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

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[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]:

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[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.
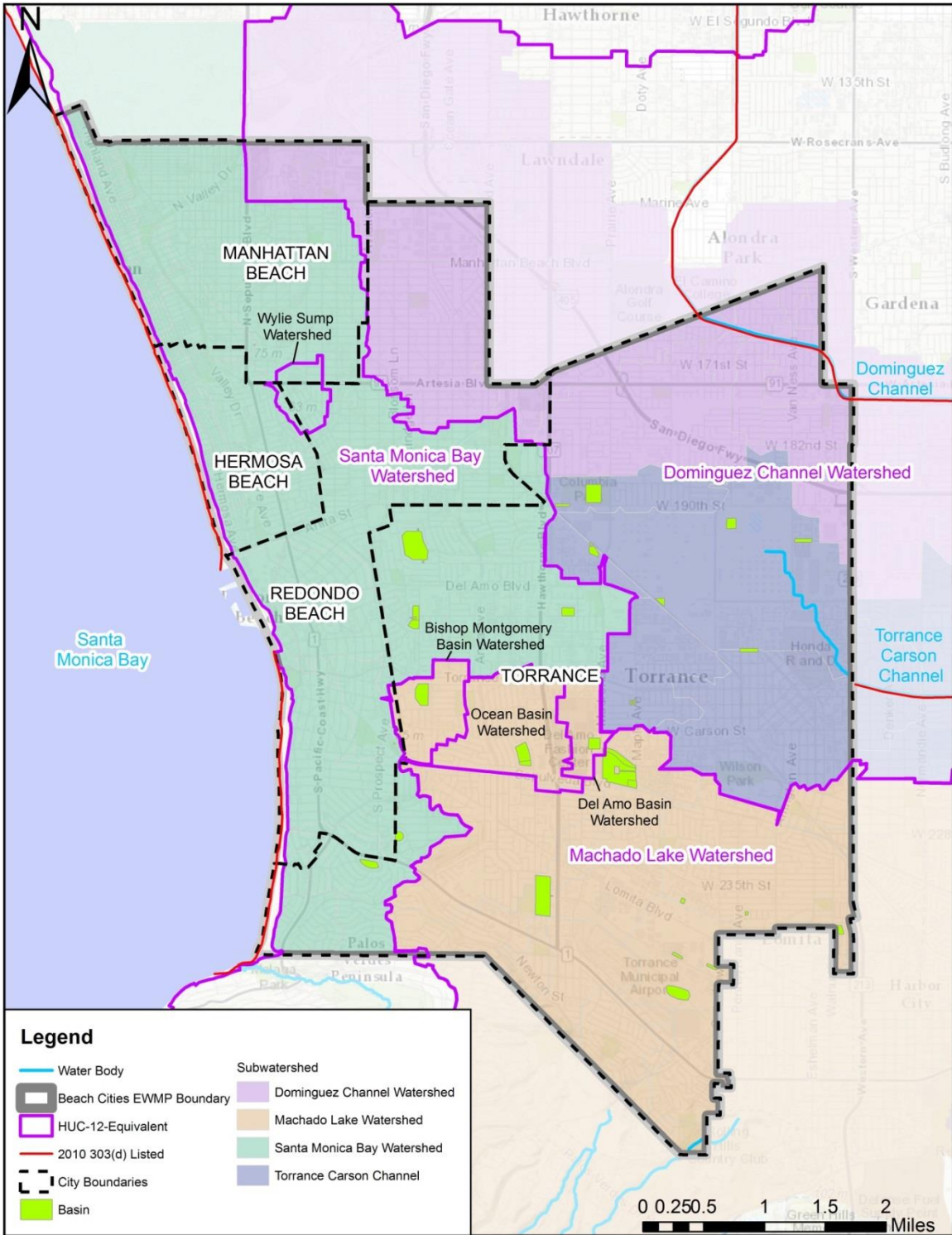
Figure ES-1. Beach Cities EWMP Area

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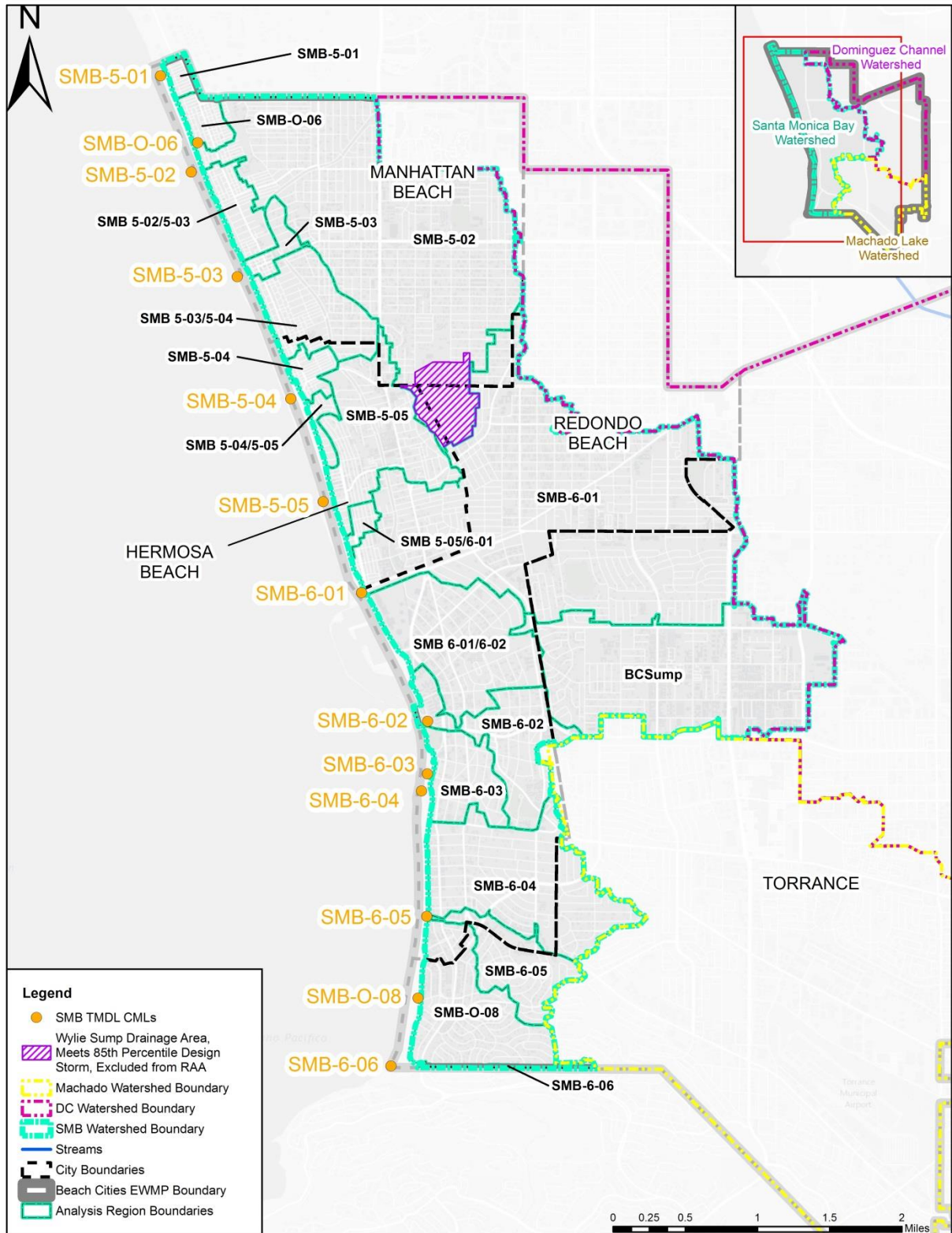
Figure ES-2. Reasonable Assurance Analysis Regions within the SMB Watershed portion of the Beach Cities EWMP Area

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			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	Interim target load reduction assessed on a watershed-wide basis		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.
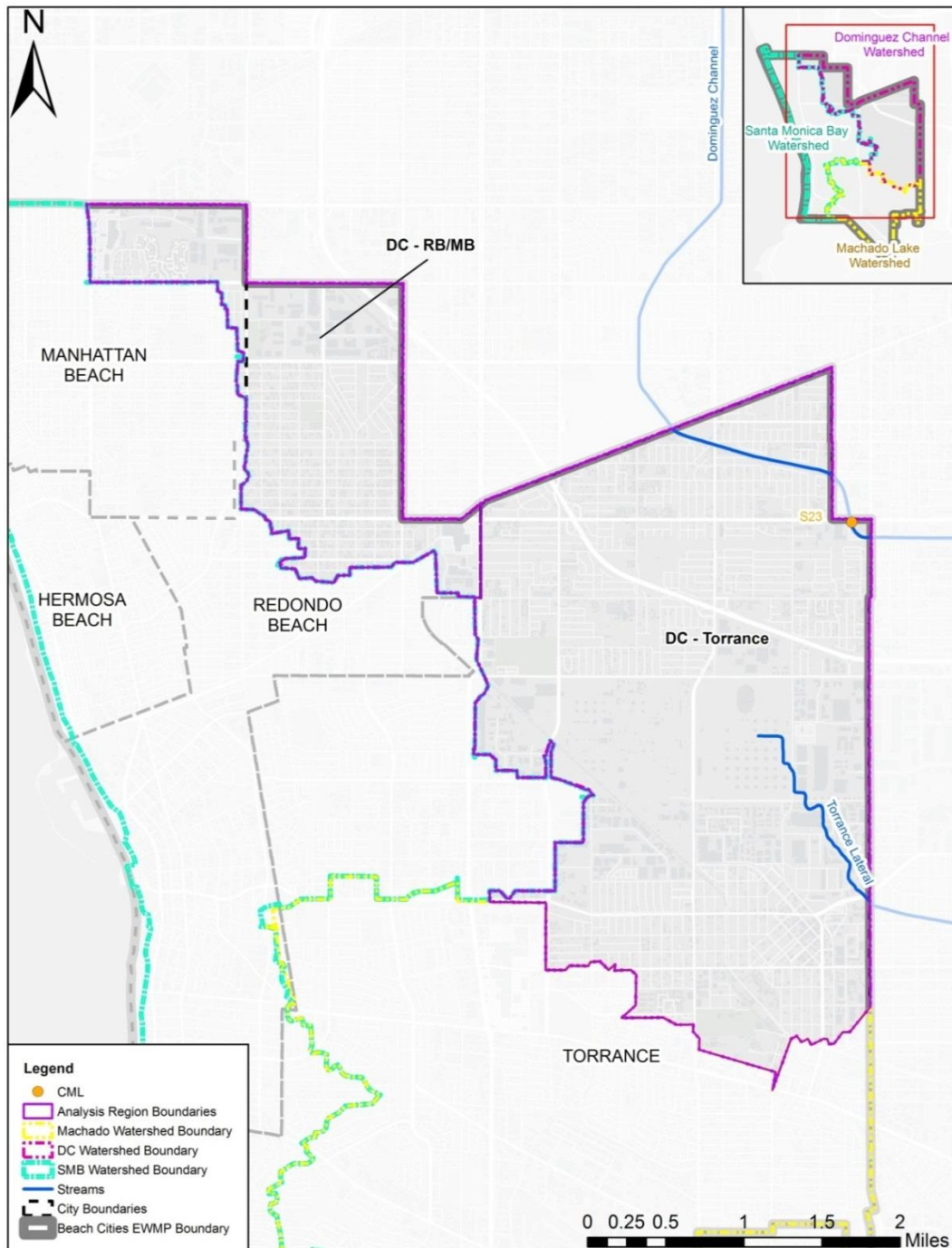
Figure ES-3. Analysis Regions within the Dominguez Channel Watershed portion of the Beach Cities EWMP Area

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 <u>non-modeled non-structural (or programmatic) BMPs</u> (five percent of baseline pollutant load);

3. Calculate load reductions for <u>public incentives for private retrofit</u> (e.g., downspout disconnects) and <u>redevelopment</u>;

4. Calculate load reductions attributable to anticipated <u>new permit compliance activities of non-MS4 entities</u> (e.g., Industrial General Permit holders and Caltrans);

5. Calculate load reductions for <u>proposed regional BMPs</u> that were identified in existing plans;

6. Meet the TLR by backfilling the remaining load reduction with <u>new regional or distributed green streets BMPs</u>, 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

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[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:

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[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**.

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

New BMP

- o Reduction of irrigation return flow;
- o Downspout disconnect program;
- o Green waste outreach program;
- o Horse manure outreach; and
- o 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 Park #3	$5.5M	$8.0M	$81K	$90K	$7.1M	$9.8M
		$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