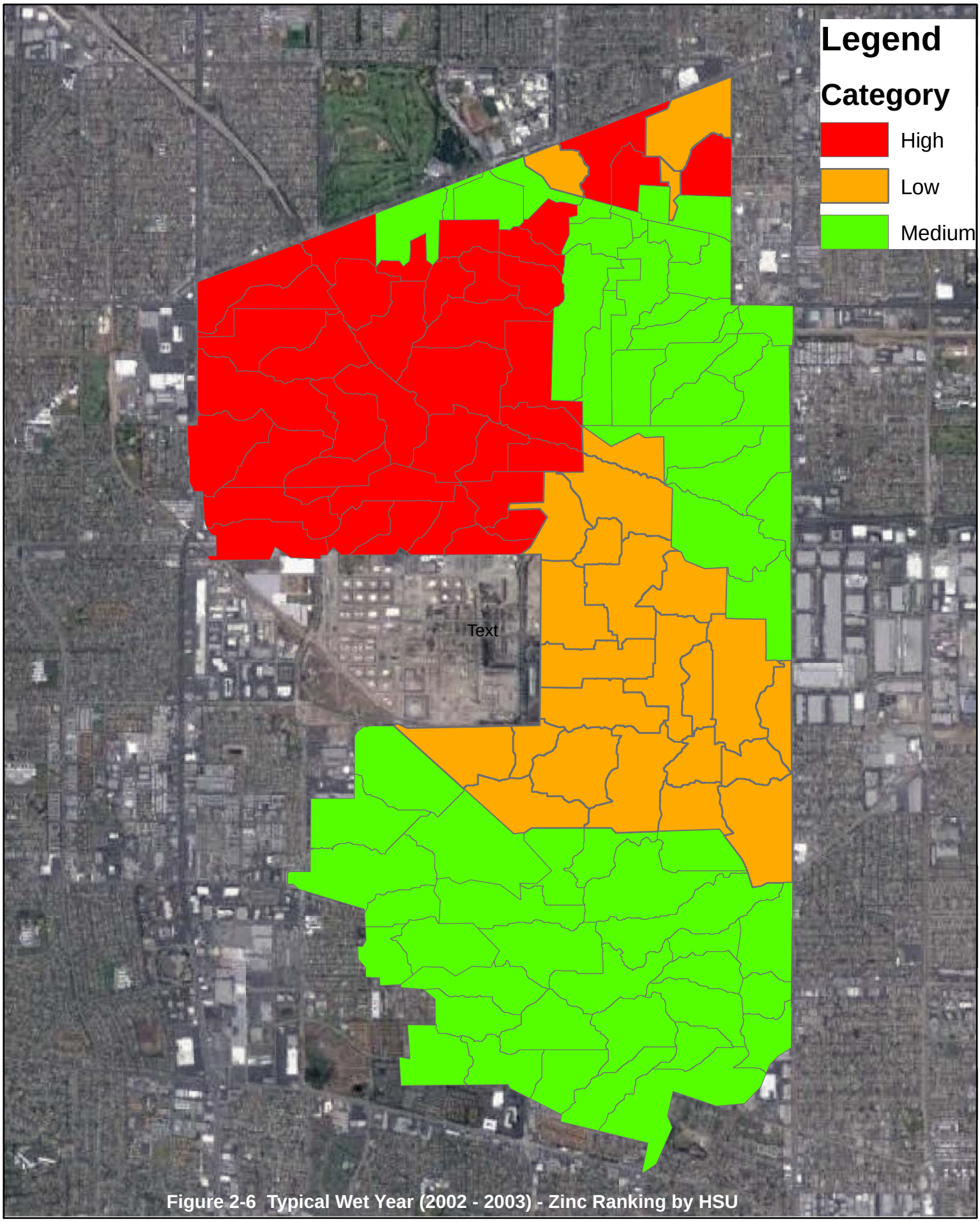


Figure 2-6 Typical Wet Year (2002 - 2003) - Zinc Ranking by HSU

Table 2.6 Summary Results of Critical Wet-weather (90th Percentile) Load Beach Cities EWMP City of Torrance						
Basin	90th Percentile –Day				90th Percentile Wet Year - 1995	
	Copper – 02/05/2009		Zinc – 11/08/2002			
	Volume (ac-ft)	Daily Load (lb)	Volume (ac-ft)	Daily Load (lb)	Volume (ac-ft)	Fecal Coliforms (MPN)
DC-Torrance (Assessment Point)	65.96	36.99	93.85	133.39	5333.24	6.27E+16

6.3.1 Fecal Coliform Baseline Loading –Exceedance Days

The 90th percentile wet day and dry day loading for fecal coliform was determined for the study area. The results were then compared against the applicable WQBELs, RWLs, and WQOs discussed earlier in this TM. During wet weather, the allowable load is a function of the volume of water in the channel and the fecal coliform target concentration.

The daily output concentrations from the model for the identified critical event days (1995) were compared against the applicable WQO value of 4,000 MPN/100 mL. The number of modeled exceedances for bacteria in DC-Torrance watershed is shown in Table 2.7.

Table 2.7 Modeled Bacteria Exeedance – Critical Wet-weather Conditions (1995) Beach Cities EWMP City of Torrance			
Subbasin	Total # of Critical Event Days	# of Fecal Coliform Exceedances	Fecal Coliform Exceeded (%)
DC-Torrance	210	81	38.6%

6.4 Determination of TMDL Reduction Objective

Numeric goals were calculated for each parameter based on the difference between the modeled load and calculated TMDL load for average and critical wet years. Modeled loads above the TMDL load were considered as a required reduction and subtracted from the model baseline load to develop an instream load reduction target.

6.4.1 Wet-Weather Required Reductions

The wet weather pollutant reduction targets for average and critical conditions are summarized in Table 2.8. For metals, the reductions are based on daily load and for bacteria, it is based on annual load. The determination of limiting pollutant considered implementation actions to control

the pollutant – for example, Senate Bill 346 will result in significant reductions of copper loading from brake pads.

Target load reductions (TLRs) are the reduction of baseline loads needed to achieve allowable loads for the 90th percentile day. To determine whether pollutant reductions are necessary and the extent of those reductions, the baseline loads for critical wet conditions determined from the SWMM model were compared against the allowed loading. Comparisons of baseline loading versus allowed loading are shown Table 2.9.

Interim limits, which were effective as of March 2012, for the Dominguez Channel Toxics TMDL are based on the 95th percentile of historic monitoring data, therefore MS4 agencies are assumed to be in compliance with these limits as of the effective date. Based on this, reasonable assurance of compliance with these interim limits has been demonstrated.

Table 2.8 Wet-weather Pollutant Reduction Targets[1]
Beach Cities EWMP
City of Torrance

Study Area	Metals – 90th Percentile Load Day		
	Copper	Lead	Zinc
DC-Torrance	62%*	0%*	76%*
	Fecal Coliform – 90th Percentile Wet Year		
	53%		

Notes:

(1) The critical year reduction targets were provided by Geosyntec.

* Metals TLRs reflect daily LRs on the 90th percentile wet weather load days and bacteria (fecal coliform) TLRs reflect annual LRs on the 90th percentile wet weather year.

Table 2.9 Wet-weather Load Reduction
Beach Cities EWMP
City of Torrance

Study Area	Metals			
	90th Percentile Load Day	Copper (lb)	Lead (lb)	Zinc (lb)
DC-Torrance	Copper – 02/05/2009 Zinc – 11/08/2008	22.93	0	101.38
	Fecal Coliform (MPNx10^14)			
	1995	332.3		

* Metals TLRs reflect daily LRs on the 90th percentile wet weather load days and bacteria (fecal coliform) TLRs reflect annual LRs on the 90th percentile wet weather year.

6.5 Dry-Weather Pollutant Reduction Targets

For dry weather, bacteria are the limiting pollutant (not zinc). That is bacteria are the only Category 1 or 2 WBPC. Reductions of bacteria during EWMP implementation will drive reductions of other the pollutants. This is based on qualitative analysis.

7.0 QUALITATIVE EVALUATION OF NONSTRUCTURAL AND DISTRIBUTED STRUCTURAL BMPS (CATCH BASIN FILTERS)

As shown in the previous sections, a number of nonstructural and distributed structural BMP (catch basin filters) options are needed to meet TMDL and the permit requirements. The evaluation uses identified implementation of catch basin filters and nonstructural projects to determine the set of actions that will most likely be implemented in an effort to achieve the TMDL and Permit requirements. As the implementation is an adaptive management process, the precise suite of actions and the timing may be changed to use resources more cost effectively. The adaptive management approach will allow changes in the number and type of catch basin filters and nonstructural BMPs to ensure cost effective measures are being implemented. Flexibility in the schedule and makeup of the Implementation Plan are key to adaptive management.

The qualitative analysis is based on the reductions from both nonstructural and catch basin filters that work together to reduce the concentration and load of pollutants. Generally nonstructural BMPs consist of pollution prevention activities and source control activities that reduce the amount of the constituent entering the MS4 system, ultimately reducing the concentration in stormwater. Nonstructural activities also encourage the effective use of water, aiming to reduce dry-weather flows. In this way, nonstructural activities reduce the constituent load entering catch basin filters located downstream of the sources.

7.1 Nonstructural BMPs

Non-structural BMPs committed by the Beach Cities' WMG will result in 5 percent reduction in metals and fecal coliform load. The nonstructural BMPs committed by the City are summarized in Table 2.10. The table lists the new nonstructural BMPs, enhancements to existing nonstructural BMPs, and the TMDL pollutants and flow conditions addressed. The City has committed to implement nonstructural BMPs in the DC-Torrance Watershed.

Table 2.10 Summary of Nonstructural BMPs to Support TMDL Implementation Beach Cities EWMP City of Torrance				
	Condition		Pollutants Addressed	
Nonstructural BMP	Wet Weather	Dry Weather	Bacteria	Metals
Enhancements to Existing BMPs				
Smart gardening program enhancements	√	√	◗	◗
TMDL-specific stormwater training	√	√	◗	◗
Enhancement of commercial and industrial facility inspection	√	√	◗	◗
Enhancement escalation procedures	√	√	◗	●
Improved street sweeping technology	√		◗	◗
New BMP				
Reduction of irrigation return flow	√	√	●	●
√ - applicable; ◗ - partially effective; ● - effective				

7.2 Distributed Structural BMPs - Catch Basin Filters

Roads represent a major source of TMDL pollutant loads, and therefore treating road runoff is considered a key strategy for multi-pollutant TMDL implementation. Because of the number and spatial distribution of catch basins in the DC-Torrance Watershed, they represent an excellent opportunity for treating pollutants in addition to trash. Implementing catch basin inserts throughout the DC-Torrance Watershed is highly applicable because of the high density of catch basins. The City will install about 200 catch basin filters in the DC-Torrance watershed. Catch basin filters were not evaluated quantitatively. Effectiveness of catch basin inserts to meet the study objectives was based on literature review documenting significant removal of heavy metals and experiences from nearby Cities.

Fact sheets and literature available on commercially available catch basin filters suggested that the proposed catch basin filters were effective at capturing and removing pollutants from stormwater runoff including sediments, heavy metals, and oil and grease. One of the literatures summarized the pollutant removal efficiencies provided by Grate Inlet Skimmer Box/Round Curb Inlet Basket (Schematic included in Appendix B). It included numeric pollutant reductions from various studies or independent tests between 1998 and 2007. The study on Optimization of Stormwater Filtration at the Urban/Watershed Interface conducted by the University of Irvine, California, Department of Environmental Health in 2005 was an independent test conducted to assess the pollutant removal efficiency of the Grate Inlet Skimmer Box/Round Curb Inlet Basket. This study in 2005 concluded a 99% reduction in Lead. Other studies include the field test conducted by the City of El Monte in 2002 that concluded that the Grate Inlet Skimmer Box/Round Curb Inlet Basket were effective in removing 95% of Zinc and Copper each and 87% of Lead concentrations. In addition, we also referred to the independent performance

assessment conducted by the City of Los Angeles in 2005 to evaluate the performance of storm drain inlet filter devices at removing oil and grease and associated pollutants from stormwater. The study aimed at evaluating the performance (at various stages of their useable lives) of four (4) different catch basin filters currently used by the City of Los Angeles in removing and retaining used motor oil and associated pollutants from urban runoff. This study tested the performance of five (5) different types of catch basin filters at removing sediments, trash, oil and grease, and metals for a flow rate ranging between 10 and 25 gallons per minute. It involved four (4) sampling events and five study sites. The key summary points indicated that qualitatively, the results of the study found that all of the units were moderately effective at removing oil and grease, suspended solids, and heavy metals. Furthermore, the study indicated that for most insert types, inspection and maintenance should occur before and after each rain event during wet weather and monthly during dry weather to maintain their performance integrity and to minimize leaching of previously captured pollutants.

A more recent independent test conducted in 2013-2014 by the City of Lake Forest suggested that the catch basin filters were effective in a heavy metal removal of 75%. The product tested was the Ultra Filter Sock Heavy Metal Drain Filter.

Based on literature review documenting the removal efficiencies demonstrated by the catch basin filters, the proposed catch basin inserts would meet the TLRs set forth by the Dominguez Channel Toxics TMDL with 75% as the estimated target load reduction for a flow rate ranging between 10 to 25 gallons per minute.

In addition, the City of Torrance is in the process of developing the Green Street Program and the ordinances to implement Green Street design features as part of street redevelopment. While implementing redevelopment of arterial streets, the City of Torrance would assess opportunities for Green Street design features to facilitate treatment through filtration or infiltration. Green Street elements may include infiltration trench that provides water quality treatment, reduction in peak flow discharges, and potential groundwater recharge. Other Green Street elements that may be considered include bioretention/biofiltration practices to achieve water quality treatment through filtration by vegetation and soils to remove pollutants with perforated underdrain to convey the treated runoff. The City of Torrance is committed to developing the Green Street Ordinance established and in effect by July 2015 as required by the MS4 Permit.

For bacteria, a combination of non-structural BMPs including Public Education and Outreach, reduction of irrigation return flows, and future development and implementation of Green Street design features would assist with meeting the TLRs for bacteria. In addition, the study on Optimization of Stormwater Filtration at the Urban/Watershed Interface conducted by the University of Irvine, California, Department of Environmental Health in 2005 indicated Fecal Coliform (bacteria) removal efficiency of 33% by the Grate Inlet Skimmer Box/Round Curb Inlet Basket.

7.3 Wet Weather

The interim and final targets are presented in total acre-feet per year that requires treatment through structural BMPs. Based on literature review documenting the removal efficiencies demonstrated by the catch basin inserts, it can be justified that the City's proposal to implement catch basin inserts to meet the TLRs set forth by the Dominguez Channel Toxics TMDL would be realistic and achievable.

Table 2.11 summarizes the catch basin filters identified through the RAA to address the TMDL implementation.

Table 2.11 Summary of Structural BMPs to Support TMDL Implementation
Beach Cities EWMP
City of Torrance

Structural BMP	Condition		TMDL Pollutant Addressed	
	Wet Weather	Dry Weather	Bacteria	Metals
Catch Basin Filters Distributed BMPs				
Catch basin Filters	√	√	●	●
Green Street Elements	√	√	●	●

√ - applicable; ○ - not effective; ● - effective

7.4 Dry Weather

Although clearly defined definitions exist for wet periods, definitions for dry periods are less clearly defined. Wet weather periods are either defined in terms of rainfall or instream flow. For bacteria, a wet day is one with a rainfall total greater than 0.1 inches plus the three subsequent days, while metals criteria define wet days as those with instream flow above the 90th percentile. One seemingly intuitive way of defining a dry period is simply to use the "non-wet" days represented as the inverse of wet days. However, summary of model results indicate some residual influence of wet weather among the "non-wet" days. This presents some challenges for estimating loads and evaluating dry weather compliance because BMP planning would be better served by choosing design conditions that are more influenced by natural background baseflow and/or anthropogenic activities such as point source discharges or dry weather runoff from irrigation (instead of post-rain event interflow).

Dry weather reductions are attained through a combination of non-structural practices including flow reduction source controls as discussed in the EWMP.

The dry weather load reduction will focus on non-structural source control and pollution prevention measures that are designed to reduce the amount of pollutants and understand the effect of pollutants entering runoff though education, enforcement and behavioral modification programs. The City plans to continue and extend the dry weather flow diversion program to the

Dominguez Channel. This program will reduce runoff and pollutant loads by diverting non-storm water discharges to the sanitary sewer system and/or vegetated areas for infiltration.

8.0 POLLUTANT REDUCTION PLAN

Fact sheets and literature available on commercially available catch basin filters were reviewed and the results were discussed in earlier sections.

The Pollutant Reduction Plan is considered an "initial" scenario because over time, through adaptive management, the responsible agencies will likely "shift" among different types of BMPs (e.g., increase implementation of green streets and reduce implementation of regional BMPs) or substitute alterative BMPs altogether (e.g., implement dry wells instead of green streets). These shifts will be supported by analyses to show the substituted BMPs provide an equivalent target load reduction as the replaced BMPs.

Table 2.12 shows the qualitative analyses were performed to evaluate the ability of BMPs to meet load reduction targets associated with WLAs.

Table 2.12 Pollutant Reduction After Implementing catch Basin BMPs
Beach Cities EWMP
City of Torrance

Pollutants	Existing Load	Target Load Reduction (%)	Nonstructural BMP	Distributed Structural BMPs (Catch Basin Inserts)	Structural + Nonstructural BMPs
Zinc 90th Percentile Load Day - 11/08/2002					
Copper (lb/d)	36.99	62%	5%	75%	80%
Zinc (lb/d)	133.39	76%	5%	75%	80%
Critical Wet Year - 1995					
Fecal Coliform (MPN/yr) x10^14	627	53%	5%	33%	38% plus filtration/infiltration opportunities through potential Green Street Implementation in future.

No TMDL developed for fecal coliform. Target Load Reduction calculated based on REC-1 standard and high-flow suspension days.

Note:

The City of Torrance is following the adaptive management approach that would allow them to monitor the performances of proposed distributed structural BMPs (catch basin filters) and non-structural best management practices with respect to meeting the established TLR requirements.

Table 2.12 Pollutant Reduction After Implementing catch Basin BMPs Beach Cities EWMP City of Torrance					
Pollutants	Existing Load	Target Load Reduction (%)	Nonstructural BMP	Distributed Structural BMPs (Catch Basin Inserts)	Structural + Nonstructural BMPs

In addition, the City of Torrance is kick-starting building the Green Street Program and the ordinances to consider implementation of Green Street design features as part of street redevelopment within the City of Torrance. While implementing redevelopment of arterial streets, the City would assess opportunities for Green Street design with measures for treatment through filtration or infiltration. Green Street elements may include infiltration trench that provides water quality treatment, reduction in peak flow discharges, and potential groundwater recharge. Other Green Street elements that may be considered include bioretention/biofiltration practices to achieve water quality treatment through filtration by vegetation and soils to remove pollutants with perforated underdrain to convey the treated runoff. The City of Torrance is committed to developing the Green Street Ordinance established and in effect by July 2015 as required by the MS4 Permit.

Based on the monitoring results, the City of Torrance would consider additional control measures if the required TLRs were not met or other improvements to existing best management practices were found necessary. This would allow changes in the number and type of best management practices selected for implementation. Through adaptive management and based on the future monitoring results, the implementation schedules may be modified to reflect the increased knowledge of the watershed. Actual schedule for Implementation of BMPs will occur as funding becomes available.

8.1 Implementation Schedules

The estimated implementation schedules for the nonstructural and catch basin filters that are being considered by the City of Torrance to comply with WLAs and the Permit requirements are discussed below. The schedules presented herein are sufficient for long-term planning. Through adaptive management and based on the future monitoring results, the implementation schedules may be modified to reflect the increased knowledge of the watershed. Actual schedule for Implementation of BMPs will occur as funding becomes available.

8.1.1 TMDL Schedule

The TMDL implementation schedule consists of a phased approach, with interim WLAs to be met by March 23, 2012, and full compliance by March 23, 2032. Interim milestones for metals have been assumed to be met. Interim limits, which were effective as of March 2012, for the Dominguez Channel Toxics TMDL are based on the 95th percentile of historic monitoring data, therefore MS4 agencies are assumed to be in compliance with these limits as of the effective date.

For bacteria, no TMDL has been developed for fecal coliform. Reduction was estimated based on the Ballona Creek Bacteria TMDL. For bacteria, a combination of non-structural BMPs including Public Education and Outreach, reduction of irrigation return flows, and future development and implementation of Green Street design features would assist with meeting the TLRs for bacteria. In addition, the study on Optimization of Stormwater Filtration at the Urban/Watershed Interface

conducted by the University of Irvine, California, Department of Environmental Health in 2005 indicated Fecal Coliform (bacteria) removal efficiency of 33% by the Grate Inlet Skimmer Box/Round Curb Inlet Basket.

8.1.2 Nonstructural BMP Schedules

An estimated schedule for the nonstructural BMPs is summarized in Table 2.13. The schedule accounts for the planning and design of the nonstructural BMP programs and the long-term implementation of the programs.

8.1.3 Distributed Structural BMPs (Catch Basin Filters) Schedules

Catch basin inserts were identified as part of the RAA analysis that the City of Torrance would consider implementing as part of the EWMP process. The City of Torrance is committed to implementing catch basin filters to meet the TLR and an estimated schedule for implementation has been presented in Table 2.14.

9.0 CONCLUSIONS

The City has completed a Reasonable Assurance Analysis (RAA) for TMDL pollutants and those pollutants that may reasonably be expected to exceed ambient water quality standards in receiving waters during wet weather conditions. Facilitating the RAA is the model recommended by Los Angeles County: *Loading Simulation Program in* C++ *(LSPC).* Based on qualitative analysis of proposed BMPs, the City is expected to meet the Dominguez Channel Toxics TMDL and the bacteria target load reductions.

10.0 REFERENCES

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3. Guidance for Performing Reasonable Assurance Analysis in a watershed management program, including an enhanced Watershed Management Program, Los Angeles Regional Water Quality Control Board, March 2014
4. BASINS Information and User's Guidance, U.S. EPA, 2001
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6. System for Urban Stormwater Treatment and Analysis IntegratioN (SUSTAIN) User's Manual Version 1.2, U.S. EPA, 2012
7. P8 Urban Catchment User's Manual, IEP, Inc.
8. Phosphorus Removal by Urban Runoff Detention Basins, Athayde et. al, 1983
9. Beach Cities EWMP Update dated February 2015, prepared by Geosyntec Consultants.

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11. Removal Efficiencies of Grate Inlet Skimmer Box/Round Curb Inlet Basket as per Longo Toyota – Independent Field Test conducted in 2002 by the City of El Monte.
12. Optimization of Stormwater Filtration at the Urban/Watershed Interface, Department of Environmental Health, Independent Test conducted by the University of California, Irvine, in 2005.
13. The California Integrated Waste Management Board Catch Basin Insert Study Final Report, May 2005.
14. The City of lake Forest, Ultra Filter Sock Heavy Metal Drain Filter, Independent test, conducted by Environmental Chemistry lab, 2013-2014.

Table 2.13 Proposed Implementation Schedule for Nonstructural BMPs
Beach Cities EWMP
City of Torrance

Structural Project	Duration (months)	Timeline				
		2014	2015	2016	2017	2018
Catch Basin Cleanouts						
Purchase Advanced cleaning Technology (steam cleaning), as needed		■				
Focus on Problem Areas	3 – 6	■	■			
Increase Frequency of Cleanouts	Ongoing		■	■	■	■
Catch Basin Inserts						
Install Catch Basin Inserts in Implementation Area	Ongoing	■	■	■	■	■
Downspout Disconnection Program						
Planning & Assessment	8 – 12		■	■		
Implementation	24			■	■	
Fats, Oils and Grease Outreach						
Focus on Residents in TMDL Implementation Area	8 – 12				■	■
Continuation of Existing FOG Outreach	Ongoing	■	■	■	■	■
Green Waste Outreach						
Planning & Assessment	8 – 12			■	■	
Implementation	24				■	■
Illicit Connection Removal						
Survey System in TMDL Implementation Area	24		■	■		
Implementation	24 – 36				■	■

Table 2.13 Proposed Implementation Schedule for Nonstructural BMPs
Beach Cities EWMP
City of Torrance

Structural Project	Duration (months)	Timeline				
		2014	2015	2016	2017	2018
Impervious Cover Reduction						
Assess Feasibility of Reducing Existing Impervious cover	8 – 12					
Implementation, if appropriate	24					
Industrial/Commercial Facilities Control Program						
Nutrients and Toxics Specific Training	3 – 6					
Outreach to Facilities to Improve Onsite Source Control Activities	8 – 12					
Continuation of Existing I/C Facilities Program	Ongoing					
Pet Waste Outreach						
Planning & Assessment	8 – 12					
Implementation of Pet Waste Bag Dispenser Stations in TMDL Implementation Area	8 – 12					
Focus on TMDL Implementation Area Resident Outreach	24					
Continuation of Existing Pet waste Outreach	Ongoing					
Post Construction Requirements						
Specialized Nutrient, Toxics and Runoff Reduction Training for Staff	3 – 6					
Require Implementation of BMPs that Effectively Remove Nutrients and Toxics for Redevelopment Projects in County Islands	Ongoing					

Table 2.13 Proposed Implementation Schedule for Nonstructural BMPs
Beach Cities EWMP
City of Torrance

Structural Project	Duration (months)	Timeline				
		2014	2015	2016	2017	2018
Sewer System Maintenance						
Specialized Training for Staff	3 – 6					
Focus maintenance in County Islands	8 – 12					
Smart Gardening Program						
Planning & Assessment	8 – 12					
Implementation	Ongoing					
Street and Parking Lot Sweeping						
Planning & Assessment	8 – 12					
Upgrade/Purchase More Effective Street Sweepers, as needed	3 – 6					
Conduct Residential Outreach	8 – 12					
Increase Frequency of Sweeping	Ongoing					

Table 2.14 Implementation Schedule for Distributed Structural BMPs (Catch Basin Inserts)
Beach Cities EWMP
City of Torrance

Structural Project	Timeline								
	2015	2017	2019	2021	2023	2025	2027	2029	2031
Catch Basin Inserts									
Green Street Elements									

Note:

Catch Basin Inserts are the distributed structural BMPs identified to be considered by the City of Torrance for implementation. The City has committed to the implementation of catch basin inserts to meet TLR requirements.

Based on literature review documenting the removal efficiencies demonstrated by the catch basin inserts, we justify that our proposal to implement catch basin inserts to meet the TLRs set forth by the Dominguez Channel Toxics TMDL would be realistic and achievable.

In addition, the City of Torrance is kick-starting developing the Green Street Program and the ordinances to consider implementation of Green Street design features as part of street redevelopment within the City of Torrance. While implementing redevelopment of arterial streets, the City would assess opportunities for Green Street with measures for treatment through filtration or infiltration. Green Street elements may include infiltration trench that provides water quality treatment, reduction in peak flow discharges, and potential groundwater recharge. Other Green Street elements that may be considered include bioretention/biofiltration practices to achieve water quality treatment through filtration by vegetation and soils to remove pollutants with perforated underdrain to convey the treated runoff. The City of Torrance is committed to developing the Green Street Ordinance established and in effect by July 2015 as required by the MS4 Permit.

For bacteria, a combination of non-structural BMPs including Public Education and Outreach, reduction of irrigation return flows, and future development and implementation of Green Street design features would assist with meeting the TLRs for bacteria. In addition, the study on Optimization of Stormwater Filtration at the Urban/Watershed Interface conducted by the University of Irvine, California, Department of Environmental Health in 2005 indicated Fecal Coliform (bacteria) removal efficiency of 33% by the Grate Inlet Skimmer Box/Round Curb Inlet Basket.

APPENDIX A – SUMMARY OF LOAD ESTIMATION

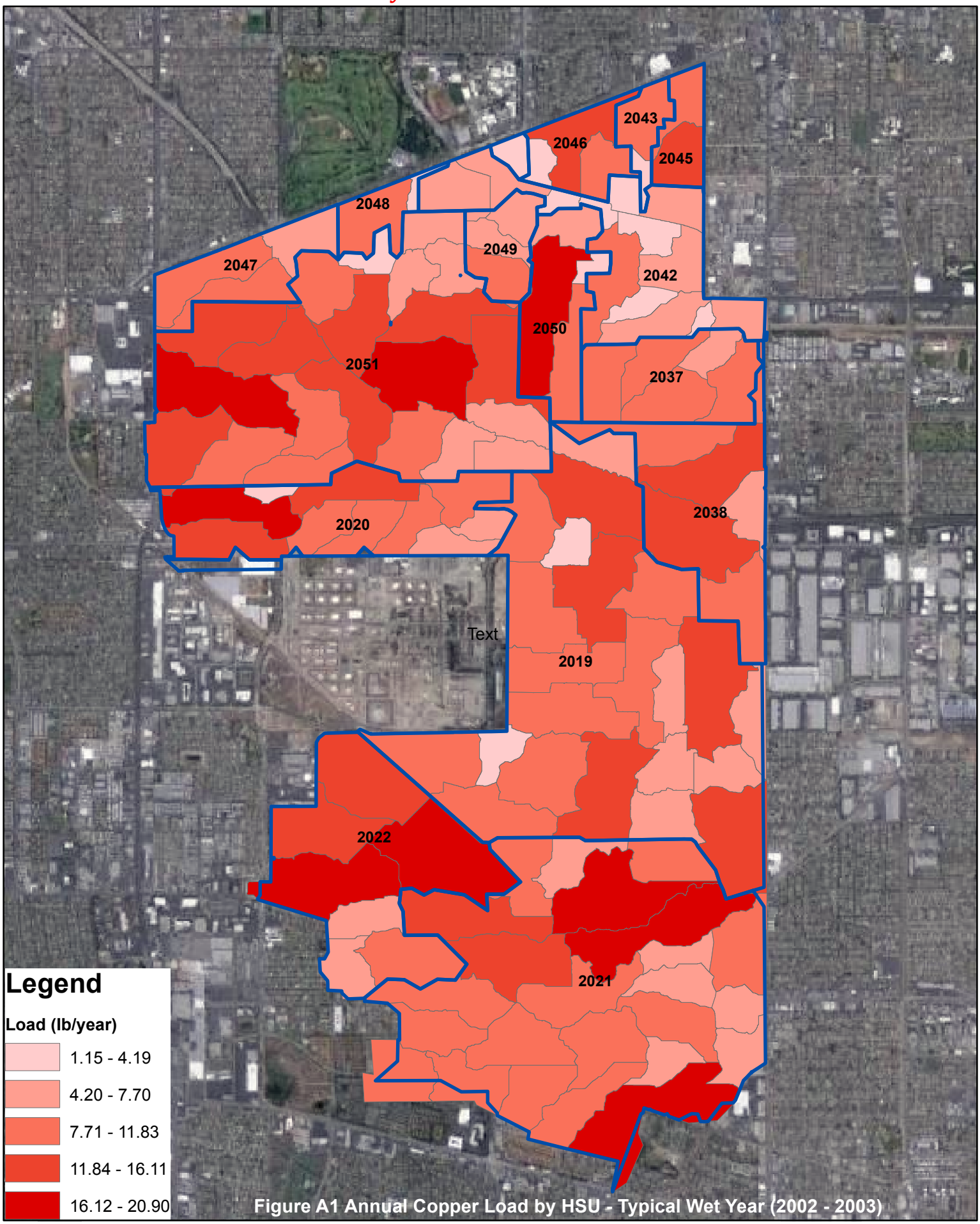

Figure A1 Annual Copper Load by HSU - Typical Wet Year (2002 - 2003)

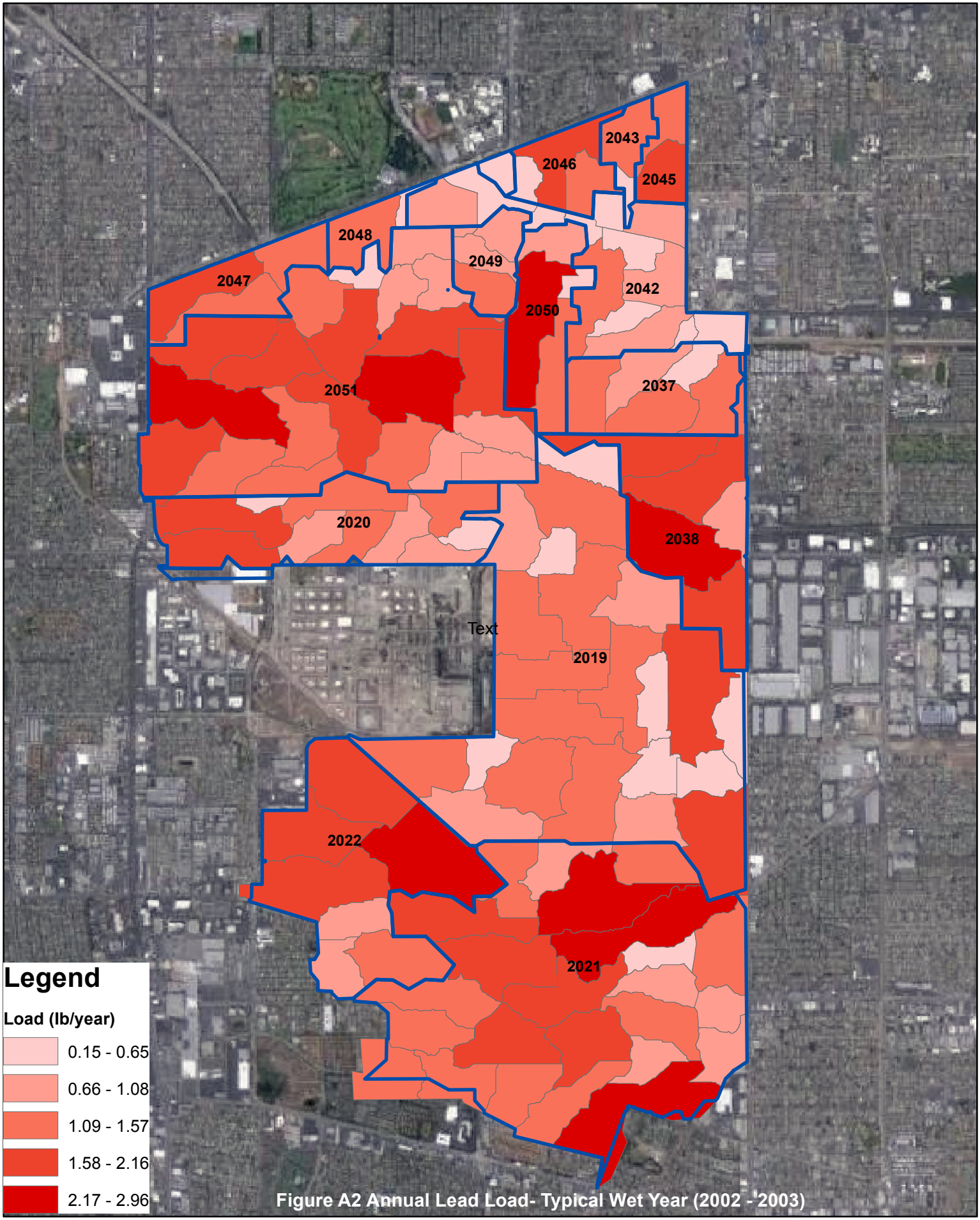

Figure A2 Annual Lead Load- Typical Wet Year (2002 - 2003)

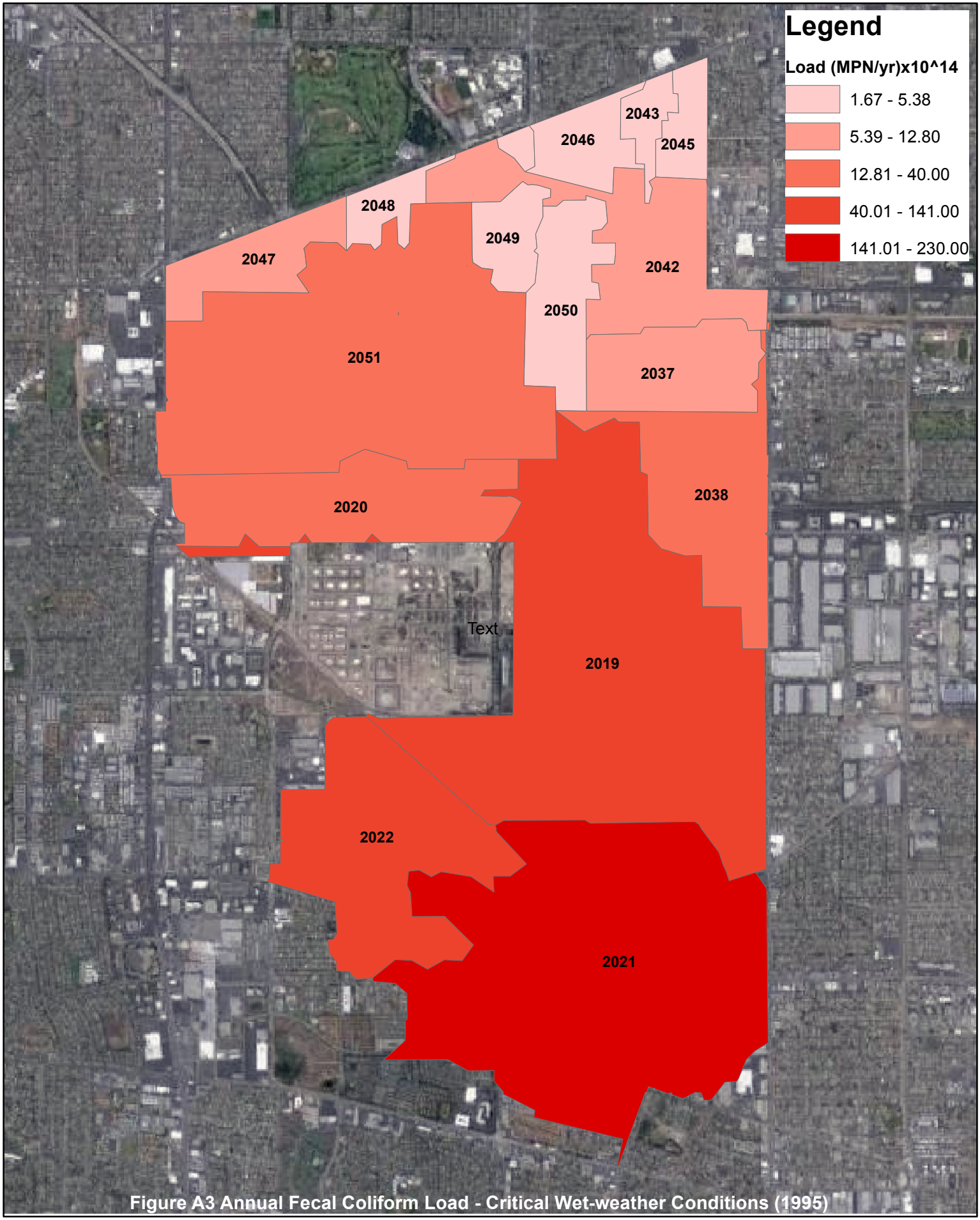

Figure A3 Annual Fecal Coliform Load - Critical Wet-weather Conditions (1995)

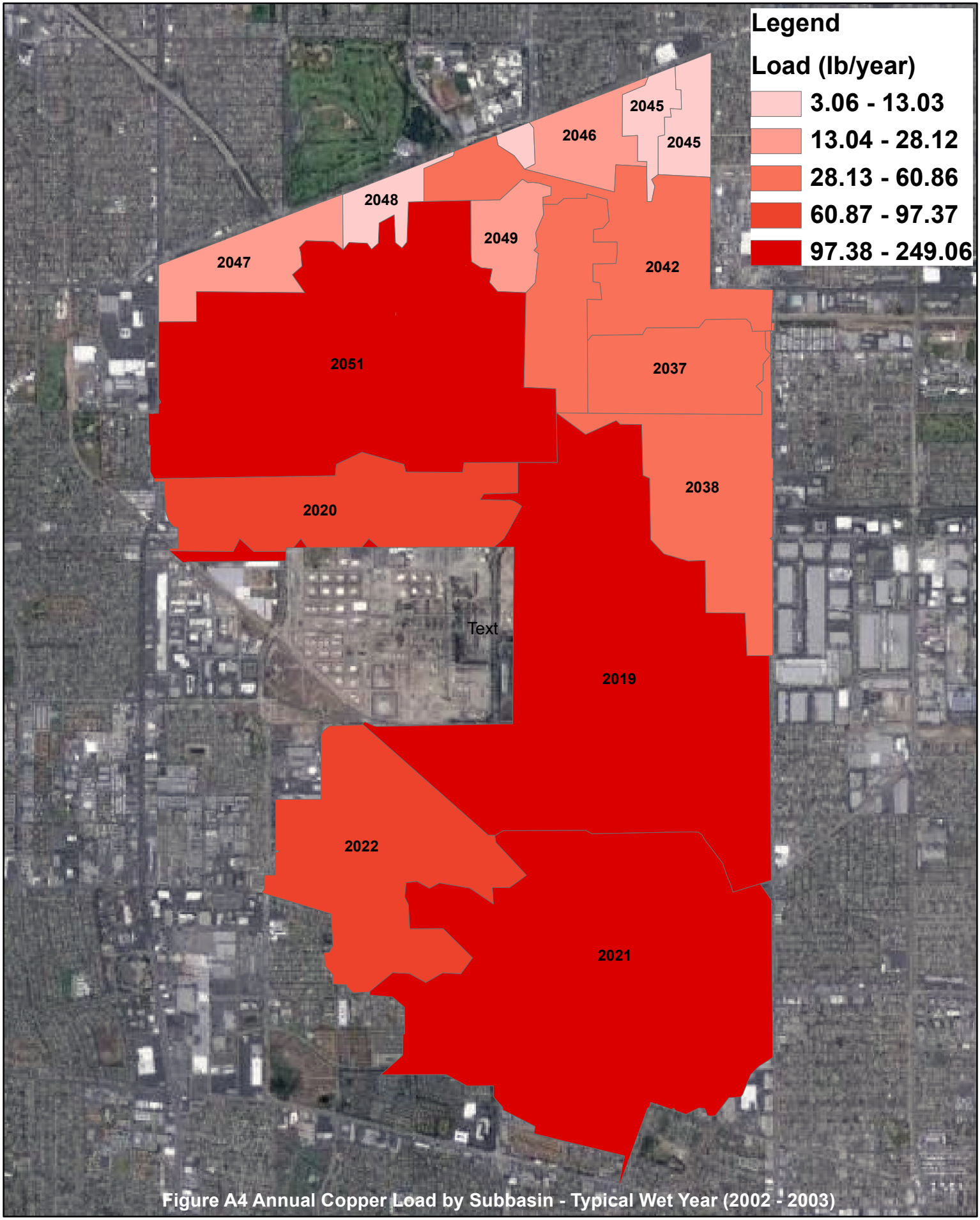

Figure A4 Annual Copper Load by Subbasin - Typical Wet Year (2002 - 2003)

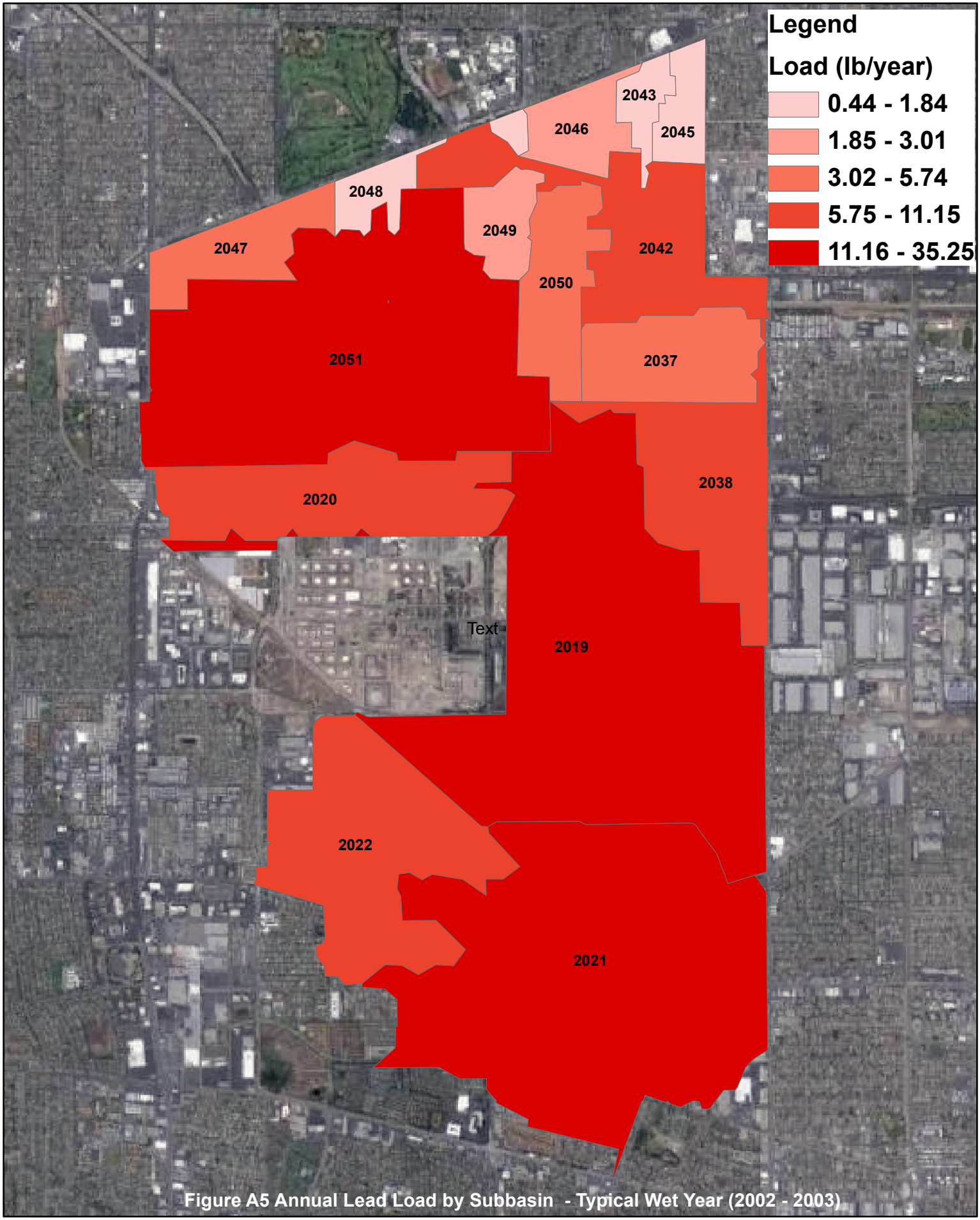

Figure A5 Annual Lead Load by Subbasin - Typical Wet Year (2002 - 2003)

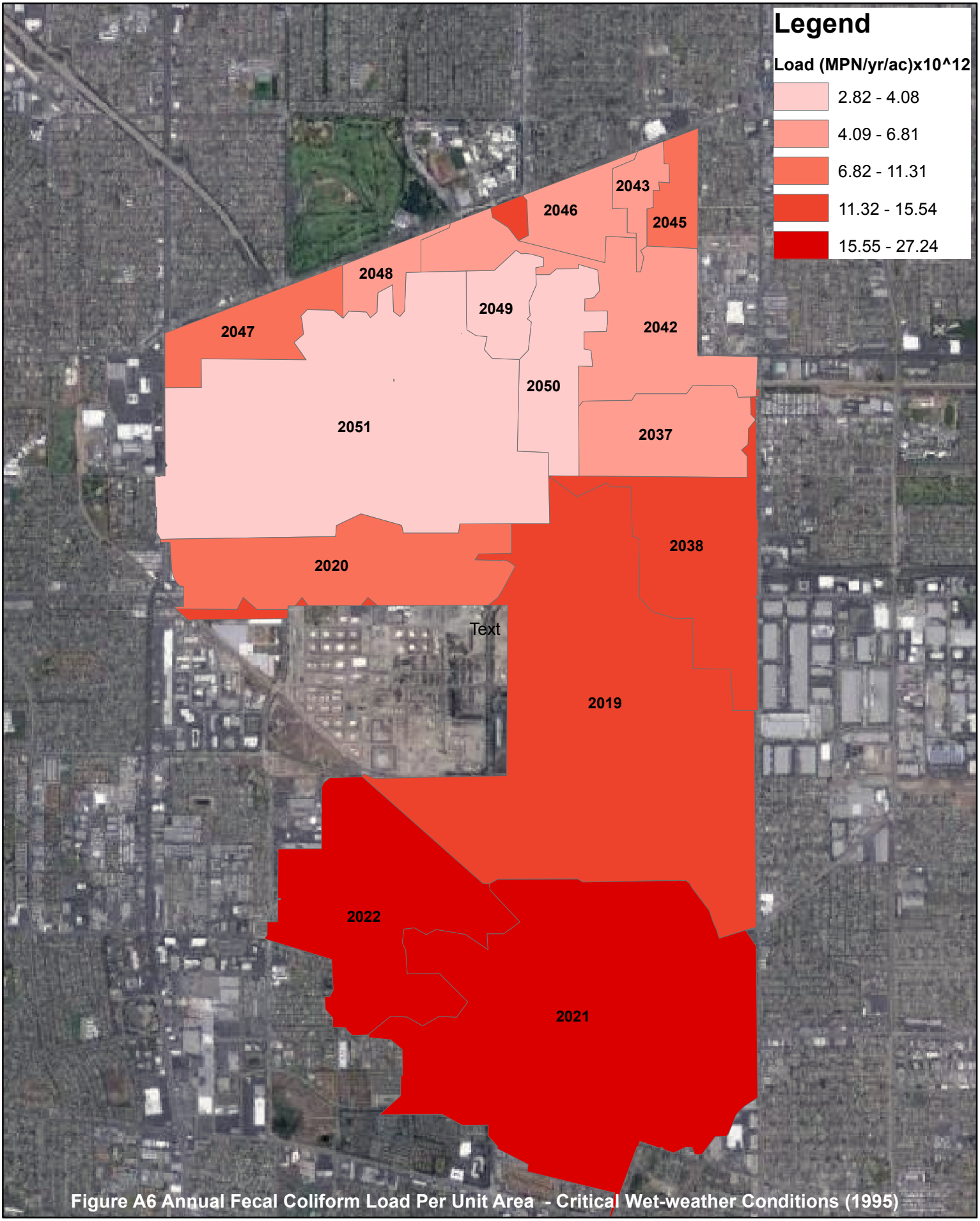

Figure A6 Annual Fecal Coliform Load Per Unit Area - Critical Wet-weather Conditions (1995)

APPENDIX B – CHARACTERISTICS CATCH BASIN INSERTS LITERATURE AND REFERENCES

ARB Contractors

3/24/2014-JTH

					Test Results			
	Laboratory	Date	Date		Conductance	Ph	TSS	Oil & Grease
	Test	Sample	Report	Tech	uMHOS	ph Units	mg/L	mg/L
1	Enviro-Chem	10/9/13	10/21/13	Coyne	609	6.33	322	4.05
2	Enviro-Chem	2/27/14	3/7/14	Coyne	153	7.28	332	2.34
3								
4								
5								
6								

Bench Mark	up to 200	6.5-8.5	up to 100	up to 15
Test-Method	SM 2510B	SM 4500-H+B	SM 2540D	EPA 413.2

Catchbasinfilter.com
Southern California

UltraTech International, Inc.

Heavy Metal Drain Filter - Ultra-Filter Sock®

Heavy Metal Drain Filter is a density polyethylene woven geo - textile sock with media type.

ULTRA-FILTER SOCK ®			
Part#	**Description**	**Dimensions** in (mm)	**Weight** lbs. (kg)
9453	Activated Carbon	108 x 7 x 4 (2,743 x 178 x 102)	40.0 (18.0)
9455	Sorb 44	108 x 7 x 4 (2,743 x 178 x 102)	15.0 (7.0)
9457	Sediment Removal	108 x 7 x 4 (2,743 x 178 x 102)	40.0 (18.0)
9456	Phos Filter	108 x 7 x 4 (2,743 x 178 x 102)	66.0 (30.0)
9454	Heavy Metal Removal	108 x 7 x 4 (2,743 x 178 x 102)	35.0 (16.0)
* Multiple Ultra-Filter Socks can be used in a “treatment train” if the potential for more than one contaminant or a large quantity of a single contaminant is present.			

Media Specifications

Media Type	Capacity Information
Activated Carbon	Each Filter Sock is filled with granular activated carbon. This media is an excellent polishing filter, due to its immense surface area and the wide range of components it is capable of absorbing. Helps with removing odors. Dry Filter Sock Weight of approximately 36 lbs
Heavy Metal Removal Media	Each Filter Sock can remove up to 1145 grams of heavy metals • Removal rates up to 50% per Filter Sock • See Heavy Metal Removal Data Sheet for more information • Dry Filter Sock Weight is approximately 32.5 lbs
Sorb 44	Each Filter Sock can absorb up to 5.33 gallons (20 liters) of hydrocarbon • Dry Filter Sock Weight is approximately 9 lbs
PhosFilter	Each Filter Sock can remove up to 26 lbs of phosphorus with up to 95% efficiency • Dry Filter Sock Weight is approximately 50 lbs
Sediment Removal Media	Recycled rubber material keeps unit in place and allows for maximum water flow • Dry Filter Sock Weight is approximately 40 lbs

* Note – All information is based on a standard 9-foot long Ultra-Filter Sock

Manufacturer: UltraTech International, Inc. All data provided by manufacturer
Authorized Distributor: Catchbasinfilter.com John Commercial Services.

Catchbasinfilter.com
Southern California

Heavy Metal Removal Media Data

List of Filterable Metals
Rubidium, Lithium, Potassium, Caesium, Ammonium, Sodium, Calcium, Silver, Cadmium, ***Lead***, ***Zinc***, Barium, Strontium, ***Copper***, Mercury, Magnesium, Iron, Cobalt, Aluminum, Chromium

Experimental Results
Percent Reduction (assumes 1" of head pressure and 15 second exposure time)

Initial Metal Concentration (ppm)	Percent Removal
4.0	30%
.04	50%

Saturation Point
The saturation point of the Heavy Metal Removal Media is 0.07 mg heavy metal/g of Media
This translates to 31.8 g of heavy metal/lb of Media

*Capacity of Different UltraTech Products**

Part Number	Description	Capacity (grams of Metal removed)
9397	Ultra-Drainguard, Heavy Metal Model	**190**
9460	Ultra-HydroKleen Media Filter 285	**285**
9302	Ultra-Downspout Guard (Standard)	**475**
9301	Ultra-Downspout Guard (Large)	**715**
9454	Ultra-Filter Sock (9-foot length)	**1145**

* - Actual results may vary based on initial metal concentration and site flow conditions

Solid Waste Recovery Efficiency +80.0% (Removal of solid particulate @ greater than .05 or 1 millimeter in diameter)
Total Suspended Solids (TSS) capture ++80% w debris catch over outlet.
Filter Test Results Per 22" of Media @ 100% Fill Rate = +80% Oil/Grease HydroCarbons & 60% Total Phosphorus (TP)

1) All flow thru test data completed by independent field test 1/31/2007 Filter Used: UltraTech Heavy metal Filter 9454 diameter 9' Filter Sock Tube 100% Fill Media.
2) Capacity: 4'x 8"
3) Final performance will vary based on open CB inlet drain type, design, grade, outlet, CFM, dimensions, solid waste type, maintenance, filter configuration. Results will vary by site installation.

Manufacturer: UltraTech International, Inc. All data provided by manufacturer
Authorized Distributor: Catchbasinfilter.com John Commercial Services.

Recommended Filter Replacement every 6 months as necessary.

CIWMB CATCH BASIN INSERT STUDY
FINAL REPORT

USED OIL RESEARCH, TESTING, AND DEMONSTRATION GRANT

Third Cycle

Grant Number URD3-02-0005

Prepared for:

The California Integrated Waste Management Board

Prepared by:

GeoSyntec Consultants
Portland, Oregon

University of California
Los Angeles

May 24, 2005

ACKNOWLEDGEMENTS

The California Integrated Waste Management Board partially funded this study through the Used Oil Research, Testing and Demonstration Grant to evaluate the performance of catch basin insert technology and methods in removing oil & grease and coarse sediments in the City of Los Angeles. The project benefited greatly from the assistance provided by the City of Los Angeles' contribution of staff time and costs in locating and providing the catch basins.

GeoSyntec Consultants and the University of California, Los Angeles (UCLA) performed the research reported herein. The Principal Investigators of this study were Eric W. Strecker of GeoSyntec Consultants and Professor Michael K. Stenstrom of UCLA. GeoSyntec staff that provided significant contributions to the project and final report includes Marc Leisenring, Dan Pankani, Chad Bird, and Andi Thayumanavan. UCLA research staff that provided significant contributions to this study includes Dr. Sim Lin Lau, Dr. Younghan Han, Simon Ha, Min-mo Chung, and Joo-Hyun Khang.

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1 INTRODUCTION

Used motor oil and other oils and greases entering storm drains represent a significant source of pollution to the waters of California, especially in highly urbanized areas, such as the City of Los Angeles. Increasingly, pollutants associated with used motor oil, such as heavy metals and petroleum hydrocarbons, have been identified as primary constituents contributing to the decline of surface water quality in California over the past several decades. Motor oil, including crankcase, transmission, gearbox, and differential lubricating oil, that leaks from automobiles or is disposed of improperly often ends up in storm drains and eventually receiving waters.

Although the use of inlet and catch basin filters has become a significant component of many agencies' non-point pollution control strategies to control oil and grease discharges, only limited third-party performance monitoring and testing has been conducted to quantitatively assess the ability of these technologies to remove oil and grease from stormwater as well as the associated other pollutants. Even fewer studies are available that assess changes in performance as filters are exposed to field conditions and no studies were found that assess the ability of inserts to retain used motor oil after an illegal dumping activity.

The City of Los Angeles has installed several types of oil-absorbent catch basin/inlet inserts in their storm drain system in partial fulfillment of the requirements of NPDES Permit No. CAS004001. These inserts have been installed according to the design requirements of the Los Angeles County Standard Urban Stormwater Mitigation Plan (SUSMP). However, the effectiveness and long-term performance of many of these inserts at removing and retaining oil and grease, as well as other pollutants is relatively unknown (i.e. limited to vendor reported or claimed performance estimates, which often report percent removals when new or were assessed in only limited studies). Furthermore, the methods used to define performance often vary significantly between vendors, as well as in independent third-party studies. Therefore, the transferability and compatibility of available performance data is extremely limited.

1.1 PROJECT PURPOSE AND GOALS

The purpose of this study was to provide an independent performance assessment of storm drain inlet filter devices at removing oil and grease and associated pollutants from stormwater. The first goal of the study was to assess the stormwater quality issues of oil and grease in the City of Los Angeles and provide a thorough literature review of catch basin insert technologies and methods for evaluating performance as it relates to the removal of oil and grease from urban runoff. The second goal was to evaluate the performance (at various stages of their useable lives) of four (4) different catch basin filters currently used by the City of Los Angeles in removing and retaining used motor oil and associated pollutants from urban runoff, as well as from illicit and accidental dumping activities.

1.2 DOCUMENT ORGANIZATION

After this introductory section, this document is organized into four main sections: Section 2 - Literature Review, Section 3 - Methodology, Section 4 - Results and Discussion, and Section 5 - Summary and Conclusions. Section 2 briefly assesses the current stormwater quality issues of oil and grease in the City of Los Angeles and reviews various catch basin insert technologies and available performance studies. Section 3 outlines the methodologies for evaluating catch basin insert performance for both the field and laboratory components of the study. Section 4 discusses the performance implications of the field observations and summarizes the results of

the laboratory tests. Finally, Section 5 summarizes the overall study and provides recommendations for future research.

In addition to the main text, Appendix A includes detailed maps identifying the location of the catch basins used in the study, Appendix B includes the field inspection photos and notes, and Appendix C provides the extraction method used for the laboratory oil and grease tests.