Santa Monica Bay Jurisdictional Group 2 and 3 Enhanced Watershed Management Program

Prepared by:
City of Los Angeles
Los Angeles County Flood Control District
County of Los Angeles
City of Santa Monica
City of El Segundo

The MWH Team

MWH Geosyntec consultants CWE M2 Resource Consulting, Inc.

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List of Acronyms

Acronym	Definition
AED	Allowable Exceedance Day
ASCE	American Society of Civil Engineers
Basin Plan	Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties
BIOL	Preservation of Biological Habitats of Special Significance Beneficial Use Designation
BMP	Best Management Practice
Caltrans	California Department of Transportation
CASQA	California Stormwater Quality Association
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIMP	Coordinated Integrated Monitoring Program
CIP	Capital Improvement Plan
City	City of Los Angeles
CML	Compliance Monitoring Location
CMP	Corrugated Metal Pipe
COMM	Commercial and Sport Fishing Beneficial Use Designation
County	County of Los Angeles
CSMP	Coordinated Shoreline Monitoring Plan
CTR	California Toxics Rule
CWA	Clean Water Act
CWSRF	Clean Water State Revolving Fund
DDT	Dichlorodiphenyltrichloroethane
DFA	State Division of Financial Assistance
DP	Dissolved Phosphorus
ED	Exceedance Day

Acronym	Definition
EMC	Event Mean Concentration
ESA	Environmentally Sensitive Area
ESCP	Erosion and Sediment Control Plan
EWMP	Enhanced Watershed Management Program
FAAST	Financial Assistance Application Submittal Tool
FC	Fecal Coliform
FIB	Fecal Indicator Bacteria
GIS	Geographic Information System
GM	Geometric Mean
HUC	Hydraulic Unit Code
IBD	International BMP Database
IC/ID	Illicit Connections and Illicit Discharges
IGP	Industrial General Permit
IND	Industrial Service Supply Beneficial Use Designation
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
JG2/JG3	Jurisdictional Groups 2 and 3
JPA	Joint Powers Authority
L-SWPPP	Local Storm Water Pollution Prevention Plan
LA	Los Angeles
LACDPW	Los Angeles County Department of Public Works
LACFCD	Los Angeles County Flood Control District
LAX	Los Angeles International Airport
LFD	Low-Flow Diversion
LID	Low Impact Development
LRP	Local Resource Program
MAR	Marine Habitat Beneficial Use Designation
MCM	Minimum Control Measure
MG/L	Milligrams per Liter

Acronym	Definition
MIGR	Fish Migration Beneficial Use Designation
MPN	Most Probable Number
MS4	Municipal Separate Storm Sewer System
MUN	Municipal and Domestic Supply Beneficial Use Designation
MWD	Metropolitan Water District of Southern California
MWH	MWH Americas, Inc.
N	Nitrogen
NA	Not Applicable
NAV	Navigation Beneficial Use Designation
NH_3	Ammonia
NO_3	Nitrate
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NSMBCW	North Santa Monica Bay Coastal Watershed
O&M	Operation and Maintenance
OPTI	Online Project Tracking and Integration System
P3s	Public-Private Partnerships
Permit	Los Angeles Regional Water Quality Control Board Order No. R4-2012-0175
PCBs	Polychlorinated Biphenyls
PIPP	Public Information and Participation Program
POTW	Publically-Owned Treatment Works
QA/QC	Quality Assurance/Quality Control
RAA	Reasonable Assurance Analysis
RARE	Preservation of Rare and Endangered Species Beneficial Use Designation
REC-1	Water Contact Recreation Beneficial Use Designation
REC-2	Noncontact Water Recreation Beneficial Use Designation
Regional Board	Los Angeles Regional Water Quality Control Board
RWL	Receiving Water Limitation
SBPAT	Structural Best Management Practice Prioritization and Analysis Tool

Acronym	**Definition**
SCCWRP	Southern California Costal Research Project
SHELL	Shellfish Harvesting Beneficial Use Designation
SMB	Santa Monica Bay
SMB EWMP Group	Santa Monica Bay EWMP Group
SMURRF	Santa Monica Urban Runoff Recycling Facility
SPWN	Fish Spawning Beneficial Use Designation
SQMP	Stormwater Quality Management Plan
SUSMP	Standard Urban Stormwater Mitigation Plan
SWAMP	Surface Water Ambient Monitoring Program
SWMM	Stormwater Management Model
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TKN	Total Kjeldahl Nitrogen
TLR	Target Load Reduction
TM	Technical Memorandum
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
UV	Ultraviolet
WARM	Warm Freshwater Habitat Beneficial Use Designation
WBPC	Water Body Pollutant Combinations
WERF	Water Environment Research Foundation
WDID	Waste Discharger Identification
WILD	Wildlife Habitat Beneficial Use Designation
WLA	Waste Load Allocation
WMA	Watershed Management Area
WMG	Watershed Management Group

Acronym	**Definition**
WMP	Watershed Management Plan
WQBEL	Water Quality-Based Effluent Limitation
WQT	Water Quality Trading
WRRDA	Water Resources Reform and Development Act of 2014

Executive Summary

The Santa Monica Bay (SMB) Jurisdictional Groups 2 and 3 (JG2/JG3) Enhanced Watershed Management Program (EWMP) has been developed by the Santa Monica Bay Enhanced Watershed Management Group (SMB EWMP Group), which is comprised of City of Los Angeles, County of Los Angeles, City of Santa Monica, City of El Segundo, and the Los Angeles County Flood Control District (LACFCD). The EWMP is a requirement of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit Order No. R4-2012-0175 (Permit), which was adopted by the Los Angeles Regional Water Quality Control Board (Regional Board) and became effective on December 28, 2012. The purpose of the Permit is to ensure the MS4s in Los Angeles County are not causing or contributing to exceedances of water quality objectives set to protect the beneficial uses in the receiving waters in the Los Angeles region.

The Permit allows Permittees to customize their stormwater programs through the development and implementation of a Watershed Management Program (WMP) or an Enhanced Watershed Management Program (EWMP) to achieve compliance with receiving water limitations (RWL) and water quality-based effluent limits (WQBELs). The City of Los Angeles (City), City of Santa Monica, City of El Segundo, Unincorporated areas of the County of Los Angeles (County), and the LACFCD, collectively referred to as the SMB EWMP Group, submitted a revised notice of intent (NOI) to develop an EWMP in December of 2013 to fulfill the requirements of the Permit.

ES-1 INTRODUCTION

As part of the Permit requirements, the SMB EWMP Group developed a Coordinated Integrated Monitoring Plan (CIMP) to monitor the effectiveness of the EWMP and resultant change in surface water quality. In addition to demonstrating compliance with NPDES requirements, the CIMP will serve as a guide for future adaptive management of the EWMP.

The SMB watershed management area (WMA) EWMP Group area falls within the boundaries of JG2 and JG3, which are located within the central region of the Santa Monica Bay Watershed. Subwatersheds within the SMB EWMP Group Area include the urbanized Dockweiler and Santa Monica subwatersheds, as well as natural open space located in the Castle Rock, Pulga Canyon, Temescal Canyon, and Santa Monica Canyon subwatersheds. The JG2/JG3 area totals 34,362 acres within the Santa Monica Bay Watershed. **Figure ES-1** illustrates the extent of the SMB EWMP Group Area. It is noted that the geographical scope of the SMB EWMP Group area excludes areas of land totaling 9,124 acres for which the MS4 Permittees do not have jurisdiction, including land owned by the State of California, Caltrans, the United States Government, and an area of the Chevron Facility located in the City of El Segundo. Therefore, with the exclusion of these areas, the SMB EWMP Group area covers 25,238 acres.

Approximately 49 percent of the SMB EWMP Group area is open space, of which approximately 93 percent is located in the northern natural portion of the subwatersheds and approximately 7 percent is located in the urbanized Dockweiler subwatershed. The boundary of the Santa Monica Bay, as defined by the National Estuary Program, extends from the Los Angeles/Ventura County line to the northwest, southward to Point Fermin located on the Palos Verdes Peninsula to the southeast. The land area that drains into the SMB follows the crest of the Santa Monica Mountains on the north to Griffith Park, then extends south and west across the Los Angeles coastal plain to include the area east of Ballona Creek and north of the Baldwin Hills. South of Ballona Creek, the drainage area is a narrow coastal strip between Playa del Rey and Palos Verdes. Subwatersheds and associated water bodies/tributaries are shown in **Table ES-1**.

Figure ES-1
Santa Monica Bay Enhanced Watershed Management Plan Group Area

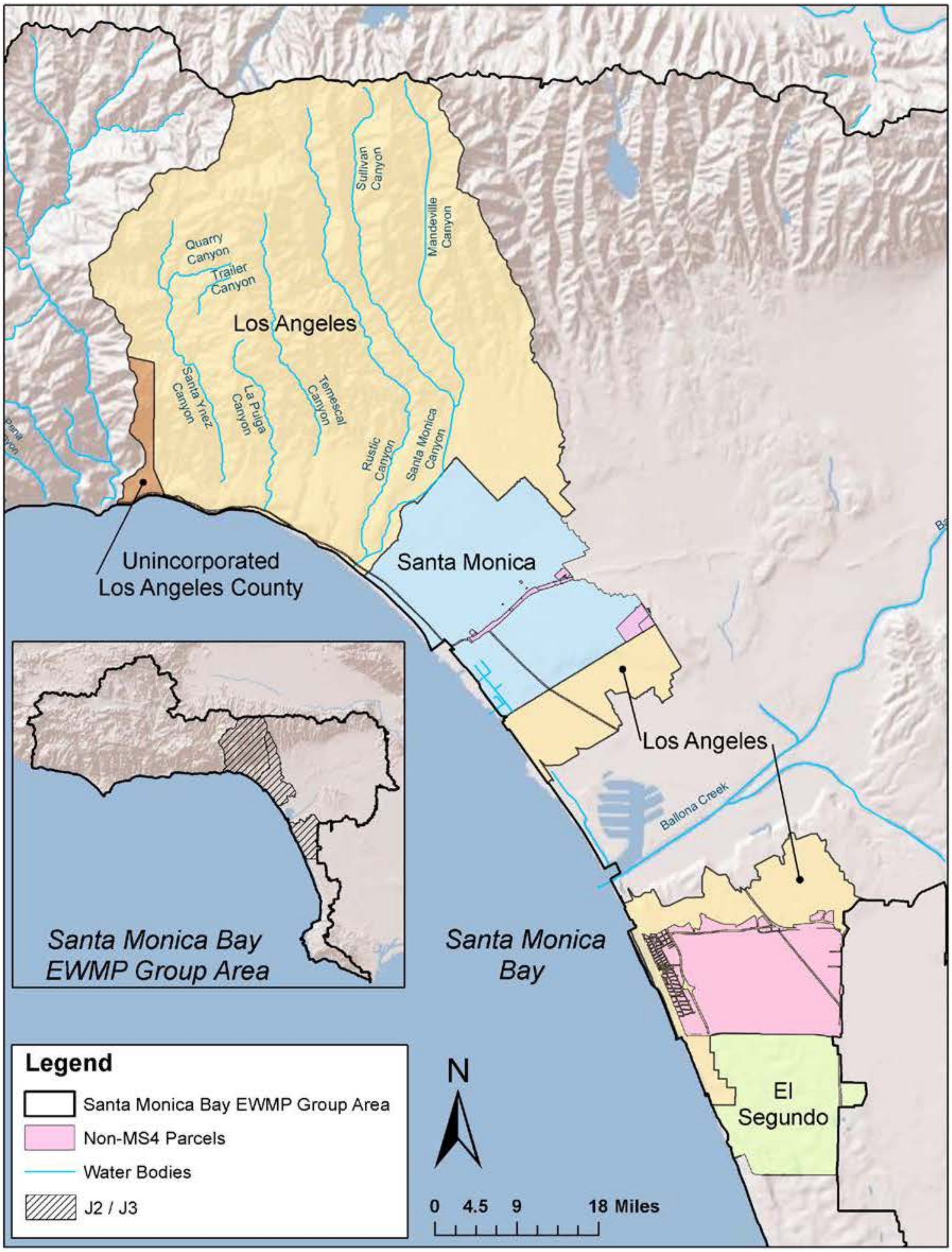


Table ES-1
Santa Monica Bay EWMP Area Subwatersheds and Associated Water Bodies/Tributaries

Subwatershed	Water Body	Water Body/Tributary
Castle Rock	Santa Ynez Canyon	Quarry Canyon Trailer Canyon
Pulga Canyon	La Pulga Canyon	-
Temescal Canyon	Temescal Canyon	-
Santa Monica Canyon	Santa Monica Canyon	Rustic Canyon Creek Sullivan Canyon Creek Mandeville Canyon Creek
Santa Monica	Santa Monica Bay	-
Dockweiler	Santa Monica Bay	-

When designated beneficial uses of a particular receiving water body are being compromised by exceeding water quality, Section 303(d) of the federal Clean Water Act (CWA) requires identifying and listing that water body as "impaired". Once a water body has been deemed impaired, a Total Maximum Daily Load (TMDL) must be developed for the impairing pollutant(s). A TMDL is an estimate of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a "factor of safety" included). Once established, the TMDL allocates the loads among current and future pollutant sources to the water body.

There are currently four TMDLs in effect for the water bodies within the JG2/JG3 geographical scope, plus one revision that became effective on July 2, 2014. These TMDLs are summarized in **Table ES-2**.

Table ES-3 identifies the applicable WQBELs and/or RWLs established pursuant to TMDLs included in the Permit and addressed by this EWMP.

Table ES-2
North Santa Monica Bay Coastal Watersheds (NSMBCW) TMDLs

TMDL Name	Agency	TMDL Effective Date
SMB Beaches (SMBB) Bacteria TMDL, Reconsideration of Certain Technical Matters of the SMBB Bacteria TMDL, Resolution R12-007[1]	Regional Board	July 2, 2014
SMB TMDL for DDT and PCBs	USEPA	March 26, 2012
SMB Nearshore Debris TMDL, Resolution R10-010	Regional Board	March 20, 2012
SMB Beaches (SMBB) Bacteria TMDL, Dry Weather, Resolution 2002-004[2]	Regional Board	July 15, 2003
SMB Beaches (SMBB) Bacteria TMDL, Wet Weather, Resolution 2002-022[2]	Regional Board	July 15, 2003

[1] This TMDL revision was approved by the USEPA in July 2014.
[2] This TMDL was revised pursuant to Resolution R12-2007.

Table ES-3
Final Permit RWLs and WQBELs for SMB TMDLs

Reference	Parameter	Effluent Limitation/ Receiving Water Limitation
SMB Nearshore Debris TMDL	Trash – WQBEL	Zero
	Plastic Pellets – WQBEL	Zero
TMDL for PCBs/DDT (for LA County MS4)	DDT – WQBEL	27.08 g/yr (based on 3-year averaging period)[2]
	PCBs – WQBEL	140.25 g/yr (based on 3-year averaging period)
SMBB Bacteria TMDL	Total coliform (daily maximum) – WQBEL	10,000 Most Probable Number (MPN)/100 mL
	Total coliform (daily maximum), if the ratio of fecal-to-total coliform exceeds 0.1 – WQBEL	1,000 MPN/100 mL
	Fecal coliform (daily maximum) – WQBEL	400 MPN/100 mL
	Enterococcus (daily maximum) – WQBEL	104 MPN/100 mL
	Total coliform (geometric mean[1]) – WQBEL/RWL	1,000 MPN/100 mL
	Fecal coliform (geometric mean[1]) – WQBEL/RWL	200 MPN/100 mL
	Enterococcus (geometric mean[1]) – WQBEL/RWL	35 MPN/100 mL

[1] The reopened 2012 TMDL, which was approved by USEPA in July 2014, modified the 30 day rolling average to weekly calculation of a rolling six week geometric mean using five or more sample, starting all calculation weeks on Sunday.
[2] Group load-based WQBELs that apply to all SMB MS4 dischargers; the individual load-based WQBELs for JG2/JG3 MS4 agencies would be an area-weighted fraction of this.

EWMP Development Process

Development of the EWMP for the SMB EWMP Group included four major components:

- Identification of water quality priorities to provide the basis for prioritizing implementation activities, as well as the selection and scheduling of BMPs in the Reasonable Assurance Analysis (RAA).
- Identification of watershed control measures (i.e., BMPs – best management practices) to reduce the impact of stormwater and non-stormwater on receiving water quality.
- Reasonable Assurance Analysis to demonstrate that control measures, specifically BMPs, will be effective.
- Stakeholder involvement to provide the opportunity for meaningful stakeholder input throughout the development of the EWMP.

ES-2 WATER QUALITY PRIORITIES

Water quality priorities provide the basis for prioritizing project implementation; selecting and scheduling BMPs; and focusing monitoring activities developed in the CIMP. Details on the development of the water quality priorities are included in the CIMP (MWH Team B, 2014).

Based on the water quality characterization, the water body–pollutant combinations (WBPCs) were classified into one of three categories, in accordance with Section IV.C.5(a)ii of the Permit. **Table ES-4** summarizes the criteria for each category, as defined by the Permit. **Table ES-5** presents the WBPCs for the SMB EWMP. Subwatersheds in SMB were further modeled into compliance monitoring location (CML) regions. These modeled CML subwatersheds, and these are herein referred to "CML analysis regions" and were used in the RAA modeling.

Table ES-4
Description of Water Body-Pollutant Prioritization Categories

Category	Description
1	Water body-pollutant combinations under Category 1 (highest priority) are defined in the Permit as "water body-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R [of the Permit]."
2	Category 2 (high priority) water body-pollutant combinations are defined as "pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment."
3	Category 3 (Medium Priority) designations are to be applied to "water body-pollutant combinations that are not 303(d)-listed, but which exceed applicable receiving water limitations contained in the Permit and for which MS4 discharges may be causing or contributing to the exceedance."

Table ES-5
Water Body Pollutant Prioritization[1]

Category	Water Body	Pollutant	Compliance Deadline
1	SMB Beaches	Summer dry weather bacteria	7/15/2006 (Final RWLs [AEDs])
	SMB Beaches	Wet weather bacteria	7/15/2009 (Interim: 10% single sample ED reduction) 7/15/2013 (Interim: 25% single sample ED reduction) 7/15/2018 (Interim: 50% single sample ED reduction) 7/15/2021 (Final: Single sample AED) 7/15/2021 (Final: Geometric Mean [GM])
	SMB Beaches	Winter dry weather bacteria	11/1/2009 (Final RWLs [AEDs])
	SMB Offshore/ Nearshore	Debris	3/20/2016 (20% load reduction) 3/20/2017 (40% load reduction) 3/20/2018 (60% load reduction) 3/20/2019 (80% load reduction) 3/20/2020 (100% load reduction)
	SMB	DDTs	Compliance to be demonstrated through monitoring and adaptive management process [2]
	SMB	PCBs	Compliance to be demonstrated through monitoring and adaptive management process [2]
2	Santa Monica Canyon Channel	Lead	NA
	Santa Monica Canyon Channel	Indicator bacteria	NA
3	None	None	None

[1] Listed in order of compliance deadline, interim and final are included.
[2] Although the TMDL lacks a formal compliance schedule for the WQBEL, the TMDL Executive Summary does state, "The time frame for attainment of the TMDL targets for the rest of Santa Monica Bay (other than the Palos Verdes shelf) is 11 years for DDT and 22 years for PCBs."

ES-3 REASONABLE ASSURANCE ANALYSIS

An important component of the SMB EWMP is the RAA. The RAA is a process used to demonstrate that institutional and structural control measures are expected to be sufficient for achieving applicable WQBELs and/or RWLs that have compliance deadlines within the Permit term. In addition to using the RAA as a means for determining the efficacy of existing and potential control measures, the RAA also facilitates the selection of BMPs as well as the prioritization of BMP implementation. While the methodology of the RAA evolved over the course of the EWMP development, the RAA approach remained consistent with the applied methodology and the "RAA Guidelines" as issued by the Regional Board (Regional Board, 2014).

In order to demonstrate reasonable assurance, BMP opportunities were identified in a prioritized manner. Prioritization was based on cost (low cost BMPs were prioritized highest); BMP effectiveness for the pollutants of concern (BMPs that had greater treatment efficiency for the pollutants of concern in a particular analysis region were prioritized higher than other BMPs); and implementation.
The RAA was performed according to the following steps:

- Assume non-modeled non-structural BMP load reduction (2.5-7.5 percent of baseline pollutant load);

- Calculate public retrofit incentives (e.g., downspout disconnects) and redevelopment load reductions;
- Calculate load reductions attributable to anticipated new permit compliance activities of non-MS4 entities (e.g., Industrial General Permit holders and Caltrans);
- Calculate planned and proposed regional/centralized BMP load reductions based on existing plans and parcel screening analysis;
- Meet the target load reduction (TLR) by backfilling the remaining load reduction with specific regional/centralized BMP projects or distributed BMPs assumed treat a percentage of developed land uses.

ES-4 WATERSHED CONTROL MEASURES

As part of the development of the EWMP, the Permit specifies that watershed control measures, also referred to as BMPs, shall be identified to: 1) ensure that stormwater discharges meet receiving water and effluent limits as established in the Permit, and 2) reduce overall impacts to receiving waters from stormwater and non-stormwater runoff.

BMPs are grouped into two broad categories, structural and institutional. Structural BMPs are physically-constructed control measures that alter the hydrology or water quality of stormwater or non-stormwater. Structural BMPs includes infiltration basins, bioswales, and bioretention/bioinfiltration. Institutional BMPs are source control measures that prevent the release of flow/pollutants or transport of pollutants, but do not involve construction of physical facilities. Minimum control measures (MCMs), such as street sweeping, are a subset of institutional BMPs.

The EWMP summarizes watershed control measures, including BMP types and existing BMPs, which reduce the current pollutant load to meet past and future compliance requirements. In addition, the EWMP summarizes BMPs that will be implemented to meet Permit compliance requirements, including institutional (non-structural) and structural BMPs consisting of low impact development (LID), distributed green streets, and regional BMPs.

A summary of total BMP runoff retained in acre-feet (AF) required by Permittee is shown in **Table ES-6** for regional projects and in **Table ES-7** for distributed projects.

Table ES-6
Summary of Total Regional BMP Runoff Retained over Critical Year by Permittee

Implementation Date for Compliance	Regional BMP Total Runoff Retained over Critical Year (AF)				
	County of Los Angeles	City of Los Angeles	City of Santa Monica	City of El Segundo	Total
2018	0.0	465.3	562.5	232.2	1260.0
2021	0.0	758.9	518.3	0.0	1277.2
Total	0.0	1224.2	1080.8	232.2	2537.2

Table ES-7
Summary of Total Distributed BMP Runoff Retained over Critical Year by Permittee

Implementation Date for Compliance	Green Street BMP Total Runoff Retained over Critical Year (AF)				
	County of Los Angeles	City of Los Angeles	City of Santa Monica	City of El Segundo	Total
2018	4.8	283.3	184.5	0.0	472.6
2021	4.6	246.6	166.2	0.0	417.3
Total	9.4	529.9	350.7	0.0	890.0

The SMB EWMP includes multi-benefit regional projects that retain the stormwater volume from the 85th percentile, 24-hour storm for the drainage areas tributary to the multi-benefit regional projects. The EWMP process emphasizes identifying Regional EWMP projects that are individually or collectively able to capture runoff from the 85th percentile, 24-hour storm.

Through an extensive screening process and coordination with the SMB EWMP Group, eight proposed example regional EWMP project sites were selected for conceptual design. These eight regional projects will retain and infiltrate or beneficially use stormwater runoff for the drainage area tributary to the project.

The location and BMP type of the eight highlighted regional EWMP projects are summarized in **Table ES-8** and shown on **Figure ES-2**. A conceptual level design was developed for each of the example Regional EWMP projects, which includes the selection of BMP type, preliminary sizing, configuration, and diversion pipeline alignment. A geotechnical evaluation and review per California Environmental Quality Act (CEQA) guidelines was completed for the example Regional EWMP projects. **Table ES-9** shows a summary of all planned/proposed regional projects and green streets separated by Agency.

Table ES-8
Summary of Eight Proposed Regional EWMP Projects

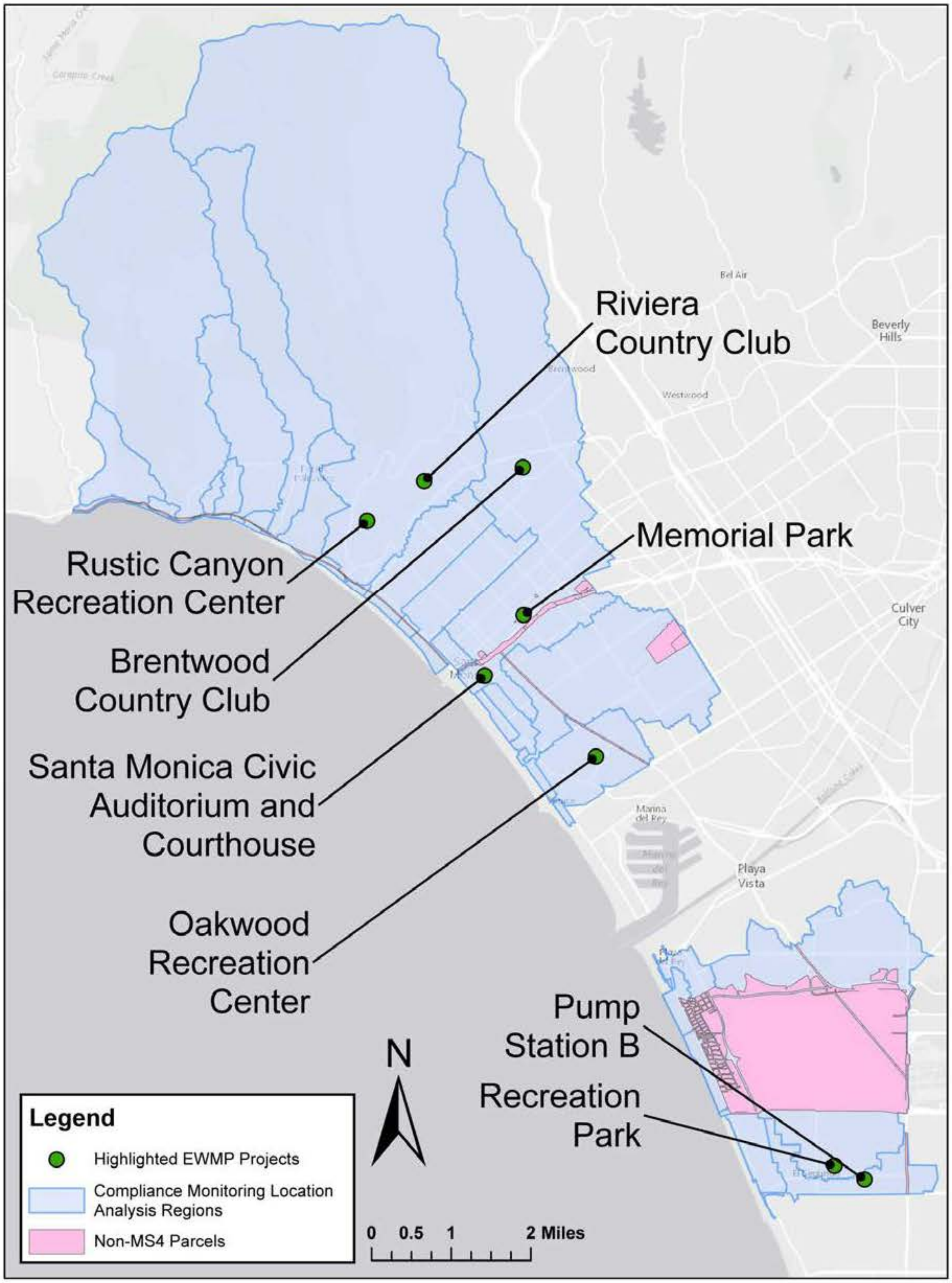
Regional EWMP Project	BMP Type	Jurisdiction	Address / Location
Brentwood Country Club	Storage, Infiltration, and Use	City of Los Angeles	590 S Burlingame Ave, Los Angeles, CA 90049
Oakwood Recreation Center	Storage, Infiltration, and Use	City of Los Angeles	767 California Ave, Venice, CA 90291
Riviera Country Club	Storage, Infiltration, and Use	City of Los Angeles	1250 Capri Dr., Pacific Palisades, CA 90272
Rustic Canyon Recreation Center	Subsurface Infiltration	City of Los Angeles	601 Latimer Rd., Santa Monica, CA 90402
Line B Pump Station	Surface Infiltration	City of El Segundo	201-223 Center St., El Segundo, CA 90245
Recreation Park	Subsurface Infiltration	City of El Segundo	401 Sheldon St., El Segundo, CA 90245
Memorial Park	Storage, Infiltration,	City of Santa Monica	1401 Olympic Blvd., Santa

	and Use		Monica, CA 90404
Santa Monica Civic Auditorium and Courthouse	Subsurface Infiltration	City of Santa Monica	1855 Main St, Santa Monica, CA 90401

Table ES-9
Summary of Planned/Proposed Regional Projects and Green Street Area by Agency

Agency	Number of Proposed/Planned Regional Projects	Proposed Green Street Area (square feet)
Los Angeles	16	4,412,791
Santa Monica	16	1,995,665
El Segundo	4	0.354087
Unincorporated Los Angeles County	0	78,657

Figure ES-2
Eight Proposed Regional EWMP Projects



ES-5 IMPLEMENTATION SCHEDULE

The EWMP Implementation Plan is the schedule for compliance for each jurisdiction to address water quality priorities and comply with the provisions of the MS4 Permit. Through the RAA, a series of quantitative analyses was used to identify the capacities of LID, green streets and regional BMPs that comprise the EWMP Implementation Plan and assure those control measures will address the water quality priorities per the milestones/compliance schedules. Implementation of the EWMP implementation plan will provide a BMP-based compliance pathway for each jurisdiction under the MS4 Permit.

Scheduling of control measure implementation is based on the milestones of the SMB TMDLs, as follows:

- Bacteria
  - Milestone 1: Achieve 10% of the reduction for wet weather bacteria (2009 – achieved)
  - Milestone 2: Achieve 25% of the reduction for wet weather bacteria (2013 – achieved)
  - Milestone 3: Achieve 50% of the reduction for wet weather bacteria (2018)
  - Milestone 4: Achieve 100% of the reduction for wet weather bacteria (2021)
- Debris
  - Milestone 1: Achieve 20% of the reduction for debris (2016)
  - Milestone 2: Achieve 40% of the reduction for debris (2017)
  - Milestone 3: Achieve 60% of the reduction for debris (2018)
  - Milestone 4: Achieve 80% of the reduction for debris (2019)
  - Milestone 5: Achieve 100% of the reduction for debris (2020)
- DDT and PCB
  - Compliance will be demonstrated through monitoring (CIMP)

Permittee actions can be categorized into three groups: implementation of projects, continued water quality monitoring, and reporting of monitoring results and progress. Annual reporting will be completed each year as part of the CIMP. In addition to assessing the overall progress of the EWMP, the CIMP reporting will detail the implemented BMPs and demonstrate that the cumulative BMP capacities achieve the interim targets. Data obtained through CIMP monitoring will be used to determine the overall effectiveness of the EWMP and will be the next phases of WMP implementation during the adaptive management process.

ES-6 ADAPTIVE MANAGEMENT

The EWMP is intended to be implemented as an adaptive program. As new program elements are implemented and information is gathered over time, the EWMP will undergo modifications to reflect the most current understanding of the watershed and present a sound approach to addressing changing conditions. As such, the EWMP will employ an adaptive management process that will allow the EWMP to evolve over time.

The adaptations to the EWMP, as called for in the adaptive management process, include: 1) re-characterization of water quality priorities, 2) a source assessment re-evaluation, 3) an effectiveness assessment of watershed control measures, and/or 4) an updated RAA. The CIMP will gather additional data on receiving water conditions and stormwater/non-stormwater quality to inform these analyses. These adaptations will be implemented and repeated every two years as part of the adaptive management process. There are numerous studies currently being conducted that will allow agencies to adapt the EWMP as needed.

ES-7 IMEPLEMENTATION COSTS AND FINANCIAL STRATEGY

Based on the RAA, a set of optimal BMPs were derived, having reasonable assurance of meeting the interim and final limitation milestones set forth by the Regional Board. Total estimated BMP costs are shown in **Table ES-10**. Estimated costs are based on model results; however, real costs will depend on monitoring results and the outcome of the adaptive management process. As a result, it is emphasized that these estimated costs are preliminary and have the potential to be reduced through the adaptive management process.

Table ES-10
Total Costs for Watershed ($ Millions)

Permittee	Capital	O&M
Los Angeles	$408.8	$54.2
Santa Monica	$213.2	$33.5
Uninc. LA County	$5.9	$0.53
El Segundo	$20.8	$6.42
Total	$648.7	$94.7

A financial strategy is needed to address these additional costs of compliance with the 2012 MS4 permit as a result of the extensive set of BMPs or "recipe for compliance" for the SMB EWMP Group. Currently, a funding source for all of the activities described in this EWMP has not been determined, and obtaining funds for all of the activities identified in the EWMP is anticipated to take many years.

Even though the Regional Board only implemented Order No R4-2012-0175, NPDES No CAS00401 on November 2012; the co-Permittees have been addressing stormwater discharge requirements for a long time prior to November 2012. Co-Permittees have existing recurring costs associated with stormwater activities in excess of $50M annually.

Just as the engineering and strategic solutions for watershed management rely upon a coordinated regional approach, so too does the financial strategy. Capital and operating costs for watershed programs are large and span decades. As such, there is no single "right" way to finance these programs. Instead, the financial strategy presented in this EWMP outlines a set of multiple approaches, allowing each co-Permittee to select those strategies that best fit their specific circumstances. Available financial strategies include: grants; user, property, and resource fees and charges; as well as legislative and policy measures.

Section 1 Introduction

The Santa Monica Bay (SMB) Jurisdictional Groups 2 and 3 (JG2/JG3) Enhanced Watershed Management Program (EWMP) has been developed by the Santa Monica Bay Enhanced Watershed Management Group (SMB EWMP Group), which is comprised of City of Los Angeles, County of Los Angeles, City of Santa Monica, City of El Segundo, and the Los Angeles County Flood Control District (LACFCD). The EWMP is a requirement of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit Order No. R4-2012-0175 (Permit), which was adopted by the Los Angeles Regional Water Quality Control Board (Regional Board) and became effective on December 28, 2012.

The EWMP has been developed as a result of the EWMP Work Plan, which documented the water quality objectives, priorities, and process for identifying regional projects. The EWMP contains strategies to address the water quality objectives, including the types and locations of distributed and regional best management practices (BMPs) that can be implemented to obtain the required target load reduction in the SMB watershed.

Also as part of the Permit requirements, the SMB EWMP Group developed a Coordinated Integrated Monitoring Plan (CIMP) to monitor the effectiveness of the EWMP and resultant change in water quality (MWH Team B, 2014). The CIMP is intended to serve as a guide for future adaptive management of the EWMP.

This document is organized as follows:

- **Section 1 Introduction -** provides an introduction to the EWMP and describes the applicability of the EWMP, the geographical extent of the watershed, the regulatory framework, and a discussion of the EWMP development process.
- **Section 2 Identification of Water Quality Priorities** –focuses on the identification of water quality priorities for the SMB watershed, including characterization and prioritization of water body pollutants.
- **Section 3 Reasonable Assurance Analysis** – describes the Reasonable Assurance Analysis (RAA), including the modeling system, RAA process overview, and modeling approach.
- **Section 4 Watershed Control Measures** – presents watershed control measures, with a review of institutional and structural BMPs, and concludes with a discussion of non-stormwater discharge control measures.
- **Section 5 EWMP Implementation Schedule** – presents the schedule for EWMP implementation for the watershed.
- **Section 6 Assessment and Adaptive Management Framework** – describes the framework for assessment and adaptive management, addressing topics such as re-characterization of water quality priorities, source assessment re-evaluation, effectiveness of watershed control measures, the adaptive management process, updating the RAA, and compliance reporting.
- **Section 7 EWMP Implementation Costs and Financial Strategy** – reviews the implementation costs and financial strategy associated with the EWMP.

- **Section 8 Legal Authority -**demonstrates that the Permittees have the necessary legal authority to implement the BMPs identified in the EWMP.

1.1. APPLICABILITY OF EWMP

The SMB watershed management area (WMA) EWMP Group area falls within the boundaries of JG2/ JG3, which are located within the central region of the SMB Watershed. Subwatersheds within the SMB EWMP Group Area include the urbanized Dockweiler and Santa Monica subwatersheds, as well as natural open space located in the Castle Rock, Pulga Canyon, Temescal Canyon, and Santa Monica Canyon subwatersheds. The JG2/JG3 area totals 34,362 acres within the SMB Watershed and **Figure 1-1** illustrates the extent of the SMB EWMP Group Area.

1.2. GEOGRAPHICAL SCOPE AND CHARACTERISTICS

The SMB EWMP Group area includes land area that drains into and includes the SMB. However, the geographical scope of the SMB EWMP Group area excludes areas of land totaling 9,124 acres for which the MS4 Permittees do not have jurisdiction, including land owned by the State of California, Caltrans, the United States Government, and an area of the Chevron Facility located in the City of El Segundo. Therefore, with the exclusion of these areas, the SMB EWMP Group area covers 25,238 acres.

Approximately 49 percent of the SMB EWMP Group area is open space, of which approximately 93 percent is located in the northern subwatersheds and approximately 7 percent is located in the Dockweiler subwatershed. The boundary of the SMB, as defined for the National Estuary Program, extends from the Los Angeles/Ventura County line to the northwest, southward to Point Fermin located on the Palos Verdes Peninsula to the southeast. The land area that drains into SMB follows the crest of the Santa Monica Mountains on the north to Griffith Park, then extends south and west across the Los Angeles coastal plain to include the area east of Ballona Creek and north of the Baldwin Hills. South of Ballona Creek the natural drainage is a narrow coastal strip between Playa del Rey and Palos Verdes (Regional Board, 2011). **Figure 1-2** shows the SMB EWMP Group within the SMB Watershed.

According to geographical information system (GIS) data from the Los Angeles County Department of Public Works (LACDPW), approximately 67 percent of the SMB EWMP Group area is pervious, with the large majority of pervious area located in the northern-most subwatersheds of Castle Rock, Pulga Canyon, Temescal Canyon and Santa Monica Canyon. Approximately 95,000 acre-feet of precipitation falls on the watershed in an average year. Approximately one third of that volume becomes runoff. Subwatersheds and their contributing water bodies/tributaries are summarized in **Table 1-1**.

Figure 1-1
Santa Monica Bay EWMP Group Area

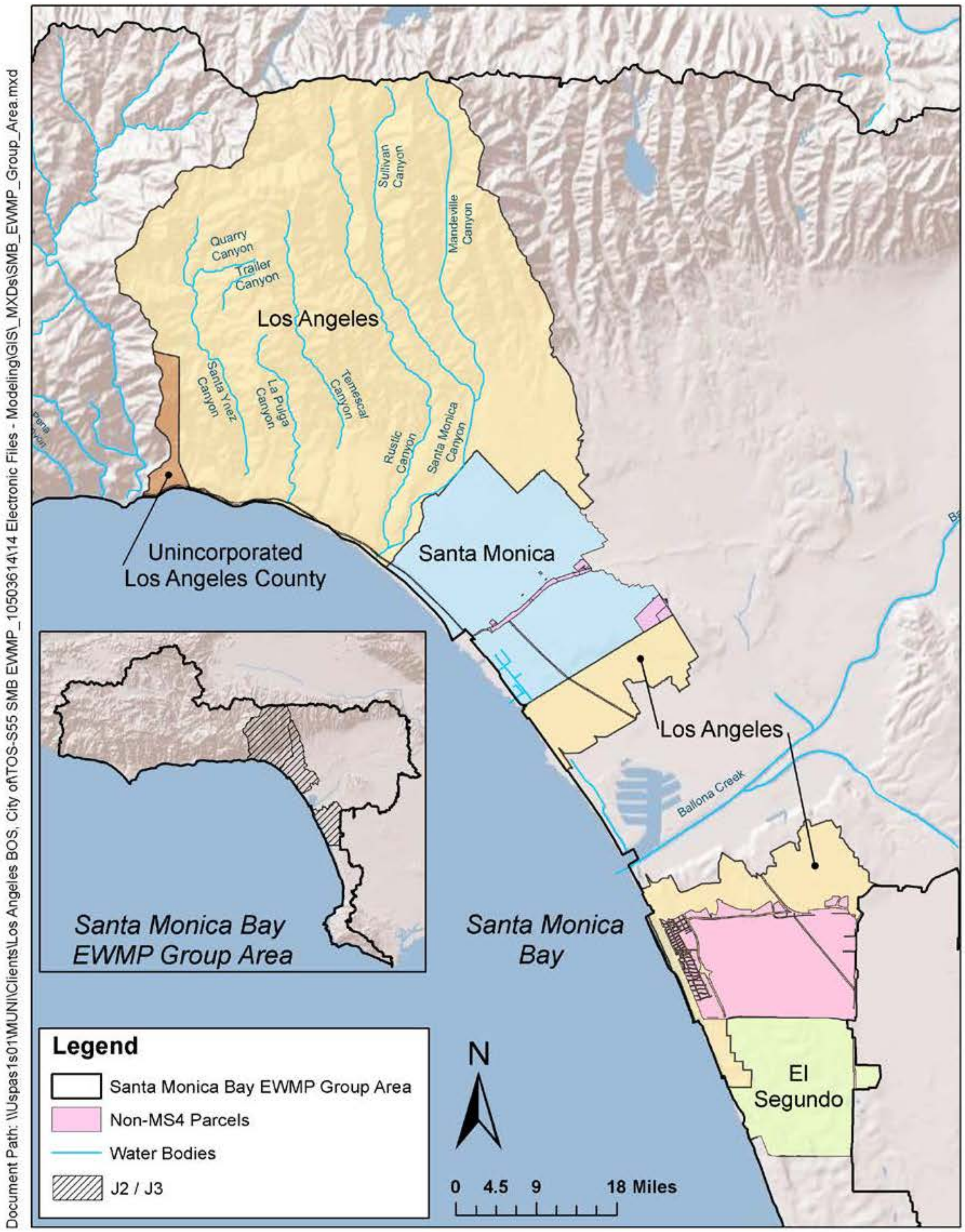


Figure 1-2
Santa Monica Bay Subwatersheds

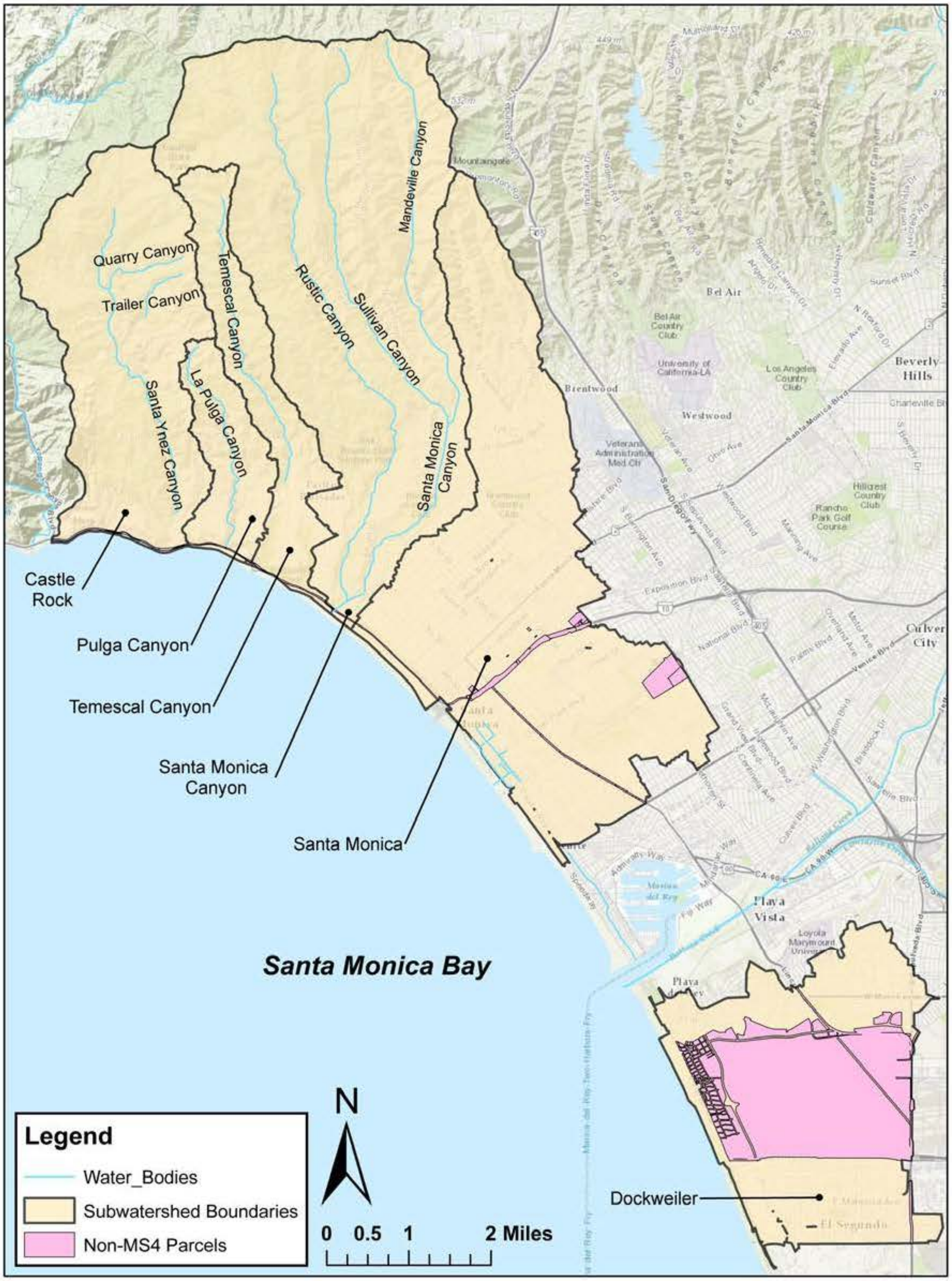


Table 1-1
Santa Monica Bay EWMP Area Subwatersheds and Associated Water Bodies/Tributaries

Subwatersheds	Water Body	Water Body/Tributary
Castle Rock	Santa Ynez Canyon	Quarry Canyon Trailer Canyon
Pulga Canyon	La Pulga Canyon	
Temescal Canyon	Temescal Canyon	
Santa Monica Canyon	Santa Monica Canyon	Rustic Canyon Creek Sullivan Canyon Creek Mandeville Canyon Creek
Santa Monica	Santa Monica Bay	
Dockweiler	Santa Monica Bay	

1.3. REGULATORY FRAMEWORK

The NPDES MS4 Permit No. R4-2012-0175 (Permit) was adopted on November 8, 2012 by the Regional Board and became effective as of December 28, 2012. The purpose of the Permit is to ensure the MS4s in the County of Los Angeles are not causing or contributing to exceedances of water quality objectives set to protect the beneficial uses in the receiving waters in the Los Angeles region.

1.3.1. MS4 Permit Requirements

The Permit allows Permittees to customize their stormwater programs through the development and implementation of a Watershed Management Program (WMP) or EWMP to achieve compliance with receiving water limitations (RWL) and water quality-based effluent limits (WQBEL). The SMB EWMP Group submitted a notice of intent (NOI) to develop an EWMP in June of 2013 (a revised NOI was submitted in December 2013) to fulfill the requirements of the Permit. This EWMP is consistent with Part VI.C.5-C.8 of the Permit, and:

1. Prioritizes water quality issues resulting from stormwater and non-stormwater discharges from the MS4 to receiving waters within the SMB EWMP Group area;

(i) Identifies strategies to implement control measures and BMPs to achieve the outcomes specified in Part VI.C.1.d of the Permit;

(ii) Provides a process to modify strategies, control measures, and BMPs as necessary based on analysis of monitoring data in order to ensure that applicable WQBELs, RWLs, and other milestones (as set forth in the EWMP Work Plan) are achieved in the required timeframes; and

2. Provides appropriate opportunity for meaningful stakeholder input, including but not limited to, a permit-wide technical advisory committee.

1.3.2 Relevant Total Maximum Daily Loads

When designated beneficial uses of a particular receiving water body are being compromised by water quality, Section 303(d) of the federal Clean Water Act (CWA) requires identifying and listing that water body as "impaired". Once a water body has been deemed impaired, a Total Maximum Daily Load (TMDL) must be developed for the impairing pollutant(s). A TMDL is an estimate of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a "factor of safety" included). Once established, the TMDL allocates the loads among current and future pollutant sources to the water body.

The CWA requires that the State Water Resources Control Board and Regional Boards conduct a water quality assessment that addresses the condition of its surface waters (required in Section 305(b) of the CWA) and provides a list of impaired waters (required in CWA Section 303(d)) which is then submitted to the United States Environmental Protection Agency (USEPA) for review and approval. The report integrates the requirements of these two CWA sections and is referred to as the Integrated Report. The 2010 Integrated Report and updated 303(d) list were approved by the State Water Resources Control Board on August 4, 2010 and by the USEPA on October 11, 2011.

The 303(d)-listed water bodies and associated pollutants within the SMB Watershed are summarized in **Table 1-2**.

Table 1-2
303(d) – Listed Water Bodies in the SMB Watershed

Water Body	Pollutant Class	Pollutant	Notes
Santa Monica Bay Beaches	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
	Pesticides	DDT	Addressed by PCB/DDT TMDL
	Other Organics	PCBs	Addressed by PCB/DDT TMDL
Santa Monica Bay Offshore/Nearshore	Trash	Debris	Addressed by Debris TMDL
	Pesticides	DDT (tissue & sediment)	Addressed by PCB/DDT TMDL
	Other Organics	PCBs (tissue & sediment)	Addressed by PCB/DDT TMDL
	Toxicity	Sediment Toxicity	Addressed by PCB/DDT TMDL
	Miscellaneous	Fish Consumption Advisory	Addressed by PCB/DDT TMDL
Santa Monica Canyon Channel	Metals/Metalloids	Lead	TMDL does not currently exist
	Pathogens	Indicator Bacteria	Addressed by Bacteria TMDL

Notes:
DDT – dichlorodiphenyltrichloroethane
PCBs - polychlorinated biphenyls

The water bodies listed in **Table 1-1** are subject to water quality objectives in the Water Quality Control Plan, Los Angeles Region (Basin Plan) (Regional Board, 1995, Updated 2011) and its Amendments, such as those to implement TMDLs. There are currently five TMDLs in effect for the water bodies within the JG2/JG3 geographical scope as listed in Attachment M of the MS4 Permit. These TMDLs are summarized in **Table 1-3**.

Table 1-3
North Santa Monica Bay Coastal Watersheds (NSMBCW) TMDLs

TMDL Name	Agency	TMDL Effective Date
SMB Beaches (SMBB) Bacteria TMDL, Reconsideration of Certain Technical Matters of the SMBB Bacteria TMDL, Resolution R12-007[1]	Regional Board	July 2, 2014
SMB TMDL for DDT and PCBs	USEPA	March 26, 2012
SMB Nearshore Debris TMDL, Resolution R10-010	Regional Board	March 20, 2012
SMB Beaches (SMBB) Bacteria TMDL, Dry Weather, Resolution 2002-004[2]	Regional Board	July 15, 2003
SMB Beaches (SMBB) Bacteria TMDL, Wet Weather, Resolution 2002-022[2]	Regional Board	July 15, 2003

[1] TMDL revision pending approved by USEPA.
[2] TMDL was revised pursuant to Resolution R12-2007.

Table 1-4 identifies the applicable WQBELs and/or RWLs established pursuant to TMDLs included in Attachment M of the Permit. The water quality objectives as listed in the Basin Plan are also applicable to water bodies based on the designated beneficial uses. The Trash TMDL final compliance deadline is March 20, 2020.

Grouped RWLs for the SMBB Bacteria TMDL are also expressed in the Permit in terms of allowable exceedance days (AEDs), which vary by season and by Coordinated Shoreline Monitoring Plan (CSMP) monitoring station. These final compliance deadline for Bacteria TMDL, WQBELs and RWLs has already passed for summer and winter dry weather and will be effective July 15, 2021 for wet weather. Compliance deadlines for applicable TMDLs are shown in **Table 2-3**.

Table 1-4
Final Permit RWLs and WQBELs for SMB TMDLs

Reference	Parameter	Effluent Limitation/ Receiving Water Limitation
SMB Nearshore Debris TMDL	Trash – WQBEL	Zero
	Plastic Pellets – WQBEL	Zero
TMDL for PCBs/DDT (for LA County MS4)	DDT – WQBEL	27.08 g/yr (based on 3-year averaging period)[2]
	PCBs – WQBEL	140.25 g/yr (based on 3-year averaging period)
SMBB Bacteria TMDL	Total coliform (daily maximum) – WQBEL	10,000 Most Probable Number (MPN)/100 mL
	Total coliform (daily maximum), if the ratio of fecal-to-total coliform exceeds 0.1 – WQBEL	1,000 MPN/100 mL
	Fecal coliform (daily maximum) – WQBEL	400 MPN/100 mL
	Enterococcus (daily maximum) – WQBEL	104 MPN/100 mL
	Total coliform (geometric mean[1]) – WQBEL/RWL	1,000 MPN/100 mL
	Fecal coliform (geometric mean[1]) – WQBEL/RWL	200 MPN/100 mL
	Enterococcus (geometric mean[1]) – WQBEL/RWL	35 MPN/100 mL

[1] The reopened 2012 TMDL, which was approved by USEPA, defines this to be a weekly calculated rolling six week geometric mean using five or more sample, starting all calculation weeks on Sunday.
[2] Group load-based WQBELs that apply to all SMB MS4 dischargers; the individual load-based WQBELs for JG2/JG3 MS4 agencies would be an area-weighted fraction of this.

1.4. ENHANCED WATERSHED MANAGEMENT PROGRAM DEVELOPMENT PROCESS

Development of the EWMP for the SMB EWMP Group included four major components:

1. **Water Quality Priorities**: The identification of water quality priorities was an important first step in the EWMP process. Water quality priorities were defined for individual constituents within a specific water body, termed water body-pollutant combinations (WBPCs). Categories of the WBPCs are defined in the Permit. Priorities were assigned to the WBPCs based on the categorization. The water quality priorities provide the basis for prioritizing implementation activities, as well as the selection and scheduling of BMPs in the Reasonable Assurance Analysis (RAA).
2. **Watershed Control Measures**: Development of the EWMP required identification of control measures/BMPs, as described in Section 4, expected to be sufficient to meet receiving water and effluent limitations set forth in the MS4 Permit (Regional Board, 2012). BMPs vary in function and type, with each BMP providing unique design characteristics and benefits from implementation. The overarching goal of BMPs in the EWMP is to reduce the impact of stormwater and non-stormwater on receiving water quality.
3. **Reasonable Assurance Analysis**: A key element of each EWMP is the RAA, which was used to demonstrate *"…that the activities and control measures…will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term"* (Section C.5.b.iv.(5), page 63). While the Permit prescribes the RAA as a quantitative demonstration that control measures will be effective, the RAA also promotes a modeling process to identify and prioritize potential

control measures to be implemented. The RAA considered the applicable compliance dates and milestones for attainment of the WQBELs and RWLs, and supports BMP scheduling.

4. **Stakeholder Investment**: The EWMP Group has been strongly committed to providing the opportunity for meaningful stakeholder input throughout the development of the EWMP. The EWMP Group participated in monthly Watershed Management Group meetings, designed to facilitate collaboration with all Permittees. Public meetings were held on April 10, 2014, November 20, 2014, and March 19, 2015, to receive feedback from stakeholders on the progress and plans. Stakeholder collaboration will continue throughout implementation of the EWMP.

Section 2
Identification of Water Quality Priorities

In accordance with the Permit Section IV.C.5(a), water quality priorities have been established for the EWMP. The water quality priorities provide the basis for prioritizing project implementation; selecting and scheduling BMPs; and focusing monitoring activities developed in the CIMP. Details on the development of the water quality priorities are included in the CIMP.

2.1. WATER QUALITY CHARACTERIZATION

Figure 2-1 identifies the receiving waters in the SMB EWMP Group area, as depicted in the Basin Plan (Regional Board, 1995, Updated 2011). Ultimately, all receiving water bodies are tributary to the Santa Monica Bay. **Table 2-1** summarizes the beneficial uses for each water body in the SMB EWMP Group area, as designated in the Basin Plan.

Figure 2-1
Receiving Waters in the SMB EWMP Group Area

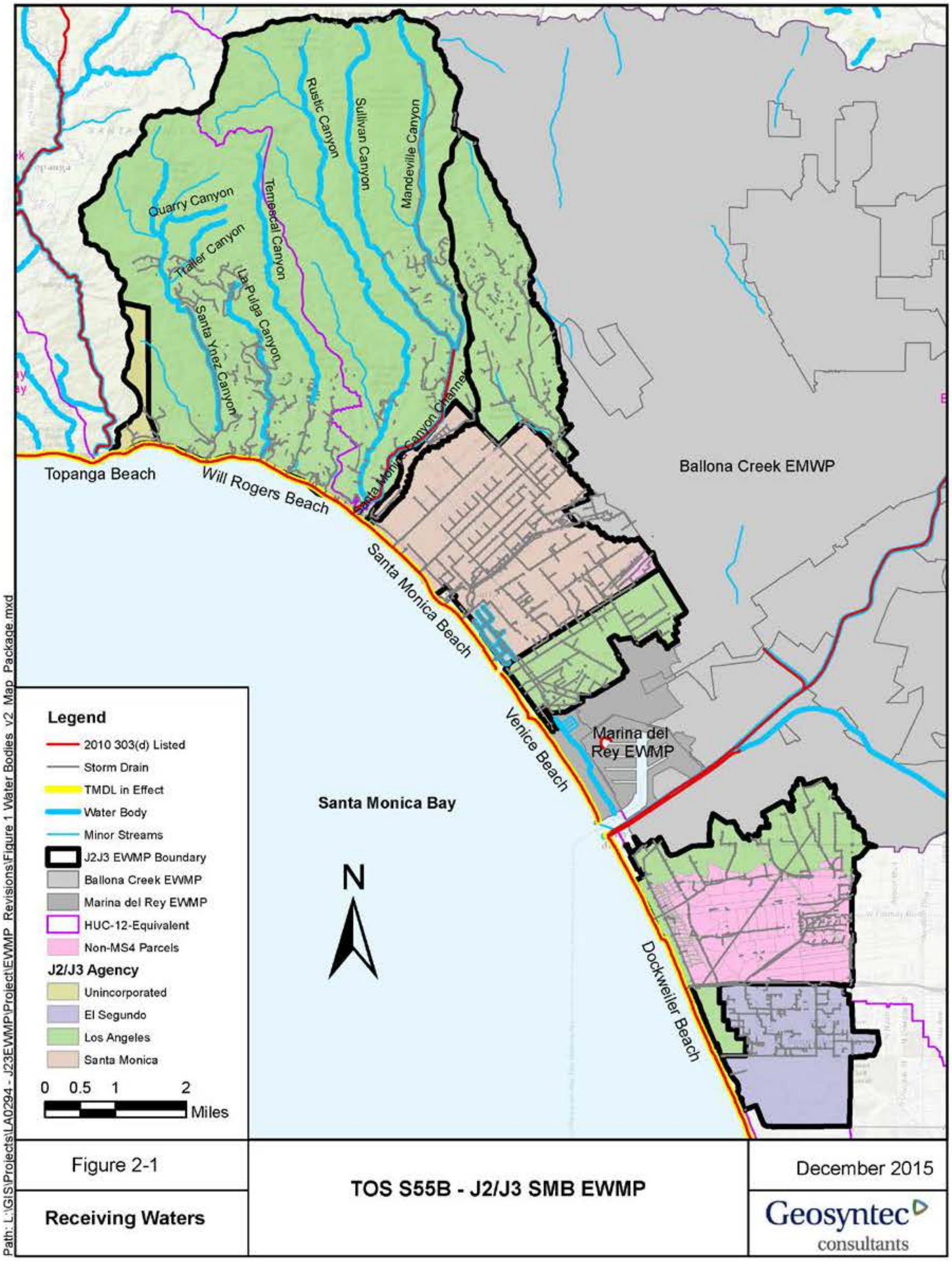


Table 2-1
Beneficial Uses of Water Bodies and Coastal Features Designed in the Basin Plan

Water Body (and Tributaries)	Beneficial Uses													
	MUN[1]	WARM	WILD	RARE	REC-1	REC-2	IND	NAV	COMM	MAR	BIOL	MIGR	SPWN	SHELL
Santa Monica Bay - Nearshore Zone^			E	Ee	E	E	E	E	E	E	Ean	Ef	Ef	Ear
La Pulga Canyon [a]			E	Ee			E	E	E	E	Ean	Ef	Ef	Ear
Temescal Canyon [a]			E	Ee			E	E	E	E	Ean	Ef	Ef	Ear
Santa Monica Canyon Channel	P*	P	P		Ps	I								
Rustic Canyon Creek	P*	I	E		I	I								
Sullivan Canyon Creek	P*	I	E		I	I								
Mandeville Canyon Creek	P*	I	E		I	I								
Santa Ynez Canyon	P*	I	E	E	Pk	E								
Quarry Canyon [a]	P*	I	E	E	Pk	E								
Trailer Canyon [a]	P*	I	E	E	Pk	E								
Will Rogers Beach			E		E	E		E	E	E			P	E
Santa Monica Beach			E		E	E		E	E	E		E	Eas	E
Venice Beach			E	E	E	E		E	E	E		E	Eas	E
Dockweiler Beach			E		E	E	E	E	E	E			P	

Notes:
Beneficial Use Designations: **MUN** = Municipal and Domestic Supply; **WARM** = Warm Freshwater Habitat; **WILD** = Wildlife Habitat; **RARE** = Preservation of Rare and Endangered Species; **REC-1** = Water Contact Recreation; **REC-2** = Noncontact Water Recreation; **IND** = Industrial Service Supply; **NAV** = Navigation; **COMM** = Commercial and Sport Fishing; **MAR** = Marine Habitat; **BIOL** = Preservation of Biological Habitats of Special Significance; **MIGR** = Fish Migration; **SPWN** = Fish Spawning; **SHELL** = Shellfish Harvesting

[1] Asterisked MUN designations are designated under State Water Resources Control Board Resolution No. 88-63 (SB 88-63) and Regional Board Resolution No. 89-03 (RB 89-03). Some designations may be considered for exemption at a later date.

P = Potential beneficial use
I = Intermittent beneficial use
E = Existing beneficial use
a = Beneficial use designations apply to all tributaries to the indicated water body, if not listed separately.
e = One or more rare species utilize all bays, estuaries, lagoons and coastal wetlands for foraging and/or nesting
f = Aquatic organisms utilize all bays, estuaries, lagoons, and coastal wetlands, to a certain extent, for spawning and early development. This may include migration into areas which are heavily influenced by freshwater inputs.
k = Public access to reservoir and its surrounding watershed is prohibited by Los Angeles County DPW
s = Access prohibited by LACDPW)
an = Areas of Special Biological Significance (along coast from Latigo Point to Laguna Point) and Big Sycamore Canyon and Abalone Cove Ecological Reserves and Point Fermin Marine Life Refuge.
ar = Areas exhibiting large shellfish populations include Malibu, Point Dume, Point Fermin, White Point and Zuma Beach.
as = Most frequently used grunion spawning beaches. Other beaches may be used as well.
^ = Nearshore is defined as the zone bounded by the shoreline or the 30-foot depth contours, whichever is further from the shoreline. Longshore extent is from Rincon Creek to the San Gabriel River Estuary.

2.2. WATER BODY-POLLUTANT PRIORITIZATION

A detailed data analysis of the existing and available monitoring data (Coordinated Shoreline Monitoring Program, Beach Watch Monitoring, and Surface Water Ambient Monitoring Program [SWAMP]) was performed to evaluate TMDL compliance status, evaluate the status of 303(d) listings, identify other water body-pollutant combinations that meet 303(d) listing criteria, and identify remaining water body-pollutant combinations demonstrating exceedance(s) of applicable receiving water limitations. Based on this water quality characterization, the WBPCs were classified into one of three categories, in accordance with Section IV.C.5(a)ii of the Permit. **Table 2-2** summarizes the criteria for each category, as defined by the Permit. **Table 2-3** presents the WBPCs for the SMB EWMP.

Table 2-2
Description of Water Body-Pollutant Prioritization Categories

Category	WBPC Description
1	Category 1 (highest priority) are defined in the Permit as *"water body-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R [of the Permit]."*
2	Category 2 (high priority) are defined as *"pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment."*
3	Category 3 (Medium Priority) designations are to be applied to "*constituents that are not 303(d)-listed, but which exceed applicable receiving water limitations contained in the Permit and for which MS4 discharges may be causing or contributing to the exceedance."*

Table 2-3
Water Body Pollutant Prioritization[1]

Category	Water Body	Pollutant	Compliance Deadline
1	SMB Beaches	Summer dry weather bacteria	7/15/2006 (Final RWLs [AEDs])
	SMB Beaches	Wet weather bacteria	7/15/2009 (Interim: 10% single sample ED reduction) 7/15/2013 (Interim: 25% single sample ED reduction) 7/15/2018 (Interim: 50% single sample ED reduction) 7/15/2021 (Final: Single sample AED) 7/15/2021 (Final: Geometric Mean [GM])
	SMB Beaches	Winter dry weather bacteria	11/1/2009 (Final RWL [AEDs])
	SMB Offshore/ Nearshore	Debris	3/20/2016 (20% load reduction) 3/20/2017 (40% load reduction) 3/20/2018 (60% load reduction) 3/20/2019 (80% load reduction) 3/20/2020 (100% load reduction)
	SMB	DDTs	Compliance to be demonstrated through monitoring and adaptive management process[2]
	SMB	PCBs	Compliance to be demonstrated through monitoring and adaptive management process [2]
2	Santa Monica Canyon Channel	Lead	NA
	Santa Monica Canyon Channel	Indicator bacteria	NA
3	None	None	None

[1] Listed in order of compliance deadline, interim and final are included

[2] Although the TMDL lacks a formal compliance schedule for the WQBEL, the TMDL Executive Summary does state, “The time frame for attainment of the TMDL targets for the rest of Santa Monica Bay (other than the Palos Verdes shelf) is 11 years for DDT and 22 years for PCBs.”

Water quality data collected in 2003 and 2004 as part of the SWAMP program was reviewed to evaluate potential Category 3 pollutants; however, this data is insufficient to characterize the sampled water bodies as Category 3 due to the limited quantity of data (two samples at each location) and the age of the data (more than ten years old). As part of the adaptive management process, categorization of WBPCs may be adjusted based on data obtained from monitoring, source evaluations, and BMP implementation. Data collected as part of the approved CIMP may result in future Category 3 designations in instances when RWLs are exceeded and MS4 discharges are identified as contributing to such exceedances. Under these conditions, the appropriate agencies will adhere to Section VI.C.2.a.iii of the Permit. Additionally, an investigation has confirmed that plastic pellets are not a source of pollutants and are not currently used, stored, handled or transported in the SMB area. **Appendix G** shows a confirmation of these results.

2.3. SOURCE ASSESSMENT

The following data sources were reviewed as part of the source assessment for bacteria, lead, and DDT/PCBs in the SMB CML analysis regions:

- Findings from the Permittees' Illicit Connections and Illicit Discharge (IC/ID) Elimination Programs;
- Findings from the Permittees' Industrial/Commercial Facilities Programs;
- Findings from the Permittees' Development Construction Programs;
- Findings from the Permittees' Public Agency Activities Programs;
- TMDL source investigations;
- Watershed model results;
- Findings from the Permittees' monitoring programs, including but not limited to TMDL compliance monitoring and receiving water monitoring; and
- Any other pertinent data, information, or studies related to pollutant sources and conditions that that contribute to the highest water quality priorities.

Because sources of pollutants for the various water bodies within the SMB watershed are essentially identical, the following source assessment is broken down by pollutant.

2.3.1. Indicator Bacteria

Wet weather runoff event mean concentrations (EMCs) for fecal coliform, based on the Southern California Coastal Water Research Project (SCCWRP) land use data for the Los Angeles region (Stein *et al*, 2007), indicate that the highest concentrations are expected from agricultural land uses, followed by commercial, single family residential, multi-family residential, open space, industrial, and transportation. Numerical data describing these concentrations are provided in Appendix A Attachment B, Table B-1.The SCCWRP study also found that in some cases, the levels of fecal indicator bacteria at the recreational (horse) and agricultural land use sites were as high as those found in primary wastewater effluent in the United States(10^6 – 10^7 MPN/100mL). Tiefenthaler *et al* (2011) also found that horse stable sites contributed to significantly higher wet weather EMCs than other land use types.

The SMBB Bacteria TMDL for both dry and wet weather was the first bacteria TMDL adopted by the Regional Board in the State of California. The SMBB Bacteria TMDL was recently opened for reconsideration, although the source assessment was not part of this update. As a result, the general findings from the original source assessment remain unchanged. These findings are summarized in the 2012 Basin Plan Amendment for the reopened SMBB Bacteria TMDL (Attachment A to Resolution No. R12-007):

"With the exception of isolated sewage spills, dry weather urban runoff and stormwater runoff conveyed by storm drains and creeks is the primary source of elevated bacterial indicator densities to SMB beaches. Limited natural runoff and groundwater may also potentially contribute to elevated bacterial indicator densities during winter dry weather" (Regional Board, 2012).

The SMBB Bacteria TMDL source assessment maintains that dry weather and stormwater runoff is the primary source of elevated bacterial concentrations at SMB beaches. Although definitive information regarding the specific sources of bacteria within the watershed is not presented, speculation provided in the Regional Board dry weather staff report provides some insight into possible sources:

"Urban runoff from the storm drain system may have elevated levels of bacterial indicators due to sanitary sewer leaks and spills, illicit connections of sanitary lines to the storm drain system, runoff from homeless encampments, illegal discharges from recreational vehicle holding tanks, and malfunctioning septic tanks among other things. Swimmers can also be a direct source of bacteria to recreational waters. The bacteria indicators used to assess water quality are not specific to human sewage; therefore, fecal matter from animals and birds can also be a source of elevated levels of bacteria, and vegetation and food waste can be a source of elevated levels of total coliform bacteria, specifically" (Regional Board, 2002).

The 2010-2011 and 2011-2012 Los Angeles County Municipal Stormwater Permit Individual Reports[1] for the JG2/JG3 agencies report that both sanitary sewer overflows and IC/ID, while eliminated shortly after being reported, do sometimes occur in those jurisdictions. The 2011-2012 Annual Report for the City of Santa Monica also indicates that overspray from irrigation systems and hosing down of hardscapes contribute dry weather runoff, although this flow is diverted at or near all its outfalls, with low diversions in operation.

The 2011-2012 Santa Monica Bay MS4 Annual Report (City of Los Angeles Environmental Monitoring Division, 2012) states that high bacterial levels measured at the Santa Monica Canyon SMB 2-7 monitoring site have been attributed, at least partially, to stagnant ponded water which attracts wildlife. It should be noted that the City and LACFCD have worked together to coordinate frequent draining of the pond to prevent it from becoming a major source of pollution.

Additionally, information on non-MS4 sources of surf zone bacteria were provided by the City of Malibu, based on a comprehensive review of Southern California published literature, as part of comments on the reopened Bacteria TMDL (City of Malibu, 2012):

"A number of recent Santa Monica Bay studies have further identified and confirmed natural (non-anthropogenic) sources of fecal indicator bacteria (FIB) including plants, algae, decaying organic matter, beach wrack and bird feces – implicating these as potentially significant contributors to exceedances (Imamura et al 2011, Izbicki 2012b). Beach sands, sediments and beach wrack have been shown to be capable of serving as reservoirs of FIB, possibly by providing shelter from ultra violet (UV) inactivation and predation by allowing for regrowth (Imamura et al 2011, Izbicki et al 2012b, Lee et al 2006, Ferguson et al 2005, Grant et al 2001, Griffith 2012, Litton et al 2010, Phillips et al 2011, Jiang et al 2004, Sabino et al 2011, and Weston Solutions 2010). In fact, enterococci include non-fecal or "natural" strains that live and grow in water, soil, plants and insects (Griffith, 2012). Thus, elevated levels of enterococci in water could be related to input from natural sources. The phenomenon of regrowth of FIB from either anthropogenic or natural sources has been suggested by several studies as a possible

[1] The available Annual Reports were reviewed for 2010-2011 and 2011-2012.

source of beach bacteria exceedances (Griffith 2012, Litton et al 2010, Weston Solutions 2010, Izbicki et al 2012b, Weisberg et al 2009)."

Other sources of bacteria during wet weather are anticipated to include other non-MS4 permitted stormwater discharges such as Industrial General Permit sites, Construction General Permit sites, Phase II MS4 Sites (e.g., college campuses), State/Federal owned lands, non-MS4 open space areas such as wildlife habitat, and Caltrans.

2.3.2. DDT and PCBs

As stated previously, limited data are available characterizing DDT and PCBs within SMB, particularly since direct discharges of these pollutants from publically owned treatment works (POTWs) have ceased. The largest concentration of DDT and PCBs within SMB is contained within the Palos Verdes shelf, which is being addressed by the USEPA as a Comprehensive Environmental Response Compensation and Liability (CERCLA) site. Loadings from the shelf to the bay are large and have been well characterized (USEPA, 2012).

With respect to stormwater, the TMDL does not specifically characterize MS4 loadings, though it does recognize that *"DDT and PCBs are no longer detected in routine stormwater sampling from Ballona Creek or Malibu Creek."* However, the TMDL also states that current detection limits used to analyze DDT and PCB concentrations are too high to appropriately assess the water quality. Stormwater inputs are assumed to come from urban areas, as the TMDL specifically states that rural areas in NSMBCW are not likely to be a major source of PCBs or DDT (USEPA, 2012). The TMDL also relies on a limited dataset to establish stormwater load allocations, relying on a single study (Curren *et al*, 2011) from a single creek (Ballona Creek, which is outside the Beach Cities watershed area) to establish MS4 waste load allocations (WLAs) throughout the entire SMB Watershed. It does not present sufficient data to assign MS4 contributions to the DDT and PCB concentrations observed in SMB, and therefore, standard RAA modeling for these pollutants cannot reasonably be conducted at this time.

Despite the lack of data for RAA modeling purposes, the load-based WQBELs for DDT and PCBs established by the TMDL were set to be existing stormwater loads (i.e., based on data used in the TMDL, no MS4 load reduction is expected to be required to achieve TMDL compliance), Therefore, it is assumed that no reductions in DDT and PCB loading from the SMB EWMP Group MS4s are required to meet the TMDL, and reasonable assurance of compliance is assumed to be demonstrated without modeling. Once three years of water quality data are collected under the CIMP and evaluated consistent with the recommendations by USEPA in the TMDL to utilize a three-year averaging period[2], then further source assessment will be considered and the categorization and prioritization of PCB and DDTs as MS4-related pollutants of concern will be reevaluated. Therefore DDT and PCBs are not included in the WBPC evaluation for RAA compliance at this time.

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[2] The TMDL states, "Because existing stormwater loads from the watersheds are lower than the calculated total allowable loads to achieve sediment targets, the waste load allocations for stormwater in this TMDL are based on existing load estimates of 28 g/yr for DDT and 145 g/yr for PCBs." These WLAs are further divided among Los Angeles County MS4, CalTrans, the Construction General Permit, and the Industrial General Permit. The assigned WLAs for the entire LA County MS4 within the Santa Monica Bay Watershed is 27.08 g/yr for DDT and 140.25 g/yr for PCBs, which are equivalent to the TMDL-estimated existing MS4 stormwater loads.

The three-year averaging period is recommended in the USEPA TMDL in Section 8.2, which reads, "We recommend that stormwater waste load allocations be evaluated based on a three year averaging period" (USEPA, 2012). Additionally, Permit Attachment M states that compliance with the PCB and DDT waste load allocations shall be determined based on a three-year averaging period.

2.3.3. Lead

While the available Annual Reports do not indicate a clear source of lead in this subwatershed, the Regional Board Final Staff Report for the TMDL for Metals in Ballona Creek[3] states that urban runoff, or the wash-off of pollutant loads accumulated on the land surface, is likely a substantial source of metals during both wet and dry weather (Regional Board, 2005). The Staff Report also states that between 1991 and 1996, 92% of the annual lead Ballona Creek watershed loads came from wet weather runoff. Additionally, indirect atmospheric deposition was estimated to account for 19% of the typical annual load for lead in the Ballona Creek Watershed (Regional Board, 2005). Analyzing industrial stormwater monitoring data, Stenstrom *et al* (2005) found that, although the data were highly variable, the mean value for lead contributed to Ballona Creek from industrial sites during wet weather was 2,960 µg/L (Stenstrom *et al*, 2005). The most prevalent metals in urban stormwater are consistently associated with suspended solids (Sansalone and Buchberger, 1997, Davis *et al*, 2001) and typically associated with fine particles in stormwater runoff (Characklis and Wiesner 1997, Liebens 2001), which have the potential to accumulate in estuarine sediment posing a toxicity risk (Williamson and Morrisey, 2000).

Wet weather EMCs for lead, based on the Los Angeles County EMC dataset, show that the highest concentrations are expected from agricultural land uses (30.2 µg/L), followed in order by industrial (16.4 µg/L), commercial (12.4 µg/L), high density single family residential (11.3 µg/L), transportation (9.2 µg/L), multi-family residential (4.5 µg/L), educational (3.6 µg/L), and open space (3.0 µg/L) land uses (Geosyntec Consultants, 2012). Other Los Angeles region land use studies have found that high density single family residential has the highest EMCs, followed by industrial and commercial land uses (Stein et. al., 2007). These potential sources will be evaluated for BMP implementation as part of the RAA. Lead will continue to be monitored in accordance with the provisions outlined in the CIMP. During the adaptive management process, the water quality characterization and RAA will be updated if the WQBELs for lead are not being met.

[3] Although the Ballona Creek Metals TMDL is not applicable to the entire Santa Monica Bay Watershed, the staff report describes sources which could be applicable to the Santa Monica Canyon Channel subwatershed.

Section 3
Reasonable Assurance Analysis

An important component of the SMB EWMP is the RAA. The RAA is a process used to demonstrate that institutional and structural control measures are expected to be sufficient for achieving applicable WQBELs and/or RWLs having compliance deadlines within the Permit term. In addition to using the RAA as a means for determining the efficacy of existing and potential control measures, the RAA also facilitates the selection of BMPs as well as the prioritization of BMP implementation. While the methodology of the RAA evolved over the course of the EWMP development, the RAA approach described herein is consistent with the applied methodology and "RAA Guidelines" as issued by the Regional Board.

3.1. MODELING SYSTEM

The RAA approach leverages the strengths of the publicly-available, Permit-approved, GIS-based model already developed for the region: the Structural BMP Prioritization and Analysis Tool (SBPAT). The rationale for utilization of this model for the RAA is described herein.

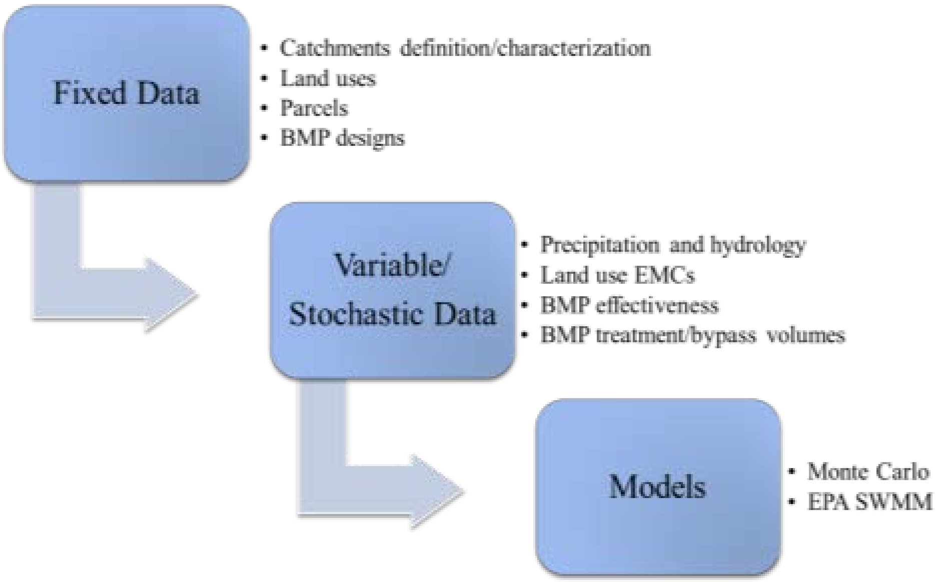
SBPAT is a public domain, "open source," GIS-based water quality analysis tool intended to: 1) facilitate the prioritization and selection of BMP project opportunities and technologies in urbanized watersheds; and 2) quantify benefits, costs, variability, and potential compliance risk associated with stormwater quality projects. The decision to use SBPAT for the SMB EWMP RAA (in the manner described herein) is based on the model capabilities and the unique characteristics of the SMB, specifically:

- **Modeling of SMB hydrologic and watershed processes** – SBPAT utilizes the USEPA's Stormwater Management Model (SWMM) as the hydrologic engine, and SBPAT has been calibrated using local rainfall and SMB stream flow gauges. Calibration results confirm the model's ability to predict stormwater runoff volumes on an annual basis.
- **SMB pollutants of concern and their compliance metric expression** – SBPAT has been utilized for planning applications related to Bacteria TMDL compliance (and specifically exceedance-day predictions, based on SMB criteria), including a demonstrated linkage of load reduction to exceedance days.
- **Availability of new open space water quality loading data** – Recently-developed EMC data are consistent with SBPAT and were also updated to reflect new data developed in SMB as part of this RAA development effort.
- **Capability to conduct opportunity and constraints investigations** – SBPAT is capable of supporting structural BMP placement, prioritization, and cost-benefit quantification, and has been applied for such purposes previously in the SMB EWMP Group area and other nearby SMB CML analysis regions.
- **Characterization of water quality variability** – SBPAT is capable of quantifying model output variability and confidence levels, which is a component of the Regional Board's RAA Guidance
- **Quantification of both structural and non-structural BMPs, and demonstration of compliance at both interim and final compliance dates** – SBPAT's modeling framework is compatible with methods for addressing non-structural BMPs and provides quantitative results for multiple BMP phasing milestones.

Data used for the quantification/analysis module include both fixed and stochastic parameters. The model utilizes land use based EMCs, USEPA SWMM, USEPA/American Society of Civil Engineers/Water

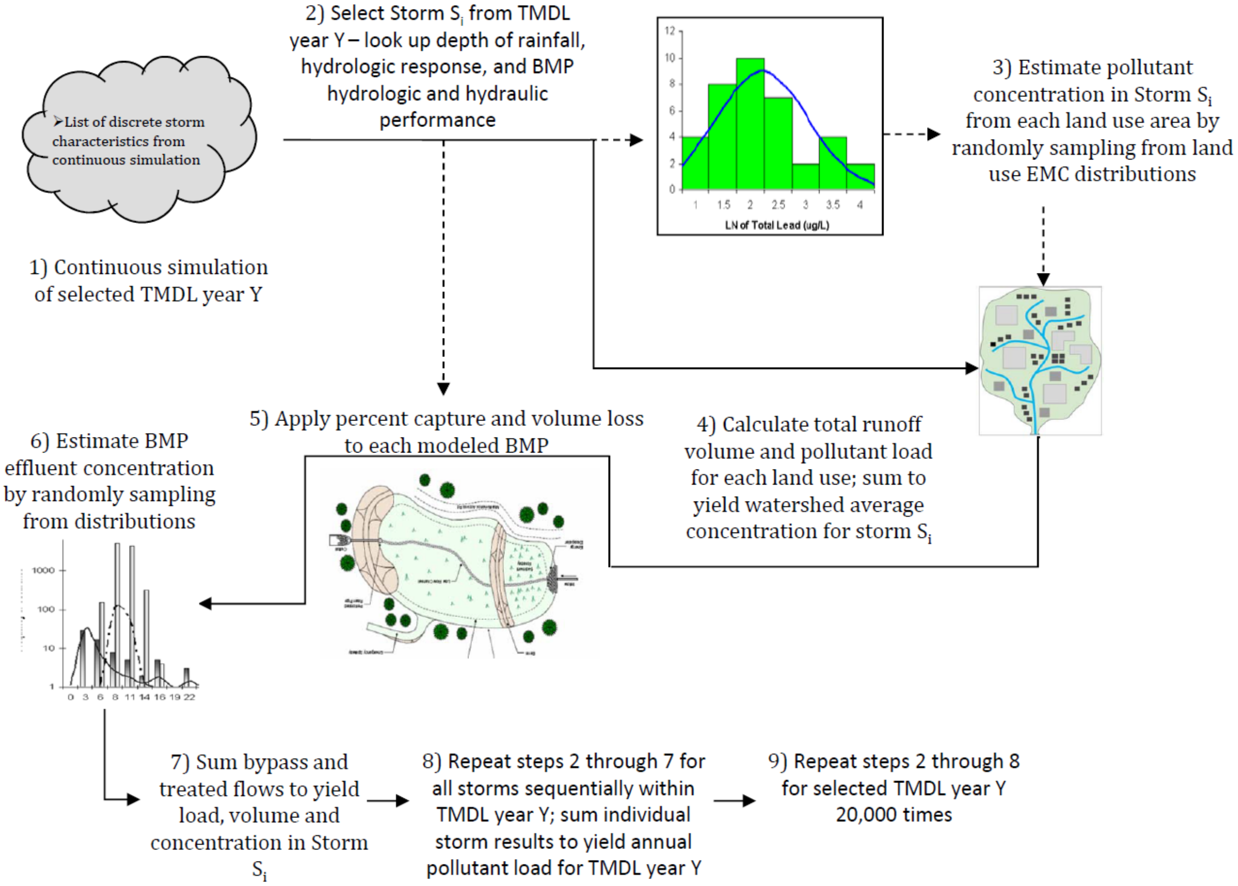
Environment Research Foundation (USEPA/ASCE/WERF) International BMP Database (IBD) water quality concentrations, watershed/GIS data, and a Monte Carlo approach (relying on repeated random sampling) to quantify water quality benefits and uncertainties. The flow of model data is illustrated in the process flow diagram provided in **Figure 3-1**.

Figure 3-1
Structural BMP Prioritization and Analysis Tool (SBPAT)



SBPAT integrates Monte Carlo methods for random sampling analysis. Model simulations are run 20,000 times to calculate a distribution of outcomes that can support the definition of confidence levels and quantify variability. The Monte Carlo random sampling analysis can be applied to any scenario (e.g., average year or critical year) to calculate a distribution of outcomes. The methodology does not change between scenarios (i.e., antecedent conditions, such as extended dry or wet periods, do not affect water quality concentrations that are randomly sampled in the model). Consistent with the SBPAT usage, Monte Carlo methods are typically used in physical and mathematical problems and are most suited for applications when it is difficult to obtain a closed-form expression or when a deterministic algorithm is not desired. A schematic of SBPAT's Monte Carlo process is shown on **Figure 3-2**. Model documentation, as well as links to related technical articles and presentations, can be found on-line at www.sbpat.net.

Figure 3-2
Structural BMP Prioritization and Analysis Tool Monte Carlo Methodology



3.2. RAA PROCESS OVERVIEW

This section describes an overview of the RAA process. Model selection, data inputs, critical condition selection (90th percentile year), calibration performance criteria, and output types have been selected for consistency with the Regional Board RAA Guidance Document (Regional Board, 2014).

3.2.1. Reasonable Assurance Analysis Approach - Dry Weather

Demonstrating reasonable assurance of compliance for the SMB Beaches Bacteria TMDL requires an accounting of many factors that cannot be modeled accurately based on urban runoff processes alone (Thoe *et al*, 2015). This is true despite the extensive summer-dry and winter-dry weather beach-specific monitoring datasets that are available. Therefore, to perform the SMB RAA for dry weather, a semi-quantitative methodology has been developed. This method was developed to follow a permit compliance structure in order to demonstrate how MS4 discharges could or could not be causing or contributing to receiving water exceedances at the beaches. Because fecal indicator bacteria (FIB) are considered the “controlling” pollutants of concern during dry weather in the SMB EWMP Group area (i.e., if MS4 discharges are compliant for bacteria during dry weather, then they will be compliant for all TMDL and 303(d) pollutants during dry weather), the methodology was developed to focus on bacteria. The following criteria form the proposed dry weather RAA methodology. If one criterion is met for each CSMP compliance monitoring location (CML), then reasonable assurance is considered to be demonstrated. This methodology was presented to Regional Board staff on April 9, 2014, and verbal feedback received at the time was supportive. The RAA methodology addressing FIB consists of:

- If a dry weather diversion, infiltration, or disinfection system is located at the downstream end of the analysis region, then reasonable assurance is considered to be demonstrated. To meet this criterion, any such system must have records to show that it is consistently operational, well maintained, and effectively removing bacteria in the treated effluent (in the case of disinfection facilities). Diversions or infiltration systems must demonstrate consistent operation and maintenance so that all freshwater surface discharges to the receiving water are effectively eliminated during year-round dry weather days.
- If there are no MS4 outfalls (major or minor) owned by the SMB EWMP Group Agencies within the CML's drainage area, then MS4 discharges are considered to not be contributing to pollutant concentrations in the receiving water. Therefore, reasonable assurance is demonstrated.
- If the allowed dry weather (summer and winter) single sample exceedance days are based on an antidegradation approach at the CML, then it can be assumed that existing water quality conditions at this CML are acceptable, requiring existing water quality to be maintained. Therefore, reasonable assurance is demonstrated. [4]
- If non-stormwater MS4 outfall discharges have been eliminated within the analysis region, then reasonable assurance is demonstrated. For this criterion to be met, supporting records from the non-stormwater outfall screening program should be supplied.

3.2.2. RAA Approach – Wet Weather

The wet-weather RAA process generally consists of the following steps:

- Identify WBPCs for which the RAA will be performed;
- Identify the MS4 service area (exclude lands of agencies not party to this EWMP such as Federal land, State land, etc.);
- Select an appropriate model, collect data, and calibrate the model based on hydrology and water quality;
- For each modeled CML analysis region[5] (**Figure 3-3**), estimate baseline loads and develop target load reductions (TLRs) for 90th percentile year based on Permit requirements and Regional Board guidance (See Section 2.3.3 of Appendix A, which includes a description of how the 90th percentile year was determined, a graphical representation of available rain gages in Figure 4, a rainfall summary of the selected gage [Pacific Palisades] in Table 3, and a TMDL year precipitation summary in Table 4) ;
- Identify structural and non-structural BMPs that either were implemented after applicable TMDL effective dates or are planned for implementation in the future;
- Evaluate the performance of these BMPs in terms of annual pollutant load reductions;
- Compare these estimates with the TLRs; and
- Revise the BMP implementation scenario until targets are met.

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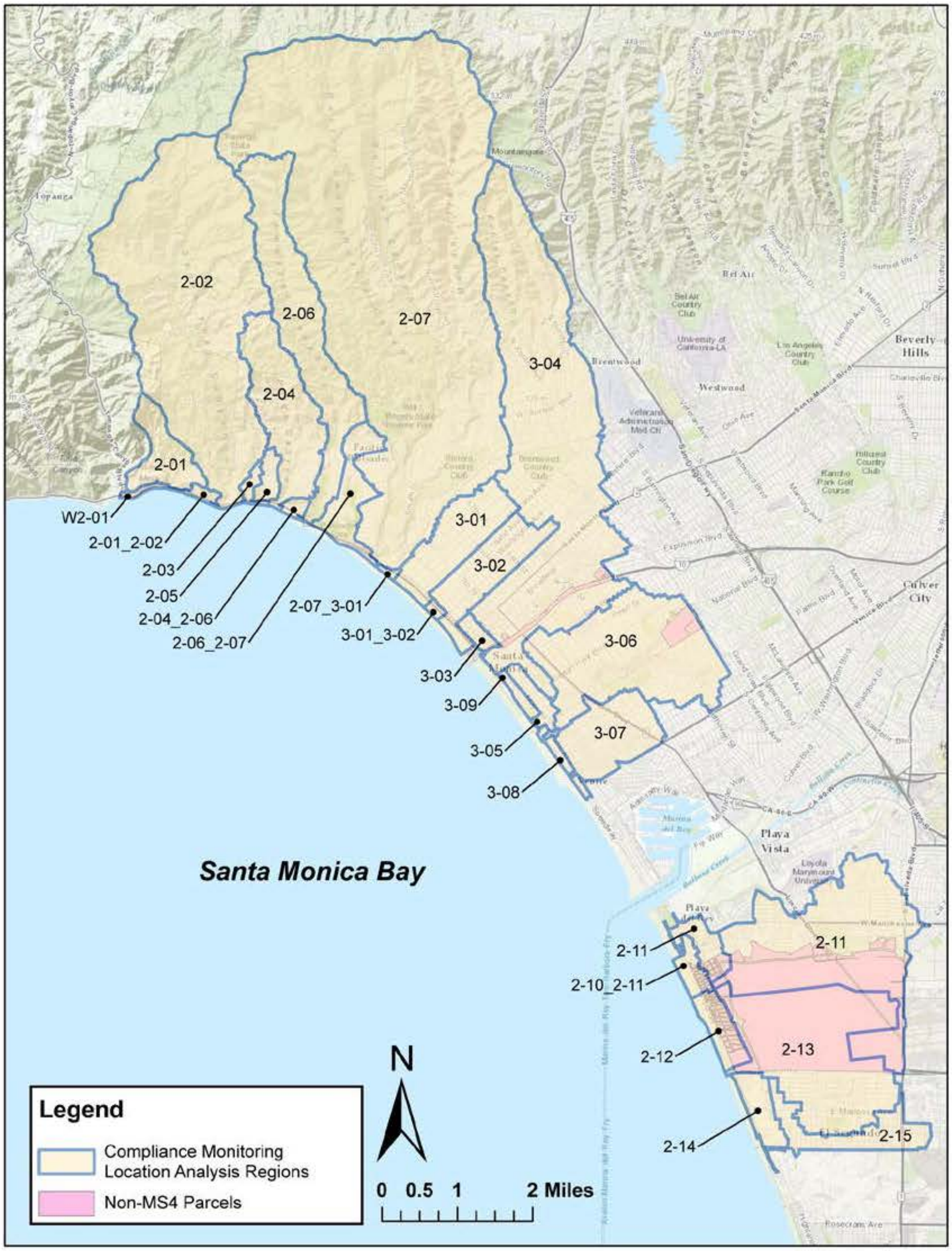
[4] SMB 2-11, 2-13, and 3-6 are all antidegradation-based CMLs for dry weather.

[5] SBPAT input files represent the following CML analysis regions under different IDs: Modeled 2-05 represents 2-06, modeled 2-06 represents 2-05, modeled 2-04_2-06 represents 2-04_2-05, and modeled 2-05_2-07 represents 2-06_2-07. CML analysis region results were post-processed and attributed to the correct CML analysis region.

TLRs represent a numerical expression of the Permit compliance metrics (e.g., bacteria AEDs 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 WQBELs and RWLs in the Permit. Selecting the 90th percentile year for the TLR calculation conservatively sets a load reduction target during a year with higher than average precipitation, thus requiring more BMPs or BMPs within larger storage/treatment capacity when compared to an average year.

Figure 3-3
Modeled Analysis Regions within the SMB EWMP Group Area



3.2.3. Methods to Identify and Prioritize BMP Opportunities

In order to demonstrate reasonable assurance, BMPs opportunities were identified in a prioritized manner. Prioritization was based on cost (low cost BMPs were prioritized highest); BMP effectiveness for the pollutants of concern (BMPs that had greater treatment efficiency for the pollutants of concern in a particular analysis region were prioritized higher than other BMPs); and implementation feasibility (as determined by a desktop screening evaluation). In general, non-structural BMPs were prioritized over structural BMPs due to their lower relative cost. Next, structural BMPs were identified that would result in the least cost per load removed, which was accomplished by targeting land uses with the highest pollutant loads for bacteria.

The RAA was performed according to the following steps:

- Assume non-modeled non-structural BMP load reduction (2.5-7.5 percent of baseline pollutant load);
- Calculate public retrofit incentives (e.g., downspout disconnects) and redevelopment load reductions;
- Calculate load reductions attributable to anticipated new permit compliance activities of non-MS4 entities (e.g., Industrial General Permit holders and Caltrans);
- Calculate planned and proposed regional/centralized BMP load reductions based on existing plans and parcel screening analysis; and
- Meet the TLR by backfilling the remaining load reduction with specific regional/centralized BMP projects or distributed BMPs assumed treat a percentage of developed land uses.

3.3. MODELING APPROACH

This section discusses the modeling approach, including the general BMP planning objectives, methods used to identify and prioritize BMP opportunities, and inputs and assumptions for the modeled non-structural and structural (regional, centralized, and distributed) BMPs.

3.3.1. BMP Objectives

The primary objectives of the non-structural and structural BMPs are to meet the TLRs in each CML analysis region in order to demonstrate reasonable assurance that compliance with the TMDL WQBELs and RWLs from the Permit will be achieved. Additional goals include reduction of other pollutants to downstream waterbodies, decreased reliance on potable water and replacement with non-potable water for irrigation due to on-site harvest/use and infiltration basin projects, increase in groundwater recharge due to infiltration, and reduction in dry weather runoff.

3.3.2. Non-Structural BMPs

Analyzed non-structural BMPs were categorized as follows. Specific model inputs for modeled non-structural BMPs, including redevelopment, public retrofit incentives, and non-MS4 parcels/areas are summarized in tabular format along with model inputs for distributed green streets BMPs in Section 3.

3.3.3. Non-Modeled Non-Structural BMPs

Non-structural BMPs that were not modeled include a combination of bacteria-targeted, wet weather source control BMPs such as pet waste controls (ordinance, signage, education/outreach, mutt mitts, etc.), human waste source tracking and remediation (e.g., homeless controls, leaking sewer investigations, etc.), enhanced street sweeping (e.g., 100 percent vacuum sweepers, increased frequency, etc.), increased catch basin and storm drain cleaning, and other new or enhanced non-structural BMPs that target the pollutants addressed in this EWMP. A combined credit of 2.5 – 7.5 percent load reduction (assuming a mean of 5 percent) was applied for all pollutants to represent the cumulative benefit from all non-modeled non-structural BMPs.

3.3.4. Modeling Redevelopment Projects

Beginning in 2001, redevelopment projects were required by the Permit (via the Standard Urban Stormwater Management Program SUSMP) to incorporate stormwater treatment BMPs if a project size exceeded specified thresholds. The 2012 MS4 Permit established new criteria for redevelopment projects, requiring certain sized projects to capture, retain, or infiltrate the 85^{th} percentile design storm or the 0.75-inch design storm, whichever is greater, via the implementation of LID BMPs. To account for these redevelopment requirements, BMPs were modeled in SBPAT assuming land use-specific annual redevelopment rates for projects that triggered former SUSMP requirements or will trigger the Permit's LID BMP requirements (**Table 3-1**). Assumed rates were based on redevelopment data collected in the Los Angeles region.

Table 3-1
Assumed Annual Redevelopment Rates

Land Use	Annual Redevelopment Rate (% of total land use area)
Residential	0.18
Commercial	0.15
Industrial	0.34
Education	0.16
Transportation	2.7

The rates for redevelopment rates across two distinct time periods consist of:

- **TMDL Effective Date to 2015**: The SUSMP requirements, based on the 2001 MS4 Permit, were assumed to be implemented over this period as flow-through media filters at a 0.2 in/hr design intensity (LACDPW, 2002).
- **2015 to Final Compliance Deadline (2021)**: The 2012 MS4 Permit post-construction requirements were assumed to be implemented over this period as 50 percent biofiltration and 50 percent bioretention. Biofiltration (bioretention with underdrains) were modeled using bioswale BMP types (to account for a small amount of volume reduction) with bioretention effluent EMCs and sized to treat 150 percent of the 1-year, 1-hour design storm (approximately 0.3 in/hr)[6] because flow-through systems do not retain all the design storm volume on site, while bioretention units were sized to retain 100 percent of the 85^{th} percentile, 24-hour design storm depth, calculated as the mean for each CML analysis region.

2015 is used as a transition date since the LID post-construction requirements from the 2012 MS4 Permit are required to be in full effect via local LID ordinances by this time.

[6] 150% of the 1-year, 1-hour design storm was used per Section VI.D.7.c.iii of the Permit.

In order to estimate load reductions associated with these redevelopment BMPs, the land use percentages shown in **Table 3-1** were multiplied by the respective land use areas in each analysis region, resulting in an assumed area treated by LID BMPs each year. This area was multiplied by the applicable number of years during each time period noted above, since new BMPs are assumed to be implemented each year. The total land use area assumed to be redeveloped for each analysis region was then modeled as being treated by the BMPs described above and the total load reduction was quantified.

3.3.5. Modeling Public Retrofit Incentives

There are a variety of programs directed at incentivizing the public to decrease the amount of stormwater runoff from their property, specifically via downspout disconnects. Public incentives for retrofitting existing development through the downspout disconnection program, was modeled as bioswales sized to a design storm intensity of 0.2 in/hr. Assumptions were: 1) 10 percent of all single family residential areas would be converted to disconnected downspout systems over the time period of 2015 (EWMP implementation start date) to 2021 (TMDL final compliance deadline) and 2) based on GIS analysis, 38 percent of the single family residential area consists of rooftops that can be effectively disconnected. Therefore, 3.8 percent of all single family residential neighborhoods were modeled as being treated by bioswales in order to account for public retrofit incentive programs.

3.3.6. Modeling Inspection of Non-MS4 Permitted Parcels or Areas

SBPAT was used to quantify the load reduction in runoff from non-MS4 areas assuming that regulated parcels/areas would be in compliance with the NPDES Statewide Stormwater 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 Stormwater Discharges Associated with Industrial Activities (Industrial General Permit [IGP], Order 2014-0057-DWQ). Load reduction was obtained from these areas by simulating treatment plants sized to treat the IGP's design storm requirement, the 85th percentile, 24-hour storm event (0.2 in/hr), with an effluent concentration set equal to the water quality standard. For fecal coliform, 400 MPN/100mL was used. A default diversion rate of 10,000 cfs was assumed for each treatment plant, intended to simulate the capture of all runoff volume from the 85th percentile event.

3.3.7. Modeling Distributed Green Street BMPs

Distributed BMPs, including green streets, were modeled by assuming 25 percent of the MS4 area can be treated in the right-of-way, and this would be met by 50/50 use of biofilters and bioretention. Biofilters were sized to 150 percent of the 85th percentile, 24-hour design storm (0.3 in/hr) consistent with the Permit's post-construction sizing requirements for flow-through systems, while bioretention units were sized to 100 percent of the 85th percentile, 24-hour design storm depth, calculated as the mean for each CML analysis region. Biofilters were modeled using bioswale volume reduction and bioretention effluent EMCs. Distributed BMPs were applied at levels unique to each CML analysis region, based on need, after accounting for load reductions attributable to non-structural and regional/centralized BMPs. Furthermore, BMPs were applied by assuming treatment of stormwater from CML analysis region-specified percentages of single family and commercial land use areas and CML analysis region-specified percentages of multi-family land use areas, until TLRs are met. These land use and BMP type combinations were chosen based on their ability to result in maximum bacterial load reduction.

Specific model inputs for public retrofit incentives, redevelopment, and distributed BMPs are summarized in **Table 3-2** and **Table 3-3**. Model input for quantifying load reductions attributable to compliance with non-MS4 permits are summarized in **Table 3-4**.

Table 3-2
Redevelopment, Public Retrofit Incentives, and Distributed Green Street BMP Model Assumptions

Implementation Level	BMP Type	Design Storm (in/hr)	Longitudinal Slope (ft/ft)	Manning's n (-)	Hydraulic Residence Time (min)	Water Quality Flow Depth (in)	Effective Retention Depth (in)	Infiltration Rate (in/hr)
Redevelopment (2003-2015)	Media Filter	0.2	-	-	-	-	-	-
Redevelopment (2015-2021)	Biofilters[1]	0.3	0.03	0.25	10	4	2	Based on CML analysis region-specific soil type
	Bioretention	Varies by CML analysis region, see **Table 3-3**	-	-	-	-	12	0.15
Public Retrofit Incentives (2015-2021)	Bioswales representing downspout disconnects	0.2	0.03	0.25	10	4	2	Based on CML analysis region-specific soil type
Distributed Green Street BMPs (2015-2021)	Biofilters[1]	0.3	0.03	0.25	10	4	2	Based on CML analysis region-specific soil type
	Bioretention	Varies by CML analysis region, see **Table 3-3**	-	-	-	-	12	0.15

[1] Modeled as bioswales using bioretention effluent EMCs

Table 3-3
CML Analysis Region-Specific 85th Percentile, 24-Hour Design Storm Depths

CML Analysis Region	Design Storm (in)		CML Analysis Region	Design Storm (in)		CML Analysis Region	Design Storm (in)
West of 2-01	0.82		SMB-2-07	1.11		SMB-3-07	1.06
SMB-2-01	0.86		Between 2-07 and 3-01	0.89		SMB-3-08	1.04
Between 2-01 and 2-02	0.82		SMB-3-01	0.98		SMB-2-10	0.98
SMB-2-02	1.04		Between 3-01 and 3-02	0.95		Between 2-10 and 2-11	0.96
SMB-2-03	0.84		SMB-3-02	1.01		SMB-2-11	1.03
SMB-2-04	0.83		SMB-3-03	0.99		SMB-2-12	1.06
Between 2-04 and 2-06	0.83		SMB-3-04	1.06		SMB-2-13	0.95
SMB-2-05	0.92		SMB-3-09	1.03		SMB-2-14	0.88
SMB-2-06	1.02		SMB-3-05	1.03		SMB-2-15	0.92
Between 2-06 and 2-07	0.88		SMB-3-06	1.10		South of 2-15	0.85

Table 3-4
Non-MS4 Parcels – Modeled as Treated by Treatment Plants
(i.e, BMPs that will treat stormwater to the Water Quality Objectives)

Implementation Level	CML Analysis Region	Treatment Flowrate (cfs)	Design Storm (in/hr)	Average Basin Depth (ft)	Equalization Volume (cu-ft)	Diversion Flowrate (cfs)	Infiltration Rate (in/hr)
Non-MS4 Parcels	All	10,000	0.20	100	1,000	10,000	0.00001

3.3.8. Regional/Centralized Design Parameters and Criteria

Existing BMPs that were constructed after 2003; and, planned and proposed regional/centralized BMPs are modeled in SBPAT as closely as possible to their actual conceptual designs. The following sections outline the regional/centralized BMPs that were modeled as well as their drainage areas, design details in SBPAT, and any relevant assumptions. The load reduction attributable to multiple regional/centralized BMPs in series is assumed to be additive unless the BMPs are not volume-capture BMPs. In those cases, the load reductions were adjusted so as to void double counting.

The RAA included 31 BMPs modeled as infiltration basins. Model inputs for the regional/centralized BMPs are summarized in **Appendix A**. Individual BMPs, as currently proposed, and associated assumptions are described in more detail by CML analysis region below. In some cases, projects which function as harvest and use systems were modeled as infiltration basins to allow for the quantification of losses. The project descriptions following the model input table provide such operational details.

Section 4
Watershed Control Measures

As part of the development of the EWMP, the Permit specifies that watershed control measures (or BMPs) shall be identified to: 1) ensure that stormwater discharges meet receiving water and effluent limits as established in the Permit, and 2) reduce overall impacts to receiving waters from stormwater and non-stormwater runoff.

BMPs are grouped into two broad categories, structural and institutional. Structural BMPs are physically-constructed control measures that alter the hydrology or water quality of stormwater or non-stormwater. Institutional BMPs are source control measures that prevent the release of flow/pollutants or transport of pollutants, but do not involve construction of physical facilities. Minimum control measures (MCMs), such as street sweeping, are a subset of institutional BMPs.

This section summarizes watershed control measures, including BMP types and existing BMPs, which reduce the current pollutant load to meet past and future compliance requirements. In addition, this section summarizes future BMPs that will be implemented to meet 2018 and 2021 Permit compliance requirements. The 2018 and 2021 BMPs were developed as a result of the RAA analysis in combination with feedback from the SMB EWMP Group. Of the proposed/future BMPs, eight were selected as example projects wherein conceptual design, feasibility, and costs were evaluated. Detailed conceptual designs of these eight highlighted projects can be found in Appendix B.

4.1. INSTITUTIONAL BMPS

This section summarizes existing, in-place -MCMs located within the SMB EWMP Group area along with an outline for modifying MCMs and measuring the effectiveness of customized programs.

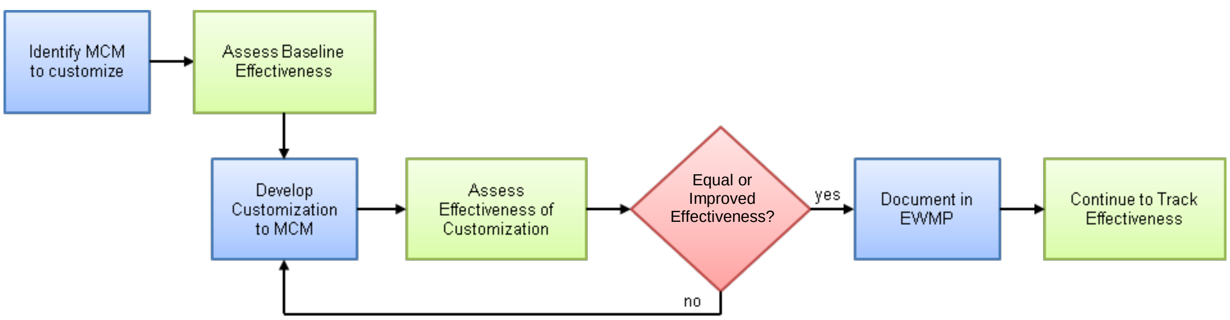
Required future MCMs are similar to programs that were required under the previous MS4 Permit (Order No. 01-182). The previous Permit requires continuation of existing MCMs until the SMB EWMP is approved by the Regional Board. Existing implementation summaries of the Program MCM tasks identified are available in the Unified Annual Stormwater Report. A comparison between program requirements of the previous and current MS4 Permit is shown in **Table 4-1**. MCMs are grouped into six categories as shown below:

- **Public Information and Participation Program (PIPP) -** The objectives of the PIPP are to measurably increase public knowledge, change waste disposal and runoff pollution generation behavior, and involve/engage target populations in stormwater pollution mitigation.
- **Industrial/Commercial Facilities Program -** The goal of the Industrial/Commercial Facilities Program is to track, inspect, and ensure compliance at industrial and commercial facilities that are critical sources of constituents in stormwater.
- **Development Planning Program -** The Development Planning Program implements a set of requirements for development and redevelopment projects to minimize impacts from urban runoff, maximize pervious surface areas, minimize the quantity of stormwater directed to impervious surfaces, and minimize parking lot and street pollution through BMPs.

- **Development Construction Program -** Similar to the Development Planning Program, the Development Construction Program aims to control stormwater pollution from active construction sites. This program is implemented through sediment control measures, retention and recycling of construction-related materials and wastes, containment of non-stormwater runoff from washing and other activities, and erosion/slope controls.
- **Public Agency Activities Program -** The activities under the Public Agency Activities Program include sewage system maintenance and overflow/spill prevention, public yards management, streets and roads maintenance, storm drain operation and management, emergency procedures, and other essential Permittee activities.
- **Illicit Connections and Illicit Discharges Elimination Program -** The final program under the existing MCMs is the Illicit Connections (ICs) and Illicit Discharges (IDs) Elimination Program (IC/ID). The program requires Permittees to document, track, and report all cases of IC/ID and implement a response procedure and methods for public reporting.

The opportunity for customization may provide benefits by allowing the SMB EWMP Group to assess the effectiveness of their current programs and to modify their programs to better serve local conditions and objectives. If an effectiveness assessment is conducted on a specific MCM activity and it can be reasonably shown that customization of the MCM would result in equal or improved effectiveness on attitudes or knowledge, behavior or implementation, load reduction, or water quality, then a defensible recommendation for modification of that activity can be made, resulting in greater resources available for more effective activities. A detailed discussion of tasks within these six MCM categories can be found in **Appendix F**. **Figure 4-1** shows the process for identifying and implementing MCM customization.

Figure 4-1
Process for Minimum Control Measure Customization



The SMB EWMP Group is interested in customizing MCM activities, with the first step being development of a framework to assess the effectiveness of each MCM currently being implemented. For each MCM that can be assessed in this manner, recommendations for customizations can be developed with reasonable assurance of impact to effectiveness.

Table 4-1
Comparison of Stormwater Management Program MCMs

Program Element	Activity	Order No. 01-182	Order No. R4-2012-0175
Public Information and Participation Program	Public Education Program - Advisory committee meeting (once per year)	x	
	"No Dumping" message on storm drain inlets (by 2/2/2004)	x	
	Reporting hotline for the public (e.g., 888-CLEAN-LA)	x	x
	Outreach and Education	x	
	Make reporting info available to public	x	x
	Public service announcements, advertising, and media relations	x (4.B.1.c.1)	x
	Public education materials - Proper handling	x (4.B.1.c.3)	x
	Public education materials - Activity specific	x	x
	Educational activities and countywide events	x	x
	Quarterly public outreach strategy meetings (by 5/1/2002)	x	
	Constituent-specific outreach information made available to public	x	x
	Business Assistance Program	x	
	Educate and inform corporate managers about stormwater regulations	x	
	Maintain storm water websites		x
	Provide education materials to schools (50 percent of all K-12 children every two years)	x	x
	Provide principle permittee with contact information for staff responsible for storm water public educational activities (by 4/1/2002)	x	x
	Principle permittee shall develop a strategy to measure the effectiveness of in-school education programs	x	
	Principle permittee shall develop a behavioral change assessment strategy (by 5/1/2002)	x	
	Educate and involve ethnic communities and businesses (by 2/3/2003)	x (4.B.1.c.2)	x
	Reporting hotline for the public (e.g., 888-CLEAN-LA)	x	x
Industrial/Commercial Facilities Program Industrial/Commercial Facilities Program	Track critical sources - Restaurants	x	x
	Track critical sources - Automotive service facilities	x	x
	Track critical sources - RGOs	x	x
	Track critical sources - Nurseries and nursery centers		x
	Track critical sources - USEPA Phase I facilities	x	x
	Track critical sources - Other federally-mandated facilities [40 CFR 122.26(d)(2)(iv)(C)]	x	x
	Track critical sources - Other commercial/industrial facilities that Permittee determines may contribute substantial constituent load to MS4		x
	Facility information - Name of facility	x	x
	Facility information - Contact information of owner/operator	name only	x
	Facility information - Address	x	x
	Facility information - NAICS code		x
	Facility information - SIC code	x	x
	Facility information - Narrative description of the activities performed and/or principal products produced	x	x
	Facility information - Status of exposure of materials to storm water		x
	Facility information - Name of receiving water		x
	Facility information - ID whether tributary to 303(d) listed water and generates constituents for which water is impaired		x
	Facility information - NPDES/general industrial permit status	x	x
	Facility information - No Exposure Certification status		x
	Update inventory of critical sources annually	x	x
	Business Assistance Program	optional	x
	Notify inventoried industrial/commercial sites on BMP requirement		once in 5 years
	Inspect critical commercial sources (restaurants, automotive service facilities, retail gasoline outlets and automotive dealerships)	twice in 5 years	twice in 5 years
	Inspect critical industrial sources (phase 1 facilities and federally-mandated facilities)	twice in 5 years[1]	twice in 5 years[2]
	Verify No Exposure Certifications of applicable facilities		x
	Verify WDID of applicable facilities	x	x
	Source Control BMPs	x	x
	Provisions for Significant Ecological Areas (SEAs) (Environmentally Sensitive Areas (ESAs)	x[3]	x
	Progressive enforcement of compliance with stormwater requirements	x	x
	Interagency coordination	x	

Table 4-1 (continued)

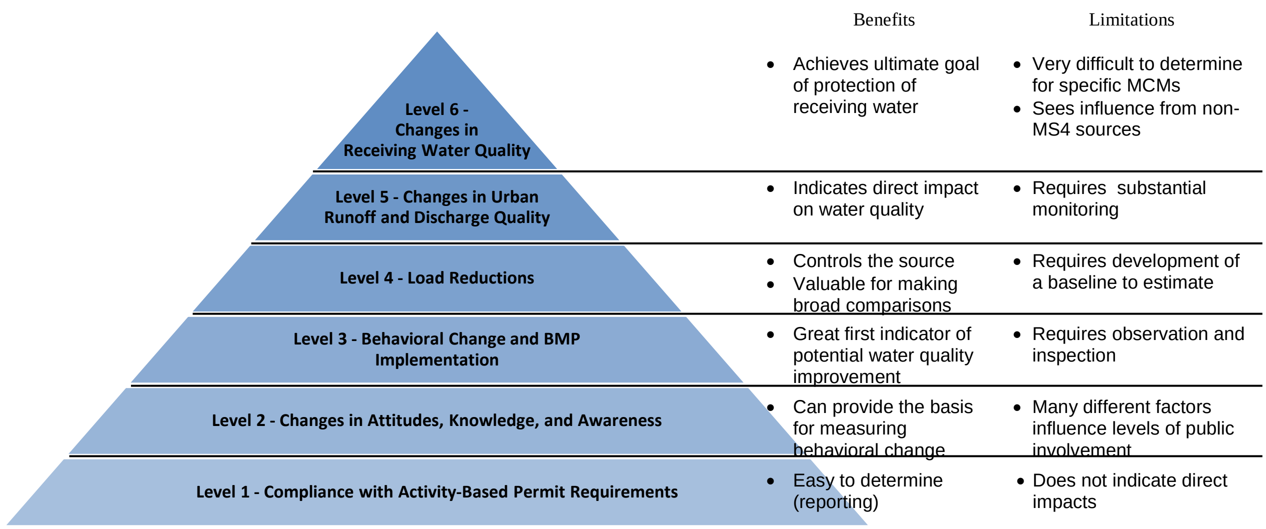
Program Element	Activity	Order No. 01-182	Order No. R4-2012-0175
Planning and Land Development Program	Peak flow control (post-development stormwater runoff rates, velocities, and duration)	x	x[4]
	Hydromodification Control Plan	in lieu of countywide peak flow control	
	SUSMP (by 3/3/03)	x	
	Volumetric Treatment Control (SWQDv) BMPs	x	x
	Flow-based Treatment Control BMPs	x	x
	Require implementation of post-construction Planning Priority Projects as treatment controls to mitigate storm water pollution (by 3/10/2003)	x	x
	Require verification of maintenance provisions for BMPs	x	x
	CEQA process update to include consideration of potential stormwater quality impacts	x	
	General Plan Update to include stormwater quality and quantity management considerations and policies	x	
	Targeted Employee training of Development planning employees	x	
	Bioretention and biofiltration systems		x
	SUSMP guidance document	x	
	Annual reporting of mitigation project descriptions		x
Development Construction Program	Erosion control BMPs	x	x
	Sediment control BMPs	x	x
	Non-storm water containment on project site	x	x
	Waste containment on project site	x	x
	Require preparation of a Local SWPPP for approval of permitted sites	x	x
	Inspect construction sites on as-needed basis		x
	Inspect construction sites equal to or greater than one acre	once during wet season	once every two weeks[5], monthly
	Electronic tracking system (database and/or GIS)		x
	Required documents prior to issuance of building/grading permit	L-SWPPP	ESCP/SWPPP
	Implement technical BMP standards		x
	Progressive enforcement	x	x
	Permittee staff training	x	x
Public Agency Activities Program	Public construction activities management	x	x
	Public facility inventory		x
	Inventory of existing development for retrofitting opportunities		x
	Public facility and activity management	x	x
	Vehicle maintenance, material storage facilities, corporation yard management	x	x
	Landscape, park, and recreational facilities management	x	x
	Storm drain operation and maintenance	x	x
	Streets, roads, and parking facilities maintenance	x	x
	Parking Facilities Management	x	x
	Emergency procedures	x	x
	Alternative treatment control BMPs feasibility study	x	
	Municipal employee and contractor training		x
	Sewage system maintenance, overflow, and spill prevention	x	
IC/ID Elimination Program	Implementation program	x	x
	MS4 Tracking (mapping) of permitted connections and illicit connections and discharges	x	x
	Procedures for conducting source investigations for IC/IDs	x	x
	Procedures for eliminating IC/IDs	x	x
	Procedures for public reporting of ID		x
	IC/ID response plan	x	x
	IC/IDs education and training for staff	x	x

[1] Tier 2 facilities may be inspected less frequently if they meet certain criteria
[2] Subject to change based on approved EWMP strategy
[3] For environmentally sensitive areas and impaired waters
[4] Maintain pre-project runoff flow rates via hydrologic control measures
[5] Sites of threat to water quality or discharging to impaired water; frequency dependent on chance of rainfall

The California Stormwater Quality Association (CASQA) provides a framework for the effectiveness assessment of Stormwater Management Programs. The outcome is a hierarchy that categorizes the classification of outcome types (levels); these types allow MCMs to be placed into one or more categories for subsequent outcome assessment. The outcome levels, Level 1 through Level 6, are shown in **Figure 4-2**.

An assessment of required MCMs was conducted and resulted in no proposed modifications for the SMB EWMP Group Area. As a result, required MCMs shall be implemented without modifications; however, the SMB EWMP Group may consider modifications in the future using the prescribed process. Existing MCMs are fully in place, and additional MCMs are expected to be implemented immediately after EWMP approval.

Figure 4-2
General Classification of Outcome types (adapted from CASQA)



4.2. STRUCTURAL BMPS

Structural BMPs are anticipated to perform the majority of required pollutant reduction within the SMB EWMP Group area. To implement control measures efficiently at the watershed-scale and to support compliance tracking, structural BMP programs will be an important element of EWMP implementation. This section describes the necessary structural BMPs for EWMP implementation.

Structural BMPs are categorized as either distributed or regional. Distributed BMPs are designed to treat runoff from small drainage areas that are comprised of a single to a few parcels. Regional BMPs are designed to capture runoff from the 85th percentile, 24-hour storm from a large drainage that includes multiple parcels and various land uses. A subset of regional BMPs capable of capturing runoff are herein referred to as "Regional EWMP Projects."

There are several existing regional and distributed structural BMPs within the SMB EWMP Group Area, as summarized in the following subsection.

4.2.1. Existing Regional BMPs

Existing regional BMPs were identified and characterized into BMP categories through a data request and literature review process, wherein a total of 27 regional BMPs were identified. The 27 regional BMPs are summarized in **Table 4-2**, with locations shown on **Figure 4-3**. Three of these regional BMPs are joint projects between multiple agencies. Of the 27 existing regional projects, 23 are low-flow diversions (LFDs), two are infiltration BMPs, one is a constructed wetland, and another is a treatment facility. Additional information on existing BMPs can be found in **Appendix F**.

Table 4-2
Summary of Existing Regional Best Management Practices[1] by Permittee and Type

Permittee	Total BMPs Reported[7]	Number of Existing Regional BMPs Reported by Permittee			
		Infiltration	Constructed Wetland	Treatment Facility	Low-Flow Diversion[2]
El Segundo	-	-	-	-	-
Los Angeles	13	2	1	1[3]	9[4,5]
Santa Monica	5	-	-	1[3]	4[4]
County[6]	-	-	-	-	-
LACFCD[6]	13	-	-	-	13[4,5]

[1] Regional BMPs summarized in this table do not necessarily meet the Permit's criterion of capturing the 85th percentile, 24-hour storm volume to be considered a Regional EWMP Project.
[2] Low-Flow Diversions capture and divert 100% of dry flow.
[3] The Santa Monica Urban Runoff Recycling Facility (SMURRF) is a joint project between the City and City of Santa Monica.
[4] The Pico-Kenter LFD is a joint project between LACFCD, the City, and the City of Santa Monica.
[5] The Imperial Highway LFD is a joint project between LACFCD and the City.
[6] Data sources contain conflicting information in regard to LACFCD and County ownership of LFDs. In this table, all LFDs with this conflict have been listed with LACFCD as the responsible permittee.
[7] This column represents the number of BMPs for which each permittee has ownership/partial ownership. As double counting occurs when multiple permittees have ownership of a project, the numbers in each column should not be added to determine the total number of physical BMPs.

4.2.2. Existing Distributed BMPs

Existing distributed BMPs were characterized through a data request process that identified a total of 2,212 BMPs in the SMB EWMP Group Area. Of these distributed BMPs, 340 exist within the City of Los Angeles, and 1,872 exist within the City of Santa Monica. The BMPs identified in the City of Santa Monica reflect both city-owned and privately-owned BMPs. Existing distributed BMPs within the SMB EWMP Group area are summarized by type in **Table 4-3**. A detailed list of existing distributed BMP can be found in Appendix F. This list is a preliminary list compiled by data requests and may not include more recently constructed BMPs.

Figure 4-3
Location of Existing Regional BMPs

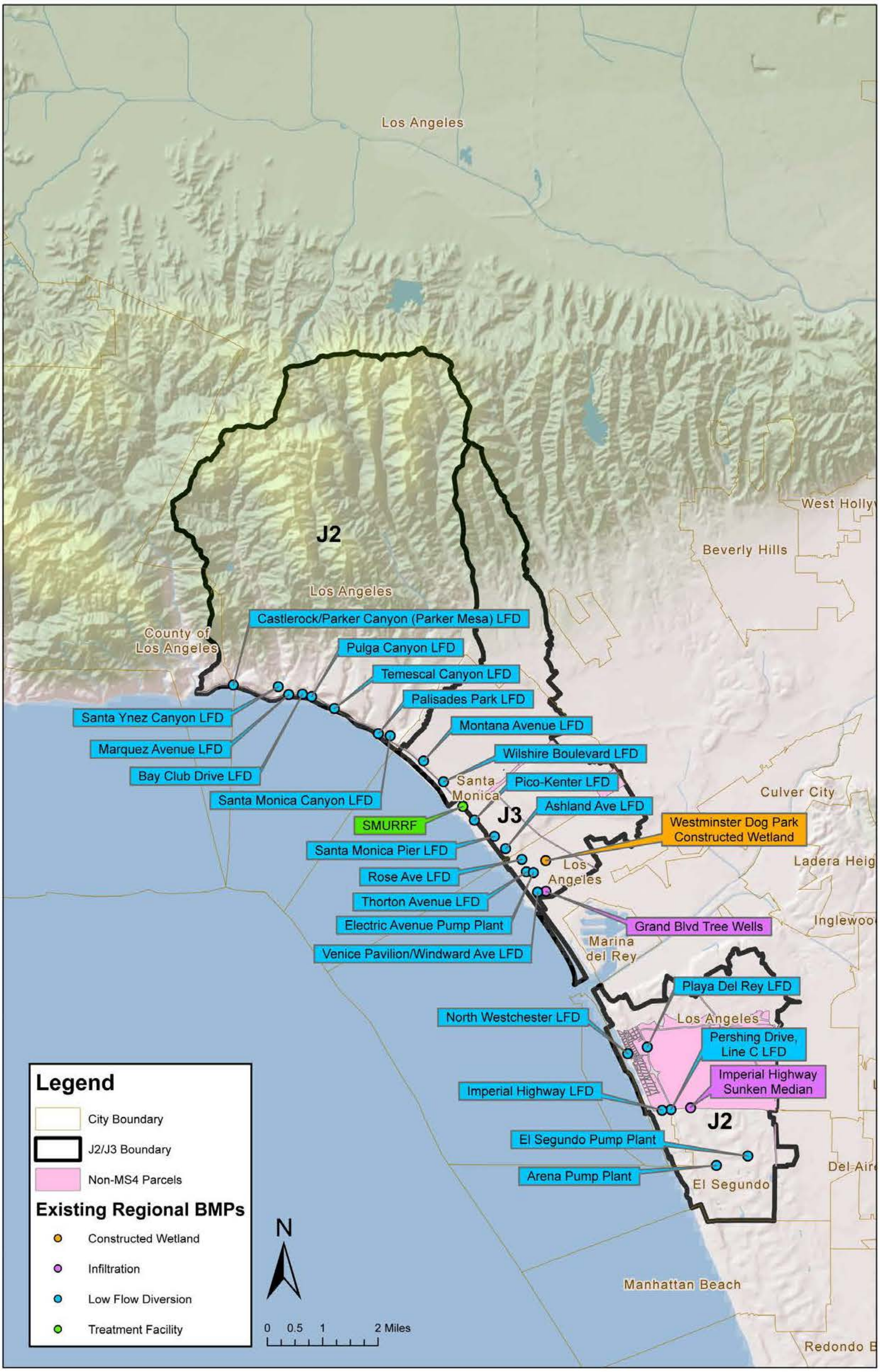


Table 4-3
Existing Distributed Best Management Practices by Permittee and Type

Permittee[2]	Number of Existing Distributed BMPs by Type Reported by Permittee										
			Green Infrastructure								
	Total BMPs Reported	Site-Scale Detention	Bioretention	Biofiltration	Permeable Pavement	Bioswale	Infiltration	Rainfall Harvest	Flow Through	Source Control	Unknown[1]
El Segundo[3]	-	-	-	-	-	-	-	-	-	-	-
Los Angeles	340	14	168	-	51	11	9	44	11	31	-
Santa Monica	1872	-	1	230	89	-	1,329	1	101	-	67
County[3]	-	-	-	-	-	-	-	-	-	-	-
LACFCD[3]	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**2212**	**14**	**169**	**230**	**140**	**11**	**1,338**	**45**	**112**	**31**	**67**

[1] BMPs listed as "unknown" are those for which a BMP category was not specified in the data request.
[2] BMPs were assigned to Permittee by geographic location in the instance that ownership information was not available.
[3] Distributed BMP data for El Segundo, the County, and LACFCD were not available for summary. Please see Attachment A4 and Attachment A5 to review the BMPs summarized for these Permittees in the 2011-2012 Unified Annual Stormwater Report.

4.2.3. Planned Structural BMPs for Compliance

The Regional Projects Initial Screening Technical Memorandum (MWH Team, 2014) documents the methods used for identifying how the parcels within the SMB EWMP Group Area were narrowed to 36 high potential regional project sites (see **Figure 4-5**). The general process used to select the high potential regional project sites is described in this section.

An initial screening step was to identify parcels within the SMB EWMP Group area that are currently publicly owned. A list of known public parcels was generated from a Los Angeles County GIS shapefile of land use types. The initial screening identified over 157 public parcels in the SMB EWMP Group area, consisting of golf courses, parks and recreation centers, colleges and universities, and schools. Large public parcels are preferable for siting regional projects, and a subsequent screening step was to identify those public parcels larger than 0.5 acres in size. Lastly, to facilitate the use of existing infrastructure, the list was limited to include only those parcels within 500 feet of existing MS4 infrastructure greater than 18 inches in diameter. Following this final screening, the list was narrowed to 95 public parcels larger than 0.5 acres in size and within 500 feet of existing MS4 infrastructure greater than 18 inches in diameter. A list of parcels that passed the initial screening was submitted to the SMB EWMP Group in order to solicit feedback regarding the initial site list and to request additional sites to consider. In total, 115 parcels were identified for further analysis.

In order to identify the most suitable sites from the 115 parcels that either passed the initial screening or were recommended by the SMB EWMP Group, sites were further analyzed using additional constraint and preference criteria in GIS. Site characteristics that greatly impact the feasibility and suitability for multi-benefit regional projects were chosen to generate a refined list of sites with the greatest relative potential for hosting regional projects and EWMP regional projects. In this manner, a more manageable list of sites was generated to allow for review of aerial photography, site-specific research, and other detailed analyses. To evaluate the potential for regional project constructability, a site suitability analysis was conducted. Two types of criteria were used to evaluate potential sites: (1) constraints and (2) preferences. GIS layers were identified to flag parcels for undesirable site characteristics and constraints. The following constraints were used in this analysis:

- Ground Slope Surface > 20%
- Underlain by Bedrock – areas where infiltration is severely limited due to underlying bedrock in close proximity to ground surface
- Significant Ecological Areas – land area that contains irreplaceable biological resources as defined by the County of Los Angeles
- High Liquefaction Potential – areas of historic occurrence of liquefaction, which is a phenomenon that occurs when saturated sand and silt take on the characteristics of a liquid during an earthquake

Following the constraint analysis, the list of potential sites without any constraints was decreased to 76 parcels. The following preference criteria were assigned to all subsequent parcels:

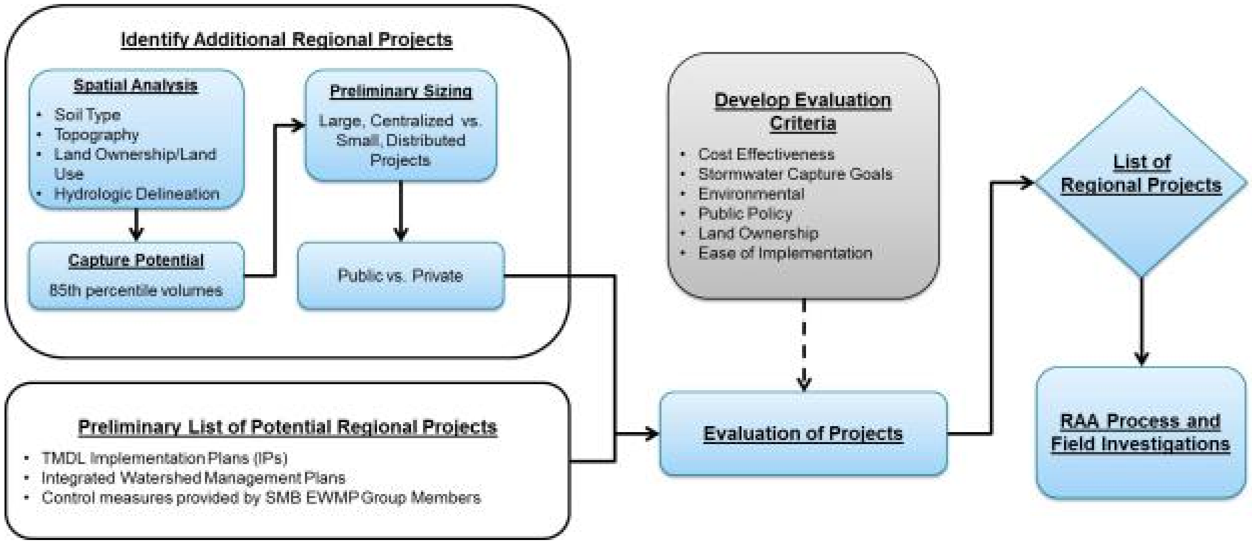
- Land Use Type – Parks and golf courses are preferred over colleges, universities, and non-LAUSD schools. LAUSD-Schools, federally-owned wildlife open spaces, and cemeteries are the least preferred.
- Proximity to MS4 Outfall – Parcels located close to MS4 outfalls have a lager drainage area than parcels located further from MS4 outfalls.
- Drainage Area Water Quality – Parcels that drain areas of the watershed with higher contaminant loading have a higher potential for load reduction.
- Soil Infiltration Rate – Parcels in areas where soil infiltration rates are high have the potential for groundwater recharge projects.

Upon completion of the screening process and suitability analysis, aerials of each parcel were observed to further investigate each site. Each site was given a ranking from 1 to 4, with a ranking of 1 denoting no constraints and a high preference. This final ranking list was evaluated and discussed with the SMB EWMP Group for further analysis and parcel selection to be modeled in the RAA. Eight highlighted regional EWMP project sites were selected for conceptual design – four from the City of Los Angeles, two from the City of Santa Monica and two from El Segundo.

Process for Identifying and Selecting Multi-Benefit Projects

The EWMP process emphasizes identifying Regional EWMP projects that are individually or collectively able to capture runoff from the 85^{th} percentile, 24-hour storm. Existing and planned BMPs and additional BMPs were considered as part of the EWMP process. This section presents the process used to identify additional potential regional EWMP projects, as illustrated schematically in **Figure 4-4**.

Figure 4-4
Process for Evaluating Regional EWMP Projects



This section presents the regional projects conceptualized and modeled in the RAA analysis to meet compliance requirements. A summary of BMP runoff retained in acre-feet (AF) by Permittee is shown in **Table 4-4** for regional projects and in **Table 4-5** for distributed projects.

The LACFCD will work with the Watershed group in their efforts to address source controls; assess, develop, and pursue funding for structural BMPs, and promote the use of water reuse and infiltration. As regional project scopes are further refined, the LACFCD will determine on a case-by-case basis our contribution to the projects.

Figure 4-5
High Potential Regional Sites

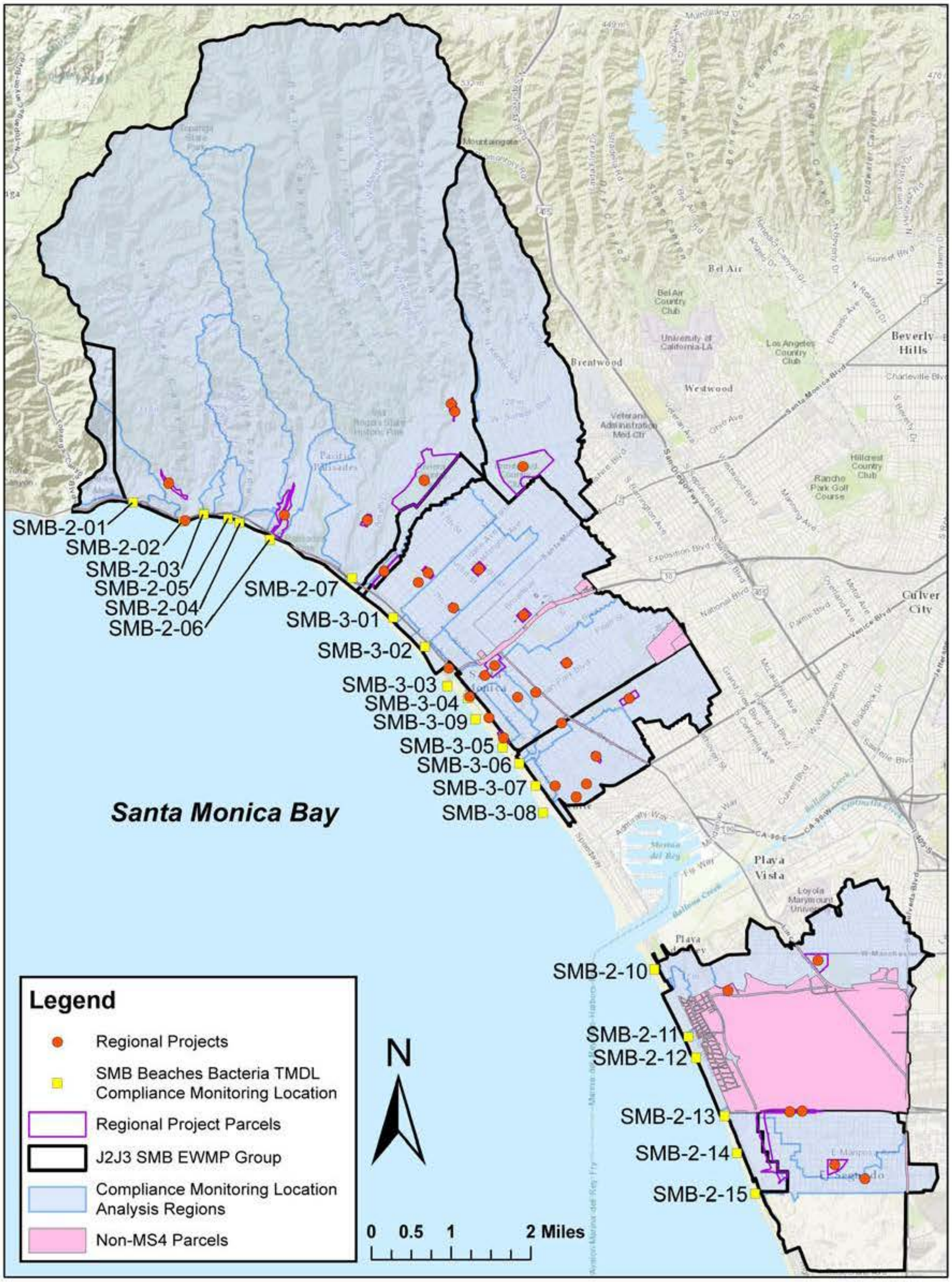


Table 4-4
Summary of Total Regional BMP Runoff Retained over Critical Year by Permittee

Implementation Date for Compliance	Regional BMP Total Runoff Retained over Critical Year (AF)				
	County of Los Angeles	City of Los Angeles	City of Santa Monica	City of El Segundo	Total
2018	0.0	465.3	562.5	232.2	1260.0
2021	0.0	758.9	518.3	0.0	1277.2
Total	0.0	1224.2	1080.8	232.2	2537.2

Table 4-5
Summary of Distributed BMP Runoff Retained over Critical Year by Permittee

Implementation Date for Compliance	Green Street BMP Total Runoff Retained over Critical Year (AF)				
	County of Los Angeles	City of Los Angeles	City of Santa Monica	City of El Segundo	Total
2018	4.8	283.3	184.5	0.0	472.6
2021	4.6	246.6	166.2	0.0	417.3
Total	9.4	529.9	350.7	0.0	890.0

For interim compliance (2018) the SMBBB TMDL requires a 50 percent reduction in exceedance days; this will be met by achieving 50 percent of the TLR in each CML analysis region, through a combination of non-structural, distributed green street BMPs, and existing and fast-tracked centralized/regional BMPs. These centralized/regional BMP projects are addressed by CML analysis region. It was assumed that 50 percent of the proposed distributed green streets BMPs would be implemented in all CML analysis regions between 2015 and 2018, and 50 percent would be implemented between 2018 and 2021. In CML analysis regions where no distributed green street BMPs are necessary to meet the final compliance deadlines, regional BMPs were prioritized to reduce redundant load reductions. However, in CML analysis region 2-11, a small number of distributed green street BMPs (5 percent of single family and commercial areas) were added rather than fast-tracking the large-scale regional projects, which would meet the interim and final targets if constructed alone.

Table 4-6 lists regional and centralized BMPs required for compliance by CML analysis region. At the time of the interim compliance deadline (2018), a 22 percent load reduction is estimated watershed-wide, which is greater than the interim target load reduction of 18 percent, determined through the RAA.At the time of the final compliance deadline (2021), a 42 percent load reduction is estimated to be achieved, which is greater than the final target load reduction of 35 percent required by the Permit. The load reduction within the CML analysis regions is primarily attributable to individual regional BMPs in each CML analysis region. Detailed descriptions of modeled BMPs for each CML analysis region can be found in Appendix A.

Table 4-6
Summary of Regional and Centralized BMPs Required for Compliance

CML Analysis Region	Modeled Regional/Centralized BMP Identifier	Lead Agency[1]	BMP Status	Implementation Date for Compliance	
				2018 (Interim)[3]	2021 (Final)[5]
2-02	RBMP20_SantaYnez1[2]	LA	Planned		X
	RBMP23_2-2ParkingLot	LA	Proposed		X
2-06	RBMP08_Temescal[2]	LA	Planned		X
2-07	RBMP47_RivieraLg85	LA	Planned	X	
	RMBP40b_RivieraBarrancaSW	LA	Proposed		X
	RBMP17_Mandeville	LA	Planned		X
	RBMP43_OldOakRd	LA	Existing	X	
	RBMP48_Rustic85[2]	LA	Proposed		X
3-01	RBMP30_GooseEggPark	SM	Proposed		X
	RBMP31_RooseveltElem[6]	SM	Proposed	X	
	RBMP29_SanVicenteMedian	SM	Proposed		X
3-02	RBMP32_ReedPark	SM	Proposed	X	
	RBMP33_LincolnMiddleSch[6]	SM	Proposed		X
3-03	RBMP16a_CleanBeachesPier	SM	Planned	X	
3-04	RBMP44_Brentwood85	LA	Proposed		X
	RBMP51_Memorial85[2]	SM	Proposed		X
	RBMP52_SMCivicAud85[2]	SM	Proposed		X
	RBMP16b_CleanBeachesPK	SM	Planned		X
	RBMP11_LosAmigos	SM	Proposed		X
	RBMP53_SMHSBuilt	SM	Existing	X	
3-05	RBMP37_3-5ParkingLot	SM	Proposed	X	
3-06	RMBP38_OlympicHigh[6]	SM	Proposed		X
	RBMP13_Ozone	SM	Proposed	X	
	RBMP10_PenmarPh2*[2]	LA	Planned	X	
	RMBP39_WillRodgersElem[6]	SM	Proposed		X
3-07	RBMP01b_GrandBlvdIMF	LA	Existing	X	
	RBMP21b_GrandBlvdIIMF	LA	Existing	X	
	RBMP03_Westminster[2]	LA	Existing	X	
	RBMP45_Oakwood85[2]	LA	Proposed		X
3-09	RBMP18_CrescentBay	SM	Proposed	X	
2-11	RBMP19_WestchesterPark[21]	LA	Planned		X
	RBMP09_WestchesterLAX	LA	Planned		X
2-13	RBMP02_ImperialHwy[2]	ES	Existing	X	
	RBMP42_ImperialStrip	ES	Planned	X	
	RBMP50_Recreation85[2]	ES	Proposed	X	

2-15	RBMP49_PumpStationB85	ES	Proposed	X	

[1] LA = Los Angeles, SM = Santa Monica, ES = El Segundo
[2] These projects were derived from the Santa Monica Bay Beaches Wet Weather Bacteria TMDL Implementation Plan.
[3] Load reduction credit applied/project implemented within RAA model to meet 2018 interim compliance deadline.
[4] Load reduction credit applied/project implemented within RAA model to meet 2021 interim compliance deadline.
[5]The incremental load reduction between Penmar Phase I (existing) and Penmar Phase II (planned) is negligible. Therefore, the full load reduction applicable to Penmar Phase II has been applied to the interim compliance deadline/target.
[6]As with all proposed projects on school properties, project design, approval, and implementation is subject to change based on input from the school and/or school district.
[7]In some cases, the total combined load reduction achieved by all BMPs in a subwatershed was estimated to be greater than the target load reduction for the subwatershed, thereby providing the Group flexibility in the design and phasing of the proposed projects. Adaptive management will be relied upon to update the EWMP and RAA as projects are designed, redesigned, and/or implemented in order to demonstrate a reasonable assurance of compliance.

It is noted that if at any time specific distributed green streets or regional/centralized BMPs are found to be infeasible for implementation, then alternative BMPs or operational changes will be planned within the same CML analysis region and within the same timeline, so as to meet an equivalent CML analysis region pollutant load reduction.

Compliance with the Debris TMDL will be met through a phased retrofit of all catch basins, -at strategic locations within the storm drain line, or combination of these two. throughout the SMB EWMP Group area to meet each interim compliance deadline (20% load reduction per year between 2016 and 2019) as well as the final compliance deadline (100% load reduction) in 2020. Consistent with the City's Trash Monitoring and Reporting Plan (City of Los Angeles Department of Public Works, 2012), "*vertical insert[s] with 5-mm openings and flow activated opening screen covers are the best suited for implementation within the City to achieve compliance with Trash TMDLs*". No additional BMPs were identified to meet the debris TMDL.

Existing (constructed after 2003), planned, and proposed regional/centralized BMPs were modeled to evaluate reasonable assurance in meeting compliance requirements. Project descriptions for the regional/centralized BMPs that were modeled as well as their drainage areas, design details, and any relevant assumptions are summarize below by CML analysis region. The pollutant load reduction attributable to multiple regional/centralized BMPs in series is assumed to be additive unless the BMPs are not volume-capture BMPs. In those cases, the pollutant load reductions were adjusted so as to avoid double counting. **Table 4-7** below summarizes the planned/proposed regional projects and estimated green street area by agency.

Table 4-7
Summary of Planned/Proposed Regional Projects and Green Street Area by Agency

Agency	Number of Proposed/Planned Regional Projects	Proposed Green Street Area (square feet)
Los Angeles	16	4,412,791
Santa Monica	16	1,995,665
El Segundo	4	0.354087
Unincorporated Los Angeles County	0	78,657

4.2.4. Regional Projects

Through an extensive screening process and coordination with the SMB EWMP Group, eight proposed regional EWMP projects were selected for conceptual design. These eight regional projects will retain, infiltrate and beneficially use stormwater runoff for the drainage area tributary to the project.

The location and BMP type of the eight proposed regional EWMP projects are summarized in **Table 4-8** and shown on **Figure 4-6**. These regional EWMP projects provide numerous anticipated benefits, as outlined in **Table 4-9**. The eight proposed project sites, selected for conceptual design were reviewed per California Environmental Quality Act (CEQA) guidelines to better understand potential environmental factors and impacts to the project sites and surrounding community. The review of CEQA environmental factors is included in the field investigation and environmental checklist provided as **Appendix C.**

As part of the preliminary field effort, a geotechnical evaluation was completed to test the feasibility of proposed infiltration facilities. Four of the proposed sites were not included in the geotechnical evaluation due to the nature of their projects or if sufficient geotechnical information already existed for a site.

The geotechnical evaluation included review of geological information and completion of a soil penetration test. One soil boring was advanced via Cone Penetrometer Test (CPT) sounding location at each of four proposed infiltration project sites with little geotechnical data, these include Brentwood Country Club, Rustic Canyon recreation Center, Santa Monica Civic Center and Auditorium, and Recreation Park. The CPT sounding is a soil investigation method which measures the soil behavior utilizing density and friction analysis to determine the subsurface soil type. Based on preliminary geotechnical evaluation for a conceptual design of BMPs, an infiltrate facility may be feasible at the four proposed sites and further required infiltration testing is recommended to evaluate the best fit design at each location. The Geotechnical Evaluation Summary report is included as **Appendix D.** At each site, project a full geotechnical analysis should be conducted within the preliminary design phase.

Table 4-8
Summary Proposed of Regional EWMP Projects

Regional EWMP Project	BMP Type	Jurisdiction	Address / Location
Brentwood Country Club	Storage, Infiltration, and Use[1]	City of Los Angeles	590 S Burlingame Ave, Los Angeles, CA 90049
Oakwood Recreation Center	Storage, Infiltration, and Use[1]	City of Los Angeles	767 California Ave, Venice, CA 90291
Riviera Country Club	Storage, Infiltration, and Use[1]	City of Los Angeles	1250 Capri Dr., Pacific Palisades, CA 90272
Rustic Canyon Recreation Center	Subsurface Infiltration	City of Los Angeles	601 Latimer Rd., Santa Monica, CA 90402
Line B Pump Station	Surface Infiltration	City of El Segundo	201-223 Center St., El Segundo, CA 90245
Recreation Park	Subsurface Infiltration	City of El Segundo	401 Sheldon St., El Segundo, CA 90245
Memorial Park	Storage, Infiltration, and Use[1]	City of Santa Monica	1401 Olympic Blvd., Santa Monica, CA 90404
Santa Monica Civic Auditorium and Courthouse	Subsurface Infiltration	City of Santa Monica	1855 Main St, Santa Monica, CA 90401

[1] This project is modeled as an infiltration basin with the outflow rate equal to the assumed use rate. This does not affect the load reduction achieved.

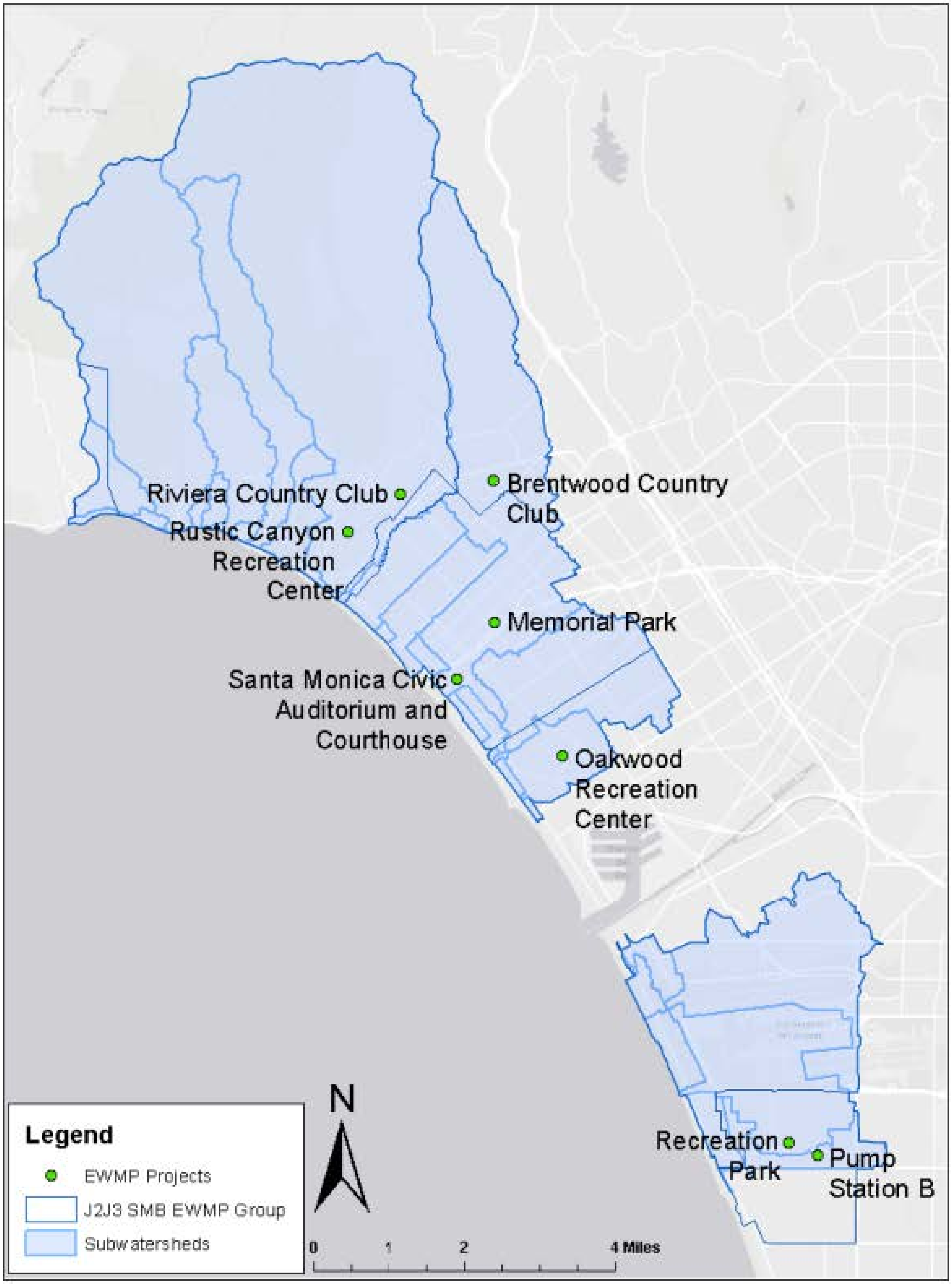
Table 4-9
Summary of Anticipated Benefits for Regional EWMP Projects

Regional EWMP Project	Brentwood Country Club	Oakwood Recreation Center	Riviera Country Club	Rustic Canyon Recreation Center	Line B Pump Station	Recreation Park	Memorial Park	Santa Monica Civic Auditorium
Improve Habitat		●		●		●	●	
Offset Potable Water Use	●	●	●				●	
Increase Aquifer Storage	●	●	●	●	●	●	●	●
Improve Recreation	●	●	●	●		●	●	
Reduce Downstream Pollutants	●	●	●	●	●	●	●	●

Project Design Criteria

A conceptual level design was developed for each of the example regional EWMP projects that include the selection of BMP type, preliminary sizing, configuration, and diversion pipeline alignment. Based on discussions with the SMB EWMP Group and industry standards, the criteria and assumptions developed provided the basis for the conceptual designs. During the final design process and implementation phase of the projects, these assumptions should be reevaluated.

Figure 4-6
Eight Proposed Regional EWMP Projects



Per Los Angeles' MS4 Permit requirements, all projects were sized to retain and infiltrate the 85th-percentile, 24-hour storm event for the drainage area tributary to the project (Regional Board, 2012). Where feasible, BMPs were configured within the site's open areas to avoid removal of trees and existing facilities. Based on discussions with the SMB EWMP Group, the following BMP types were selected:

Surface Infiltration

- Line B Pump Station

The surface infiltration facility (Line B Pump Station) is an existing retention basin that will be converted by removing the concrete lining at the bottom of the basin to allow infiltration. Based on discussions with and recommendations from the Greater Los Angeles County Vector Control District, a 96-hour drawdown time was selected for vector control. To eliminate this constraint, a floating cover is recommended to allow the use of the full depth available.

Subsurface Infiltration

- Santa Monica Civic Auditorium and Courthouse
- Recreation Park
- Rustic Canyon Recreation Center

Subsurface infiltration facilities were sized to infiltrate the 85th-percentile, 24-hour storm volume. Storage facilities were sized to store the 85th-percentile, 24-hour storm volume. For the purposes of cost estimating, 60-inch perforated aluminized steel type II corrugated metal pipe (CMP) was selected as the system for subsurface infiltration BMPs and storage BMPs. Subsurface infiltration CMP systems were to use backfill with 40% porosity that contributes to the total BMP volume.

Storage, Irrigation Use, & Infiltration

- Brentwood Country Club
- Oakwood Recreation Center
- Riviera Country Club
- Memorial Park

Storage and irrigation use facilities were designed using diversion pipelines to pull from nearby, upstream existing storm drains to deliver the 85th-percentile, 24-hour storm volume to the site by gravity. For the purposes of cost estimating, diversion pipelines were assumed to be constructed of reinforced concrete pipe (RCP). The preliminary alignments of diversion pipelines were selected to utilize streets and avoid crossing major obstacles (e.g. open channels, railways, highways). A diversion structure would be constructed at the point of diversion to deliver the 85th-percentile, 24-hour storm volume to the site and allow higher flows to bypass into the existing storm drain infrastructure. For the conceptual cost estimate, pretreatment is based on CDS Hydrodynamic Separation systems (Contech, 2015).

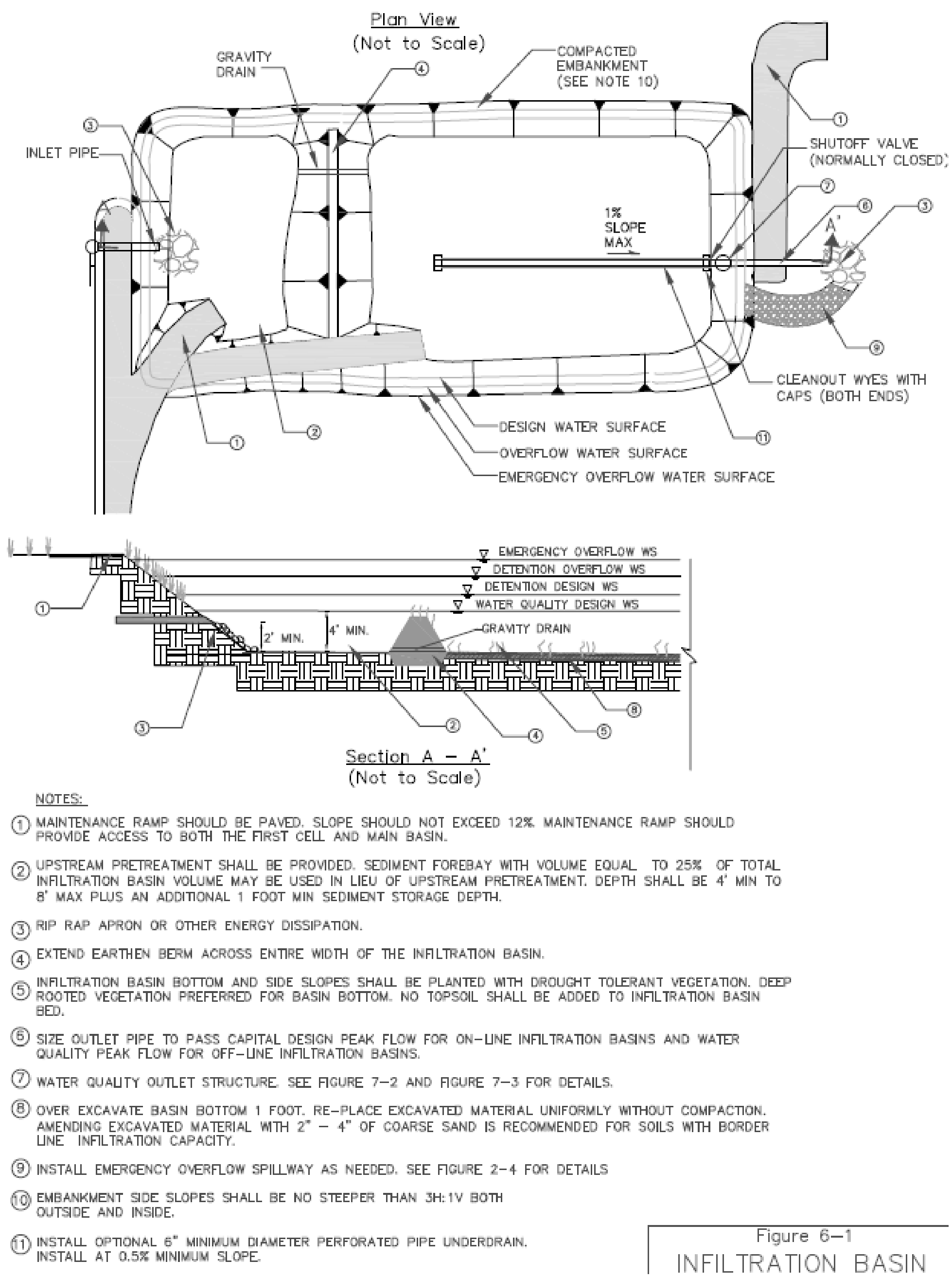
Project Components

The regional EWMP projects consist of surface infiltration basins, subsurface infiltration systems, and storage facilities. Each of the projects will include a diversion pipe to deliver water to the site from existing storm drains. Additionally, each site will include educational components and low impact development (LID) components to provide multi-benefit features to the projects. Major components of the conceptual projects are discussed below.

Surface Infiltration Basins

Surface infiltration basins will consist of retention basins designed to allow for infiltration of stormwater into the subsurface. The major construction components of surface infiltration basins include excavation, earthwork, inlets/outlets, and energy dissipation (e.g., riprap). Surface infiltration basins are sized to provide a 96-hour drawdown time, following vector control recommendations, based on the underlying soils potential to infiltrate. Drawdown time governs the maximum depth of the basin and, consequently, the footprint of the basin. Drawdown time can be increased if additional vector control options are considered. An example schematic of an infiltration basin is shown in **Figure 4-7** (LACDPW, 2009).

Figure 4-7
Conceptual Infiltration Basin Schematic
(LACDPW, 2009)



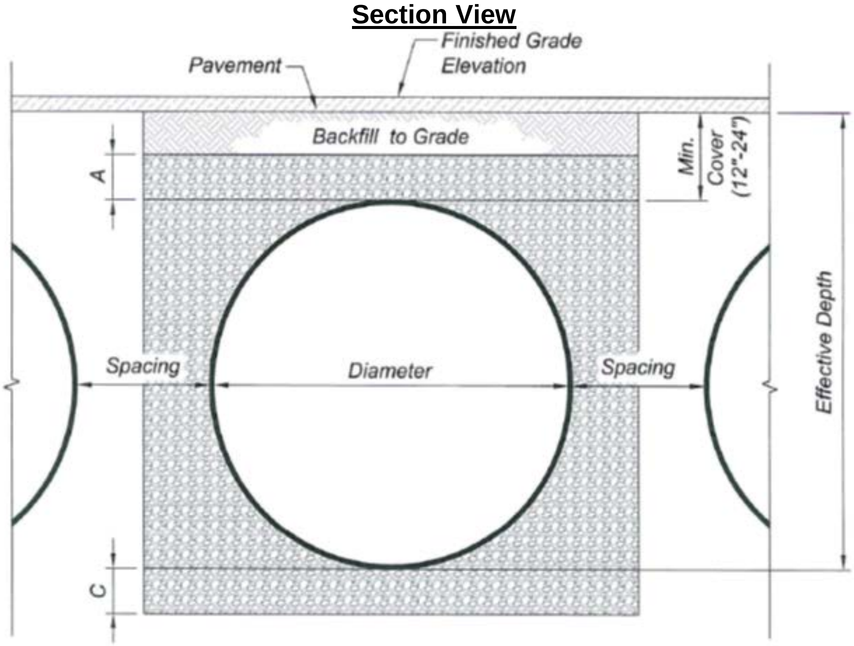
Subsurface Infiltration Systems

Subsurface infiltration basins consist of underground storage systems designed to infiltrate stormwater into subgrade soils. Subsurface infiltration basins require structures to be placed underneath the site and backfilled to the existing site grade. Such structures are available in a variety of sizes and material types, including plastic, concrete, and metal. For the purposes of cost estimating, 60-inch CMP was assumed as the subsurface infiltration structure material type. Based on discussions with the manufacturer, the subsurface infiltration basin can be configured in a variety of shapes to match site requirements. A diversion pipe would convey stormwater to CMP headers for distribution through the subsurface infiltration basin. Access risers will be provided for operations and maintenance. Design considerations include vector control, such as sealed lids to restrict insect access. An example concept of subsurface infiltration using CMP is depicted in **Figure 4-8** (Contech, 2015).

Figure 4-8
Conceptual Subsurface Infiltration System Using CMP
(modified from Contech, 2015)

Plan View

Section View



Storage, Irrigation Use, & Infiltration Facilities

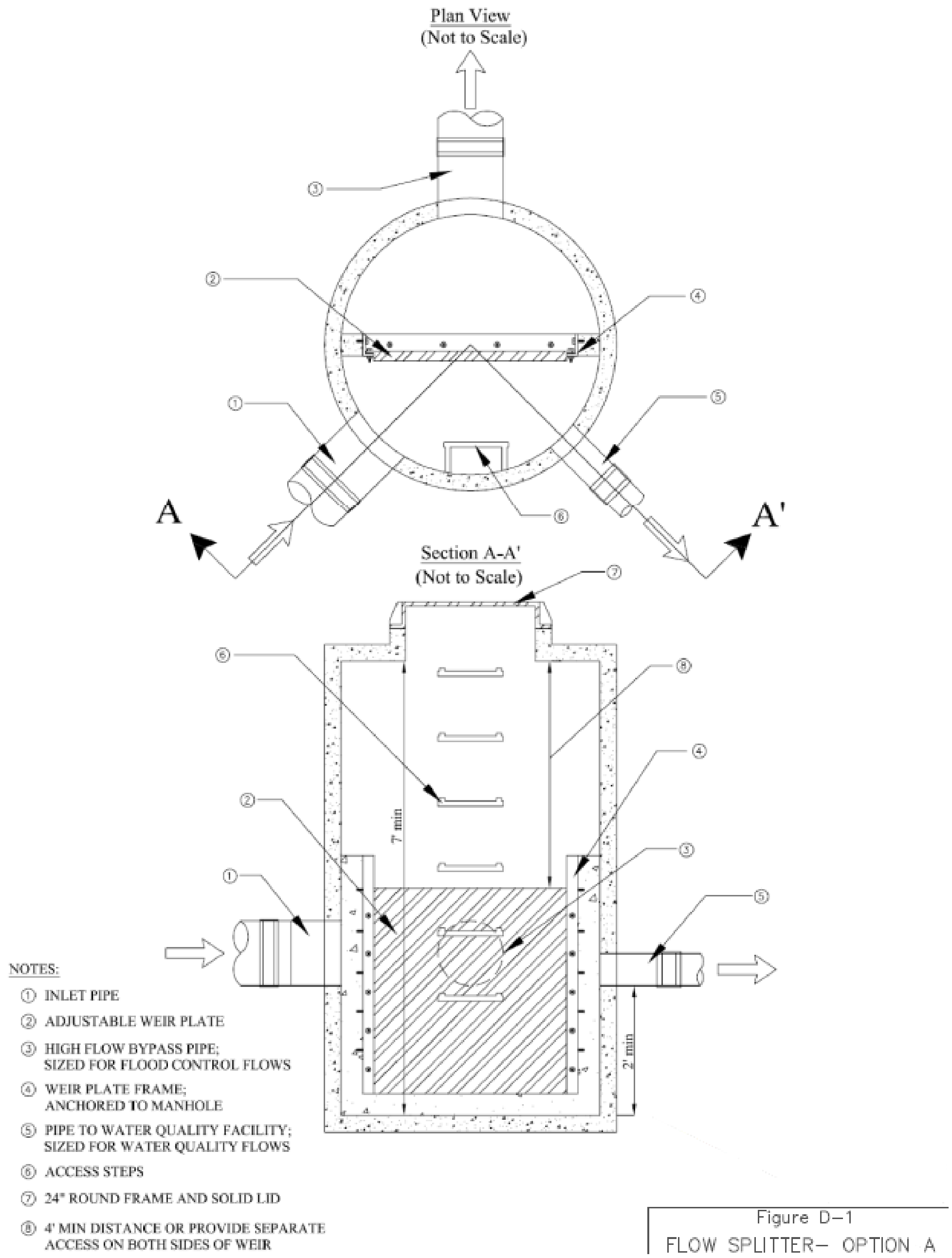
Similar to subsurface infiltration systems, subsurface stormwater storage facilities consist of underground storage systems designed to detain stormwater below the existing site grade. Subsurface storage facilities require structures to be placed underneath the site and backfilled to the existing site grade. Such structures are available in a variety of sizes and material types, including plastic, concrete, and metal. For the purposes of cost estimating, 60-inch CMP was assumed as the subsurface storage structure material type. Based on discussions with the manufacturer, subsurface storage facilities can be configured in a variety of shapes to match site requirements. A diversion pipe would convey stormwater to CMP headers for distribution throughout the storage system. Access risers will be provided for operations and maintenance. A photograph of a CMP detention system being installed at a real site is shown on **Figure 4-9** (Contech, 2015). In addition to CMP storage, a chlorine contact tank and pump station is required to disinfect and deliver treated stormwater for irrigation use.

Figure 4-9
Photograph Storage/Detention System Using CMP
(Contech, 2015)

Diversion Structure and Piping

To deliver water to the sites, diversion structures and piping will be constructed to connect existing storm drains to the BMP. Diversion structures are designed to convey the required water quality flow to the BMP and allow excess flows to bypass through the existing storm drain. Diversion structures may be constructed in a manhole or subsurface tank and include hydraulic controls (e.g., weirs) and/or mechanical controls (e.g., valves and rubber dams). For the purposes of cost estimating, it was assumed that diversion pipelines would be constructed of RCP. Adequate hydraulic head is required to deliver water to the BMP by gravity. A hydraulic analysis must be conducted to confirm hydraulic limitations of the diversion structure and pipeline during the full-scale design phase. An example diversion structure is shown in **Figure 4-10** (LACDPW, 2009).

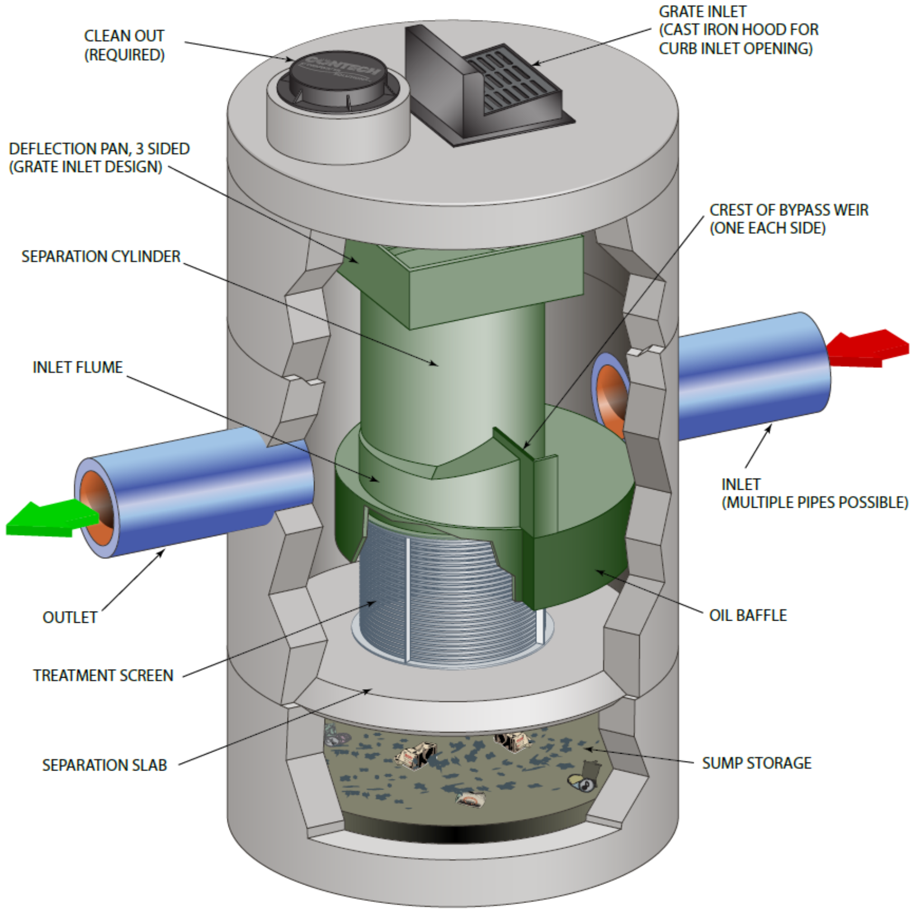
Figure 4-10
Conceptual Diversion Structure Drawing



Pretreatment Facilities

Pretreatment of storm water runoff is an important component of both surface and subsurface infiltration facilities and provides benefits for storage facilities. Removal of sediment, trash, and debris will greatly reduce maintenance required for the infiltration facilities and increase the useful life of the BMP. Pretreatment can also reduce the maintenance associated with storage facilities. There are a variety of technologies available for treating runoff, including hydrodynamic separators, mechanical filters, and biofilters. For the purposes of these conceptual designs, a hydrodynamic separator (swirl chamber type system) is chosen to remove sediment and debris in stormwater prior to being conveyed to each regional EWMP project. As depicted in **Figure 4-11**, continuous deflection separators (CDS) units are pre-cast units placed downstream of drain inlets to capture sediment and debris, and can be manufactured in a variety of configurations. These underground units create a vortex of water that allows water to escape through the screen, while contaminants are deflected into the sump, and later removed. The CDS units are intended to screen litter, fine sand, and larger particles that can have other pollutants adsorbed to them. They can act as a first screen influence for trash and debris, vegetative material, oil and grease, and heavy metals. Multiple units in parallel may be required for high flows.

Figure 4-11
Example CDS Pretreatment Unit
(Contech, 2015)



Project Sizing and Configuration

Calculations were performed to determine the approximate size required to capture the 85th-percentile, 24-hour storm volume for each project site. Next, layouts were developed to site the BMP footprint and diversion pipeline on an aerial photograph for each project site.

The 85th-percentile, 24-hour storm volume was determined using the County of Los Angeles Modified Rational Method,

$$V = \frac{A \times P \times C_d}{12},$$

where V is the 85th-percentile, 24-hour storm volume in acre-feet,
A is the drainage area in acres
P is the precipitation depth corresponding to the 85th-percentile, 24-hour storm in inches per hour
C_d is the developed runoff coefficient, as follows:

$$C_d = 0.9 \times Imp + C_u \times (1 - Imp),$$

where C_d is the developed runoff coefficient
Imp is the impervious percentage of the drainage area
C_u is the undeveloped runoff coefficient (assumed to be a constant 0.1)

Infiltration rates for each site were determined using GIS soils data and soil infiltration curves from the County of Los Angeles, Department of Public Works Hydrology Manual (LACDPW, 2006 and County of Los Angeles, 2014). Additional data will be gathered during geotechnical sampling of the project sites. **Table 4-10** summarizes the Rational Method inputs for each site. **Table 4-11** presents the capture volumes and infiltration rates used to size the BMPs for each project site.

Sizing of subsurface infiltration basins and subsurface storage facilities was calculated using the Contech CMP Detention System – Rectangular DYODSTM tool (Contech, 2015). The sizing of subsurface infiltration basins and storage facilities is shown in

Table 4-12. Estimated excavation and backfill volumes were developed for each project site and are summarized in **Table 4-13**.

Table 4-10
Rational Method Inputs

Regional EWMP Project	Drainage Area (acres)	85th-Percentile, 24-hour Storm Rainfall Depth[1] (inches)	Percent Impervious Area[2] (%)	Developed Runoff Coefficient[3] (-)	85th-Percentile, 24-hour Storm Volume (acre-feet)
Brentwood Country Club	173.6	1.07	21.6	0.27	4.2
Oakwood Recreation Center	14.5	1.07	63.6	0.61	0.8
Riviera Country Club	32.7[5]	1.03	14.1	0.21	4.1[6]
Rustic Canyon Recreation Center	50.1	0.97	16.1	0.23	0.9
Line B Pump Station	262.2	0.93	78.3	0.73	14.8
Recreation Park	41.5	0.92	73.2	0.69	2.2[4]
Memorial Park	135.9	1.06	83.6	0.77	9.2
Santa Monica Civic Auditorium and Courthouse	88.0	1.04	61.5	0.59	4.5

[1] From LA County Department of Public Works GIS (http://dpw.lacounty.gov/wrd/hydrologygis/).
[2] From LA County Department of Public Works as part of the WMMS package (http://dpw.lacounty.gov/wmd/wmms/).
[3] Assumes undeveloped runoff coefficient of 0.1.
[4] Scaled to include the storm volume generated from Recreation Park itself.
[5] Drainage area of 324.7 acres is a portion of the larger intended drainage area of 4590.6 acres
[6] 85th-percentile 24-hour storm volume is calculated based on detailed expected storage quantities obtained from Concept Summary – Rivera Country Club Stormwater BMP Project

Table 4-11
Conceptual Design Inputs

Regional EWMP Project	Total Size (acres)	85th-Percentile, 24-hour Storm Volume (acre-feet)	Infiltration Rate (inches per hour)	Estimated Diversion Pipe Diameter (inches)[1]	Estimated Diversion Pipe Length (feet)
Brentwood Country Club	129.3	4.2	n/a[2]	18	190
Oakwood Recreation Center	3.6	0.8	n/a[2]	12	750
Riviera Country Club	158.2	3.1[5]	n/a[2]	18	1,800
Rustic Canyon Recreation Center	8.1	0.9	0.36	12	3,680
Line B Pump Station	2.2	14.8	0.72	n/a[3]	0[4]
Recreation Park	19.7	2.2	0.72	18	1,240

Memorial Park	10.3	9.2	n/a[2]	30	1,830
Santa Monica Civic Auditorium and Courthouse	6.9	4.5	0.63	24	130

[1] Sized for peak velocity of 10 feet per second assuming peak flow rate is one-third the 85th-percentile, 24-hour storm volume over one hour.
[2] Not applicable for storage projects.
[3] No diversion pipe necessary, Line B Pump Station Project uses existing storm drain infrastructure.
[4] Assumes no additional piping necessary as stormwater in the drainage area is already conveyed to this location.
[5] This project is not designed for the 85th percentile, 24 hour storm volume due to large size.

Table 4-12
CMP Infiltration/Storage Sizing[1]

Regional EWMP Project	85th Percentile Volume (cubic feet)	Pipe Storage (cubic feet)	Backfill Storage (cubic feet)	Depth to Invert (feet)	Number of CMP Pipes	Total Length (feet)	Total Width (feet)
Brentwood Country Club	183,912	184,088	0[3]	7	12	781	90
Oakwood Recreation Center	34,310	34,400	0[3]	25	11	159	82
Riviera Country Club Client Revised	180,468	n/a[6]	n/a[6]	n/a[6]	n/a[6]	n/a[6]	n/a[6]
Rustic Canyon Recreation Center	40,401	28,323	12,272[3]	7	10	144	75
Line B Pump Station	n/a[5]						
Recreation Park	94,376	66,121	28,807[4]	7	20	168	150
Memorial Park	401,875	402,742	0[3]	7	52	394	390
Santa Monica Civic Auditorium and Courthouse	196,739	137,121	59,916[4]	7	28	249	210

[1] Developed using Contech CMP Detention System – Rectangular DYODSTM tool (Contech, 2015). Additional information on the tool is available at http://www.conteches.com/products/stormwater-management/detention-and-infiltration/cmp-detention-and-infiltration.aspx#2004317-technical-info.
[2] Depth to CMP invert assumes at minimum two feet of cover; actual depth will change due to diversion pipe slope requirements and other site-specific requirements that will be identified in subsequent design phases.
[3] No backfill storage for storage BMPs.
[4] Assumes backfill media has a porosity of 40%.
[5] Not applicable for Line B Pump Station.
Assumptions: (1) 60-inch CMP pipes; (2) 30-inch spacing between CMP pipes per AISI standards; and (3) two feet of clearance between site grade and top of CMP system.
[6] A detailed concept report has been developed for Riviera Country Club that utilizes an existing 350,000 tank and a new 1 MG tank. Please refer to Appendix H for further details.

Table 4-13
Estimated Excavation and Backfill Volumes of BMP

Regional EWMP Project	Total Excavation (cubic yards)	Structural Backfill (cubic yards)	Backfill to Grade (cubic yards)
Brentwood Country Club[1]	19,417	7,421	5,178
Oakwood Recreation Center[1]	12,314	1,382	9,658
Riviera Country Club Client Revised[1]	6,000[3]	n/a[4]	n/a[4]
Rustic Canyon Recreation Center[1]	2,980	1,136	795
Line B Pump Station[2]	4,343	4,343	0
Recreation Park[1]	6,977	2,667	1,860
Memorial Park[1]	42,629	16,345	11,368
Santa Monica Civic Auditorium and Courthouse[1]	18,355	5,548	3,864

[1] Developed using Contech CMP Detention System – Rectangular DYODSTM tool (Contech, 2015). Additional information on the tool is available at http://www.conteches.com/products/stormwater-management/detention-and-infiltration/cmp-detention-and-infiltration.aspx#2004317-technical-info.

[2] Assumes excavation of 21,000 square foot base at a depth of 5 feet and 8 inches for media backfill (2 inches of pea gravel, 5 feet of washed gravel, and 6 inches of sand).
[3] Phase I of Riviera Country Club utilizes an existing 350,000 gallon tank. Phase II consists of a new 1 MG tank. This excavation quantity consists of excavation volume required for 1 MG tank. See Appendix H for details on Riviera Country Club Concept Report
[4] CMP not used for Riviera Country Club, please refer to Appendix H for details on Riviera Country Club concept report.

Conceptual Design Illustrations

Project concepts are described and illustrated in this section. Each Regional EWMP Project site layout is shown, including conceptual locations of BMPs, diversion piping, and other project elements.

Brentwood Country Club

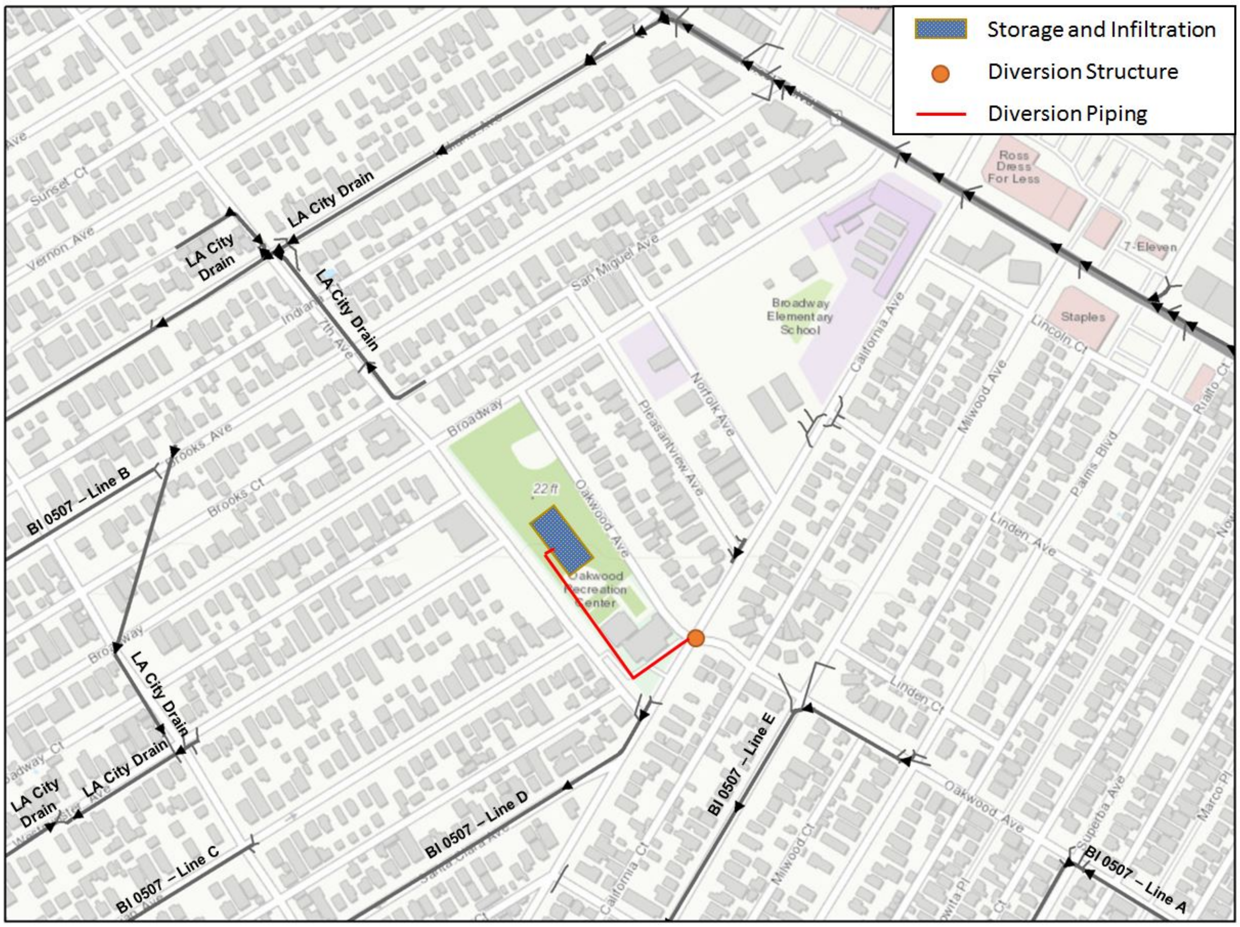
The conceptual design for the Brentwood Country Club Regional EWMP Project consists of diversion of stormwater from a city storm drain adjacent the Brentwood Line BI 0042. Stormwater is conveyed by gravity and stored in a 60-inch CMP storage system for later irrigation use. **Figure 4-12** illustrates the Brentwood Country Club project.

Figure 4-12
Brentwood Country Club Project Concept

Oakwood Recreation Center

The conceptual design for the Oakwood Recreation Center Regional EWMP Project consists of diversion of stormwater from surface street runoff or a city storm drain (the storm drains in this area need to be verified). Stormwater would be conveyed by gravity and stored in a 60-inch CMP storage system for later irrigation use. **Figure 4-13** shows the Oakwood Recreation Center project concept.

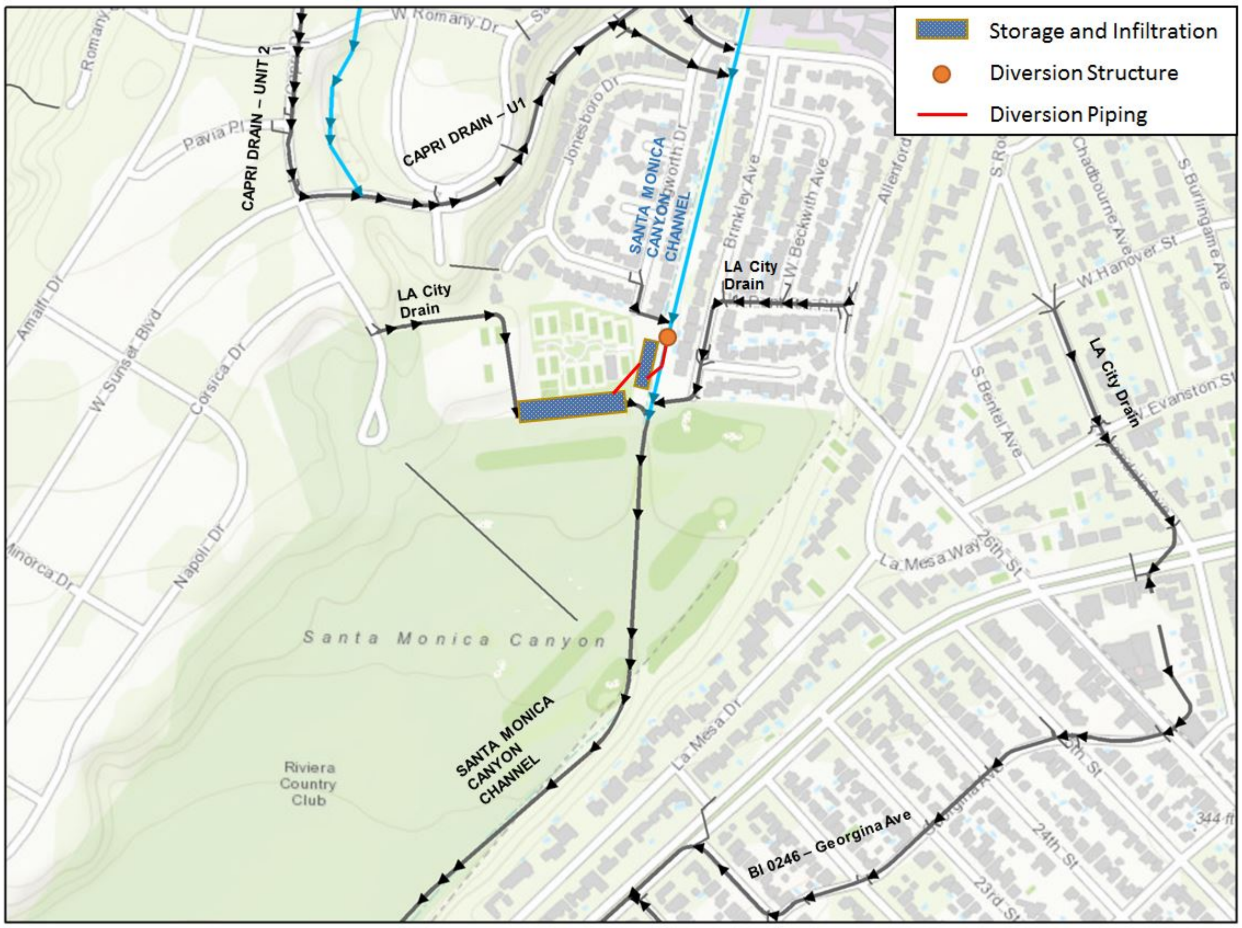
Figure 4-13
Oakwood Recreation Center Project Concept



Riviera Country Club

The conceptual design for the Riviera Country Club Regional EWMP Project consists of diversion of stormwater from Santa Monica Canyon Channel. This Regional Project is divided into two phases: Phase I uses an existing 350,000 gallon tank for dry and wet weather flows and Phase II consists of a new additional 1 million gallon (MG) tank for storage and infiltration. This project will also provide for a water feature/infiltration parallel to the channel. **Figure 4-14** shows the Riviera Country Club project concept.

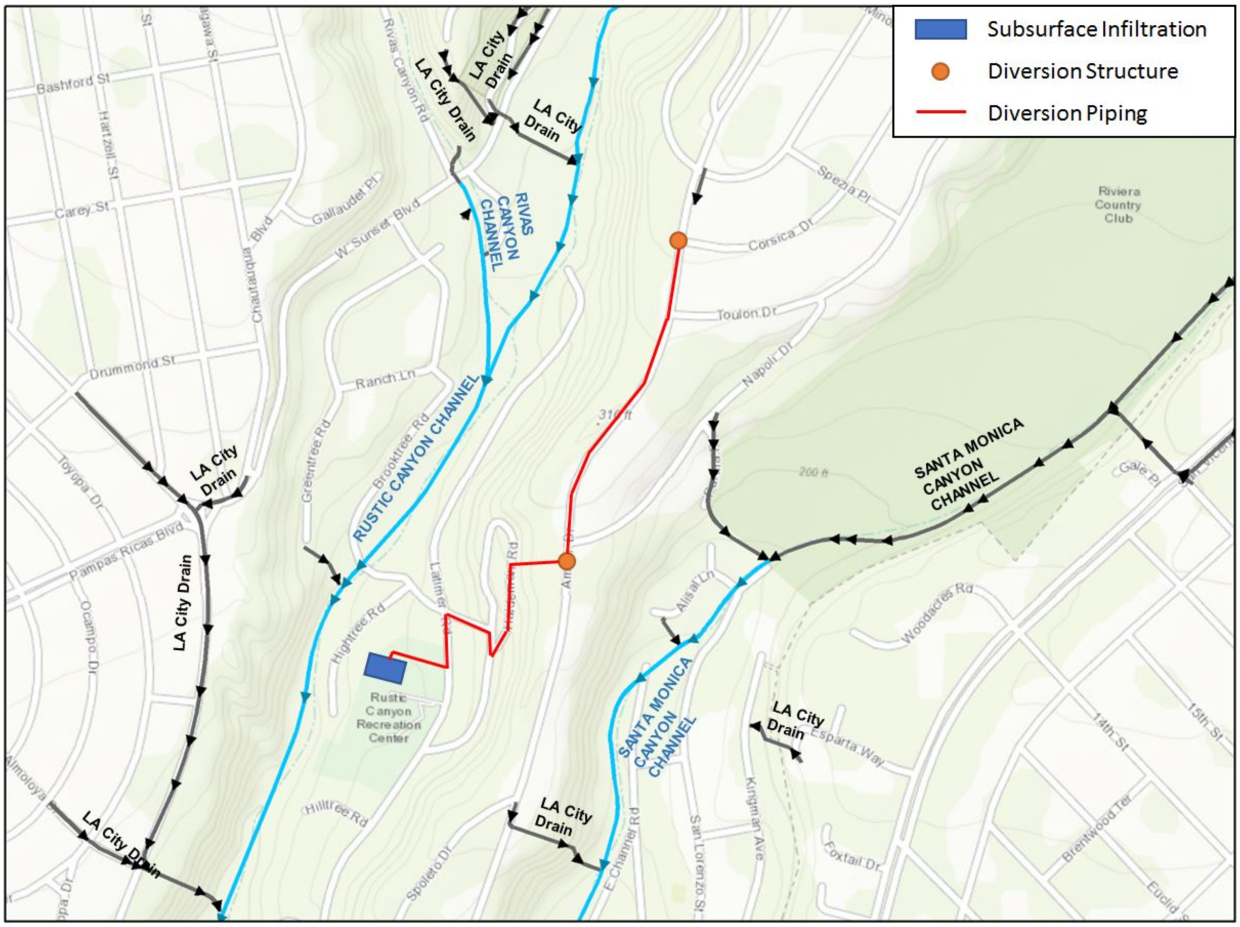
Figure 4-14
Riviera Country Club Project Concept



Rustic Canyon Recreation Center

The conceptual design for the Rustic Canyon Recreation Center Regional EWMP Project consists of diversion of stormwater from two city storm drains northeast of the park. The northern diversion point is chosen because of the larger drainage area contribution at this location; flow from this point drains south and east to the Santa Monica Canyon Channel. Next, flow is rerouted along Amalfi Drive and meets the second diversion point that would then divert flow to Rustic Canyon Recreation Center. Stormwater would be conveyed by gravity and infiltrated via a 60-inch CMP infiltration system. **Figure 4-15** illustrates the Rustic Canyon Recreation Center project concept.

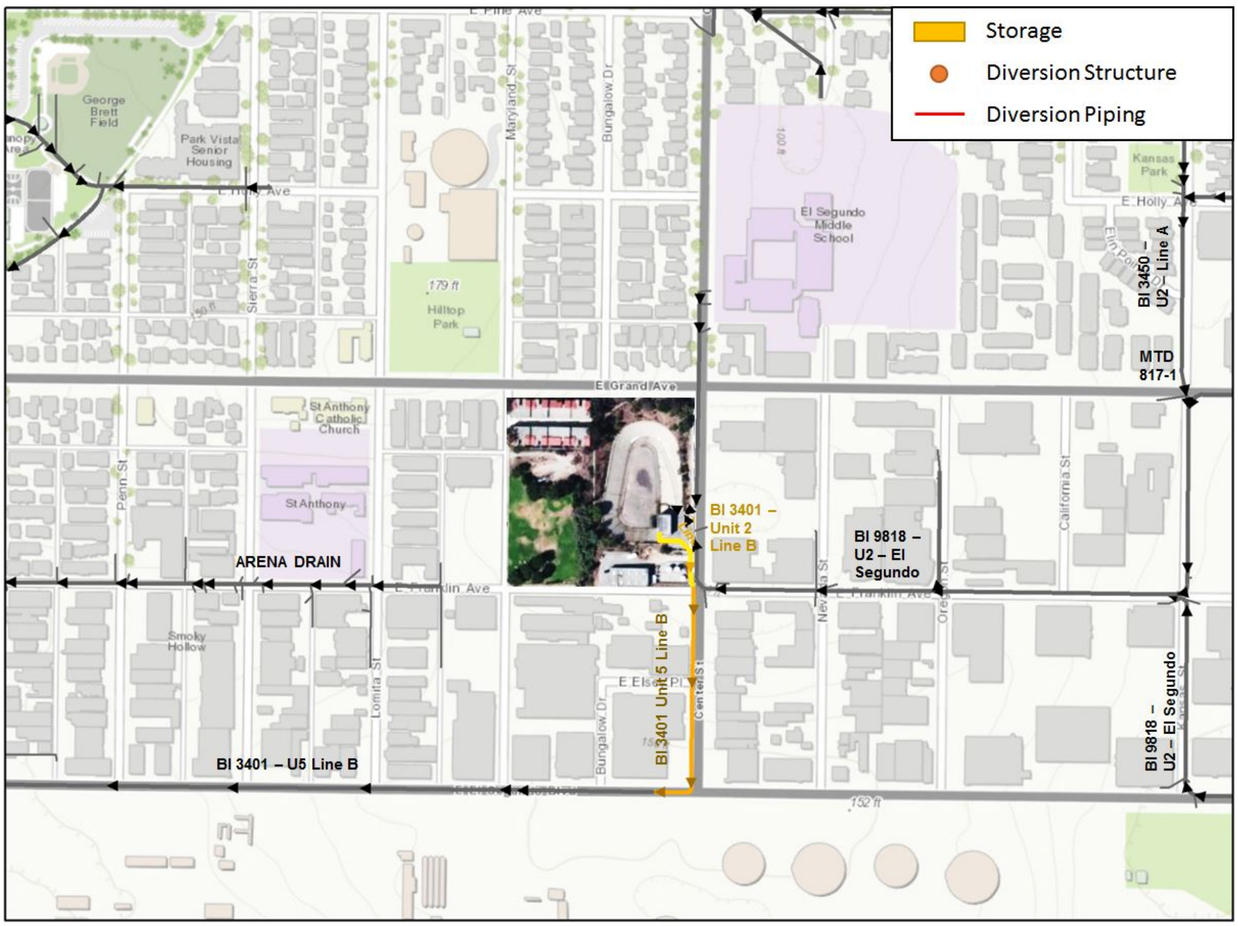
Figure 4-15
Rustic Canyon Recreation Center Project Concept



Line B Pump Station

The conceptual design for the Line B Pump Station Regional EWMP Project consists of using the existing retention basin at the site and replacing the basin invert's concrete base with a media fill optimized for infiltration. Areas east of the site currently drain to the retention basin, via Line BI 9818-U2 and others, and no additional diversions are necessary. Stormwater would be conveyed by gravity for infiltration. A floating cover would be installed to allow for the use of the full depth of the existing basin without restrictions due to vector control. Additionally, the existing pump station could be used to send stormwater to the drain along El Segundo Blvd if needed. **Figure 4-16** illustrates the Line B Pump Station project concept.

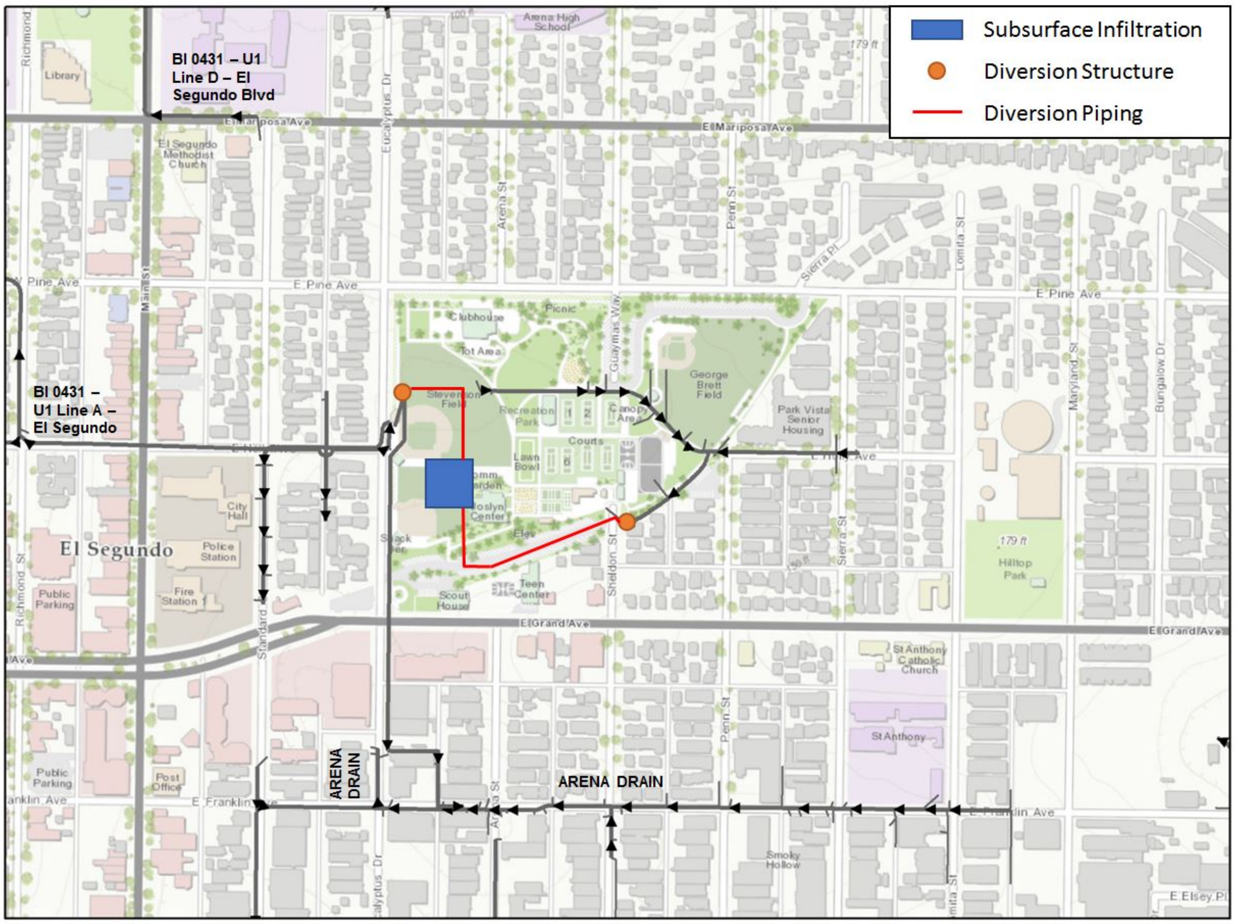
Figure 4-16
Line B Pump Station Project Concept



Recreation Park

The conceptual design for the Recreation Park Regional EWMP Project consists of diversion of stormwater from two city storm drains northeast of the park. Stormwater would be conveyed by gravity and infiltrated via a 60-inch CMP infiltration system. **Figure 4-17** illustrates the Recreation Park project concept.

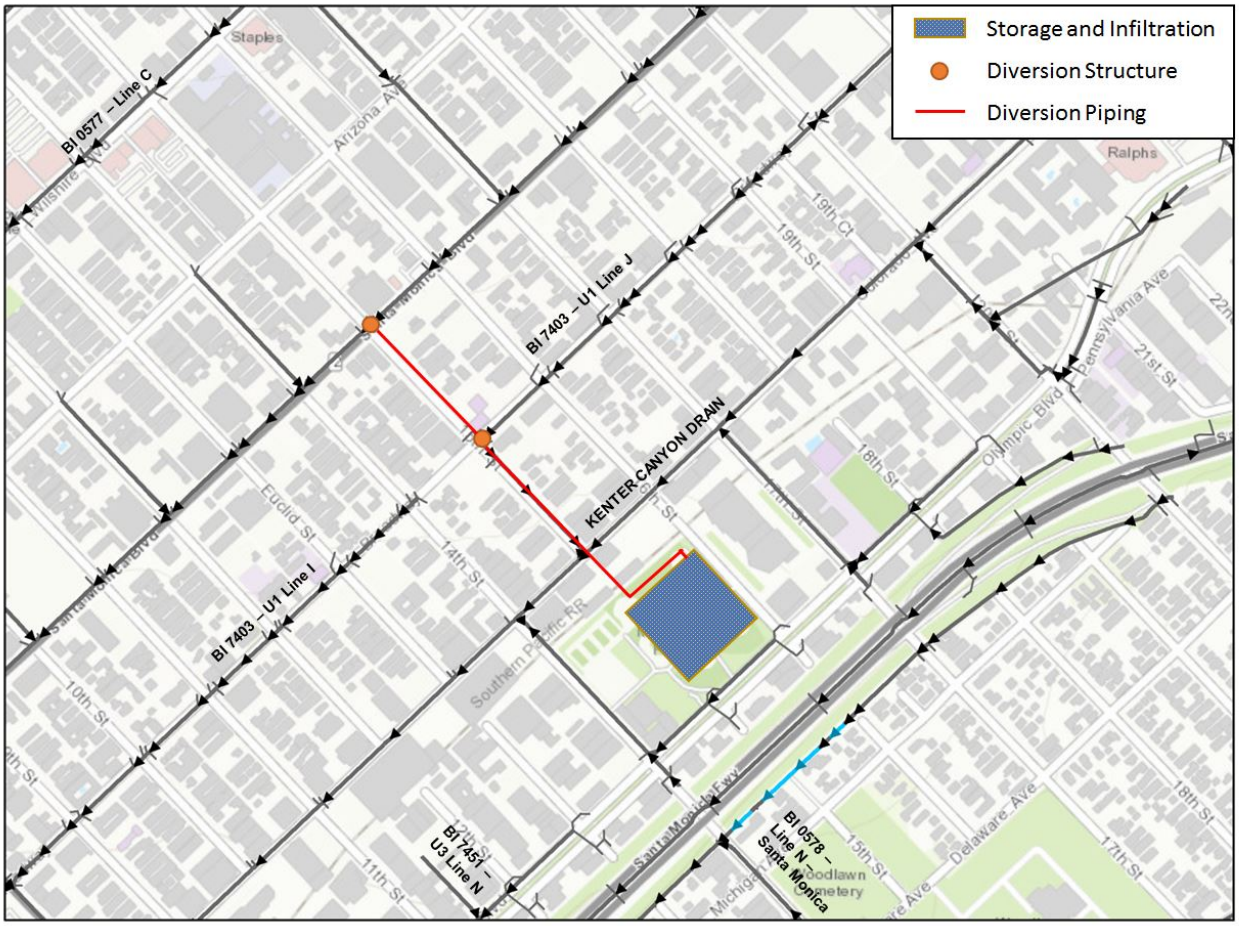
Figure 4-17
Recreation Park Project Concept



Memorial Park

The conceptual design for the Memorial Park Regional EWMP Project consists of diversion of stormwater from BI 7403-U1 Line J and a city storm drain. Stormwater would be conveyed by gravity and stored in a 60-inch CMP storage system for later irrigation use. **Figure 4-18** illustrates the Memorial Park project concept.

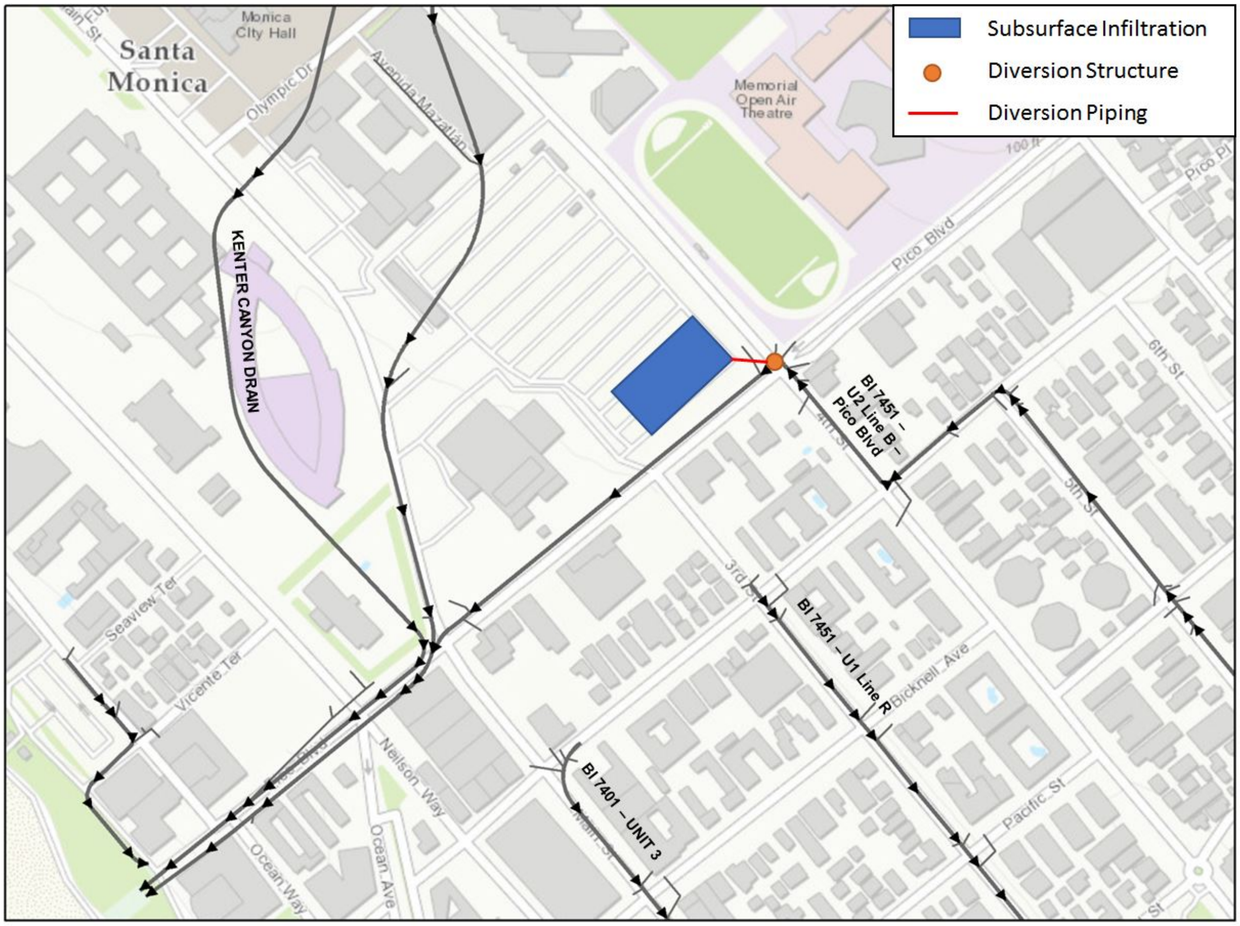
Figure 4-18
Memorial Park Project Concept



Santa Monica Civic Auditorium and Courthouse

The conceptual design for the Recreation Park Regional EWMP Project consists of diversion of stormwater from BI 0249-U2 Line B (along Pico Blvd.). Stormwater would be conveyed by gravity and infiltrated via a 60-inch CMP infiltration system. **Figure 4-19** illustrates the Santa Monica Civic Auditorium and Courthouse project concept.

Figure 4-19
Santa Monica Civic Auditorium and Courthouse Project Concept



4.2.5. Green Streets

The right-of-way along streets may be one of the most extensive opportunities to implement BMPs on public land. In developed areas, curbs and gutters provide the primary means of conveying stormwater (and associated pollutants) directly to storm drain inlets and receiving waters. Green streets provide an opportunity to intercept this runoff prior to entering the MS4 and treat it within the extents of the public right-of-way. Green streets have been demonstrated to provide "complete streets" benefits in addition to stormwater management, including pedestrian safety and traffic calming, street tree canopy and heat island effect mitigation, increased property values, and even reduced crime rates.

As with LID, green streets tend to be distributed practices that are deployed throughout a watershed to treat runoff near the source. When compared to LID projects, key advantages of green streets, are that they are located on land directly controlled by public entities and can intercept runoff from larger upstream drainage areas.

Green streets are typically implemented as linear bioretention/biofiltration practices installed parallel to roadways. Bioretention stormwater treatment facilities are landscaped shallow depressions that slow capture and filter stormwater runoff. These facilities function as a soil- and plant-based filtration device that removes pollutants through a variety of natural physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plantings. As stormwater passes down through the soil, pollutants are filtered, adsorbed, and biodegraded by both soil and plants. An optional gravel layer can be added below the planting soil to provide additional storage volume for infiltration. Bioretention is typically designed without an underdrain in areas of high soil permeability – runoff treated via filtration infiltrates to the underlying soils after leaving the unit. Bioretention with an underdrain (or “biofiltration”) is a treatment control measure that can be used for areas with low permeability native soils or steep slopes, allowing for the treatment of runoff through filtration despite impermeable underlying soils. Bioretention can also be designed with a raised underdrain (or “bioinfiltration”) to function more as an infiltration / full-capture BMP. **Figure 4-20** through **Figure 4-22** show different views of an example green street project. **Figure 4-23** presents a typical green street schematic. Permeable pavement can also be implemented in tandem, or as a standalone practice, in parking lanes of roads. A typical permeable pavement schematic is shown in **Figure 4-24**.

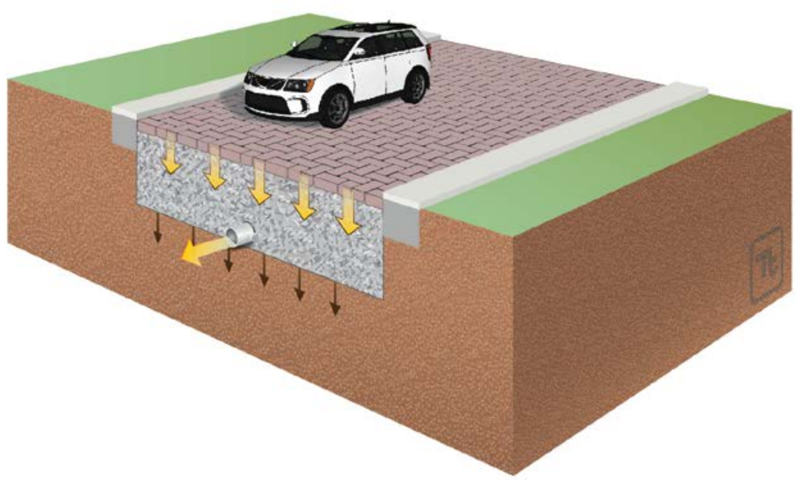
Figure 4-20
Example Green Streets Project in Pacific Palisades – View 1

Figure 4-21
Example Green Streets Project in Pacific Palisades – View 2

Figure 4-22
Section View of Bioretention with Underdrain

Figure 4-23
Typical Distributed Green Street Schematic

Figure 4-24
Typical Distributed Permeable Pavement Schematic with Underdrain



Notes: Arrows indicate water pathways.
Images courtesy of Upper San Gabriel River Enhanced Watershed Management Program Plan.

Due to the large number of locations where green streets could be implemented, it is anticipated that a green streets program will be a key element of the compliance strategy for the EWMP. The development of a reliable, repeatable, and cost-effective program will require several considerations:

- Development and integration of standard specifications and drawings tailored to meeting EWMP objectives;
- Development of data sets necessary to make street-scale site selection decisions;
- Strategic identification and prioritization of street-scale opportunities (that can significantly reduce capital costs);
- Coordination with existing street and/or utility rehabilitation programs;

- Adaptation and/or enhancement of existing O&M practices for roadside bioretention and permeable pavement; and
- BMP tracking systems.

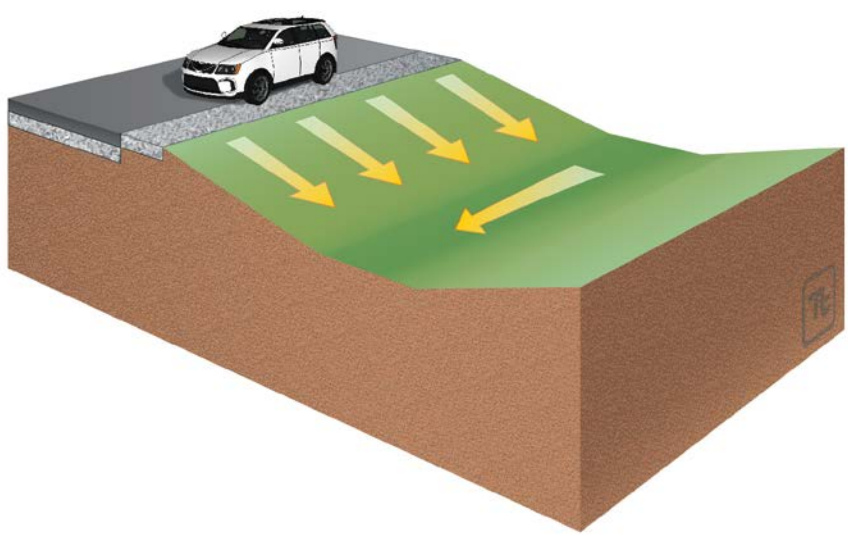
Although the green streets program will carry significant responsibility for achieving EWMP goals, these efforts must be balanced with other programs, especially the residential LID program and the regional BMP program. For example, downstream of places where the residential LID program is heavily implemented, or upstream of locations where large regional projects are constructed, the need for green street retrofits would be reduced.

4.2.6. Additional Structural BMPs

A preliminary list of planned regional projects has been developed for the EWMP based on a review of existing watershed planning documents, including TMDL Implementation Plans, Integrated Regional Water Management Plans, and other documents provided by the SMB EWMP Group. Alongside this preliminary list, additional distributed structural BMPs were considered. Detailed descriptions of structural BMP types can be found in the EWMP Work Plan. (MWH Team A, 2014).

Bioswales were also considered as an additional structural BMP. Bioswales (also known as vegetated swales) are open, shallow channels with low-lying vegetation covering the side slopes and bottom topography in order to collect and slowly convey runoff to downstream discharge points. Bioswales provide pollutant removal through settling and filtration in the vegetation (usually grasses) lining the channels, thereby allowing for stormwater volume reduction through infiltration and evapotranspiration, reduction in the flow velocity, and conveyance of stormwater runoff. The vegetation in the bioswale can vary depending on its location and design criteria outlined in this section. **Figure 4-25** shows a schematic of a typical distributed bioswale.

Figure 4-25
Typical Bioswale Schematic



Notes: Arrows indicate water pathways.
Image courtesy of Upper San Gabriel River Enhanced Watershed Management Program Plan.

4.3. NON-STORM WATER DISCHARGE CONTROL MEASURES

The overarching goal of BMPs in the EWMP is to reduce the impact of stormwater and non-stormwater on receiving water quality. The MS4 permit effectively prohibits non-stormwater discharges, and the SMB TMDL includes summer dry weather compliance requirements for bacteria in 2006 and winter dry in 2009. The SMB EWMP Group's dry weather compliance approach is to eliminate 100 percent of non-exempt dry weather MS4 discharges through a combination of the 23 existing LFDs along the J2/J3 EWMP area and a suite of non-structural source controls (e.g., water conservation incentives, enhanced Illicit Discharge Detection and Elimination (IDDE) efforts, and enhanced education/outreach and inspection/enforcement to address sources of non-stormwater flow) and source investigations following dry weather outfall screening. The primary mechanism to maintain compliance is the use of LFDs. These diversions are effectively eliminating non-stormwater surface discharges to the surf zone during dry weather days. Elimination of flows is equivalent to 100 percent load reduction for all pollutants, thereby demonstrating reasonable assurance of meeting all applicable Permit limitations during dry weather. Elimination of discharges is a pathway for compliance with RWLs and WQBELs in the MS4 permit (per section VI.E.2.e.i.(3)), without discharges there can be no "cause or contribute" to receiving water issues.

Section 5
EWMP Implementation Schedule

The EWMP Implementation Plan is the schedule for compliance for each jurisdiction to address water quality priorities and comply with the provisions of the MS4 Permit. Through the RAA, a series of quantitative analyses were used to identify the capacities of LID, green streets and regional BMPs that comprise the EWMP Implementation Plan and assure those control measures will address the Water Quality Priorities per the milestones/compliance schedules. The EWMP Implementation Plan provides a BMP-based compliance pathway for each jurisdiction under the MS4 Permit. This section describes the EWMP Implementation Plan and the pace of its implementation in order to achieve applicable milestones, and is organized into the following subsections:

- Compliance Schedule of Stormwater Control Measures
- Stormwater Control Measures to be Implemented by 2018 for Bacterial Milestone Compliance
- Stormwater Control Measures to be Implemented by 2021 for Bacterial TMDL Compliance
- Other Constituents and TMDL Compliance
- Summary of Permittee Actions

5.1. COMPLIANCE SCHEDULE OF STORMWATER CONTROL MEASURES

As described in Section 2 of the EWMP, scheduling of control measure implementation is based on the milestones of the SMB Beaches TMDLs, as follows:

- Bacteria
  - Milestone 1: Achieve 10% of the reduction for wet weather bacteria (2009 - achieved)
  - Milestone 2: Achieve 25% of the reduction for wet weather bacteria (2013- achieved)
  - Milestone 3: Achieve 50% of the reduction for wet weather bacteria (2018)
  - Milestone 4: Achieve 100% of the reduction for wet weather bacteria (2021)
- Debris
  - Milestone 1: Achieve 20% of the reduction for debris (2016)
  - Milestone 2: Achieve 40% of the reduction for debris (2017)
  - Milestone 3: Achieve 60% of the reduction for debris (2018)
  - Milestone 4: Achieve 80% of the reduction for debris (2019)
  - Milestone 5: Achieve 100% of the reduction for debris (2020)
- DDT
  - Compliance is to be demonstrated through CIMP monitoring and data analysis
- PCB
  - Compliance is to be demonstrated through CIMP monitoring and data analysis

5.2. STORMWATER CONTROL MEASURES TO BE IMPLEMENTED BY 2018 FOR BACTERIAL MILESTONE COMPLIANCE

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, and implementation feasibility as determined by desktop screening. Non-structural BMPs typically were prioritized higher over structural BMPs due to their lower relative cost.

The interim compliance deadline for the SMB Beaches TMDL requires a 50 percent reduction in exceedance days; this will be met by achieving 50 percent of the TLR in each CML analysis region, through a combination of non-structural, distributed green streets BMPs, existing centralized/regional BMPs and fast-tracked centralized/regional BMPs. Assuming a phased implementation, that can be controlled by the Permittee, it was assumed that 50 percent of the proposed distributed green streets BMPs would be implemented in all CML analysis regions between 2015 and 2018, and 50 percent would be implemented between 2018 and 2021.

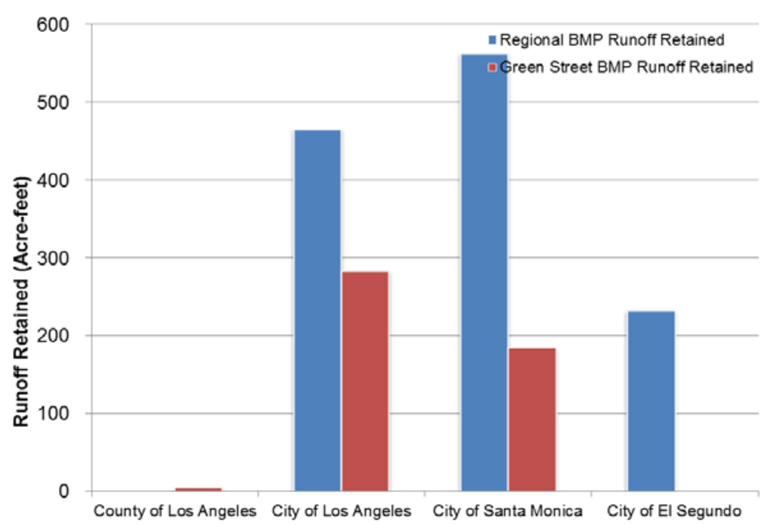
In CML analysis regions that needed additional load reductions beyond the default to meet the interim targets, the implementation of a higher relative percentage (greater than 50 percent) of distributed BMPs before 2018 was prioritized first, and fast-tracking specific-planned or proposed regional BMPs were prioritized second. In CML analysis regions where no distributed green streets BMPs are necessary to meet the final compliance deadlines, regional BMPs were prioritized to reduce redundant load reductions. However, in CML analysis region 2-11, a small number of distributed green streets BMPs (5 percent of single family and commercial areas) was added rather than fast-tracking the large-scale regional projects, which would meet the interim and final targets. Alternatively, if the regional projects could be fast-tracked to be operable by 2018, then no distributed green streets BMPs would be required. The incremental load reduction between Penmar Phase I (existing) and Penmar Phase II (planned) that can be considered is negligible. Therefore, the full load reduction applicable to Penmar Phase II has been applied to the interim compliance deadline/target. **Table 5-1** lists projects that must be completed by 2018 to meet the milestone TLRs in all CML analysis regions. **Figure 5-1** illustrates the required capacity in 2018 to meet and be in compliance with the SMB Beaches TMDL. Further detailed scheduling for each jurisdiction, including stormwater volumes to be managed and control measure capacities, presented in **Appendix A**. Every jurisdiction has a standalone recipe for each assessment area/watershed.

Table 5-1
Summary of Regional and Centralized BMPs Required Compliance in 2018

Sub-watershed	Regional/Centralized BMP Identifier	Permittee[1]	BMP Status	Type	Volume (ft^3)
2-07	RBMP47 – Riviera	LA	Planned	Infiltration	2,600,000
2-07	*RBMP43 – Old Oak Rd*	*LA*	*Existing*	*Bioswale*	*48,343*
3-01	RBMP31 - Roosevelt Elem	SM	Proposed	Infiltration	196,000
3-02	RBMP32 – Reed Park	SM	Proposed	Infiltration	192,000
3-03	RBMP16a - Clean Beaches Pier	SM	Planned	Infiltration	160,000
3-04	*RBMP53 – SMHS Built*	*SM*	*Existing*	*Infiltration*	*40,000*
3-05	RBMP37 - 3-5 Parking Lot	SM	Proposed	Infiltration	409,000
3-06	RBMP13 - Ozone	SM	Proposed	Infiltration	105,000
3-06	RBMP10 – Penmar Ph2	LA	Planned	Infiltration	371,000
3-07	*RBMP01b – Grand Blvd IMF*	*LA*	*Existing*	*Media Filter*	*NA*
3-07	*RBMP21b – Grand Blvd IIMF*	*LA*	*Existing*	*Media Filter*	*NA*
3-07	*RBMP03 - Westminster*	*LA*	*Existing*	*Infiltration*	*1,460*
3-09	RBMP18 – Crescent Bay	SM	Proposed	Infiltration	34,300
2-13	*RBMP02 – Imperial Hwy*	*ES*	*Existing*	*Infiltration*	*54,800*
2-13	RBMP42 – Imperial Strip	ES	Planned	Bioswale	NA
2-13	RBMP50 - Recreation85	ES	Proposed	Infiltration	94,400
2-15	RBMP49 - PumpStationB85	ES	Proposed	Infiltration	1,290,000

[1] LA = Los Angeles, SM = Santa Monica, ES = El Segundo

Figure 5-1
BMP Runoff Retained over Critical Year by Permittee by 2018



5.3. STORMWATER CONTROL MEASURES TO BE IMPLEMENTED BY 2021 FOR BACTERIAL MILESTONE COMPLIANCE

At the time of the final 2021 compliance deadline, a 42 percent load reduction is estimated, which is greater than the TLR of 35 percent. The load reduction attributable to individual regional BMPs in each CML analysis region is provided in **Appendix A** (Attachment E). The 2021 compliance deadline will be met by achieving 100 percent of the TLR in each CML analysis region, through a combination of non-structural BMPs, distributed green streets BMPs, existing centralized/regional BMPs and fast-tracked centralized/regional BMPs.

Table 5-2 lists projects that must be completed by 2021 to meet the milestone TLRs in all CML analysis regions. **Figure 5-2** illustrates the required capacity in 2021 to meet and be in compliance with the SMB Beaches TMDL.

It should be noted that if at any time specific distributed green streets or regional/centralized BMPs are found to be infeasible for implementation, then alternative BMPs or operational changes will be planned within the same CML analysis region and within the same timeline, in order to meet an equivalent CML analysis region load reduction. **Table 5-3** and **Table 5-4** present a summary of the regional and Green Street BMP capacity required for compliance, respectively.

Figure 5-2
BMP Runoff Retained over Critical Year by Permittee by 2021

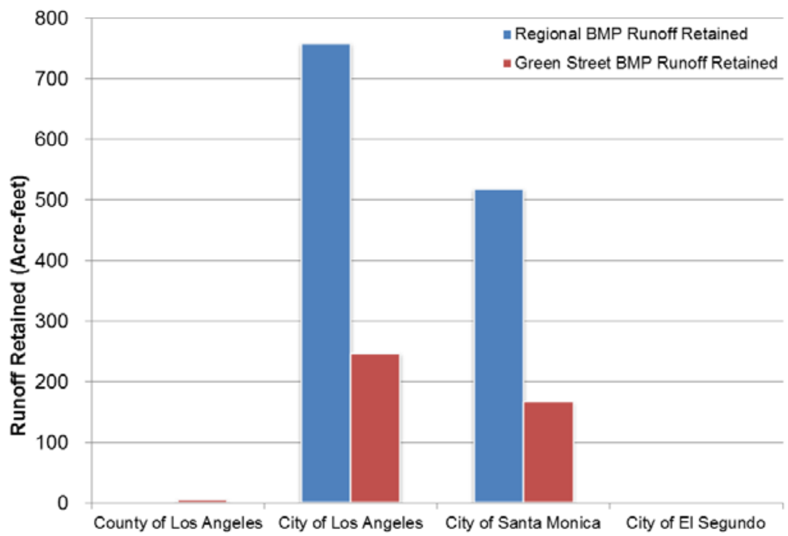


Table 5-2
Summary of Regional and Centralized BMPs Required Compliance in 2021

Sub-watershed	Regional/Centralized BMP Identifier	Permittee[1]	BMP Status	Type	Volume (ft^3)
2-02	RBMP20 – Santa Ynez	LA	Planned	Infiltration	131,000
2-02	RBMP23 - 2-2 Parking Lot	LA	Proposed	Infiltration	134,000
2-06	RBMP08 - Temescal	LA	Planned	Infiltration	241,000
2-07	RMBP40b – Riviera Barranca SW	LA	Proposed	Bioswale	NA
2-07	RBMP17 - Mandeville	LA	Planned	Infiltration	136,000
2-07	RBMP48 – Rustic Canyon	LA	Proposed	Infiltration	40,400
3-01	RBMP29 – San Vicente Median	SM	Proposed	Infiltration	144,000
3-01	RBMP30 - Goose Egg Park	SM	Proposed	Infiltration	29,400
3-02	RBMP33 – Lincoln Middle School	SM	Proposed	Infiltration	128,000
3-04	RBMP44_Brentwood CC	LA	Planned	Infiltration	184,000
3-04	RBMP51_Memorial Park	SM	Proposed	Infiltration	402,000
3-04	RBMP52_SM Civic Auditorium	SM	Proposed	Infiltration	197,000
3-04	RBMP16b - Clean Beaches Park	SM	Planned	Infiltration	10,700
3-04	RBMP11 – Los Amigos	SM	Proposed	Infiltration	261,000
3-06	RMBP38 – Olympic High	SM	Proposed	Infiltration	86,000
3-06	RMBP39_Will Rodgers Elem	SM	Proposed	Infiltration	103,000
3-07	RBMP45 – Oakwood 85	LA	Planned	Infiltration	34,300
2-11	RBMP19 – Westchester Park	LA	Planned	Infiltration	823,000
2-11	RBMP09 – Westchester LAX	LA	Planned	Infiltration	802,000

[1] LA = Los Angeles, SM = Santa Monica, ES = El Segundo

Table 5-3
Regional BMP Capacity Required for Compliance (Acre-feet)

Milestone	County of Los Angeles	City of Los Angeles	City of Santa Monica	City of El Segundo
2018	0.0	30.1	29.0	30.6
2021	0.2[1]	105.4	21.3	0.0
Total	0.2	135.4	50.3	30.6

[1] Although there are no regional projects in the County of Los Angeles, 3.1% of CML analysis region 2-02 falls within County of Los Angeles

Table 5-4
Green Street BMP Capacity Required for Compliance (Acre-feet)

Milestone	County of Los Angeles	City of Los Angeles	City of Santa Monica	City of El Segundo
2018	0.5	35.1	20.2	0.0
2021	0.5	25.3	15.1	0.0
Total	1.0	60.3	35.4	0.0

5.4. OTHER IMPLEMENTATION ACTIVITIES FOR TMDL COMPLIANCE

Listed below are subject activities that Permittees are responsible for during the implementation process.

5.4.1. Non-Structural BMPs

Non-structural BMPs include a combination of bacteria-targeted, wet weather source control BMPs that the SMB EWMP agencies are committed to implementing, such as pet waste controls, human waste source tracking, enhanced street sweeping, increased catch basin and storm drain cleaning, and other new or enhanced non-structural BMPs that target the pollutants addressed in this EWMP. Permittees are responsible for continued development, execution, enforcement, and reporting of the progress of these programs in their annual reports.

5.4.2. Public Retrofit Incentives for BMPs

These programs are directed at incentivizing the public to decrease the amount of stormwater runoff from their property. Permittees are responsible for continued development, execution, enforcement, and reporting of the progress of these programs in their annual reports.

5.4.3. Non-stormwater Control Measures

The objective of the EWMP is to reduce the impact of stormwater and non-stormwater on receiving water quality. The Permit effectively prohibits non-stormwater discharges and the SMB TMDL includes summer dry weather compliance requirements for bacteria since 2006 and winter dry compliance since 2009. Consistent with the Permit, The SMB EWMP Group's dry weather compliance approach is to eliminate 100 percent of non-exempt dry weather MS4 discharges through a combination of existing LFDs and a suite of non-structural source controls and source investigations when needed.

The primary mechanism to maintain compliance is the use of LFDs. These diversions are effectively eliminating non-stormwater surface discharges to the surf zone during dry weather days (MWH Team B, 2014). By eliminating flows, this is equivalent to 100 percent load reduction for all pollutants, thereby demonstrating reasonable assurance of meeting all applicable Permit limitations during dry weather. Elimination of discharges is a pathway for compliance with RWLs and WQBELs in the MS4 permit (per section VI.E.2.e.i.(3)); without discharges there can be no "cause or contribute" to receiving water issues. Implementaiton of additional non-storm water disharge is not applicable at this time.

5.5. OTHER CONSTITUENTS AND TMDL COMPLIANCE

Other constituents and TMDL compliance are described in the following two subsections.

5.5.1. Compliance with Debris TMDL

Compliance with the debris TMDL will be met through a phased retrofit of appropriate catch basins and other strategic in-line storm drain locations throughout the SMB EWMP area in order to meet each interim compliance milestones deadline (20% load reduction per year between 2016 and 2019) as well as the final compliance deadline (100% load reduction) in 2020. Consistent with the City's Trash Monitoring and Reporting Plan (TMRP) (City of Los Angeles Department of Public Works, 2012), "vertical insert[s] with 5-mm openings and flow activated opening screen covers are the best suited for implementation within the City to achieve compliance with Trash TMDLs".

5.5.2. SMB TMDL for DDTs and PCBs

The SMB TMDL for DDTs and PCBs developed WLAs for stormwater throughout the SMB watershed. Because the SMB EWMP group area contribution is not distinctly defined in the TMDL, the WLAs assigned to the entire SMB WMA as a whole are being used for this discussion. The existing TMDL-estimated loads for all of SMB and most of the individual watersheds are lower than the maximum allowable loads. Therefore, consistent with the TMDL, it is assumed that there is a zero load reduction required for PCBs and DDTs in MS4 discharges, and reasonable assurance is demonstrated. However, in spite of this zero required load reduction, the BMPs proposed in this EWMP are expected to reduce sediment and sediment-associated pollutants such as DDTs and PCBs, so the non-quantified but greater-than-zero anticipated BMP load reductions for DDTs and PCBs will exceed the TMDL WLA. Therefore, compliance with the TMDL-based permit limits for DDTs and PCBs has been demonstrated through this narrative RAA evaluation.

As part of the adaptive management process, based on monitoring data collected through the approved CIMP, additional structural and/or non-structural BMPs may be proposed if needed. Additionally, if the loads are found to be higher than estimated, but still less than the maximum allowable loads, there may be potential for the WLA to be revised.

5.6. SUMMARY OF PERMITTEE ACTIONS

Permittee actions can be categorized into three groups: project implementation, continued water quality monitoring, and reporting of monitoring results and progress.

Project Implementation: The rate of project implementation required for milestone and TMDL compliance is rapid. Permittees must implement projects within the RAA, listed in **Table 5-1** and **Table 5-2**, by their associated construction date. Implementation of EWMP projects will have numerous actions, too many to list, including associated project planning, funding, permitting, design, construction, and operation.

Water Quality Monitoring: Permittees shall continue TMDL monitoring as specified in the TMDLs. Monitoring and reporting of the results are currently a Permittee action. The monitoring will primarily be used to ensure compliance; however, monitoring may also assist in the development of adaptive management if unforeseen water quality changes occur.

Reporting: Permittees shall continue TMDL reporting. Preparation of an annual report for compliance with TMDLs is currently a Permittee action, although this action will be expanded to include progress towards implementation of projects for milestone and TMDL compliance. Annual reports shall be amended to include the following:

- Non-Structural BMPs – update on program development, execution, and enforcement.
- Public Retrofit Incentives – update in development, execution, and enforcement.
- Green Street BMP Project Implementation – provide an update on the Green Street BMP projects in planning, design, and construction. Each project should have an associated capacity. The current and planned green street BMP shall be reported and reconciled with the RAA modeled required green street BMP capacity for compliance. Deviations from the planned projects will be reported and the calculated BMP capacity documented.
- Regional BMP Project Implementation – provide an update on the regional BMP projects in planning, design, and construction. Each project should have an associated capacity. The current and planned regional BMP capacity shall be reported and reconciled with the RAA modeled

required capacity for compliance. Deviations from the planned projects will be reported and the calculated BMP capacity documented.

Section 6
Assessment and Adaptive Management Framework

6.1 ADAPTIVE MANAGEMENT PROCESS

The EWMP is intended to be implemented as an adaptive program. As new program elements are implemented and information is gathered over time, the EWMP will undergo modifications to reflect the most current understanding of the watershed and present a sound approach to addressing changing conditions. As a result, outlining an effective adaptive management process is critical for implementation of the EWMP. This process will allow the EWMP to evolve over time.

Part VI.C.8 of the Permit details the adaptive management process to be included in the EWMP that includes the following requirements:

i. Permittees shall adapt the EWMP every two years to become more effective from the date of program approval based on, but not limited to a consideration of:
   (1) progress toward achieving WQBELs and/or RWLs;
   (2) Permittee monitoring data;
   (3) achievement of interim milestones;
   (4) re-evaluation of water quality priorities and source assessment;
   (5) non-Permittee monitoring data;
   (6) Regional Board recommendations; and
   (7) Recommendations through a public participation process.

ii. Permittees shall report any modifications to the EWMP in the annual report.

iii. Permittees shall implement any modifications to the EWMP upon approval by the Regional Board or within 60 days of submittal if the Regional Board expresses no objections.

The adaptations to the EWMP, if and when necessary, as called for in the adaptive management process, essentially include: 1) re-characterization of water quality priorities, 2) a source assessment re-evaluation, 3) an effectiveness assessment of watershed control measures, and 4) an updated RAA. The updated RAA may include, but is not limited to, water quality calibration based on monitoring data, PCB and DDT baseline load and target load reduction quantification, or lead baseline load and target load reduction quantification for the Santa Monica Canyon subwatershed. The CIMP will gather additional data on receiving water conditions and stormwater/non-stormwater quality to inform these analyses. This management process will be implemented and repeated every two years as part of the adaptive management process. Each of these adaptations are described in the following subsections. Additional details outlining the customization process of specific MCMs can also be found in **Appendix F**.

6.1.1. Re-Characterization of Water Quality Priorities

Water quality within the SMB EWMP Group area will be re-characterized using data collected as a result of the CIMP implementation to include the most recent data available. WBPC classifications may be updated as a result of changing water quality conditions. These WBPCs will be important for refocusing water quality improvement efforts and informing the selection of future watershed control measures.

6.1.2. Source Assessment Re-Evaluation

The assessment of possible sources of water quality pollutants will be re-evaluated based on new information from the CIMP implementation. The identification of non-MS4 and MS4 pollutant sources is an essential component of the EWMP because it determines whether the source can be controlled by watershed control measures. As further monitoring is conducted and potential sources are better understood, the source assessment becomes more accurate and informed.

6.1.3. Effectiveness Assessment of Watershed Control Measures

The evaluation of BMP effectiveness is an important part of the EWMP adaptive management process. Implementation of the CIMP will provide a quantitative assessment of structural BMP effectiveness as it relates to actual pollutant load reduction to determine how selected BMPs have performed at addressing established water quality priorities. The effectiveness assessment of watershed control measures becomes important for the selection of future control measures to be considered.

6.1.4. Update of Reasonable Assurance Analysis

The data gathered as a result of the CIMP will support adaptive management at multiple levels, including 1) generating data not previously available to support model updates, and2) tracking improvements in water quality over the course of EWMP implementation. As described in **Section 3**, the RAA is an iterative process that depends on the continuous refinement and calibration of the watershed model used.

6.2 REPORTING

Annual reporting will be completed each year as part of the CIMP. In additional to assessing the overall progress of the WMP, the CIMP reporting will detail the implemented BMPs and demonstrate the cumulative BMP capacities to achieve the interim targets. Data obtained through CIMP monitoring will be used to determine the overall effectiveness of the EWMP and the next phases of EWMP implementation during the adaptive management process.

Section 7
EWMP Implementation Costs and Financial Strategy

This section identifies the estimated order-of-magnitude cost of the activities, and potential funding sources that the SMB EWMP Group will be pursuing to fund the program. Major investments in the watershed will be required, particularly for the construction of structural BMPs, but the program will bring many benefits: water quality, clean beaches, stormwater and rainwater harvesting for infiltration and offset of potable water use, creation of new green space, and neighborhood enhancements. These benefits are important, but the monetary value is difficult to determine. Although the definition of a financial strategy varies across industries, within the context of the EWMP, the financial strategy is interpreted to represent the strategic options available to the Permittees for financing program costs associated with the new MS4 Permit and the appropriate application and prioritization of these options. This section provides an overview of the following:

- Documentation of estimated program costs by BMPs;
- Assessment of impact of program costs on Permittees;
- Review of existing policies, revenues, and costs affecting stormwater;
- Identification of a prioritized financial strategy for financing program costs; and
- Identification of potential future steps to support the financial strategy.

7.1. EWMP COSTS

The purpose of this section is to present order-of-magnitude cost estimates to implement the EWMP. Estimated program costs were developed using the methodology described in **Appendix B**. Program costs consist of expenses that must be borne by the co-Permittees in order to comply with the Permit requirements.

Costs were derived using an RAA that includes the identification and evaluation of BMPs to be used in order to achieve applicable WQBELS and RWLs. This approach identifies a variety of watershed BMPs including LID, green streets, and regional projects. Costs were developed using unit costs of similar stormwater BMPs described in the *Multi-Pollutant TMDL Implementation Plan for the Unincorporated County Area of Los Angeles River Watershed* (LACDPW, 2010). Select unit costs were modified based on recent construction experience for similar projects.

For structural BMP projects, costs are included for planning, design, permits, construction, operation and maintenance (O&M), and post-construction monitoring, where applicable. The O&M costs represent present value of the estimated costs over a 20-year period. Unit costs for major construction components are presented in **Table 7-1**. To the extent possible, BMPs have been located on publicly-owned land to reduce land acquisition costs. Estimated costs are based on model results; however, real costs will depend on monitoring results and the outcome of the adaptive management process. As a result, it is emphasized that these estimated costs are preliminary and have the potential to be reduced through the adaptive management process.

Table 7-1
Conceptual Design Major Components Unit Cost

Construction Component	Unit Cost
Mobilization[1]	10% of construction total
Site Preparation[1]	$6,000 per acre
Excavation and Removal	$30.00 per cubic yard
Asphalt/Base Removal	$9.60 per cubic yard
Reinforced Concrete Pipe[1]	$16.00 per diameter (inch) per length (foot)
Gravel Sub-base	$63.00 per cubic yard
Backfill Material[1]	$20.00 per cubic yard
Landscaping[1]	$5.00 - $25.00 per square foot
60-inch Corrugated Metal Pipe[2]	$150,000 per acre-foot
Planning/Project Management[1]	20% of total construction costs
Design and Permitting (Centralized)[1]	15% of total construction costs
Contingency for Planning Estimate (Centralized)	25% of total construction costs

Notes:
[1] Unit costs have been modified from TMDL Implementation Plan based on recent construction experience for similar projects.
[2] Material costs for the 60-inch CMP used in subsurface infiltration basins were provided by Contech Engineering Solutions. Costs include CDS pretreatment.

The costs for structural BMPs are considered to be planning level only (order of magnitude), and can be refined as implementation of the EWMP progresses, using actual BMP implementation costs. Costs for enhanced minimum control measures and other institutional BMPs have not been included because they will vary by jurisdiction and are estimated to be a small percentage of the overall program costs.

7.1.1. EWMP Costs by BMP and TMDL Milestones

Based on the RAA, a set of optimal BMPs, consisting of distributed green streets and regional/centralized BMPs, were derived, having reasonable assurance of meeting the interim and final limitation milestones set forth by the Regional Board. Total estimated BMP costs are shown in **Table 7-2**. Capital costs and O&M costs are based on a 20-year implementation cost schedule. The 20-year implementation cost schedule relies on initial capital costs and recurring annual O&M costs for each specific type of BMP over a 20-year time frame. Additionally, estimated capital costs have been developed for each TMDL milestone and are presented along with the expected annual O&M costs for that milestone in **Table 7-2**.

Table 7-2
Total Costs by Milestone ($ Millions)[1]

Agency	Program	Present to Milestone 1[2] Capital	Present to Milestone 1[2] O&M/year	Milestone 1 to Milestone 2[3] Capital	Milestone 1 to Milestone 2[3] O&M/year
Los Angeles	Streets	$188.4	$6.2	$140.2	$9.0
	Regional	$5.7		$75.8	
Santa Monica	Streets	$85.5	$4.9	$63.1	$5.6
	Regional	$22.3		$42.4	
Uninc. LA County	Streets	$3.1	$0.09	$2.7	$0.09
	Regional	-		-	
El Segundo	Streets	$0.0016	$0.96	-	$1.1
	Regional	$20.8		-	
Total		$325.8	$12.2	$322.9	$15.8

[1]O&M costs for each milestone includes cost from previous milestone (i.e. the costs are cumulative)
[2] Milestone 1 represents the 2018 Interim TLR deadline
[3] Milestone 2 represents the 2021 Final TLR deadline

7.1.2. EWMP Costs by Agency in the SMB Watershed

Similar to EWMP costs described in **Section 7.1.1**, the total BMP costs were identified by jurisdiction (City or Agency) and watershed as shown in **Table 7-3**.

Table 7-3
Total Costs by Agency ($ Millions)

Agency	Capital	O&M[1]
Los Angeles	$410.1	$54.2
Santa Monica	$213.2	$33.5
Uninc. LA County	$5.9	$0.53
El Segundo	$20.8	$6.42
Total	$650.0	$94.7

[1]O&M cost is the present worth value of an annual O&M cost over a lifespan of 20 Years with a 5% interest.

7.1.3. Impact of EWMP Costs

The EWMP costs will have a significant financial impact on all Permittees. In order to determine the financial impact to each Permittee, a high-level calculation was conducted by dividing the costs by the total number of parcels in the watershed. There are a total of 64,971 parcels within SMB, resulting in a capital cost of $11,462 per parcel. It is important to note that this preliminary estimate is for planning purposes only. As parcels are not uniform throughout the cities, the final cost will be dependent on a number of other factors.

7.2. EXISTING STORMWATER PROGRAMS

Even though the Regional Board only implemented Order No R4-2012-0175, NPDES No CAS00401 on November 2012, the SMB EWMP Group has been addressing stormwater discharge prior to November 2012 with existing recurring costs associated with these activities in excess of $50 million annually.

Table 7-4 provides a summary of existing costs and associated funding source(s) by jurisdiction. It is assumed that these recurring costs will continue into the future and the costs for implementing the activities outlined in this EWMP are in addition to these costs.

Table 7-4
Existing Stormwater Costs

Jurisdiction	Existing Utility? (Yes/No)	Funding Source	Description of Costs	Total Costs ($)
Los Angeles	Yes	Stormwater Fund	Management, Outreach, inspection, enforcement, monitoring	~$30M/yr (City Wide; not including Prop O)
Santa Monica	Yes	Stormwater and Clean Beaches Fund	O&M and Capital, Outreach, Inspections, Management	~$13.7M/yr
Unincorporated LA County	Yes	General Fund	Management, Outreach, inspection, enforcement, monitoring	~80M/yr (County-wide)
El Segundo	No	To Be Determined	To Be Determined	~$300k/yr

7.3. FINANCIAL STRATEGY

The financial strategy described in this section is focused on developing a set of options to address the expected additional costs associated with compliance with the new MS4 Permit. It is not intended to incorporate the costs associated with existing stormwater activities identified previously. Just as the engineering and strategic solutions for watershed management rely upon a coordinated regional approach, so too does the financial strategy. Capital and operating costs for watershed programs are large and span decades. As such, there is no single "right" way to finance these programs. Instead, the financial strategy presented herein outlines multiple approaches to funding and allows each jurisdiction to consider and select the funding sources that best fit the specific preferences of their agency. These funding sources would be combined with existing funding sources such as general funds or fees to resource EWMP programs in the future in order to improve cost-effectiveness and leverage existing resources. Additional activities to reduce the overall cost of EWMP implementation, including source control efforts (e.g., copper in brake pads and zinc in tires), are expected to be pursued at a regional level.

The financial strategy is a long term planning tool developed based on project needs identified for implementation over the next two decades. In consideration of the immediate needs and the potential for future adaptation of the EWMP, the financial strategy is focused on the identification and prioritization of funding sources that provide the best opportunities for project and program funding over the next five years. This planning horizon covers approaches to meet the first two TMDL milestones in 2018 and

2021. As with other aspects of the EWMP, the financial strategies will evolve and will be adaptively managed as funding needs and opportunities change.

7.3.1. Potential Funding Sources

The detailed financial approach to funding the EWMP costs will be highly dependent on a variety of factors and vary by jurisdiction. Each Permittee has different resources; therefore, each Permittee will use a different set of options at its disposal. High-level alternatives that can be examined as each Permittee moves forward as a group or as individuals are described below. The following are funding sources in addition to the general fund or existing program specific funds that can be examined for each jurisdiction or the entire EWMP Group. For each source, a brief description is included that describes the funding source, challenges, the potential or feasibility for securing funding under the source, and where possible, an estimate of the available funding from each source. Acknowledgement is given to *Stormwater Funding Options – Providing Sustainable Water Quality Funding in Los Angeles County,* a report authored by Ken Farfsing and Richard Watson dated May 21, 2014.

Clean Water State Revolving Fund

The Clean Water State Revolving Fund (CWSRF) is a potential funding source available to individual agencies that could be used to fund individual projects or groups of projects. The CWSRF can fund a variety of projects including stormwater measures to manage, reduce, treat, or recapture stormwater or subsurface drainage water; water conservation, efficiency, and reuse; and watershed pilot projects meeting criteria in CWA §122.

Financing terms include interest rates at ½ of the most recent General Obligation Bond Rate at the time of funding approval (1.6% in March 2015) with terms up to 30 years and there is no maximum funding limit. Typically, $200 - $300 million is available annually. However, the State Board estimates financing between $500 and $700 million in projects for FY 2015-16. Repayment begins one year after completion of construction.

One of the challenges in utilizing the CWSRF for project funding is the need to have existing funding streams to pay back the loans. However, if qualifying revenues are identified to cover the cost of the loans in the near term, longer term strategies (e.g., new fee programs) could be developed and implemented to provide the basis for the remainder of the loan.

Funds obtained under the CWSRF could be used for a variety of projects including LID, green streets, and regional projects. The legality of using CWSRF for property acquisition and funding of projects on private land needs further research. The CWSRF has high potential as a funding source in the near term (<5 years) as well as in longer term implementation.

The City of Los Angeles has begun discussions with CWSRF staff regarding the appropriate approach to submitting a request for funding. As part of preparing for the application for funding, the City of Los Angeles has developed a 5-year Capital Improvement Plan (CIP) that embodies the full range of projects required to comply with stormwater quality regulations and provide flood protection for the City's residents and rate payers. The projects address urban runoff that occurs in wet weather (stormwater) and dry weather (non-stormwater runoff). Overall, the projects in the CIP support a multi-benefit approach to improving stormwater quality while supporting the City's broader water resource initiatives to ensure that water supply benefits are being maximized while also providing flood protection.

Federal and State Grants

Federal and State Grant programs provide potential funding sources for individual agencies or groups of agencies and would typically be used to fund individual projects identified in the EWMP. Project eligibility is dependent on the grant program. For example, $200 million has been dedicated under the Proposition 1 Stormwater Grant Program that will be available for LID, green streets, and regional projects. Additional grant funding available under Proposition 1 via other programs may also support EWMP projects such as urban creek restoration projects and IRWMP projects.

Challenges associated with grants include the matching requirements, which can be up to 50% of project costs under Proposition 1, and administration of the grants. Project readiness can be an issue, as many grant programs are focused on implementation of projects, with less money provided for planning needs. Grants are also competitive, with only $200 million available statewide under the Stormwater Grant Program. Given the intensive regulatory pressures on agencies across California, securing this type of funding could prove difficult. Lastly, grants are typically "one time" sources of funding for construction and would not include operations and maintenance costs.

Funds obtained through grant programs could be useful in design and construction of LID, green streets, and regional projects. Grants may contain restrictions on use for private property acquisition and it may not be possible to fund projects on private property. While grant programs may be an excellent source of funding for some key projects (rather than overall program implementation), due to the associated challenges, limited funding availability, and sustainability issues, the potential for grants to provide significant support to EWMP needs is minimal in comparison to the overall EWMP costs in the near and longer terms.

In addition to funding through Proposition 1, other grant options include:

- Integrated Regional Water Management (IRWM) grant program - $251 million dollars will be awarded in 2016 to fund planned or partially completed local and regional projects that increase local reliability. Examples of qualifying projects include stormwater recapture, expansion of recycled water distribution, and enhancement of groundwater storage management, among others.
- Section 319 of Clean Water Act, which authorizes the USEPA to develop a program aimed at implementing nonpoint source management programs.
- Other grants (state and federal) for stormwater improvement, beach water quality improvement, and green infrastructure projects. (e.g., Prop. 84, CBI, TIGER, etc.).

Multiple agencies in the watershed are pursuing grant funding for various projects. For example:

- The City of Los Angeles is pursuing grant funding for high priority projects in the near term while they seek to identify sustainable sources of funding in the long term for future projects and operation and maintenance related to EWMP implementation.

- Unincorporated LA County is planning to apply for the Proposition 84 Santa Monica Bay Restoration Commission Grant.

Traditional Fee Based Programs

Traditional fee based programs include modification of existing or establishment of new fee based programs that are familiar to government agencies, including service related fees, property based fees, and special assessment districts. These types of programs have typically been institutionalized in other capacities within local government. Examples of service related fees that could be used to fund portions of stormwater programs include establishment of, or increases to, fees associated with new and redevelopment, drainage or other environmental impacts, solid waste, water conservation, inspections, or storm drain/BMP maintenance. Property-based fees include regular fees associated with land ownership (e.g., stormwater parcel tax) and may be calculated based on factors such as parcel size, impervious surface, land use, water use, or some combination. Special assessment districts would be focused on specific projects or program implementation areas (e.g., Watershed Management Areas) and could be implemented on tax rolls as a secure funding stream for a discrete area (e.g., the land area draining to a retention basin). An example could be the use of Enhanced Infrastructure Finance Districts tailored to the Watershed Management Group, as outlined in recently adopted (2014) California legislation SB628. Another example could be the formation of a Joint Powers Authority (JPA). The City of Los Angeles has conducted a preliminary scoping to assess the efforts that may be needed to evaluate the feasibility of creating new regional funding sources cooperatively implemented via a JPA as a potential approach to focus revenue generation and utilization on a more targeted basis.

With the exception of special assessment districts and JPAs, these types of funding sources (e.g., service related fees) would typically be pursued within individual agencies, potentially streamlining approval processes and governance. Funding from these types of programs would typically cover project and program costs within individual agencies and revenues would be commensurate with program responsibilities and agency size. Additional funding could be in the tens of millions of dollars annually, depending on the program and the size of the agency.

There are clear challenges to implementation of these programs and individual agencies will have to work with legal counsel to determine the most feasible, appropriate, and beneficial to their respective programs. The most challenging hurdle may be Proposition 218, which requires public approval through a formal ballot initiative for the establishment of new or increases to existing fees associated with stormwater. However, new legislation such as AB2403 may successfully modify the legislative definition of water to include stormwater which could reduce or eliminate the need for a ballot measure to implement stormwater fees. This and other efforts to reform Proposition 218 to include stormwater as a utility may reduce these challenges in the future.

Considering the current Proposition 218 challenges, these funding sources appear to be viable in the longer term, with each source having a high long term potential. However, even in the near term, many agencies may be able to successfully navigate legal constraints, with greater potential for success lying within internal fee based programs. Although perhaps more challenging, property based fees and special assessment districts would have a moderate potential for success in the near term.

Innovative Regional Funding Sources

Several potential funding sources could be considered through regional or watershed based collaboration between agencies. These funding sources include water quality trading programs, public private partnerships, monetizing rain water, sales tax measures, and environmental impact fees. The sources could generate longer term revenue streams for programs and projects.

Water Quality Trading – Water quality trading (WQT) is an innovative market based approach that involves a party facing relatively high pollutant reduction costs compensating another party to achieve less costly pollutant reduction with the same or greater water quality benefit. WQT has the potential to provide benefits to the public and private sectors by creating opportunities to fund costly structural projects more efficiently and at lower costs. The program could fund regional BMPs on public and private property, depending on the design of the program. The concept is founded upon the difference in feasibility and costs to construct BMPs depending on site constraints, with some projects being more challenging (i.e., technically infeasible, cost prohibitive) than others.

The availability of funds is subject to market conditions related to supply and demand. As development/redevelopment rebounds, particularly infill development in dense areas of the watershed, the demand for offsite options, in lieu fee programs, and/or water quality credits could increase. In order for the program to be feasible, the need would be balanced by an availability of local projects that would serve as offsite compliance measures, either from private developers or from municipal agencies (e.g., EWMP projects).

While the concept of water quality trading is not new and several successful programs have been established across the United States, there are relatively few water quality trading programs that are actively trading water quality credits. Lessons learned and considerations from other programs include substantial up front program development costs related to technical support and stakeholder outreach; significant transaction costs associated with connecting buyer and seller are mostly driven by uncertainty; and ongoing internal administrative and resource demands can be burdensome. However, if the program were developed regionally, some of these challenges may be reduced through economies of scale.

Due to the significant technical, administrative, and legal undertakings to establish a WQT program, it could be a viable source for funding regional projects, but would likely not be able to contribute significantly to funding needs in the near term. Such a program appears to be more feasible in the long term.

Public Private Partnerships – Public-private partnerships (P3s) are contractual agreements between the public and private sectors that could allow for greater private sector participation in the financing, construction, and operation of watershed projects. While the concept is relatively new to the watershed management sector, P3s are active in other disciplines, supporting transportation, water, and wastewater infrastructure projects, health care, building construction, power, parks and recreation, and technology. P3s may be a potential funding source for green streets projects, regional projects, and projects on private property.

P3 projects can provide the agency the ability to combine existing sources of revenue with new financing resources such as private commercial debt, increasing the ability of the agency to fund much needed projects, while reducing the burden on local resources. Benefits of P3s can include expedited completion of projects, cost savings, improved quality and system performance, use of private resources and personnel, and access to new sources of private capital. P3s also allow an agency to better manage risk associated with the project(s) by placing more responsibility onto the private sector partner. In this context, there may be the potential for the private sector to somewhat offset regulatory risk.

P3s represent a largely unexplored resource within the stormwater sector and have the potential to provide financing for projects and programs. Anticipated challenges include initial development of programs, identification and mitigation of institutional constraints, availability of investors with the expertise in the field, identification of opportunities, and understanding legal implications. Additionally, where projects do not produce revenue (i.e., those without long term funding sources such as fee programs), investors will likely be less interested. Considering the challenges and relative infancy of P3 funding within California, P3s may have more potential as a funding mechanism in the long term rather than in the near future.

The relationship that Culver City has developed with Costco in the Marina del Rey Watershed is a good example of recent advances in P3 funding. Although not in Ballona Creek, this project may be used as a model for the development of future partnerships in this watershed.

Regional Sales Tax Measures, Environmental Impact Fees – Increases in sales tax or the imposition of environmental impact fees have the potential to provide significant levels of funding to local programs. Sales tax measures could fund LID, greens streets, and regional BMPs, whereas environmental impact fees may be more limited to larger projects (e.g., green streets, regional BMPs).

Sales tax measures could be implemented by jurisdiction or regionally, but would likely need extensive outreach to gain voter approval. Environmental impact fees associated with products that contribute to water quality issues would likely originate at the state level. Examples of products include residential pesticides contributing to aquatic toxicity or automobile tires contributing to heavy metals. Either funding source would potentially take years to move forward through the legislative processes. While these sources are viable solutions and have the potential to provide funding in the millions of dollars annually, the legislative process makes them more feasible as long term solutions.

7.3.2. Applicability and Prioritization

The funding sources, associated BMPs, near/long term feasibility (less or greater than five years, respectively, to establish the funding source), and ranges of potential funding available are summarized in **Table 7-5**. The ranges of potential funding available are broad estimates for the watershed on an annual basis once a funding source was fully implemented and will vary depending on the approach and methods of implementation, scale/service area, legal constraints, and public/political acceptance.

Table 7-5
Funding Sources Summary

Funding Source	Estimate of Potential Annual Available Funding in the Watershed	Scope/ Scale		Applicability				Potential/ Feasibility	
		Project	Program	LID	Distributed Green Streets	Regional/ Centralized	Regional on Private	Near Term (<5 years)	Long Term (>5 years)
Clean Water State Revolving Fund[1]	$$$$	●	●	●	●	●	●	High	High
Federal/ State Grants[1]	$-$$	●		●	●	●	●	Moderate	Moderate
Service Related Fees[1]	$$		●	●	●		●	High	High
Property Based Fees[1]	$$$		●		●	●	●	Moderate	High
Special Assessment Districts[1]	$$-$$$	●	●		●	●	●	Moderate	High
Water Quality Trading	$-$$	●	●			●	●	Low	Moderate
Public Private Partnerships	$$	●	●		●	●	●	Low	Moderate
Monetizing Rain Water	$$		●			●		Low	Moderate
Sales Tax Measure[1]	$$$		●	●	●	●	●	Low	Moderate
Environmental Impact Fees[1]	$-$$		●		●	●	●	Low	Moderate

1. Subject to local, state, and federal restrictions on use of funds. May not be eligible for property acquisition.

Available Funding Key:
$ = $1-5M
$$ = $5-25M
$$$ = $25-100M
$$$$ = >$100M

Based on available funds, the near and long term potential or feasibility of the funding sources, and on the applicability of the funding sources to the types of BMPs identified in the EWMP, the preferred funding sources can generally be prioritized for each BMP type. The funding sources for each BMP type are ranked in general order of preference in **Table 7-6** through **Table 7-9**.

Table 7-6
Low Impact Development Projects Funding Sources Prioritization

Funding Source	Estimate of Potential Annual Available Funding in the Watershed	Scope/ Scale		Potential/ Feasibility	
		Project	Program	Near Term (<5 years)	Long Term (>5 years)
Clean Water State Revolving Fund[1]	$$$$	●	●	High	High
Service Related Fees[1]	$$		●	High	High
Federal/ State Grants[1]	$-$$	●		Moderate	Moderate
Sales Tax Measure[1]	$$$		●	Low	Moderate

1. Subject to local, state, and federal restrictions on use of funds. May not be eligible for property acquisition.
Available Funding Key:
$ = $1-5M
$$ = $5-25M
$$$ = $25-100M
$$$$ = >$100M

Table 7-7
Distributed Green Streets Projects Funding Sources Prioritization

Funding Source	Estimate of Potential Annual Available Funding in the Watershed	Scope/ Scale		Potential/ Feasibility	
		Project	Program	Near Term (<5 years)	Long Term (>5 years)
Clean Water State Revolving Fund[1]	$$$$	●	●	High	High
Service Related Fees[1]	$$		●	High	High
Federal/ State Grants[1]	$-$$	●		Moderate	Moderate
Property Based Fees[1]	$$$		●	Moderate	High
Special Assessment Districts[1]	$$-$$$	●	●	Moderate	High
Public Private Partnerships	$$	●	●	Low	Moderate
Sales Tax Measure[1]	$$$		●	Low	Moderate
Environmental Impact Fees[1]	$-$$		●	Low	Moderate

1. Subject to local, state, and federal restrictions on use of funds. May not be eligible for property acquisition.
Available Funding Key:
$ = $1-5M
$$ = $5-25M
$$$ = $25-100M

$$$$ = >$100M

Table 7-8
Regional/Centralized Projects Funding Sources Prioritization

Funding Source	Estimate of Potential Annual Available Funding in the Watershed	Scope/ Scale		Potential/ Feasibility	
		Project	Program	Near Term (<5 years)	Long Term (>5 years)
Clean Water State Revolving Fund[1]	$$$$	●	●	High	High
Federal/ State Grants[1]	$-$$	●		Moderate	Moderate
Property Based Fees[1]	$$$		●	Moderate	High
Special Assessment Districts[1]	$$-$$$	●	●	Moderate	High
Water Quality Trading	$-$$	●	●	Low	Moderate
Public Private Partnerships	$$	●	●	Low	Moderate
Monetizing Rain Water	$$		●	Low	Moderate
Sales Tax Measure[1]	$$$		●	Low	Moderate
Environmental Impact Fees[1]	$-$$		●	Low	Moderate

1. Subject to local, state, and federal restrictions on use of funds. May not be eligible for property acquisition.

Available Funding Key:
$ = $1-5M
$$ = $5-25M
$$$ = $25-100M
$$$$ = >$100M

Table 7-9
Projects on Private Property Funding Sources Prioritization

Funding Source	Estimate of Potential Annual Available Funding in the Watershed	Scope/ Scale		Potential/ Feasibility	
		Project	Program	Near Term (<5 years)	Long Term (>5 years)
Clean Water State Revolving Fund[1]	$$$$	●	●	High	High
Service Related Fees[1]	$$		●	High	High
Federal/ State Grants[1]	$-$$	●		Moderate	Moderate
Property Based Fees[1]	$$$		●	Moderate	High
Special Assessment Districts[1]	$$-$$$	●	●	Moderate	High
Water Quality Trading	$-$$	●	●	Low	Moderate
Public Private Partnerships	$$	●	●	Low	Moderate
Sales Tax Measure[1]	$$$		●	Low	Moderate
Environmental Impact Fees[1]	$-$$		●	Low	Moderate

1. Subject to local, state, and federal restrictions on use of funds. May not be eligible for property acquisition.

Available Funding Key:
$ = $1-5M
$$ = $5-25M
$$$ = $25-100M
$$$$ = >$100M

7.3.3. Near Term Projects

Eleven near term projects are identified in Section 5.2 that need to be implemented by 2018 to meet the 50% reduction in exceedance days required by the SMB Beaches Bacteria TMDL. Near term projects consist of regional/centralized BMPs on public lands. Treatment volumes for these projects range from approximately 34,000 to 2,600,000 cubic feet. Near term projects identified in the SMB watershed and responsible permittees are described in Section 5.2. Although funding for design and construction has not been identified for all near term projects, agencies are pursuing various funding sources. The process for securing the funding includes several steps:

- An evaluation of the agency specific funding need for each project;
- A prioritization of funding sources depending on the needs; and
- Pursuing the selected funding source(s).

Consistent with prioritized funding sources for distributed green streets and regional/centralized projects, (Table 7-6 and Table 7-7), preferred funding sources for these projects include the loans through the CWSRF, Federal and/or State Grants, property based fees, and/or special assessment districts. The process for obtaining funds through the CWSRF is:

1. Agency submits an application for financial assistance to the State Water Board using the Financial Assistance Application Submittal Tool (FAAST) system. The initial application consists of general, financial, technical, and environmental components.

2. Upon receipt of a complete application, the State Division of Financial Assistance (DFA) reviews the application for project scope, budget, and timeline, and if acceptable, adds the project to the project list.

3. Once the application review is complete, DFA prepares an initial Financial Assistance Agreement based on estimated construction costs. At this stage, soft costs, including those incurred prior to the agreement are eligible for re-imbursement.

4. The Agency submits the Final Budget Approval package once the project has been bid and construction costs finalized.

5. The initial Financial Assistance Agreement is then updated with the construction costs and executed. Upon execution, construction costs are eligible for re-imbursement.

6. Based on the Final Budget Approval package, a construction completion date is established, which sets the initial date for repayment, one year from the construction completion date. Upon project completion, the agency would submit a final project report.

The process to obtain Federal and State Grant Funds is similar. Projects that have completed preliminary design are more likely to receive funding for construction. In the near term, agencies are anticipating Round 1 solicitation for Proposition 1 stormwater grant funds in the spring of 2016 and are currently preparing preliminary project designs. In order to be eligible, the approved EWMP will have to meet the Stormwater Resource Plan guidelines adopted by the State Board (anticipated in December 2015) and will have to be incorporated into the IRWMP. Where this integration has occurred, projects may be eligible for funding under the Proposition 1 Stormwater Grant Program. Upon solicitation, project applications detailing project design, environmental needs, multiple benefits, and agency matching funds will be completed through the FAAST system. Upon award, applicants will enter into funding agreements with the State Board and typically have three years to construct the projects.

Property based fees and special assessment districts will take considerably more effort to implement. Agencies are currently investigating the potential for property based fees and special assessment districts on a regional scale, but are currently subject to Proposition 218 restrictions. As legislation progresses to ease the Proposition 218 restrictions, agencies may be able to implement these types of funding sources through internal process such as ordinance modifications and approval by their governing body. Until then, these types of funding sources will require explicit public concurrence.

Table 7-10
Near Term EWMP Projects

Near Term Project	BMP Type	Responsible Agency	Potential Funding Sources[2]			
			Clean Water State Revolving Fund	Federal and State Grants	Property Based Fees	Special Assessment District
RBMP47 - Riviera	Regional/Centralized (infiltration basin)	Los Angeles	1	2	3	4
RBMP31 – Roosevelt Elem	Regional/Centralized (infiltration basin)	Santa Monica	1	2	3	4
RBMP32 – Reed Park	Regional/Centralized (infiltration basin)	Santa Monica	1	2	3	4
RBMP16a – Clean Beaches Pier	Regional/Centralized (infiltration basin)	Santa Monica	1	2	3	4
RBMP37 – 3-5 Parking Lot	Regional/Centralized (infiltration basin)	Santa Monica	1	2	3	4
RBMP13 - Ozone	Regional/Centralized (infiltration basin)	Santa Monica	1	2	3	4
RBMP10 – Penmar Ph2	Regional/Centralized (infiltration basin)	Los Angeles	1	2	3	4
PBMP18 – Crescent Bay	Regional/Centralized (infiltration basin)	Santa Monica	1	2	3	4
RBMP42 – Imperial Strip	Regional/Centralized (bioswale)	El Segundo	1	2	3	4
RBMP50 – Recreation85	Regional/Centralized (infiltration basin)	El Segundo	1	2	3	4
RBMP49 – PumpStationB85	Regional/Centralized (infiltration basin)	El Segundo	1	2	3	4

Notes:

1. Near term projects are part of a suite of potential projects and strategies that may be implemented to meet EWMP milestones, which may be modified as outlined through adaptive management.
2. The potential funding sources are ranked in order of preference with 1 being the most preferable.

7.3.4. Potential Future Steps

The financial strategy discussed herein outlines an approach to utilize multiple options for funding individual projects and the overall EWMP program. Potential future steps to support execution of the financial strategy include:

- Development of public support for executing the financial strategy through outreach efforts. The outreach efforts would build on the recommendations in the Stormwater Funding Options Report (Farfsing and Watson, 2014) which include:
  - Improvement of existing public education and outreach programs to make a more direct connection with residents, the business community, and others regarding stormwater program requirements and funding issues.
  - Outreach to the public, school districts, state, and federal officials.

    - Communication with the governor and legislature on the need for additional funding opportunities to address stormwater issues.
    - Outreach to the area's Congressional delegation to provide education on stormwater and urban runoff issues; consistent and coordinated action in requesting federal funding assistance.
    - Encourage the incorporation of the best science into the Basin Plan.
    - Active participation in the design of future bond programs to ensure additional funding is provided for stormwater and urban runoff programs.
- Creation of inter-jurisdiction EWMP financial working group. Local agencies will reconvene the City Managers Work Group in early 2016 to continue to develop viable funding alternatives for stormwater programs and projects. The group serves at the direction of the City Managers Committees of the California Contract Cities Association and the League of California Cities, Los Angeles County division. Future efforts will be an outgrowth of the recommendations in the Stormwater Funding Options Report (Farfsing and Watson, 2014).
- Development of a financial plan thath could include the following components: implementation of a new fee or charge, establishment of a new enterprise fund, cash and debt financing, operating and capital reserves, and cash flow modeling. As described above, the City Managers Work Group will reconvene in 2016 and will be further developing funding options and outlining steps to support implementation. The group will be working to address recommendations related to legislation (e.g., the use of state facilities, capture and use, source control, establishment of special assessment districts), updating the Clean Water, Clean Beaches initiative that was put on hold in 2012, and implementing local funding options. Next steps at each level – legislation, Clean Water, Clean Beaches, and local funding – will explore the necessary actions to implement new fees or charges, establish new enterprise funds, and options for cash and debt financing.

Section 8
Legal Authority

As required on page 39 of the Standard Provisions of the Permit, each Permittee must maintain the legal authority to implement the provisions of the Permit consistent to the Annual Report submittals. **Appendix E** includes copies of the legal authority certification.

Section 9
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APPENDIX A

REASONABLE ASSURANCE ANALYSIS

Geosyntec consultants

3415 S. Sepulveda Blvd., Suite 500
Los Angeles, CA 90034
PH 310.957.6100
FAX 310.957.6101
www.geosyntec.com

TECHNICAL MEMORANDUM

Date: Draft: March 20, 2015

Revised Draft: January 21, 2016

To: Victor Harris and Sarah Munger, MWH America

From: Ken Susilo and Megan Otto, Geosyntec Los Angeles

Subject: J2J3 SMB EWMP – RAA Summary
Geosyntec Project: LA0294

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1 RAA APPROACH AND METHODOLOGY

1.1 Introduction

The National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. R4-2012-0175 (Permit) was adopted November 8, 2012 by the Los Angeles Regional Water Quality Control Board (Regional Board) and became effective December 28, 2012. The purpose of the Permit is to ensure the MS4s in Los Angeles County are not causing or contributing to exceedances of water quality objectives set to protect the beneficial uses in the receiving waters in the Los Angeles region.

The Permit allows Permittees to customize their stormwater programs through the development and implementation of a Watershed Management Program (WMP) or an Enhanced Watershed Management Program (EWMP) to achieve compliance with receiving water limitations (RWL) and water quality-based effluent limits (WQBEL). Jurisdictional Groups 2 and 3 (JG2/JG3) include the City of Los Angeles (City), City of Santa Monica, City of El Segundo, unincorporated areas of the County of Los Angeles (County), and the Los Angeles County Flood Control District (LACFCD), collectively referred to as the Santa Monica Bay (SMB) EWMP Group (SMB EWMP Group), submitted a notice of intent (NOI) to develop an EWMP in June of 2013 to fulfill the requirements of the Permit.

In June of 2014, the SMB EWMP Group submitted the SMB EWMP Work Plan to the Los Angeles Regional Water Quality Control Board (Regional Board) (City of Los Angeles, LACFCD, County of Los Angeles, City of Santa Monica, and City of El Segundo, 2014). The EWMP Work Plan detailed the proposed Reasonable Assurance Approach (RAA) to addressing the identified Category 1, 2, and 3 water-body pollutant combinations. This memorandum is intended to provide a summary of the RAA approach for both wet and dry weather, including any refinements to the approach since the June Work Plan submittal, as well as to present quantitative and qualitative analyses to demonstrate reasonable assurance that the load reduction targets will be met by the compliance deadlines for the identified water-body pollutant combinations.

The SMB EWMP Work Plan identified the water-body pollutant combinations (WBPCs) summarized in **Table 1**. Of these, wet weather bacteria in Santa Monica Bay and Santa Monica Canyon Channel, as well as wet weather lead in Santa Monica Canyon Channel are addressed quantitatively through water quality modeling of proposed non-structural and structural (distributed and regional/centralized[1]) best management practices (BMPs). The other WBPCs are addressed qualitatively herein.

Table 1. Water Body Pollutant Prioritization

<table>
<tr><th>Category</th><th>Water Body</th><th>Pollutant</th><th>Compliance Deadline</th></tr>
<tr><td rowspan="6">1</td><td rowspan="3">SMB Beaches</td><td>Summer dry weather bacteria</td><td>7/15/2006 (Final: Single sample summer AEDs)</td></tr>
<tr><td>Wet weather bacteria</td><td>7/15/2018 (Interim: 50% single sample ED reduction)
7/15/2021 (Final: Single sample AED)
7/15/2021 (Final: Geometric Mean [GM])</td></tr>
<tr><td>Winter dry weather bacteria</td><td>11/1/2009 (Final: Single sample winter AEDs)</td></tr>
<tr><td>SMB Offshore/ Nearshore</td><td>Debris</td><td>3/20/2016 (20% load reduction)
3/20/2017 (40% load reduction)
3/20/2018 (60% load reduction)
3/20/2019 (80% load reduction)
3/20/2020 (100% load reduction)</td></tr>
<tr><td>SMB</td><td>DDTs</td><td rowspan="2">Although the TMDL lacks a formal compliance schedule for the WQBEL, the TMDL Executive Summary does state, “The time frame for attainment of the TMDL targets for the rest of Santa Monica Bay (other than the Palos Verdes shelf) is 11 years for DDT and 22 years for PCBs.”</td></tr>
<tr><td>SMB</td><td>PCBs</td></tr>
<tr><td rowspan="2">2</td><td>Santa Monica Canyon Channel</td><td>Lead</td><td>NA</td></tr>
<tr><td>Santa Monica Canyon Channel</td><td>Indicator bacteria</td><td>NA</td></tr>
</table>

[1] Centralized BMPs are defined as large-scale constructed structural BMPs intended to treat runoff from a contributing area composed of multiple parcels, normally on the order of 10s or 100s of acres (and potentially but not necessarily funded by multiple agencies). Regional BMPs are defined as centralized BMPs that can capture the 85th percentile storm.

3	None	None	None

1.2 Scope

This memorandum describes the results from the reasonable assurance analysis for the SMB EWMP Group, conducted as part of the draft EWMP. This deliverable is intended to satisfy Tasks 4.3 and 4.5.4 of MWH Subcontract No. S10503614-100306-OM.

1.3 Terms of Reference

This work was conducted by Geosyntec Consultants, Inc. (Geosyntec) for the SMB EWMP Group agencies. This work was managed and conducted by Ken Susilo and Megan Otto, respectively. Peer and senior reviews were conducted by Brian Apple, Megan Otto, Brandon Steets, and Ken Susilo in accordance with Geosyntec's quality assurance policies.

1.4 Limitations

The professional opinions and recommendations expressed in this memorandum are made in accordance with generally accepted standards of practice and were based largely on source information provided by others. No other warranty is either expressed or implied. Geosyntec is responsible for the recommendations contained in this report based on the data and information relating only to the specific projects modeling discussed herein. Geosyntec is not responsible for use of the information contained in this report for purposes other than those expressly stated in this report namely the RAA in support of the SMB EWMP. In the event that there are changes in modeling assumptions, including the design or location of projects that do not conform to the projects as described herein, Geosyntec is not responsible for these changes. Geosyntec is not responsible for any conclusions or recommendations made by others based upon the data or conclusions contained herein unless given the opportunity to review them and concur with them in writing.

2 REASONABLE ASSURANCE ANALYSIS APPROACH

2.1 Consistency with Regional Board Guidance

The approach described below, including model selection, data inputs, critical condition selection (90^{th} percentile year), calibration performance criteria, and output types (presented in the EWMP Work Plan and below) have all been selected for consistency with the Regional Board RAA Guidance Document (Regional Board, 2014).

2.2 Reasonable Assurance Analysis Approach - Dry Weather

Demonstrating "reasonable assurance" of compliance with dry weather limits for the SMB Beaches Bacteria TMDL requires a methodology that accounts for many factors which cannot be accurately modeled based on urban runoff processes alone (Thoe et al, 2015), despite the extensive summer-dry and winter-dry weather beach-specific monitoring datasets that are available. Therefore, to perform the RAA for dry weather for the SMB EWMP Group area, a semi-quantitative methodology has been developed to follow a permit compliance structure, as independent lines of evidence for demonstrating that MS4 discharges could not be causing or contributing to receiving water exceedances at the beaches. Because fecal indicator bacteria (FIB) are considered the "controlling" pollutants of concern during dry weather in the SMB EWMP Group area (i.e., if MS4 discharges are compliant for bacteria during dry weather, they will be compliant for all TMDL and 303(d) pollutants during dry weather), the methodology was developed to focus on bacteria. The following criteria form the proposed dry weather RAA methodology. If one criterion is met for each Coordinated Shoreline Monitoring Plan (CSMP) compliance monitoring location (CML), then "reasonable assurance" is considered to be demonstrated. This methodology was presented to Regional Board staff on April 9, 2014, and verbal feedback received at the time was supportive.

- If a dry weather diversion, infiltration, or disinfection system is located at the downstream end of the analysis region, then reasonable assurance is considered to be demonstrated. To meet this criterion, any such system must have records to show that it is consistently operational, well maintained, and effectively removing bacteria in the treated effluent (in the case of disinfection facilities). Diversions or infiltration systems must demonstrate consistent operation and maintenance so that all freshwater surface discharges to the receiving water are effectively eliminated during year-round dry weather days.
- If there are no MS4 outfalls (major or minor) owned by the SMB EWMP Group Agencies within the CML's drainage area, then MS4 discharges are considered to not be contributing to pollutant concentrations in the receiving water. Therefore, reasonable assurance is demonstrated.
- If the allowed dry weather (summer and winter) single sample exceedance days are based on an antidegradataion approach at the CML, then it can be assumed that existing water quality conditions at this CML are acceptable, requiring existing water quality to be maintained. Therefore, reasonable assurance is demonstrated[2].

[2] SMB 2-11, 2-13, and 3-6 are all antidegradation-based CMLs for dry weather.

- If non-stormwater MS4 outfall discharges have been eliminated within the analysis region, then reasonable assurance is demonstrated. For this criterion to be met, supporting records from the non-stormwater outfall screening program should be supplied.

2.3 RAA Approach – Wet Weather

The wet-weather RAA process consists generally of the following steps:

- Identify WBPCs for which the RAA will be performed;
- Identify the MS4 service area (exclude lands of agencies not party to this EWMP such as Federal land, State land, etc.);
- For each subwatershed[3] (**Figure 1,** agency representation in **Attachment A**), develop target load reductions (TLRs) for 90th percentile year based on Permit requirements and Regional Board guidance;
- Identify structural and non-structural BMPs that either were implemented after applicable TMDL effective dates or are planned for implementation in the future;
- Evaluate the performance of these BMPs in terms of annual pollutant load reductions;
- Compare these estimates with the TLRs; and
- Revise the BMP implementation scenario until targets are met.

TLRs, as discussed previously, represent a numerical expression of the Permit compliance metrics (e.g., bacteria AEDs 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 WQBELs and RWLs in the Permit.

[3] SBPAT input files represent the following subwatersheds under different IDs: Modeled 2-05 represents 2-06, modeled 2-06 represents 2-05, modeled 2-04_2-06 represents 2-04_2-05, and modeled 2-05_2-07 represents 2-06_2-07. Subwatershed results were post-processed and attributed to the correct subwatershed.

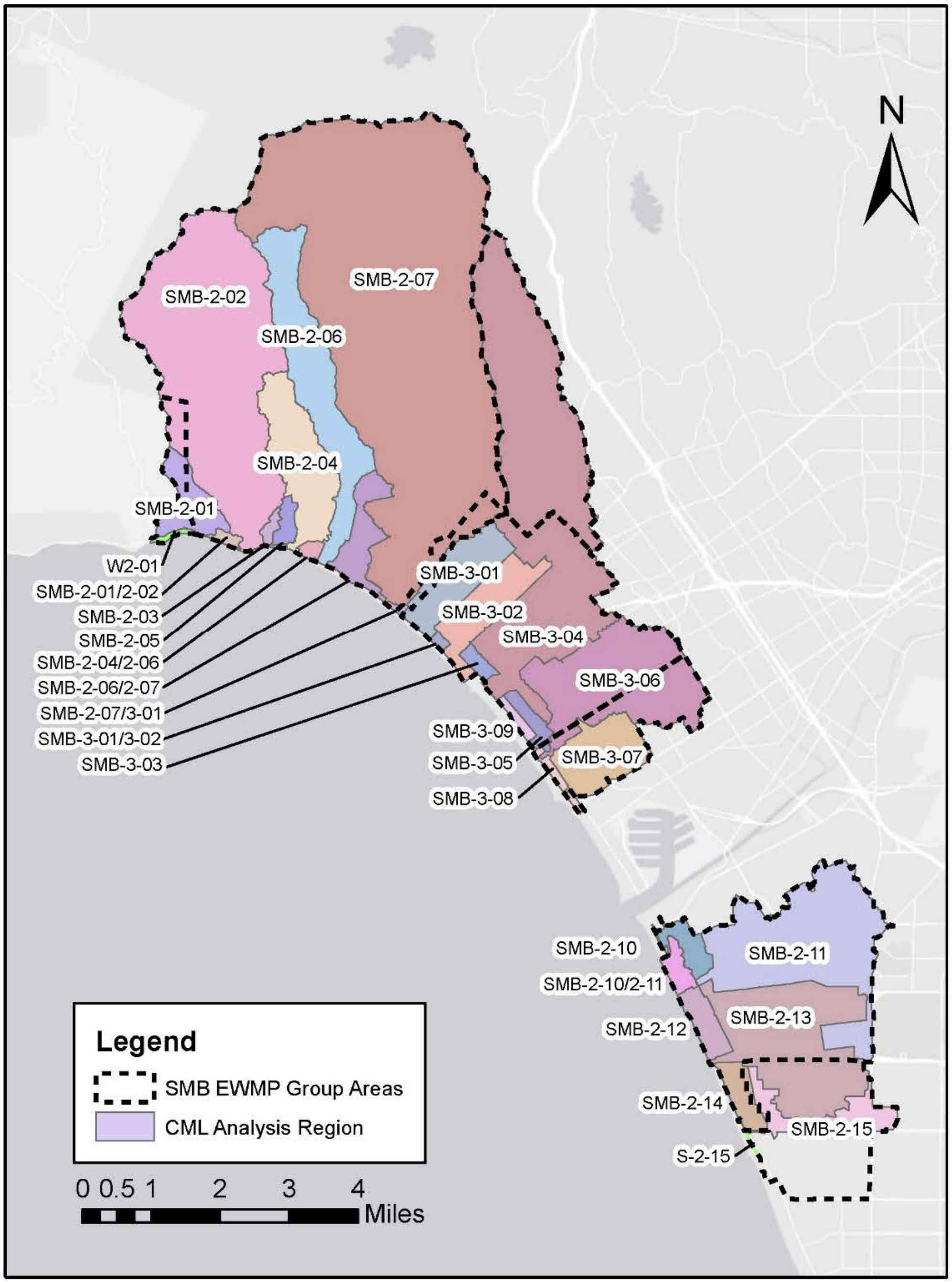

Figure 1. Modeled Subwatersheds within the SMB EWMP Group

2.3.1 SBPAT Model

The recommended RAA approach leverages the strengths of the publicly available, Permit-approved, Geographical Information System (GIS)-based model that has already been developed for the region: the Structural BMP Prioritization and Analysis Tool, SBPAT[4]. The following describes the rationale for utilization of this model for the wet weather RAA.

SBPAT is a public domain, "open source," GIS-based water quality analysis tool intended to: 1) facilitate the prioritization and selection of BMP project opportunities and technologies in urbanized watersheds; and 2) quantify benefits, costs, variability, and potential compliance risk associated with stormwater quality projects. The decision to use SBPAT for the SMB EWMP RAA in the manner described below is based on the model capabilities and the unique characteristics of the SMB, specifically:

- **Modeling of SMB hydrologic and watershed processes –** SBPAT utilizes EPA's Stormwater Management Model (SWMM) as the hydrologic engine, and SBPAT has been calibrated to local rainfall and Santa Monica Bay (SMB) stream flow gauges, confirming the ability to predict stormwater runoff volumes on an annual basis;
- **SMB pollutants of concern and their compliance metric expression –** SBPAT has been utilized for planning applications related to Bacteria TMDL compliance (and specifically exceedance-day predictions, based on SMB criteria), including a demonstrated linkage of load reduction to exceedance days;
- **Availability of new open space water quality loading data –** Recently developed Event Mean Concentration (EMC) data are consistent with SBPAT and were also updated to reflect new data developed in SMB as part of this RAA-development effort;
- **Capability to conduct opportunity and constraints investigations –** SBPAT is capable of supporting structural BMP placement, prioritization, and cost-benefit quantification, and has been applied for such purposes previously in the SMB EWMP Group area and other nearby SMB subwatersheds;
- **Characterization of water quality variability –** SBPAT is capable of quantifying model output variability and confidence levels, which is a component of the Regional Board's RAA Guidance; and
- **Supports quantification of both structural and non-structural BMPs, and demonstrates compliance at both interim and final compliance dates –** SBPAT's

[4] SBPAT is specifically referenced in the MS4 Permit Part VI.C.5.b.iv and was presented at the first two Permit Group TAC RAA Subcommittee meetings. Furthermore, SBPAT has been used for reasonable assurance analysis purposes in the Los Angeles region for four TMDL Implementation Plans, two WMPs, four EWMPs, and, in the San Diego region, for two Combined Load Reduction Plans and two Water Quality Improvement Plans.

modeling framework is easily compatible with methods for addressing non-structural BMPs and provides quantitative results for multiple BMP phasing milestones.

The quantification analysis component of SBPAT includes a number of features. The model:

- Calculates and tracks inflows to BMPs, treated discharge, bypassed flows, evaporation, and infiltration at each 10 minute time step;
- Distinguishes between individual runoff events by defining six-hour minimum inter-event time in the rainfall record (in order to track rain events), while also tracking inter-event antecedent conditions;
- Tracks volume captured by and bypassing BMPs, and summarizes and records these volumes by storm event; and
- Produces a table of each BMP's hydrologic performance, including concentrations and loads by storm event, and consolidates these outputs on an annual basis.

Data used for the quantification/analysis module include both fixed and stochastic parameters. The model utilizes land use based EMCs, USEPA SWMM, USEPA/American Society of Civil Engineers/Water Environment Research Foundation (USEPA/ASCE/WERF) International BMP Database (IBD) water quality concentrations, watershed/GIS data, and a Monte Carlo approach (relying on repeated random sampling) to quantify water quality benefits and uncertainties. Model data flow is provided below in **Figure 2**.

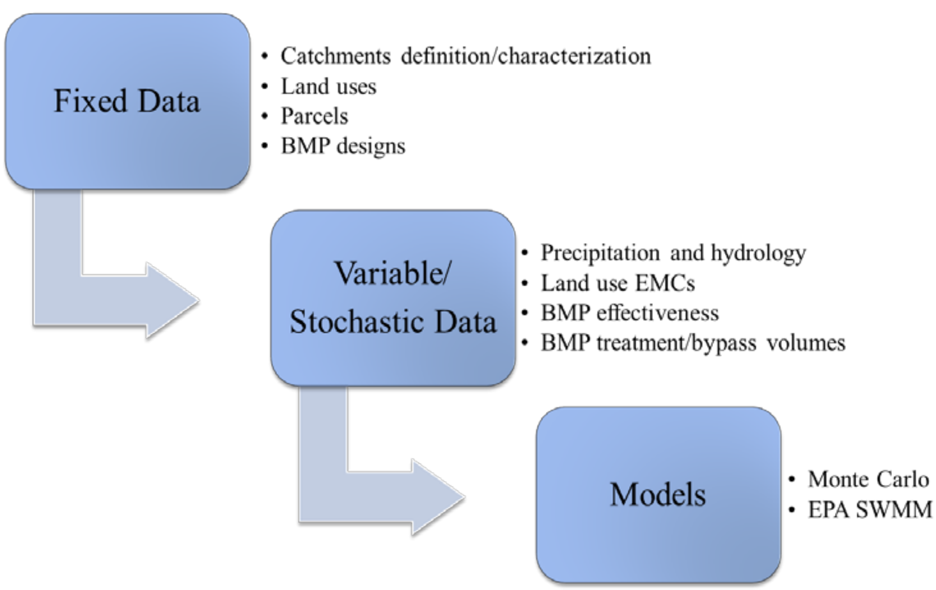

Figure 2. SBPAT Model Data Flow

Each model simulation integrates Monte Carlo methods that rely on repeated random sampling to obtain numerical results. Model simulations are run 20,000 times to calculate a distribution of outcomes that can support the definition of confidence levels and quantify variability. Consistent with the SBPAT usage, Monte Carlo methods are typically used in physical and mathematical problems and are most suited to be applied when it is difficult to obtain a closed-form expression or when a deterministic algorithm is not desired. A schematic of SBPAT's Monte Carlo process is provided in **Figure 3**.

Model documentation, as well as links to related technical articles and presentations, is provided at www.sbpat.net.

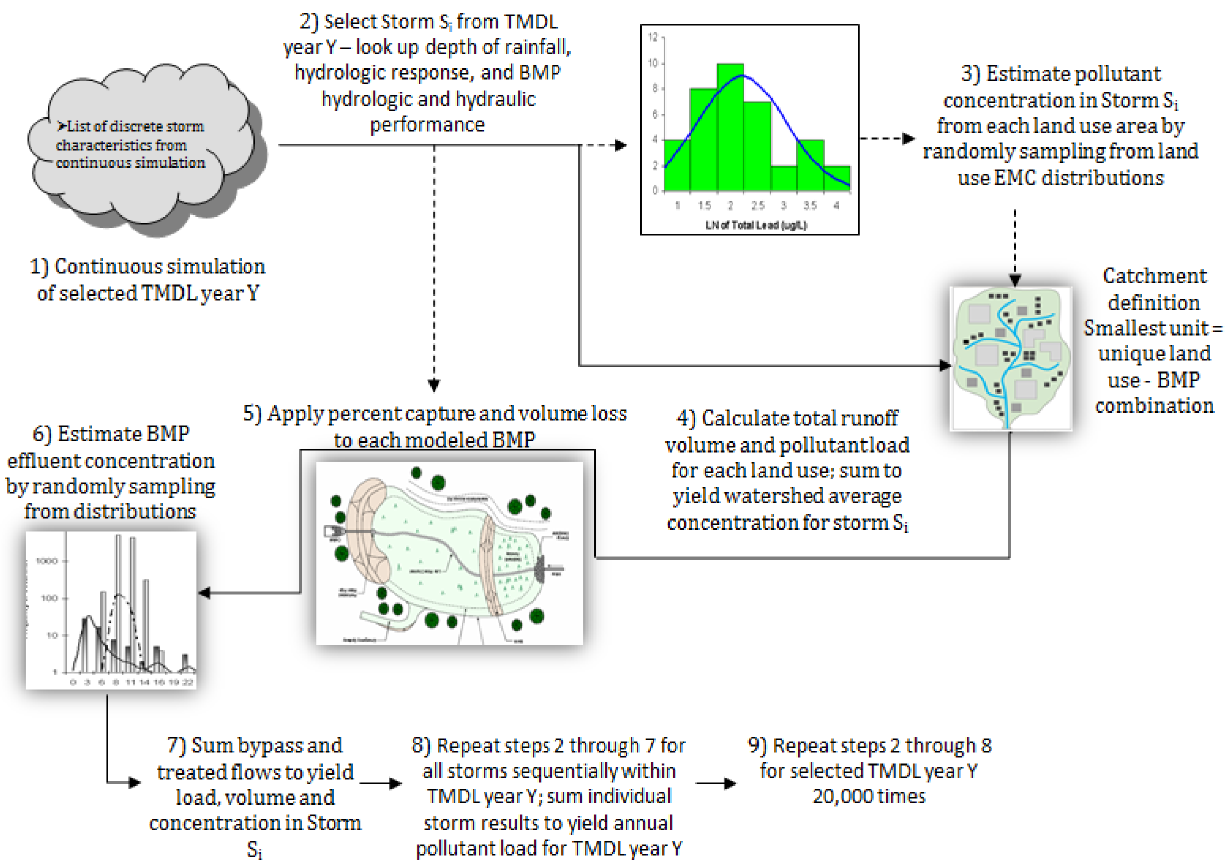

Figure 3. SBPAT Monte Carlo Method Components

2.3.2 Spatial Domain

The spatial domain of the RAA includes the subwatersheds within the SMB EWMP area. Adjustments have been made to account for contributions from agencies not party to this EWMP (e.g., State/Federal, Caltrans, etc.) and are described in more detail later in this document.

GIS layers to be used in SBPAT will include, but not be limited to, the following:

- Storm drains
- Soils
- Rain gauge polygons
- Parcels
- Land use
- Catchments

SBPAT utilizes a customized version of SWMM for continuously simulating study area hydrology and BMP hydraulics. Long-term, hourly rainfall data and average monthly evapotranspiration values are used along with land use-linked catchment imperviousness and soil properties to estimate runoff volumes. Revised and recalibrated SBPAT database values and EWMP-defined BMP information are used to estimate the volume of runoff generated from watershed areas and captured by BMPs. Storm events are individually tracked for the entire simulation so that the volumes of runoff infiltrated, evapotranspired, captured, and released (if applicable) by BMPs are estimated for every storm event. Hourly rainfall data from LAX (NCDC ID45114) and Sepulveda Dam (NCDC ID48092) were used in the SMB EWMP RAA modeling (see **Figure 4**).

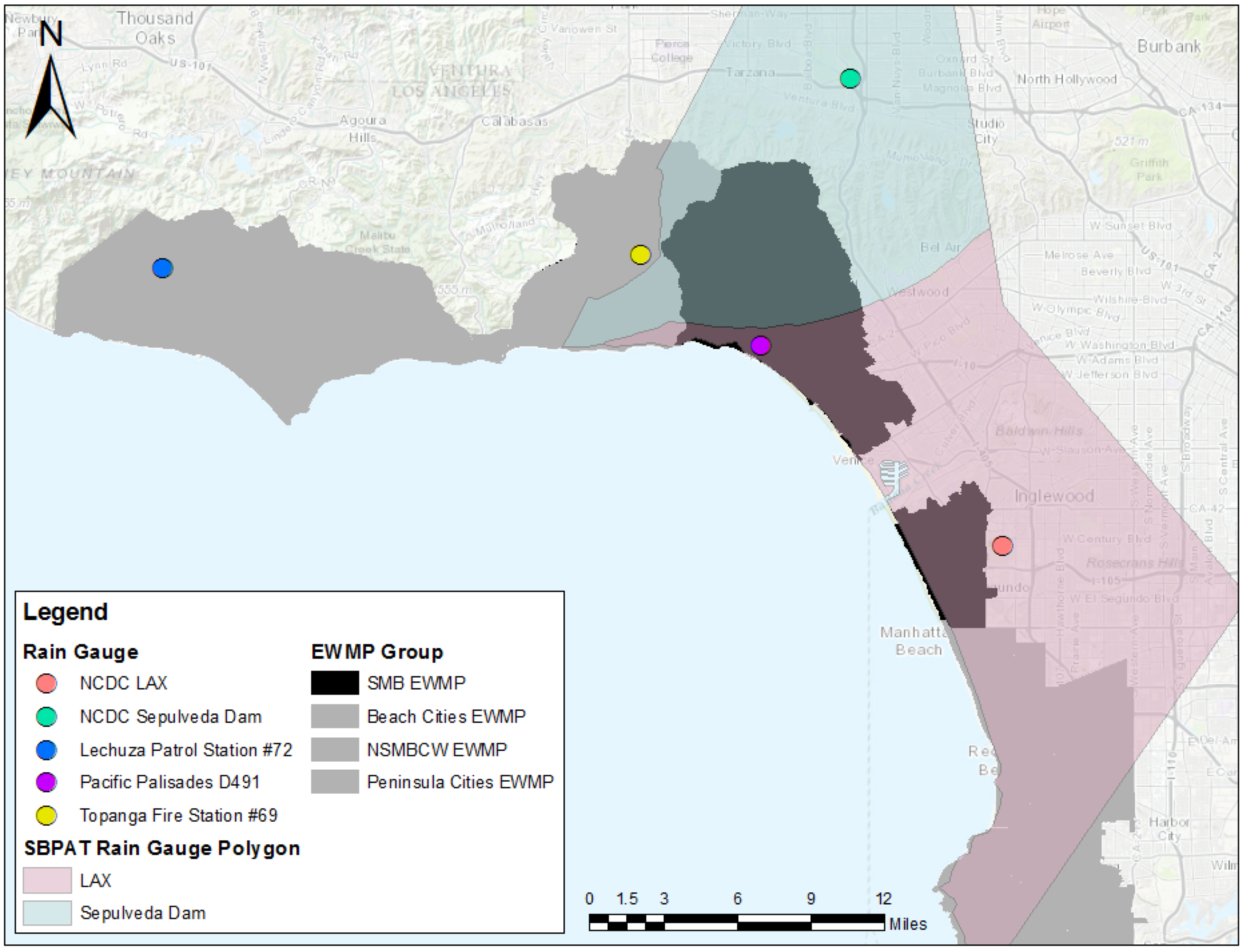

Figure 4. Rain Gauges used in Selection of 90th Percentile Year, Calibration, and/or RAA

The priority WBPCs for the SMB EWMP area, combined with data availability, establishes the specific WBPCs addressed by the RAA. As previously described, SBPAT links the long-term hydrologic output from SWMM to a stochastic Monte Carlo water quality model to develop statistical descriptions of stormwater quantity and quality. Through this approach, the predicted runoff volumes for each storm are randomly sampled from the long-term storm event runoff volume record produced by SWMM. Land use-based wet weather pollutant EMC values (see **Attachment B**) and BMP effluent concentrations (see **Attachment C**) for each storm are then randomly sampled from their lognormal statistical distributions. The runoff volumes (including volumes treated and bypassed by BMPs), land use EMCs, and BMP effluent concentrations are combined to determine the total pollutant loads and load reductions (i.e., difference between existing and post-BMP load estimates) for each randomly sampled storm event. This procedure is then repeated thousands of times, each time recording the volume, pollutant concentrations, loads, and load reductions for each randomly selected storm event. The statistics of these recorded results are then used to characterize the average (mean) values for the annual volume, pollutant loads, and pollutant concentrations in stormwater runoff from the modeled area for the critical year, with and without BMPs implemented.

The International Stormwater BMP Database (IBD) is a comprehensive source of BMP performance information (www.bmpdatabase.org), comprised of data from a peer-reviewed collection of studies that have monitored the effectiveness of a variety of BMPs in treating water quality pollutants for a variety of land use types. Water quality performance data from the IBD were used to develop effluent concentrations (averages and standard deviations) of the BMPs and constituents listed in **Table 2**. As with land use EMCs, the effluent quality of BMPs is highly variable. To account for this variability in SBPAT, effluent quality data were analyzed and descriptive statistics were generated for use in the Monte Carlo statistical sampling technique. **Attachment C** contains detailed information on the BMP effluent statistics.

Table 2. BMPs and Constituents Modeled in SBPAT[a]

BMPs	Constituents
Constructed Wetland / Retention Pond (with Extended Detention)	Fecal Coliform (FC)
	Total lead (TPb)
Constructed Wetland / Retention Pond (without Extended Detention)	Total suspended solids (TSS)
	Total phosphorus (TP)
Dry Extended Detention Basin	Dissolved phosphorus as P (DP)[b]
Hydrodynamic Separator	Ammonia as N (NH3)
Media Filter	Nitrate as N (NO3)
Subsurface Flow Wetland	Total Kjeldahl nitrogen as N (TKN)
Treatment Plant	Dissolved copper (DCu)
Bioswale	Total copper (TCu)
Bioretention with underdrain	Dissolved zinc (DZn)
Bioretention (volume reduction only)	Total zinc (TZn)
Cistern (volume reduction only)	
Green Roof (volume reduction only)	
Porous Pavement (volume reduction only)	
Low Flow Diversion (volume reduction only)	

[a] All constituents are addressed for all BMPs that provide treatment (i.e., excluding those identified as "volume reduction only"). Fecal coliform and lead are the only two constituents contained in WBPCs for the SMB EWMP, and as such only results for these constituents are presented in this report.

[b] Dissolved phosphorus and orthophosphate datasets were combined to provide a larger dataset and because the majority of orthophosphate is typically dissolved and many datasets either report dissolved phosphorus or orthophosphate, but not both.

2.3.3 90th Percentile Year Definition

Consistent with the SMB Beaches Bacteria (SMBBB) TMDL and the Regional Board RAA Guidance Document, the RAA was performed on the 90th percentile critical year. This year was determined by evaluation of local rainfall records for all four EWMP Groups located along Santa Monica Bay over the 1989 to 2011 period of record, evaluating “TMDL years” as defined by the SMBBB TMDL (i.e., November 1 – October 31). Of the local rain gauges evaluated, the Los Angeles County Pacific Palisades rain gauge (D491) (see **Figure 4**) was determined to be the most representative of the SMB EWMP Group area and elevation range. The rainfall record was analyzed to determine the 90th percentile year based on both the number of wet days (days with >=0.10-inch for rainfall and the three days following, per the SMBBB TMDL) as well as total annual rainfall. **Tables 3 and 4** below presents these results. The 90th percentile year was determined to be 2005 based on number of wet days, and 1995 based on total annual rainfall. 1995 was selected to be the most conservative of these two years because while it is the 90th percentile year based on total annual rainfall, 1995 also had more wet days than 2005 (SMB EWMP Group, 2014). Therefore, the RAA was performed on TMDL year 1995. Although detailed results are only provided for the SMB EWMP Group, the 90th percentile year was determined to be 1995 across all four SMB EWMP Groups (SMB, North Santa Monica Bay Coastal Watersheds, Beach Cities, and Peninsula).

Table 3. Rainfall Summary at Pacific Palisades Precipitation Gauge

Pacific Palisades Gauge	TMDL Year	Wet Days*	Total Rainfall (in)
90th Percentile TMDL Year using Number of Wet Days	2005	78	36.6
90th Percentile TMDL Year using Total Annual Rainfall	1995	86	33.7

*Compliance with the wet weather SMBBB TMDL is based on the number of allowable exceedance days.

Table 4. TMDL Year Precipitation Summary, with respect to calculated 90th percentiles

TMDL Year	Annual Wet Days	TMDL Year	Annual Rainfall Depth (in)
1998	119	1998	40.8
1995	**86**	2005	36.6
2005	78	**1995**	**33.7**
90th Percentile	78	90th Percentile	33.1
2011	78	1993	30.8
2004	74	1992	21.8
1993	67	2011	21.5
2010	65	2001	20.7
1992	60	2010	17.7
2009	58	2003	16.8
2006	57	1997	16.1
1989	56	2004	15.8
1994	52	2008	15.3
1999	52	2000	14.6
2000	49	2006	14.5
2003	49	2009	13.0
1996	47	1991	11.7
2001	47	1996	11.4
2002	47	1994	10.3
2007	45	1989	9.5
1997	41	1999	7.3
2008	41	1990	6.7
1990	38	2002	5.3
1991	36	2007	3.9

2.3.4 Hydrologic Calibration

The hydrology component of SBPAT was calibrated for the only location in the entire SMB watershed where all data requirements (daily flow, hourly precipitation, and daily beach bacteria concentrations) were met - the Topanga Creek subwatershed. No other SMB areas have sufficient data available. The Topanga subwatershed is located on the western edge of the SMB EWMP Group area.

Since primary output for SBPAT includes annual volumes and pollutant loads, the calibration focused on accurate prediction of annual discharge volumes from the Topanga subwatershed outlet, with estimated baseflow removed. Hourly rainfall data were used for the nearby Lechuza

Patrol Station #72 gauge (gauge reference ID 352b, **see Figure 4**) in Malibu, with these data adjusted upward based on an annual rain depth ratio between the higher elevation Topanga Fire Station #69 gauge (gauge reference ID 6) and the coastal Lechuza gauge. Los Angeles County's Topanga Creek streamflow gauge (gauge reference ID F54C-R) was used to estimate measured annual discharge volumes for comparison with modeled volumes. The effective impervious percentage for the open space land use category and the saturated hydraulic conductivity of all mapped soil types served as calibration parameters.

Previous hydrologic calibration reported in the SMB EWMP Work Plan (City of Los Angeles, LACFCD, County of Los Angeles, City of Santa Monica, and City of El Segundo, 2014) was refined to include additional precipitation and streamflow data. The refined calibration used a vacant undifferentiated land use effective imperviousness value of 1 percent. The refined calibration required the evaluation of various saturated hydraulic conductivity multipliers that would result in increased model runoff (i.e., each soil type's original hydraulic saturated conductivity was multiplied by the same value). The calibration was performed iteratively with multipliers ranging from 0.1 to 2.0 until the average annual modeled volume produced an acceptable error value when compared to the average annual observed volumes. A multiplier of 0.20 was selected as most appropriate. **Figure 5** is a depiction of the refined hydrologic calibration results, including the 0.20 saturated hydraulic conductivity multiplier. **Figure 6** shows the same results in a flow duration curve format, which compares the distribution of annual discharge volume magnitudes throughout the period analyzed between the modeled and observed data. The emphasis of the calibration effort focused on accurate, unbiased prediction of "non-extreme" annual conditions (annual volumes exceeding a 25-year frequency, 4 percent probability, were excluded from the calibration effort). Based on available data, the period of calibration was 12 years, between 2001 and 2012, with water years 2005 and 2008 excluded due to outlying streamflow measurement results. These calibrated input parameter values were used throughout all SMB watersheds in the wet weather RAAs.

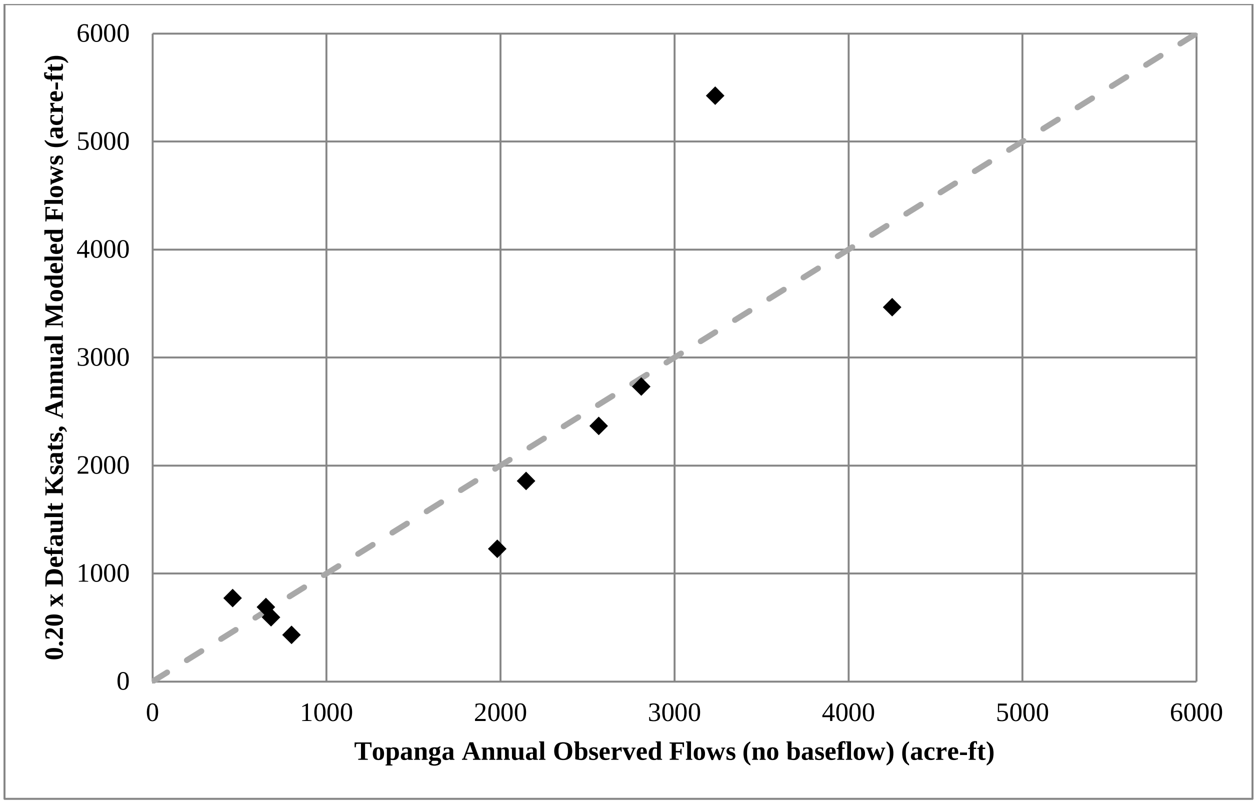

Figure 5. Annual Runoff Volumes for Topanga Subwatershed: Modeled vs. Observed, 2001-2012

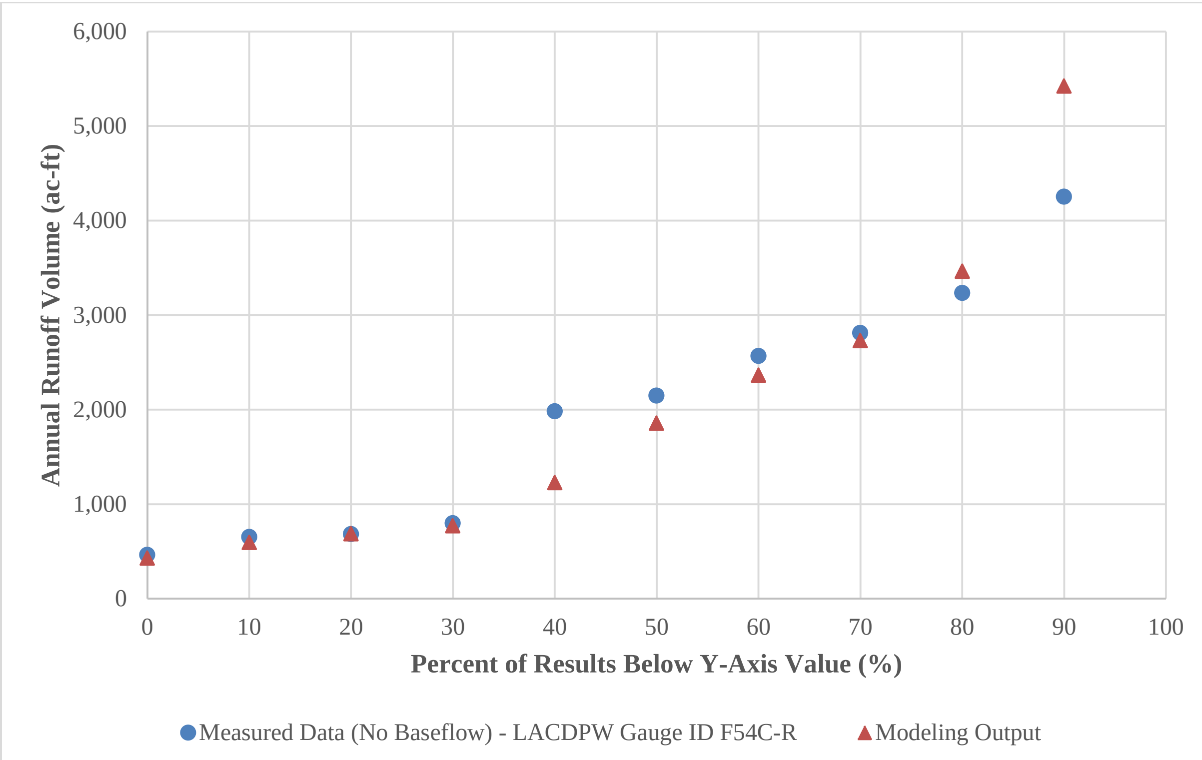

Figure 6. Annual Runoff Volumes for Topanga Subwatershed: Modeled vs Observed (Flow Duration Curve Format)

Following calibration, average relative prediction error (or the percent differences between the average annual observed and modeled annual runoff volume) was calculated to be -0.24 percent. According to the Regional Board's RAA Guidance Document, which is based on Donigian, 2000, SBPAT model performance with respect to hydrology as a result of this calibration is in the "very good" category.

2.3.5 Water Quality Calibration

The RAA Guidelines require water quality calibration based on available monitoring data from each subwatershed over the most recent 10 years. However, in the SMB EWMP subwatersheds, freshwater (i.e., mass emission type) monitoring stations with fecal coliform data[5] are not available from a recent 10 year period. Therefore, calibration meeting the guidelines is not possible at this time. After Coordinated Integrated Monitoring Program (CIMP) monitoring data

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[5] Fecal coliform data were used to represent all fecal indicator bacteria because it has the most robust land use and BMP effluent EMC datasets.

have been collected, this may be reevaluated as part of the EWMP adaptive management process. Also, since a conventional water quality calibration was not possible at this time, a validation of baseline exceedance day output was performed for the Leo Carrillo reference watershed using recent beach bacteria monitoring results, as described below. The reference watershed was used for this validation because it is the basis of the TMDL Waste Load Allocations, which these TLRs are intended to represent.

2.4 Wet Weather Target Load Reductions

The process for establishing TLRs of the two pollutants to be addressed quantitatively, lead and bacteria, are described in the following section.

2.4.1 Lead

Total lead is listed as a Category 2 WBPC in the Santa Monica Canyon Channel (subwatershed 2-07) due to the existing 303(d) listing. Currently there is no WQBEL established in the Permit because a TMDL has not been developed, so the California Toxics Rule (CTR) criteria maximum concentration (CMC) for total lead of 82 µg/L was used as the Water Quality Objective for wet weather. 82 µg/L was converted from the dissolved CMC of 65 µg/L by assuming a hardness of 100 mg/L as $CaCO_3$, a default conversion factor of 0.791, and a Water Effects Ratio (WER) of 1.0. The TLR for subwatershed 2-07 was calculated as follows:

$$\text{Target Load Reduction} = (\text{Load}_{baseline} - \text{Load}_{target}) / \text{Load}_{baseline} =$$

$$(299 \text{ lbs} - 1182 \text{ lbs}) / 299 \text{ lbs} = 0 \text{ lbs (or 0\%)}$$

Where,

$\text{Load}_{baseline} = V \times C_{critical}$ = 5,300 acre-ft x 21 ug/L = 299 lbs

$\text{Load}_{target} = V \times C_{WQO}$ = 5,300 acre-ft x 82 ug/L = 1182 lbs

V = modeled total annual runoff in 90th percentile critical year = 5,300 acre-ft[6]

$C_{critical}$ = modeled 90th percentile daily concentration in 90th percentile critical year = 21 ug/L[6]

C_{WQO} = Water Quality Objective = 82 ug/L

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[6] The data used to determine the annual runoff and the 90th percentile daily lead concentration in the 90th percentile critical year can be found in the electronic data files submitted along with the J2/J3 SMB EWMP.

Therefore, even in the critical year, the TLR for total lead is zero. Furthermore, the 90th percentile daily concentration from subwatershed 2-07 is 21 ug/L total lead, which is still well below the Water Quality Objective of 82 ug/L. Total lead reductions are reported in this RAA document for subwatershed 2-07 (Santa Monica Canyon), but these reductions are not compared with a numeric TLR.

2.4.2 Bacteria

In order to establish the bacteria TLR for each Santa Monica Bay modeled subwatershed, a new modeling methodology was developed and tested to relate the annual number of modeled calendar days with rainfall-generated runoff (or “discharge days”) to the expected annual bacteria exceedance days, which is the Permit’s receiving water limit expression for the SMBBB TMDL (per Permit Attachment M). To be consistent with the SMBBB TMDL for wet weather, which established the allowed exceedance day Waste Load Allocations based on monitoring results from the Leo Carrillo reference beach, this modeling methodology was first tested on Leo Carrillo and its Arroyo Sequit subwatershed for the same critical year as the TMDL (TMDL year 1993). The goal of this analysis was to validate the modeling methodology by comparing its predicted exceedance days for Leo Carrillo with the 17 exceedance days from the TMDL, for TMDL year 1993. This analysis occurred in three steps:

1. The calibrated SBPAT model, using the nearby Lechuza Patrol Station gauge for TMDL year 1993 (consistent with the TMDL), resulted in 59 discharge days for Arroyo Sequit.
2. Based on 2003 to 2013 Leo Carrillo monitoring data, 27 percent of wet weather samples exceeded the single sample recreational Water Quality Objectives on days with rainfall greater than 0.10-in. In other words, 27 percent of wet weather days when runoff discharges might be expected, FIB concentrations at the beach exceeded the objectives.
3. Multiplying 59 discharge days by the 27 percent exceedance percentage results in 16 predicted wet weather exceedance days for Leo Carrillo for TMDL Year 1993. This result is within 6 percent of the 17 exceedance days that were determined through the original analysis in the SMBBB wet weather TMDL, therefore validating the proposed exceedance day model prediction methodology.

After validation of the modeling methodology using the reference watershed, it was applied to all SMB subwatersheds in the EWMP to predict baseline EDs for the 90th percentile year, or TMDL year 1995. Once baseline exceedance days were estimated for every subwatershed, the exceedance day count was compared with allowed exceedance days from the TMDL (i.e., 17 for all non-antidegradation compliance monitoring beaches). To determine the TLR necessary for each subwatershed to meet the allowed exceedance days, a virtual retention BMP was modeled at the outlet of each subwatershed. This approach was presented to Regional Board staff on June 6, 2014 and verbal feedback received during the meeting was supportive.

Each virtual retention BMP included a diversion with a virtual hydraulic capacity that results in in a model-derived bypass frequency (or number of discharge days), during TMDL year 1995 that meets the allowable exceedance day criteria. Each diversion is modeled as a full capture system. The net load reduction resulting from this BMP scenario (i.e., baseline subwatershed load minus subwatershed load with the diversion system and retention BMP in place) for the 90th percentile year (1995), becomes the TLR for each subwatershed. For the RAA, reasonable assurance of compliance is established when load reductions associated with proposed BMPs equal the TLR for each subwatershed.

In summary, the following approach is implemented to calculate a TLR for each SMB modeled subwatershed (see **Attachment D** for example calculation):

1. Each subwatershed is modeled in SBPAT for the 90th percentile year (1995).
2. The existing, baseline condition (i.e., without any outlet retention BMP) is modeled for each subwatershed, resulting in a mean baseline fecal coliform (FC) load for the 90th percentile year (baseline load).
3. The exceedance percentage of samples collected during days with precipitation greater than 0.1 inches is determined for each subwatershed's receiving water.
4. The allowable number of discharge days for each subwatershed is calculated by dividing 17 TMDL allowable exceedance days by the exceedance percentage calculated in Step 3.
5. An instream diversion to a large virtual retention BMP at the outlet of each subwatershed is iteratively sized so that it only bypasses during the number of allowable discharge days determined in Step 4.
6. Each diversion and virtual retention BMP is then modeled in SBPAT to produce a mean FC load for the 90th percentile year (allowed load).
7. For each subwatershed, the difference between the baseline load (step 2) and the allowed load (step 6) results in a TLR for the 90th percentile year, which is the target load reduction required to meet the 17 allowable TMDL exceedance days for wet weather.

2.5 Validation of Using Annual Loads to Predict Exceedance Day Reductions

A second methodology validation step was performed to demonstrate whether modeled annual fecal coliform loads were indeed predictive of the compliance metric, or annual beach exceedance days for all fecal indicator bacteria. For bacterial modeling, verifying the linkage between modeled *fecal coliform loads* (i.e., discharged from the watershed outlets) and total observed wet weather *exceedance days* (in the ocean, based on the REC1 beneficial use daily maximum Water Quality Objectives) is important to establish reasonable assurance that the ocean monitoring locations will be in compliance with the Permit limits for the SMBBB TMDL. To establish this linkage, an analysis was conducted using shoreline monitoring data at Topanga Canyon[7] (SMB 1-18) between 2005 and 2013. **Figure 7** illustrates that decreasing fecal coliform loads should result in measurable reductions in exceedance days, and that there is a reasonable correlation between total annual modeled fecal coliform loads and total annual observed wet weather exceedance days. Each point shown represents one TMDL year.

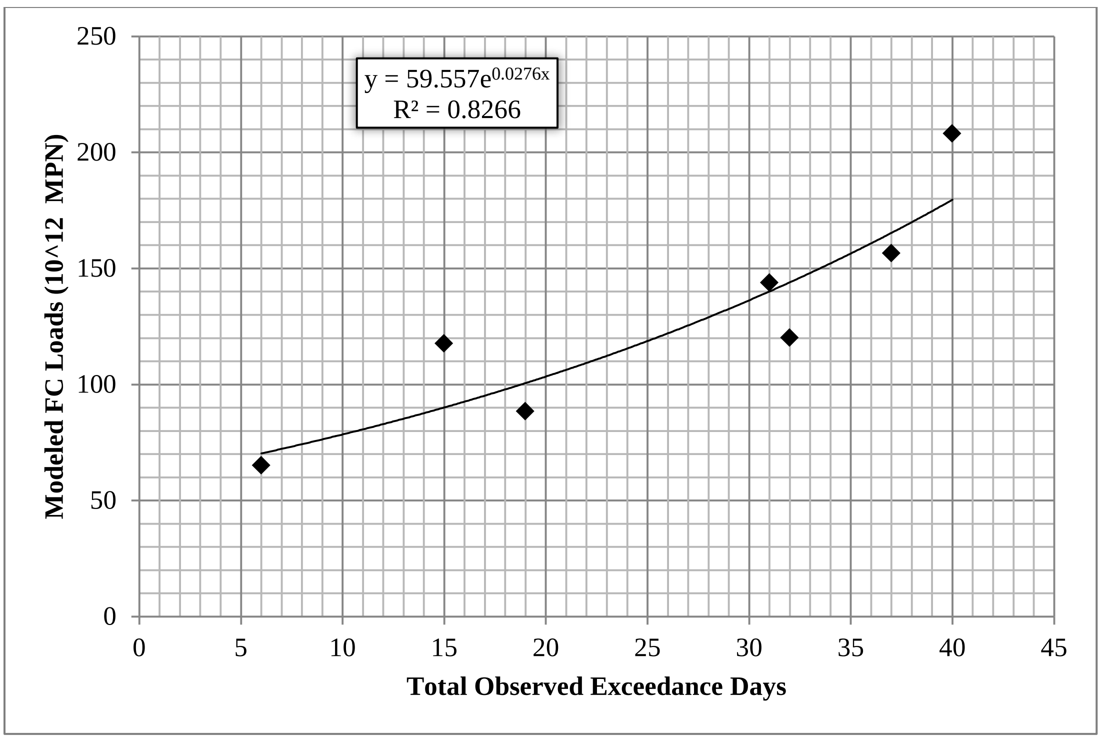

Figure 7. Correlation between Modeled Fecal Coliform Loads and Observed Exceedance Days (each point represents one TMDL year, 2005-2013)

[7] This subwatershed is 88% open space and was selected for water quality validation due to it being the hydrologic calibration subwatershed as well as because it had *daily* shoreline monitoring data, which was necessary in order to have a sufficiently robust dataset of annual wet weather exceedance days.

3 MODELING EXISTING, PLANNED, AND PROPOSED BEST MANAGEMENT PRACTICES (BMPS)

The section below specifically discusses the general BMP planning objectives, methods used to identify and prioritize BMP opportunities, and inputs and assumptions for the modeled non-structural and structural (regional, centralized, and distributed) BMPs.

3.1 BMP Objectives

The objectives of the non-structural and structural BMPs are foremost to meet the TLRs in each subwatershed in order to demonstrate reasonable assurance that compliance with the TMDL WQBELs and RWLs from the Permit will be achieved. Additional goals include reduction of other pollutants to downstream waterbodies, decreased reliance on potable water and replacement with non-potable water of for irrigation due to on-site harvest/use and infiltration basin projects, increase in groundwater recharge due to infiltration, and reduction in dry weather runoff.

3.2 Methods to Identify and Prioritize Opportunities

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 desktop screening. In general, non-structural BMPs were prioritized over structural BMPs due to their lower relative cost, and then structural BMPs were identified that would result in the least cost per load removed. This was accomplished by targeting land uses with the highest pollutant loads for bacteria.

The RAA was performed according to the following steps:

- Assume non-modeled non-structural BMP load reduction (2.5-7.5 percent of baseline pollutant load);
- Calculate public retrofit incentives (e.g., downspout disconnects) and redevelopment load reductions;
- Calculate load reductions attributable to anticipated new permit compliance activities of non-MS4 entities (e.g., Industrial General Permit holders and Caltrans);
- Calculate planned and proposed regional/centralized BMP load reductions based on existing plans and parcel screening analysis;

- Meet the TLR by backfilling the remaining load reduction with specific regional/centralized BMP projects or distributed BMPs assumed treat a percentage of developed land uses.

Load reductions were evaluated for the interim and final compliance dates of 2018 and 2021.

3.3 Non-Structural BMPs

Analyzed non-structural BMPs have been categorized as follows. Specific model inputs for modeled non-structural BMPs, including redevelopment, public retrofit incentives, and non-MS4 parcels/areas are summarized in tabular format in the next section, along with model inputs for distributed green streets BMPs (**Tables 6 through 8**).

3.3.1 Non-Modeled Non-Structural BMPs

These include a combination of bacteria-targeted, wet weather source control BMPs that the SMB EWMP agencies are committed to implementing, such as pet waste controls (ordinance, signage, education/outreach, mutt mitts, etc.), human waste source tracking and remediation (e.g., homeless controls, leaking sewer investigations, etc.), enhanced street sweeping (e.g., 100 percent vacuum sweepers, increased frequency, etc.), increased catch basin and storm drain cleaning, and other new or enhanced non-structural BMPs that target the pollutants addressed in this EWMP. A combined credit of 2.5 – 7.5 percent load reduction (assuming a mean of 5 percent) was applied for all pollutants to represent the cumulative benefit from all non-modeled non-structural BMPs.

3.3.2 Modeled 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 2012 MS4 Permit established new criteria for redevelopment projects, requiring certain sized projects to capture, retain, or infiltrate the 85^{th} percentile design storm or the 0.75-inch design storm, whichever is greater, via the implementation of low impact development (LID) BMPs. To account for these redevelopment requirements, BMPs were modeled in SBPAT assuming land use-specific annual redevelopment rates for projects that triggered former SUSMP requirements or will trigger the Permit's LID BMP requirements (**Table 5**). These assumed rates were based on redevelopment data collected in the Los Angeles region.

Table 5. Assumed Annual Redevelopment Rates

Land Use	Annual Redevelopment Rate (% of total land use area)
Residential	0.18
Commercial	0.15
Industrial	0.34
Education	0.16
Transportation	2.7

BMPs were assumed to be implemented, and to continue be implemented in the future, at these rates across two distinct time periods:

1. **TMDL Effective Date - 2015:** The Standard Urban Storm Water Mitigation Plan (SUSMP) requirements, based on the 2001 MS4 Permit, were assumed to be implemented over this period as flow-through media filters at a 0.2 in/hr design intensity (Los Angeles County Department of Public Works, 2002).
2. **2015 - Final Compliance Deadline (2021):** The 2012 MS4 Permit post-construction requirements were assumed to be implemented over this period as 50 percent biofiltration and 50 percent bioretention. Biofiltration (bioretention with underdrains) were modeled using bioswale BMP types (to account for a small amount of volume reduction) with bioretention effluent EMCs and sized to treat 150 percent of the 1-year, 1-hour design storm (approximately 0.3 in/hr)[8] because they do not retain all the design storm volume on site (they are flow-through systems), while bioretention units were sized to retain 100 percent of the 85th percentile, 24-hour design storm depth, calculated as the mean for each subwatershed.

2015 is used as a transition date since the LID post-construction requirements from the 2012 MS4 Permit are required to be in full effect via local LID ordinances by this time.

In order to estimate load reductions associated with these redevelopment BMPs, the land use percentages shown in **Table 5** were multiplied by the respective land use areas in each analysis region, resulting in an assumed area treated by LID BMPs each year. This area was multiplied by the applicable number of years during each time period above, since new BMPs are assumed to be implemented each year. The total land use area assumed to be redeveloped for each analysis

[8] 150% of the 1-year, 1-hour design storm was used per Section VI.D.7.c.iii of the Permit.

region was then modeled as being treated by the BMPs described above and the total load reduction was quantified.

3.3.3 Modeled 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 disconnects. Public incentives for retrofitting existing development were assumed to be a downspout disconnection program, modeled as bioswales sized to a design storm intensity of 0.2 in/hr. Assumptions included that 10 percent of all single family residential areas would be converted to disconnected downspout systems over the 2015 (EWMP implementation start date) to 2021 (TMDL final compliance deadline) time period, and that, based on GIS analysis, 38 percent of the single family residential area consists of rooftops that can be effectively disconnected. Therefore, 3.8 percent of all single family residential neighborhoods were modeled as treated by bioswales in order to account for public retrofit incentives.

3.3.4 Modeled Inspection of Non-MS4 Permitted Parcels or Areas

SBPAT was used to quantify the load reduction assuming 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). A load reduction was obtained from these areas by simulating treatment plants sized to treat the IGP's design storm requirement, the 85th percentile, 24-hour storm event (0.2 in/hr), with an effluent concentration set equal to the water quality standard. For fecal coliform, 400 MPN/100mL was used.

3.4 Distributed Green Street BMPs

Distributed BMPs, including green streets, were modeled by assuming 25 percent of the MS4 area can be treated in the right-of-way, and this would be met by 50/50 use of biofilters and bioretention. Biofilters were sized to 150 percent of the 85th percentile, 24-hour design storm (0.3 in/hr) consistent with the Permit's post-construction sizing requirements for flow-through systems, while bioretention units were sized to 100 percent of the 85th percentile, 24-hour design storm depth, calculated as the mean for each subwatershed. Biofilters were modeled using bioswale volume reduction and bioretention effluent EMCs. Distributed BMPs were applied at levels unique to each subwatershed, based on need, after accounting for load reductions attributable to non-structural and regional/centralized BMPs. They were applied by assuming treatment of stormwater from subwatershed-specified percentages of single family and commercial land use areas and subwatershed-specified percentages of multi-family land use areas, until TLRs are met. These land use and BMP type combinations were chosen based on their ability to result in maximum bacteria load reduction.

Specific model inputs for public retrofit incentives, redevelopment, and distributed BMPs are summarized in **Tables 6 and 7.** Model input for quantifying load reductions attributable to compliance with non-MS4 permits are summarized in **Table 8.**

Table 6. Redevelopment, Public Retrofit Incentives, and Distributed Green Street BMP Model Assumptions

Implementation Level	BMP Type	Design Storm	Longitudinal Slope (ft/ft)	Manning n	Hydraulic Residence Time (min)	Water Quality Flow Depth (in)	Effective Retention Depth (in)	Infiltration Rate (in/hr)
Redevelopment (2003-2015)	Media Filter	0.2 in/hr	-	-	-	-	-	-
Redevelopment (2015-2021)	Biofilters[1]	0.3 in/hr	0.03	0.25	10	4	2	Based on subwatershed-specific soil type
	Bioretention	Varies by subwatershed, see Table 7	-	-	-	-	12	0.15
Public Retrofit Incentives (2015-2021)	Bioswales representing downspout disconnects	0.2 in/hr	0.03	0.25	10	4	2	Based on subwatershed-specific soil type
Distributed Green Street BMPs (2015-2021)	Biofilters[1]	0.3 in/hr	0.03	0.25	10	4	2	Based on subwatershed-specific soil type
	Bioretention	Varies by subwatershed, see Table 7	-	-	-	-	12	0.15

[1] Modeled as bioswales using bioretention effluent EMCs

Table 7. Subwatershed-Specific 85th Percentile, 24-Hour Design Storm Depths

Subwatershed	Design Storm (in)		Subwatershed	Design Storm (in)		Subwatershed	Design Storm (in)
West of 2-01	0.82		SMB-2-07	1.11		SMB-3-07	1.06
SMB-2-01	0.86		Between 2-07 and 3-01	0.89		SMB-3-08	1.04
Between 2-01 and 2-02	0.82		SMB-3-01	0.98		SMB-2-10	0.98
SMB-2-02	1.04		Between 3-01 and 3-02	0.95		Between 2-10 and 2-11	0.96
SMB-2-03	0.84		SMB-3-02	1.01		SMB-2-11	1.03
SMB-2-04	0.83		SMB-3-03	0.99		SMB-2-12	1.06
Between 2-04 and 2-06	0.83		SMB-3-04	1.06		SMB-2-13	0.95
SMB-2-05	0.92		SMB-3-09	1.03		SMB-2-14	0.88
SMB-2-06	1.02		SMB-3-05	1.03		SMB-2-15	0.92
Between 2-06 and 2-07	0.88		SMB-3-06	1.10		South of 2-15	0.85

Table 8. Non-MS4 Parcels – Modeled as Treated by Treatment Plants (i.e., BMPs that will treat stormwater to the WQOs)

Implementation Level	Subwatershed	Treatment Flowrate (cfs)	Design Storm (in/hr)	Average Basin Depth (ft)	Equalization Volume (cu-ft)	Diversion Flowrate (cfs)	Infiltration Rate (in/hr)
NonMS4 Parcels	All	10,000	0.20	100	1,000	10,000	0.00001

3.5 Regional/Centralized Design Parameters and Criteria

Existing (constructed after 2003), planned, and proposed regional/centralized BMPs are modeled in SBPAT as closely as possible to their actual conceptual designs. The following sections outline the regional/centralized BMPs that were modeled as well as their drainage areas, design details in SBPAT, and any relevant assumptions. The load reduction attributable to multiple regional/ centralized BMPs in series is assumed to be additive unless the BMPs are not volume-capture BMPs. In those cases, the load reductions were adjusted so as to void double counting.

Modeling for the RAA included 31 BMPs modeled as infiltration basins. Model inputs for the regional/centralized BMPs are summarized in **Table 9**. Individual BMPs, as currently proposed, and associated assumptions are described in more detail by subwatershed below. In some cases, projects which function as harvest and use systems were modeled as infiltration basins to allow for the quantification of losses. The project descriptions following the model input table provide such operational details.

In some cases, the total combined load reduction achieved by all BMPs in a subwatershed was estimated to be greater than the target load reduction for the subwatershed, thereby providing the Group flexibility in the design and phasing of the proposed projects. Adaptive management will be relied upon to update the EWMP and RAA as projects are designed, redesigned, and/or implemented in order to demonstrate a reasonable assurance of compliance.

Table 9. Modeled Parameters for Regional/Centralized BMPs

Subwatershed	Modeled Regional/ Centralized BMP ID	Lead Agency	BMP Status	BMP Type	Treatment Volume (ft3)	Average Depth (ft)	Diversion Rate (cfs)	Infiltration Rate Under Basin (in/hr)	Design Storm (in/hr)	Slope (ft/ft)	Manning's Roughness Coefficient	Flow Depth (in)	Residence Time (min)	Effective Retention Depth (in)
2-02	RBMP20_SantaYnez	Los Angeles	Planned	Infiltration Basin	131,000	4.5	See Note 1	0.35	-	-	-	-	-	-
	RBMP23_2-2ParkingLot	Los Angeles	Proposed	Infiltration Basin	134,000	2.0	See Note 1	0.25	-	-	-	-	-	-
2-06	RBMP08_Temescal	Los Angeles	Planned	Infiltration Basin	241,000	30.0	35	0.48	-	-	-	-	-	-
2-07	RBMP47_RivieraLg85	Los Angeles	Planned	Infiltration Basin	2,600,000	6.0	See Note 1	0.36	-	-	-	-	-	-
	RMBP40b_RivieraBarrancaSW	Los Angeles	Proposed	Bioswale	-	-	-	-	0.2	0.03	0.25	3.0	10	2.0
	RBMP17_Mandeville	Los Angeles	Planned	Infiltration Basin	136,000	7.0	See Note 1	0.36	-	-	-	-	-	-
	RBMP43_OldOakRd	Los Angeles	Existing	Bioswale	-	-	-	-	0.2	0.03	0.25	3.0	10	2.0
	RBMP48_Rustic85	Los Angeles	Proposed	Infiltration Basin	40,400	5.0	See Note 1	0.36	-	-	-	-	-	-
3-01	RBMP30_GooseEggPark	Santa Monica	Proposed	Infiltration Basin	29,400	2.0	See Note 1	0.50	-	-	-	-	-	-
	RBMP31_RooseveltElem	Santa Monica	Proposed	Infiltration Basin	196,000	4.0	See Note 1	0.50	-	-	-	-	-	-
	RBMP29_SanVicenteMedian	Santa Monica	Proposed	Infiltration Basin	144,000	1.0	See Note 1	0.50	-	-	-	-	-	-
3-02	RBMP32_ReedPark	Santa Monica	Proposed	Infiltration Basin	192,000	2.0	See Note 1	0.50	-	-	-	-	-	-
	RBMP33_LincolnMiddleSch	Santa Monica	Proposed	Infiltration Basin	128,000	2.0	See Note 1	0.50	-	-	-	-	-	-
3-03	RBMP16a_CleanBeachesPier	Santa Monica	Planned	Infiltration Basin	160,000	7.5	See Note 1	0.94	-	-	-	-	-	-
3-04	RBMP44_Brentwood85	Los Angeles	Planned	Infiltration Basin	184,000	6.0	See Note 1	0.51	-	-	-	-	-	-
	RBMP51_Memorial85	Santa Monica	Proposed	Infiltration Basin	402,000	6.0	See Note 1	0.36	-	-	-	-	-	-
	RBMP52_SMCivicAud85	Santa Monica	Proposed	Infiltration Basin	197,000	5.0	See Note 1	0.63	-	-	-	-	-	-
	RBMP16b_CleanBeachesPK	Santa Monica	Planned	Infiltration Basin	10,700	7.5	See Note 1	0.94	-	-	-	-	-	-
	RBMP11_LosAmigos	Santa Monica	Proposed	Infiltration Basin	261,000	18.0	See Note 1	2.25	-	-	-	-	-	-
	RBMP53_SMHSBuilt	Santa Monica	Existing	Infiltration Basin	40,000	2.0	See Note 1	0.50	-	-	-	-	-	-
3-05	RBMP37_3-5ParkingLot	Santa Monica	Proposed	Infiltration Basin	409,000	2.0	See Note 1	0.80	-	-	-	-	-	-
3-06	RMBP38_OlympicHigh	Santa Monica	Proposed	Infiltration Basin	86,000	2.0	See Note 1	0.80	-	-	-	-	-	-
	RBMP13_Ozone	Santa Monica	Proposed	Infiltration Basin	105,000	5.0	20.3	2.50	-	-	-	-	-	-
	RBMP10_PenmarPh2	Los Angeles	Planned	Infiltration Basin	371,000	20.0	0.48	2.50	-	-	-	-	-	-
	RMBP39_WillRodgersElem	Santa Monica	Proposed	Infiltration Basin	103,000	2.0	See Note 1	0.80	-	-	-	-	-	-
3-07	RBMP01b_GrandBlvdIMF	Los Angeles	Existing	Media Filter	-	-	-	-	0.2	-	-	-	-	-
	RBMP21b_GrandBlvdIIMF	Los Angeles	Existing	Media Filter	-	-	-	-	0.2	-	-	-	-	-
	RBMP03_Westminster	Los Angeles	Existing	Infiltration Basin	1,460	4.0	See Note 1	0.50	-	-	-	-	-	-
	RBMP45_Oakwood85	Los Angeles	Planned	Infiltration Basin	34,300	6.0	See Note 1	0.52	-	-	-	-	-	-
3-09	RBMP18_CrescentBay	Los Angeles	Proposed	Infiltration Basin	34,300	1.2	See Note 1	0.77	-	-	-	-	-	-
2-11	RBMP19_WestchesterPark	Los Angeles	Planned	Infiltration Basin	823,000	10.0	See Note 1	0.74	-	-	-	-	-	-
	RBMP09_WestchesterLAX	Los Angeles	Planned	Infiltration Basin	802,000	22.0	175	2.00	-	-	-	-	-	-
2-13	RBMP02_ImperialHwy	El Segundo	Existing	Infiltration Basin	54,800	6.0	See Note 1	0.74	-	-	-	-	-	-
	RBMP42_ImperialStrip	El Segundo	Planned	Bioswale	-	-	-	-	0.75	0.03	0.25	3.0	3.0	2.0
	RBMP50_Recreation85	El Segundo	Proposed	Infiltration Basin	94,400	5.8	See Note 1	0.72	-	-	-	-	-	-
2-15	RBMP49_PumpStationB85	El Segundo	Proposed	Infiltration Basin	1,290,000	25	See Note 1	0.72	-	-	-	-	-	-

Note 1: BMPs with N/A specified under the diversion rate are assumed to have a default diversion rate of 10,000 cfs in the model. This was assumed where an exact diversion rate was not provided and the BMPs were capacity-limited, rather than flow-limited.

3.5.1 Subwatershed 2-02 Regional/Centralized BMPs

Two centralized BMPs are modeled within Subwatershed 2-02 (see **Figure 8**):

1. **RBMP20 Santa Ynez (City of Los Angeles).** RBMP20 is a proposed debris basin and bioswale project located within Los Liones Park in Los Angeles. It will be constructed as a debris basin formed by a dike that houses the inlet to a City of Los Angeles concrete box storm drain. The existing rustic bioswale currently only collects local storm flows, but it provides an opportunity for integration into the Santa Ynez BMP. It is modeled as an infiltration basin to best reflect capture rates and volume losses. Multiple benefits include pollutant load reduction and groundwater recharge.
   Status: Planned; construction by 2021

2. **RBMP23 2-2 Parking Lot (City of Los Angeles).** RBMP23 is a proposed subsurface infiltration basin located south of PCH, adjacent to Will Rogers Beach, in Los Angeles. It is modeled as an infiltration basin to best reflect capture rates and volume losses however it is assumed that all harvested stormwater will be used for either irrigation purposes or pumped to the existing low flow diversion. The assumed depth of the basin was determined assuming a 96-hr drawdown time for vector control purposes[9].
   Status: Proposed; construction by 2021

[9] A 96-hour drawdown time was assumed based on Attachment H of the MS4 Permit which states, "Harvested rainwater must be stored in a manner that precludes the breeding of mosquitoes or other vectors or with a draw down not to exceed 96 hours."

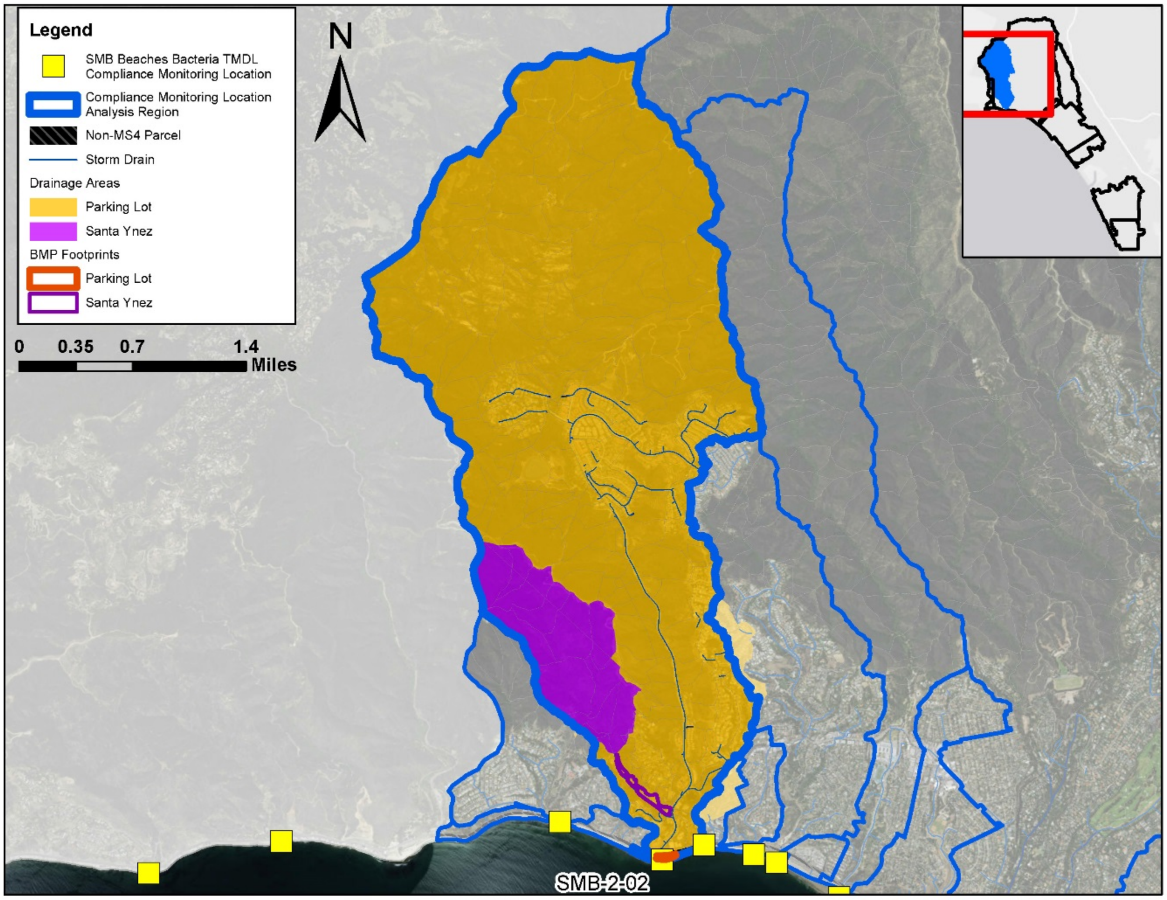

Figure 8. Modeled Regional/Centralized BMPs within Subwatershed 2-02

3.5.2 Subwatershed 2-06 Regional/Centralized BMPs

One centralized BMP is modeled within Subwatershed 2-06 (see **Figure 9**):

- **RBMP08 Temescal (City of Los Angeles).** The Temescal Canyon Project is a large-scale storage, treatment and diversion project located within Temescal Canyon Park, in Los Angeles. It is modeled as an infiltration basin to best reflect capture rates and volume losses however all captured stormwater will be pumped at the dewatering rate (5 cubic feet per second) to the wastewater treatment plant.
  Status: Planned; concept report completed; construction by 2021

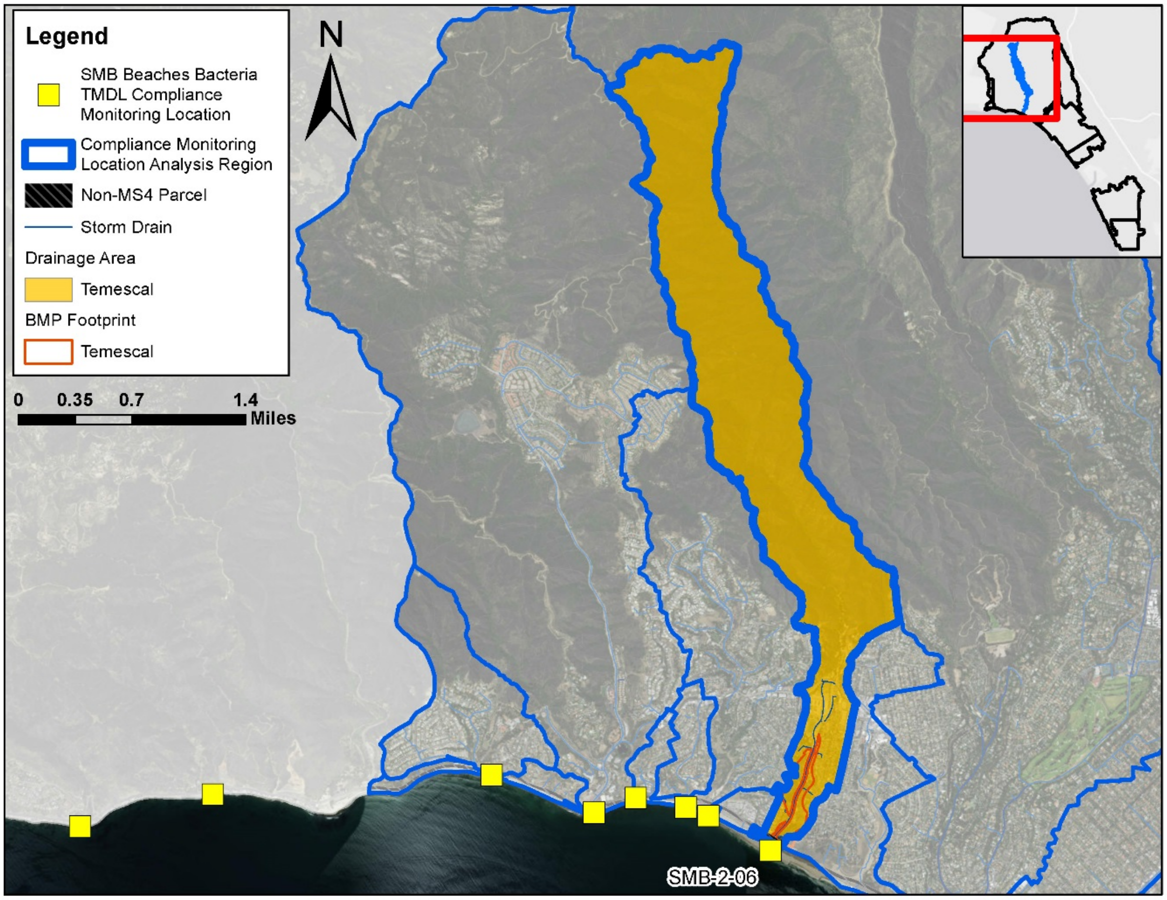

Figure 9. Modeled Regional/Centralized BMPs within Subwatershed 2-06

3.5.3 Subwatershed 2-07 Regional/Centralized BMPs

Three regional and two centralized BMPs are modeled within Subwatershed 2-07 (see **Figure 10**):

- **RBMP47 RivieraLg85 (City of Los Angeles).** The Riviera project is a planned large-scale storage, treatment and use regional BMP (capturing the 85th percentile storm) located at the Riviera Country Club, which would divert runoff from the storm channel to the north. It is modeled as an infiltration basin to best reflect capture rates and volume losses, however, harvested stormwater will be used for both golf course irrigation purposes as well as infiltration. The average depth of the basin was determined assuming

a 96-hr drawdown time. Multiple benefits include pollutant load reduction, reduced potable water demand, and some groundwater recharge.
Status: Planned; in concept development; construction by 2018

- **RBMP48 Rustic85 (City of Los Angeles).** The Rustic Canyon regional BMP (capturing the 85th percentile storm) is a proposed 5-ft deep infiltration basin located at the Rustic Canyon Recreation Center in Los Angeles, designed to collect runoff from local neighborhoods to the north. Harvest and use may also be an option to potentially supplement or replace landscape irrigation at the park. Multiple benefits include pollutant load reduction, potential reduced potable water demands, and groundwater recharge.
Status: Proposed; in concept development; construction by 2021

- **RBMP40b RivieraBarrancaSW (City of Los Angeles).** The Riviera barranca is a proposed centralized BMP which would treat stormwater runoff from the adjacent channel in a 4,800-ft long bioswale running in a north-south direction through the Riviera Country Club. Multiple benefits include pollutant load reduction, aesthetic enhancements, and minor groundwater recharge.
Status: Proposed; in concept development; construction by 2021

- **RBMP17 Mandeville (City of Los Angeles).** Mandeville Canyon is a planned centralized BMP, specifically a roadside bioswale with underground storage capacity. Harvested stormwater will be treated via bioswale, stored within a subsurface tank and then used for park irrigation purposes. In order to account for the capture and use components of the project, this BMP was modeled as an infiltration basin. Multiple benefits include pollutant load reduction, reduced potable water demands, and minor groundwater recharge.
Status: Planned; concept report completed; construction by 2021

- **RBMP43 OldOakRoad (City of Los Angeles).** RBMP43 is a recently constructed regional BMP (treating the 85th pervcentile storm), specifically a series of bioswales located along Old Oak Road (one block west of Sunset Boulevard) extended slightly beyond the intersection with Riviera Ranch Road.
Status: Existing; construction completed in 2014

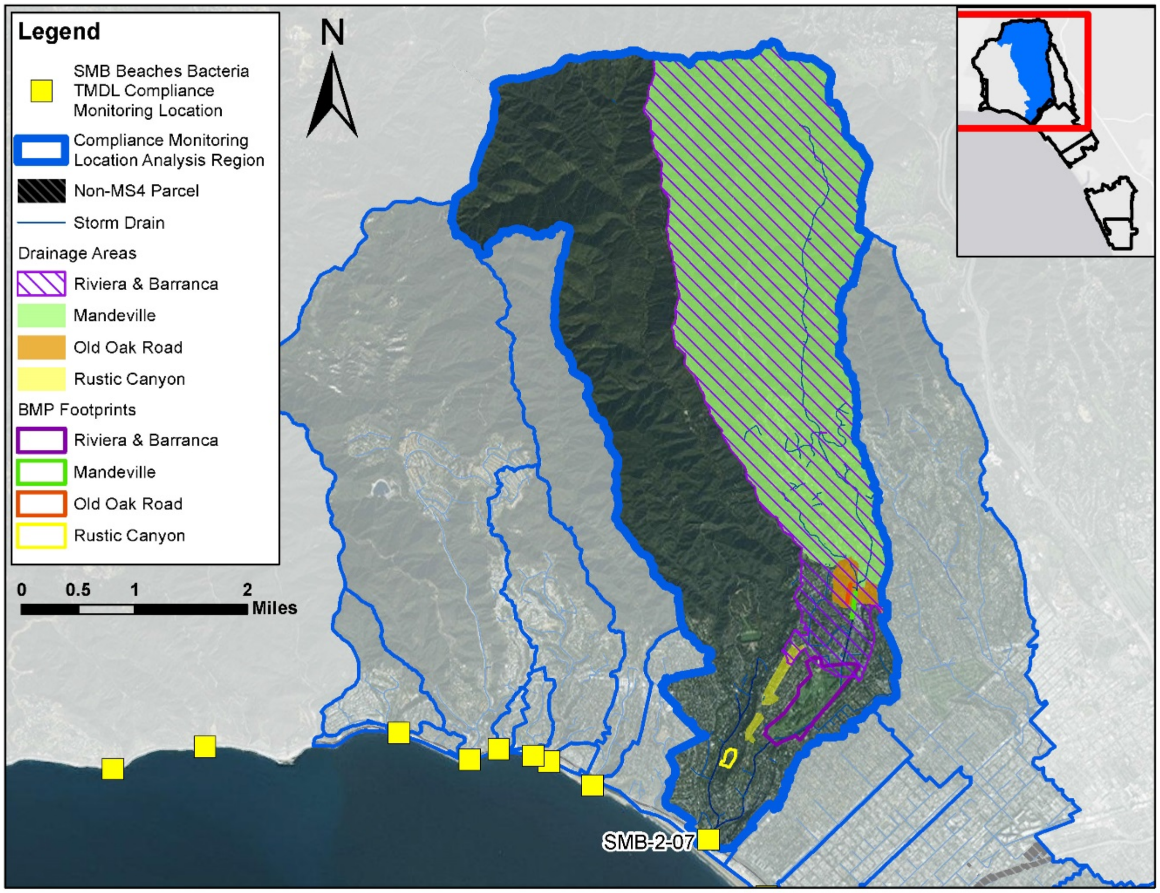

Figure 10. Modeled Regional/Centralized BMPs within Subwatershed 2-07

3.5.4 Subwatershed 3-01 Regional/Centralized BMPs

Three centralized BMPs are modeled within Subwatershed 3-01 (see **Figure 11**):

- **RBMP30 GooseEggPark (Lead Agency: City of Santa Monica).** RBMP30 is a proposed centralized BMP, specifically an infiltration basin located in Goose Egg Park. A shallow 2-ft depth was selected for the model to allow for sizing adjustments if, based on site specific utility information, the full footprint is not found to be feasible. Multiple benefits include pollutant load reduction and groundwater recharge.
  Status: Proposed; construction by 2021

- **RBMP31 RooseveltElemen (Lead Agency: City of Santa Monica).** RBMP31 is a proposed centralized BMP, specifically a cistern located under the Roosevelt Elementary

School athletic field and open green space on the front lawn. It is assumed that both areas can be used for direct onsite use and/or subsurface infiltration. A 96-hour drawdown time was assumed. Multiple benefits include pollutant load reduction and decreased reliance on potable water. As with all proposed projects on school properties, project design, approval, and implementation is subject to change based on input from the school and/or school district.
Status: Proposed; construction by 2018

- **RBMP29 SanVicenteMedian (Lead Agency: City of Santa Monica).** RBMP29 is a proposed centralized BMP, specifically an infiltration basin located in the median of San Vicente Boulevard. A depth of 1-ft was assumed in order to reflect the potential for surface infiltration, modeled after a bioswale or bioretention-type BMP, also allowing for sizing adjustments if, based on site specific utility information, the full footprint is not found to be feasible. Harvest and use may also be an option to potentially supplement or replace landscape irrigation along the median. Multiple benefits include pollutant load reduction and potentially reduced reliance on potable water.
Status: Proposed; construction by 2021

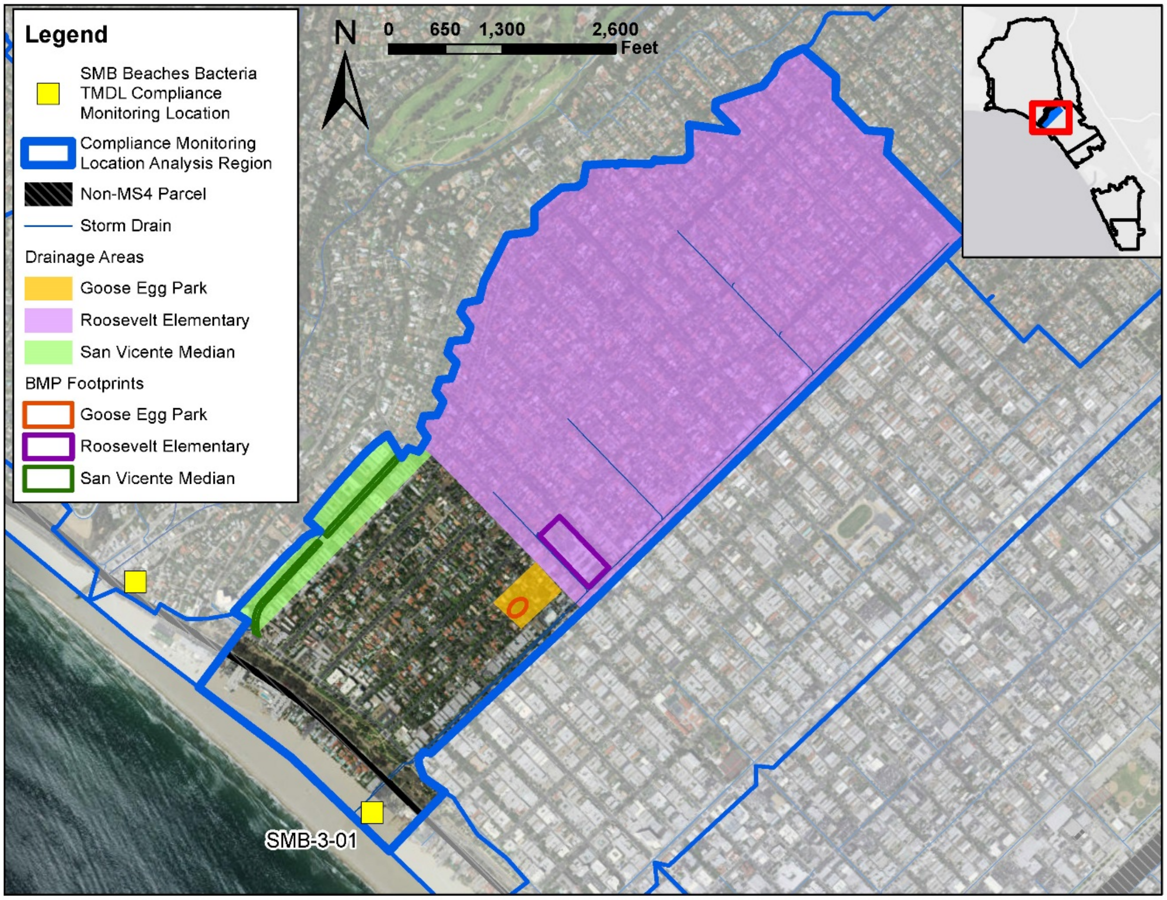

Figure 11. Modeled Regional/Centralized BMPs within Subwatershed 3-01

3.5.5 Subwatershed 3-02 Regional/Centralized BMPs

Two centralized BMPs are modeled within Subwatershed 3-02 (see **Figure 12**):

- **RBMP32 ReedPark (Lead Agency: City of Santa Monica).** RBMP32 is a proposed centralized BMP, specifically a cistern located under the tennis courts and green space at Reed Park in Santa Monica, intended to be used for irrigation. It is modeled as a shallow infiltration basin to best reflect capture rates and volume losses and a portion of captured stormwater could also be infiltrated in addition to the harvest and use plan. Multiple benefits include pollutant load reduction and reduced potable water demand.
Status: Proposed; construction by 2018

- **RBMP33 LincolnMiddleSch (Lead Agency: City of Santa Monica).** RBMP33 is a proposed centralized BMP, specifically a cistern located under the Lincoln Middle School athletic field, intended to be used for irrigation. It is modeled as a shallow infiltration basin to best reflect capture rates and volume losses, and a portion of captured stormwater could also be infiltrated in addition to the harvest and use plan. Multiple benefits include pollutant load reduction and potential for reduced potable water demand. As with all proposed projects on school properties, project design, approval, and implementation is subject to change based on input from the school and/or school district. *Status: Proposed; construction by 2021*

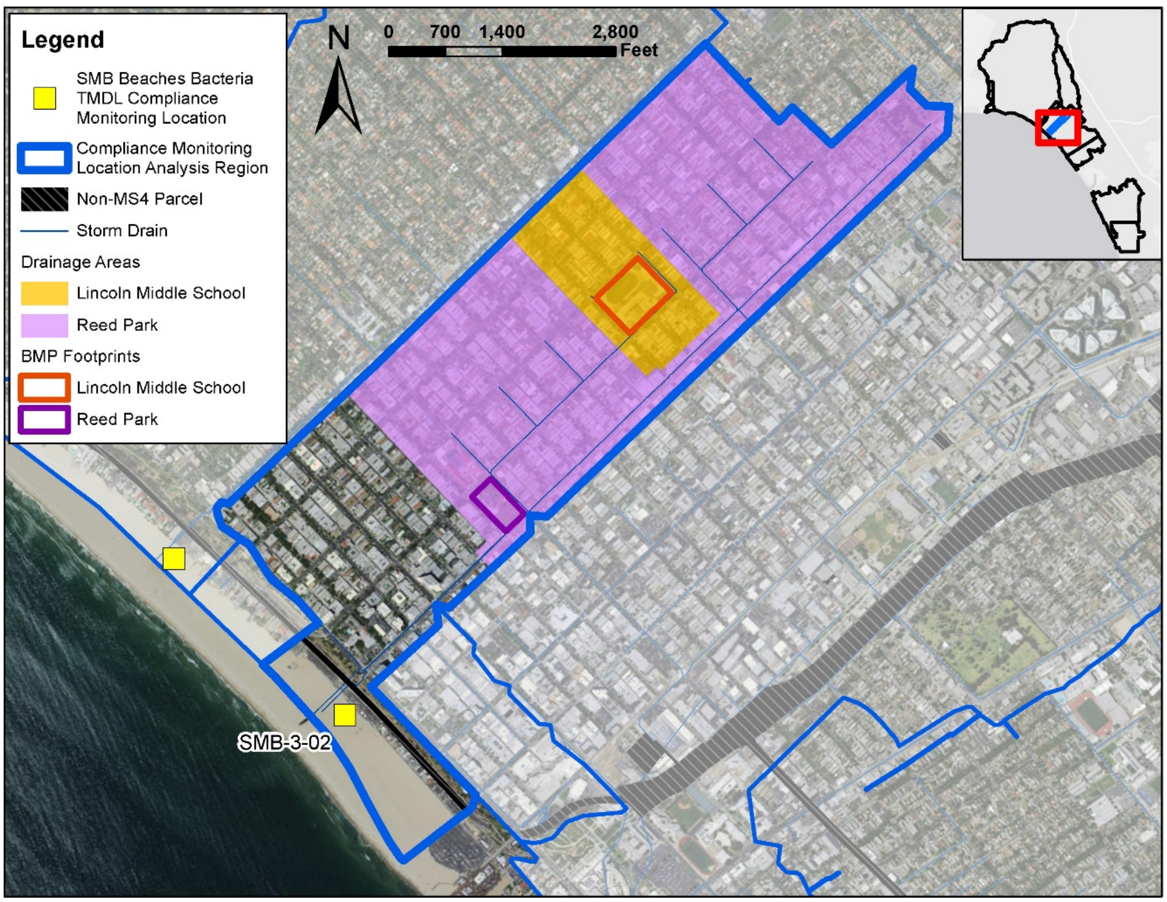

Figure 12. Modeled Regional/Centralized BMPs within Subwatershed 3-02

3.5.6 Subwatershed 3-03 Regional/Centralized BMPs

One centralized BMP is modeled within Subwatershed 3-03 (see **Figure 13**):

- **RBMP16a CleanBeachesPier (Lead Agency: City of Santa Monica).** RBMP16a is a planned centralized BMP, specifically a storage, treatment, and use project located immediately north of the Santa Monica Pier, adjacent to the City Beach Maintenance Yard. This project will divert runoff stormwater runoff to modular storage tanks for treatment and use via the existing SMURRF plant. It is modeled as an infiltration basin to best reflect capture rates and volume losses. The average depth of the basin was determined assuming a 96-hr drawdown time.
  Status: Planned; concept developed; construction by 2018

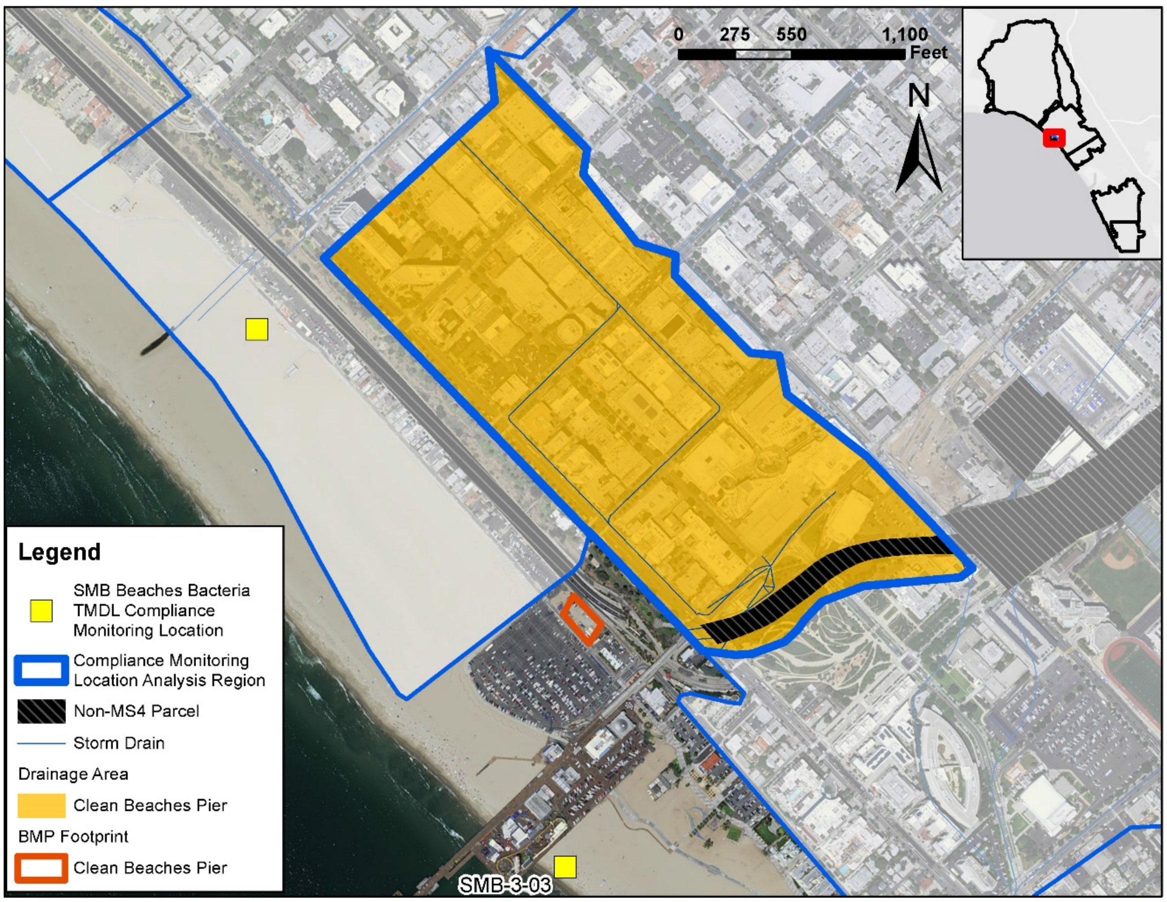

Figure 13. Modeled Regional/Centralized BMPs within Subwatershed 3-03

3.5.7 Subwatershed 3-04 Regional/Centralized BMPs

Six regional/centralized BMPs are modeled within Subwatershed 3-04 (see **Figure 14**):

- **RBMP44 Brentwood85 (Lead Agency: City of Los Angeles).** RBMP44 is a planned regional BMP (designed to capture the 85th percentile storm), specifically a large-scale storage, treatment and use project located at the Brentwood Golf Course. It is modeled as an infiltration basin to best reflect capture rates and volume losses, however, all harvested stormwater will be used for golf course irrigation purposes. The assumed depth of the basin was determined assuming a 96-hr drawdown time. Multiple benefits include pollutant load reduction and reduced potable water demand.
Status: Planned; concept report developed; construction by 2021

- **RBMP55 Memorial85 (Lead Agency: City of Santa Monica).** RBMP55 is a proposed regional BMP (designed to capture the 85th percentile storm), specifically a storage tank located within Memorial Park and designed to capture the 85th percentile, 24-hour volume. It is modeled as an infiltration basin to best reflect capture rates and volume losses, however, the harvested stormwater would be used for irrigation and flushing purposes. The assumed depth of the basin was determined assuming a 96-hr drawdown time. Multiple benefits include pollutant load reduction and reduced potable water demand.
Status: Proposed; construction by 2021

- **RBMP52 SMCivicAud85 (Lead Agency: City of Santa Monica).** RBMP52 is a proposed regional BMP (designed to capture the 85th percentile storm), specifically a subsurface storage tank located under the parking lot for the Santa Monica Civic Center Auditorium. It is modeled as an infiltration basin to best reflect capture rates and volume losses, however, harvested stormwater would be used for irrigation and flushing purposes. Multiple benefits include pollutant load reduction and potential for reduced potable water demand.
Status: Proposed; construction by 2021

- **RBMP16b CleanBeachesPK (Lead Agency: City of Santa Monica).** RBMP16b is a planned centralized BMP, specifically a large-scale storage, treatment and use project located at the existing Pico-Kenter Pump Station area, specifically on the beach adjacent to the outfall channel. The storage tanks would allow captured stormwater to be transferred to the SMURRF for treatment and use. It is modeled as an infiltration basin to best reflect capture rates and volume losses. The assumed depth of the basin was determined assuming a 96-hr drawdown time.
Status: Planned; concept report developed; construction by 2021

- **RBMP11 LosAmigos (Lead Agency: City of Santa Monica).** RBMP11 is a proposed centralized BMP, specifically a large-scale storage, treatment, and use project located

within Los Amigos Park. It would be constructed as a cistern but is represented as an infiltration basin for the RAA to best reflect capture rates and volume losses. All stormwater harvested by this project would be used for indoor flushing and irrigation purposes. The assumed depth of the basin was determined assuming a 96-hr drawdown time. Multiple benefits include pollutant load reduction and reduced potable water demand.
Status: Proposed; construction by 2021

- **RBMP53 SMHSBuilt (Lead Agency: City of Santa Monica).** RBMP34 is a recently constructed centralized BMP, specially an infiltration and permeable pavement project located at Santa Monica High School. It is modeled as both an infiltration basin as well as permeable pavement.
Status: Existing; construction completed 2015

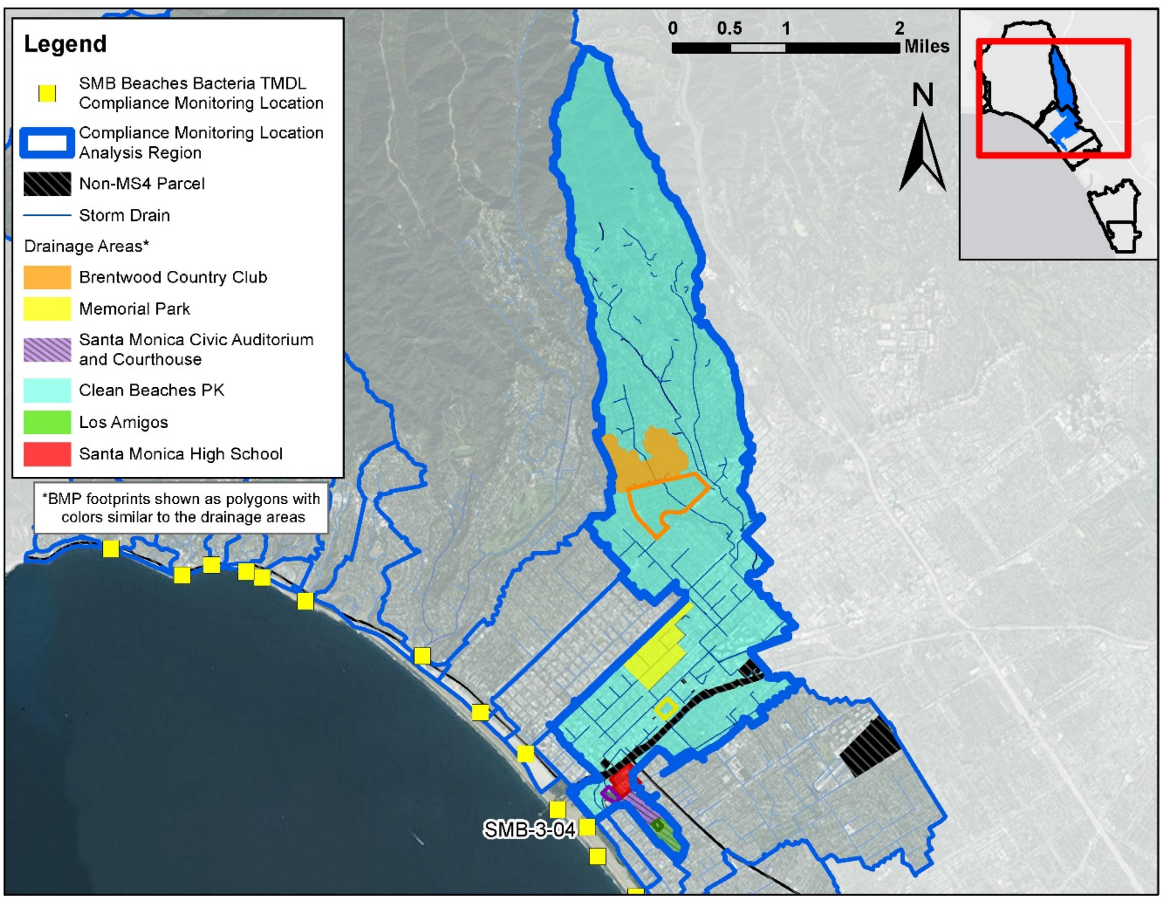

Figure 14. Modeled Regional/Centralized BMPs within Subwatershed 3-04

3.5.8 Subwatershed 3-05 Regional/Centralized BMPs

One centralized BMP is modeled within Subwatershed 3-05 (see **Figure 15**):

- **RBMP37 3-5ParkingLot (Lead Agency: City of Santa Monica).** RBMP37 is a proposed centralized BMP, specifically a subsurface infiltration basin located under the parking lot adjacent to Ocean Beach Park in between Ocean Front Walk and Barnard Way. A shallow 2-ft depth was assumed in order to minimize the potential impacts due to tidal influences, although this should be evaluated in further stages of design. This parcel is state-owned and such permissions would need to be obtained.
  Status: Proposed; construction by 2018

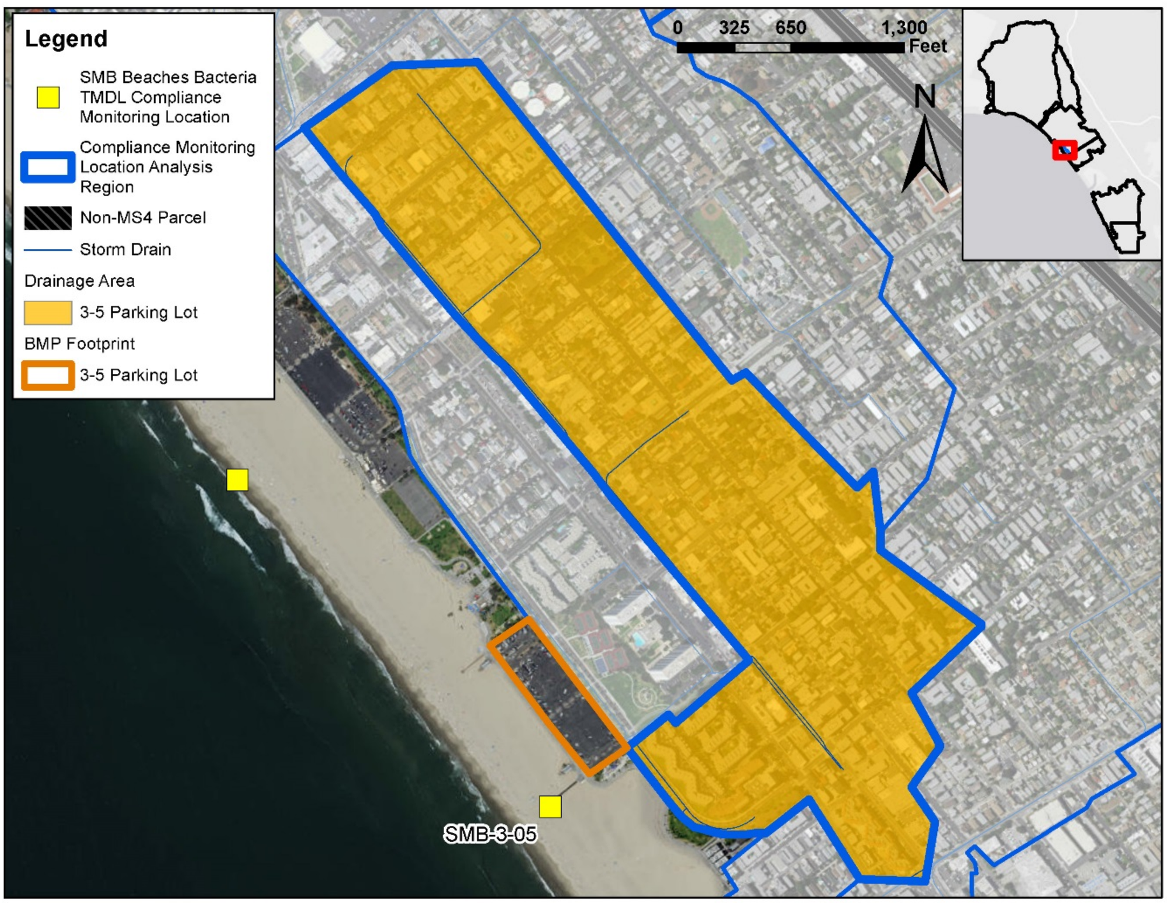

Figure 15. Modeled Regional/Centralized BMPs within Subwatershed 3-05

3.5.9 Subwatershed 3-06 Regional/Centralized BMPs

Four centralized BMPs are modeled within the Subwatershed 3-06 (see **Figure 16**):

- **RBMP38 OlympicHigh (Lead Agency: City of Santa Monica).** RBMP38 is a proposed centralized BMP, specifically an infiltration basin located under the parking lot at Olympic Continuation High School. A shallow 2-ft depth was assumed to allow for the same volume capture, but with a smaller footprint, if further stages of design indicate that such and adjustment is necessary. This project is modeled as an infiltration basin to best reflect capture rates and volume losses, however, a portion of the harvested stormwater may be used for irrigation purposes. Multiple benefits include pollutant load reduction and potential for reduced potable water demand. As with all proposed projects on school properties, project design, approval, and implementation is subject to change based on input from the school and/or school district.
Status: Proposed; construction by 2021

- **RBMP13 Ozone (Lead Agency: City of Santa Monica).** RBMP13a is a proposed centralized BMP, specifically a large-scale storage, treatment and use project located within Ozone Park. It is modeled as an infiltration basin to best reflect capture rates and volume losses, however, all harvested stormwater would be used for irrigation purposes. The modeled infiltration rate is intended to reflect a discharge rate of 1.2 cubic feet per second. Multiple benefits include pollutant load reduction and reduced potable water demand.
Status: Proposed; construction by 2018

- **RBMP10 PenmarPh2 (Lead Agency: City of Los Angeles).** RBMP10 is a planned centralized BMP, specifically an expansion to the recently constructed large-scale storage, treatment and diversion project (adding 3,300 cubic feet of storage volume to the existing 367,000 cubic feet). It is modeled as an infiltration basin to best reflect capture rates and volume losses, however, all harvested stormwater will be pumped at the discharge rate, assumed based on a 96-hour drawdown time, to the wastewater treatment plant. Harvested stormwater may also potentially be used at Santa Monica's Marine Park.
Status: Planned; construction by 2021

- **RBMP39 WillRodgersElem (Lead Agency: City of Santa Monica).** RBMP39 is a proposed centralized BMP, specifically a subsurface infiltration basin located under the field and paved play areas at Will Rogers Elementary School. It is modeled as an infiltration basin to best reflect capture rates and volume losses, however a portion of the captured stormwater may be used for irrigation and flushing purposes. Multiple benefits

include pollutant load reduction and potential for reduced potable water demand. As with all proposed projects on school properties, project design, approval, and implementation is subject to change based on input from the school and/or school district.
Status: Proposed; construction by 2021

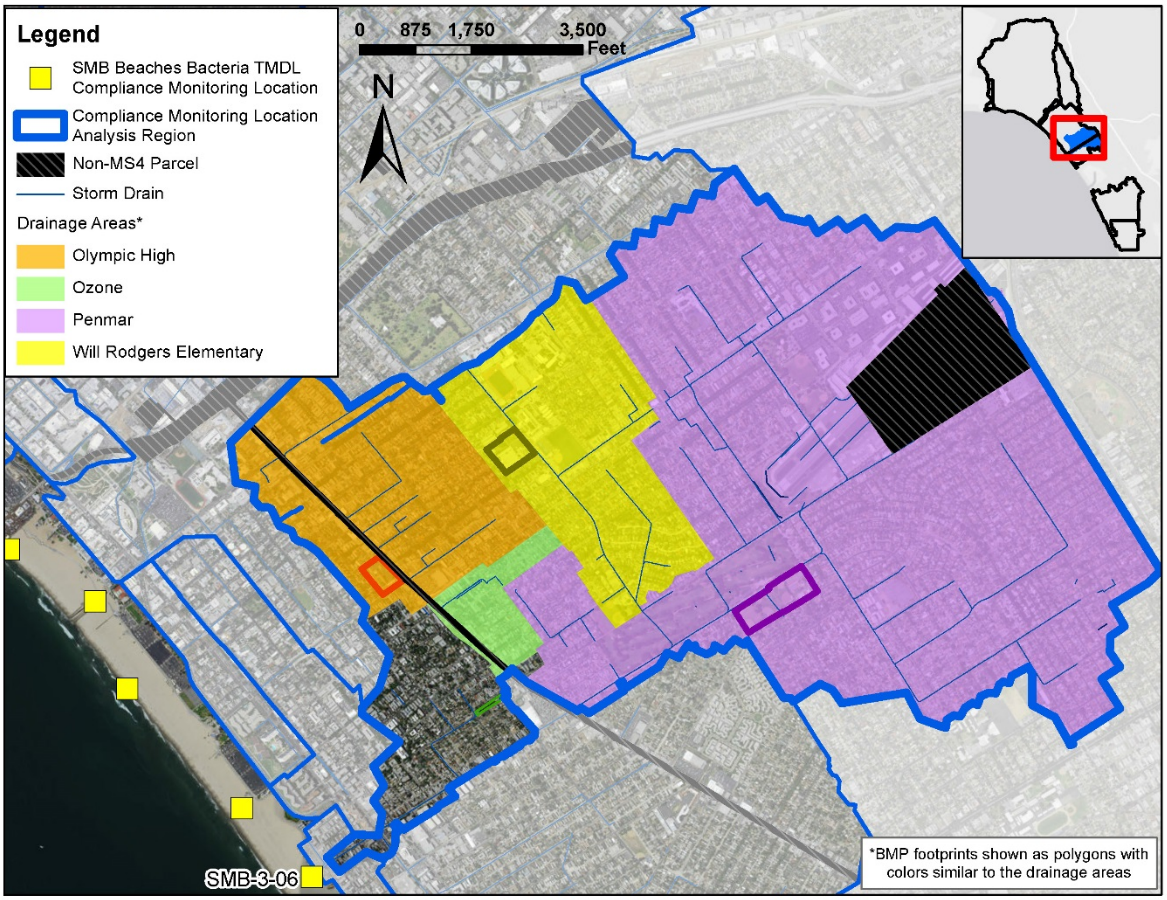

Figure 16. Modeled Regional/Centralized BMPs within Subwatershed 3-06

3.5.10 Subwatershed 3-07 Regional/Centralized BMPs

Four regional BMPs are modeled within Subwatershed 3-07 (see **Figure 17**):

- **RBMP01b GrandBlvdIMF (Lead Agency: City of Los Angeles).** RBMP01b includes four existing tree wells located at the intersection of Grand Boulevard and Riviera Avenue. The tree boxes filter stormwater through soil filter media and treated flows are captured in an underdrain connected to the adjacent downstream catch basin. It is

modeled as media filters to best reflect pollutant concentration and volume reductions. Multiple benefits include pollutant load reduction, and street greening.
Status: Existing; construction completed December 2009

- **RBMP21b GrandBlvdIIMF (Lead Agency: City of Los Angeles).** RBMP21b includes four existing tree wells located along Abbot Kinney Boulevard between Rialto Avenue and Santa Clara Avenue. The tree boxes filter stormwater through soil filter media and treated flows are captured in an underdrain connected to the adjacent downstream catch basin. It is modeled as media filters to best reflect pollutant concentration and volume reductions. Multiple benefits include pollutant load reduction and street greening.
Status: Existing; construction completed December 2009

- **RBMP03 Westminster (Lead Agency: City of Los Angeles).** RBMP03 is an existing centralized BMP, specifically a bioswale, constructed wetland, and diversion to sewer located within the Westminster Dog Park. It is represented as an infiltration basin for the RAA to best reflect capture rates and volume losses. The diversion rate to the sewer assumes a 96-hr drawdown time.
Status: Existing; construction completed July 2010

- **RBMP06 Oakwood85 (Lead Agency: City of Los Angeles).** RBMP06 is a planned regional BMP (capturing the 85th percentile storm), specifically an infiltration basin located at the Oakwood Recreation Center. It is modeled as an infiltration basin to best reflect capture rates and volume losses however a portion of harvested stormwater may be used for park irrigation purposes. Multiple benefits include pollutant load reduction, groundwater recharge, and potential for reduced potable water demand.
Status: Planned; concept report completed; construction by 2021

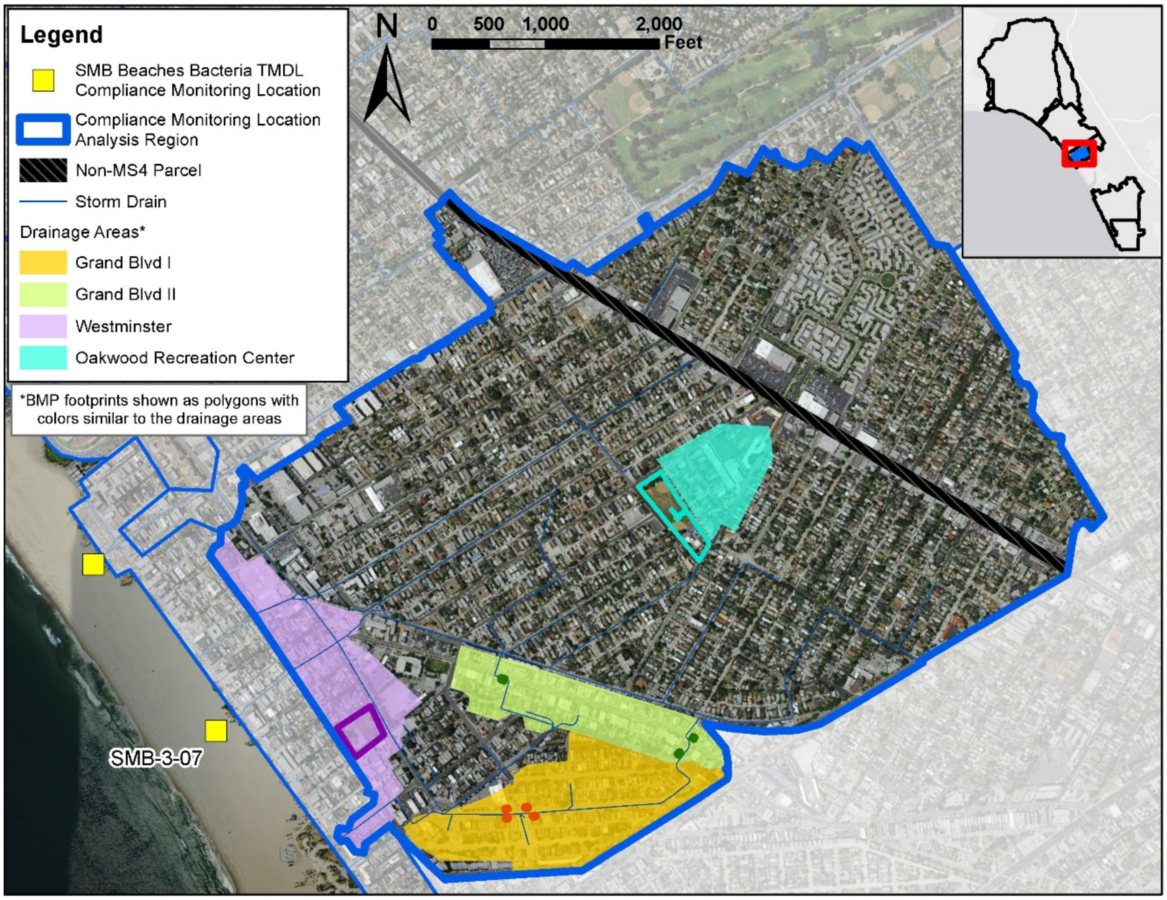

Figure 17. Modeled Regional/Centralized BMPs within Subwatershed 3-07

3.5.11 Subwatershed 3-09 Regional/Centralized BMPs

One regional BMP is modeled within Subwatershed 3-09 (see **Figure 18**):

- **RBMP18 CrescentBay (Lead Agency: City of Los Angeles).** RBMP18 is a proposed regional BMP, specifically a subsurface permeable pavement infiltration basin located under the parking lot near Crescent Park. This green beach parking lot is modeled as an infiltration basin to best reflect capture rates and volume losses. The average depth was set to reflect a reasonable permeable pavement depth of three feet of sub-base with a 40 percent void ratio. Multiple benefits include pollutant load reduction and groundwater recharge.
  Status: Proposed; construction by 2018

Figure 18. Modeled Regional/Centralized BMPs within Subwatershed 3-09

3.5.12 Subwatershed 2-11 Regional/Centralized BMPs

Two regional BMPs are modeled within Subwatershed 2-11 (see **Figure 19**):

- **RBMP19 WestchesterPark (Lead Agency: City of Los Angeles).** RBMP19 is a planned regional BMP, specifically an infiltration basin located in Westchester Park. A Corrugated Metal Pipe (CMP) laid above a layer of stone will be used as the detention and infiltration system. It is modeled as an infiltration basin to best reflect capture rates and volume losses however a portion of the harvested stormwater may be treated and used to irrigate Westchester Park. Multiple benefits include pollutant load reduction, groundwater recharge, and potential for reduced potable water demand.
  Status: Planned; concept report completed; construction by 2021

- **RBMP09 WestchesterLAX (Lead Agency: City of Los Angeles).** RBMP09 is a planned regional BMP, specically a large-scale subsurface infiltration basin located in Westchester adjacent to LAX airport. This project is modeled to reflect preliminary designs to divert stormwater into a subsurface tank, where it will be stored and pumped at the dewatering rate (20 cubic feet per second) to a separate subsurface infiltration gallery. Multiple benefits include pollutant load reduction and groundwater recharge.
  Status: Planned; concept in development; construction by 2021

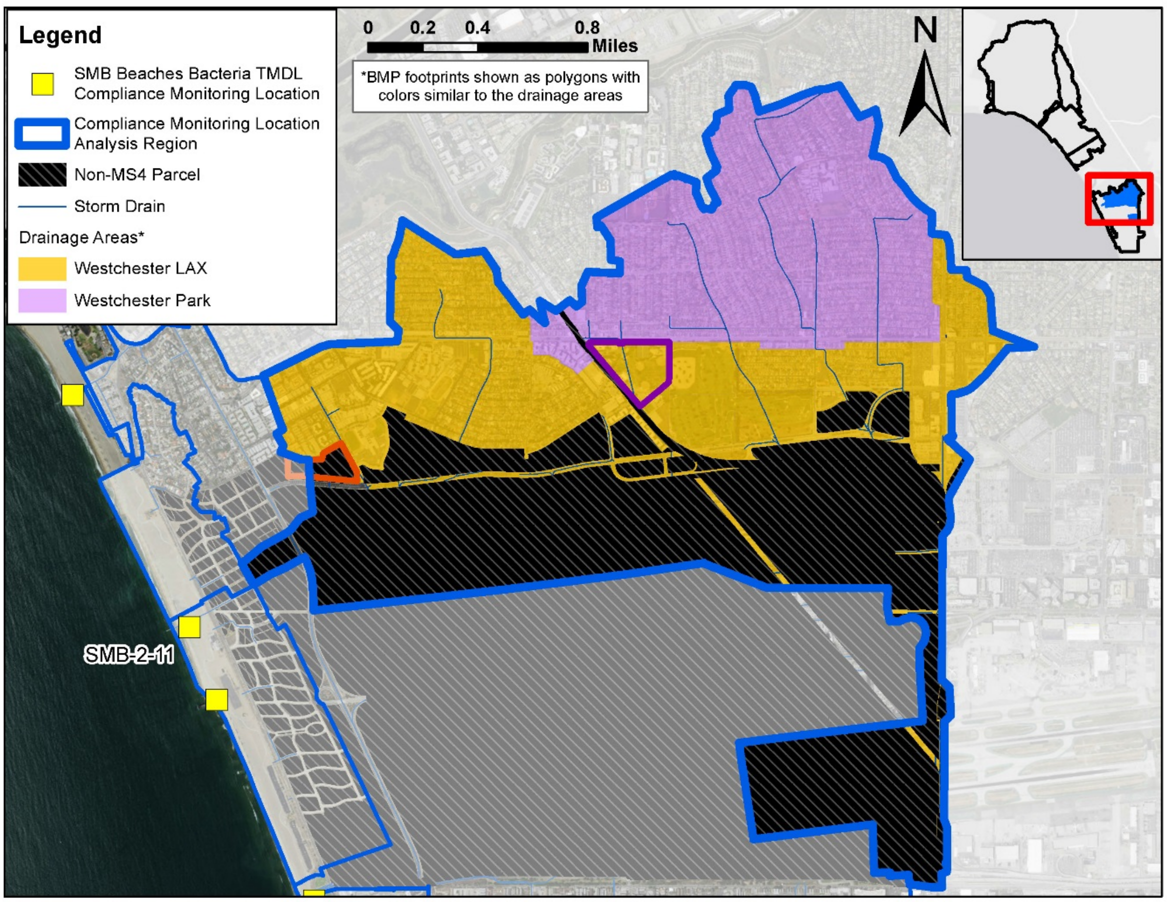

Figure 19. Modeled Regional/Centralized BMPs within Subwatershed 2-11

3.5.13 Subwatershed 2-13 Regional/Centralized BMPs

Three regional/centralized BMPs are modeled within Subwatershed 2-13 (see **Figure 20**):

- **RBMP02 ImperialHwy (Lead Agency: City of El Segundo).** RBMP02 is an existing centralized BMP, specifically a bioswale and dry well project located within the median along Imperial Highway. This BMP was modeled as an infiltration basin to account for volume losses. Multiple benefits include pollutant load reduction and groundwater recharge.
  Status: Existing; construction completed August 2011

- **RBMP42 ImperialStrip (Lead Agency: City of El Segundo).** RBMP42 is a planned centralized BMP, specifically a series of two 350-ft long roadside bioswales located in the area between Imperial Highway and Imperial Avenue, from Main Street to Hillcrest Street. Pressurized flow from Pump Station 17 is directed to these bioswales and conveyed back to the storm drain in Imperial Highway after treatment. It is modeled as a bioswale to best reflect pollutant filtration and some volume losses.
  Status: Planned; construction by 2018

- **RBMP15 Recreation85 (Lead Agency: City of El Segundo).** RBMP15 is a proposed regional BMP (capturing the 85th percentile storm), specifically an infiltration basin located within Recreation Park. It is modeled as an infiltration basin to best reflect capture rates and volume losses however a portion of harvested stormwater may be used for irrigation purposes. Multiple benefits include pollutant load reduction, groundwater recharge, and potential for reduced potable water demand.
  Status: Proposed; construction by 2018

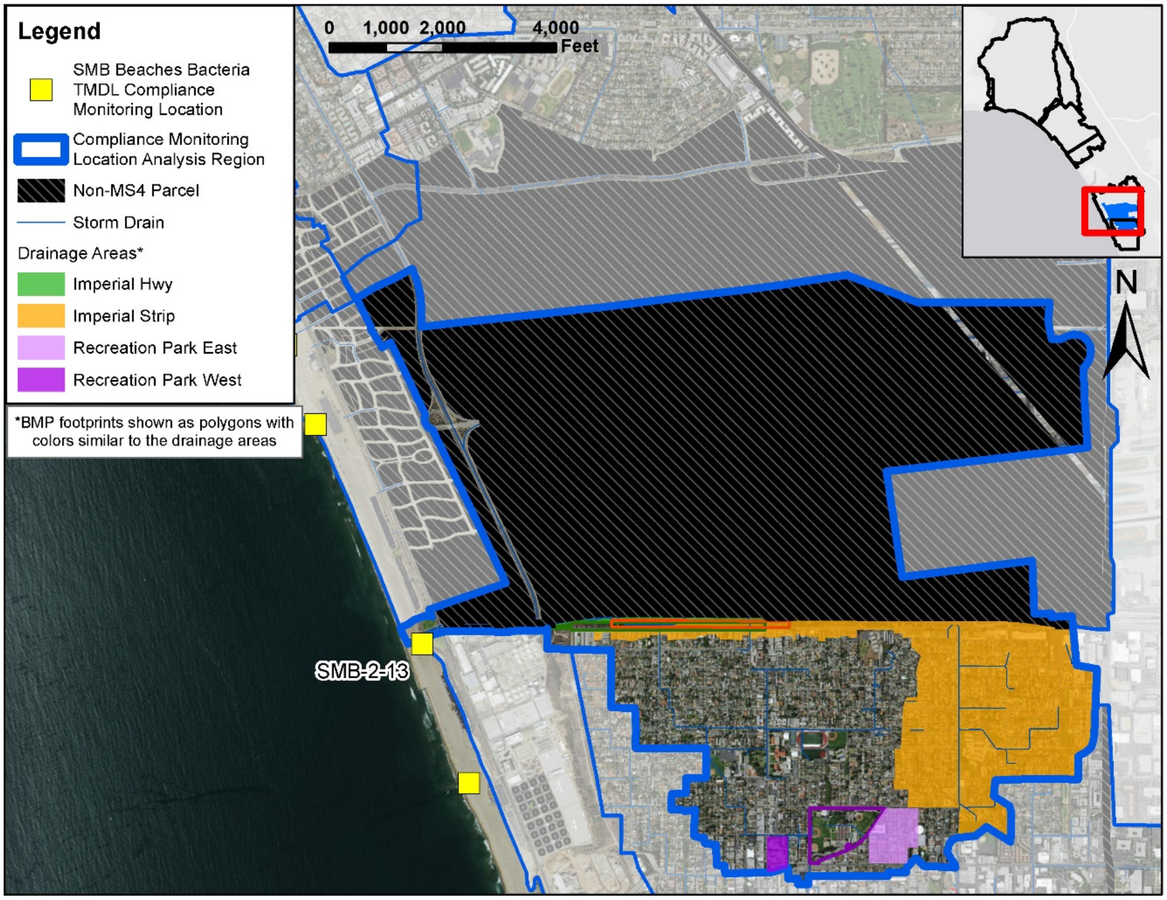

Figure 20. Modeled Regional/Centralized BMPs within Subwatershed 2-13

3.5.14 Subwatershed 2-15 Regional/Centralized BMPs

One regional BMP is modeled within Subwatershed 2-15 (see **Figure 21**):

- **RBMP41 PumpStationB85 (Lead Agency: City of El Segundo).** RBMP41 is a proposed regional BMP (caturing the 85th percentile storm), specifically an infiltration basin located at the existing LA County Line B Pump Station. The basin floor will be replaced with a pervious structural section below the basin invert and sized to capture the 85th percentile, 24-hour design event. It is modeled as an infiltration basin to best reflect capture rates and volume losses. Multiple benefits include pollutant load reduction and groundwater recharge.
Status: Proposed; brief concept report developed; construction by 2018

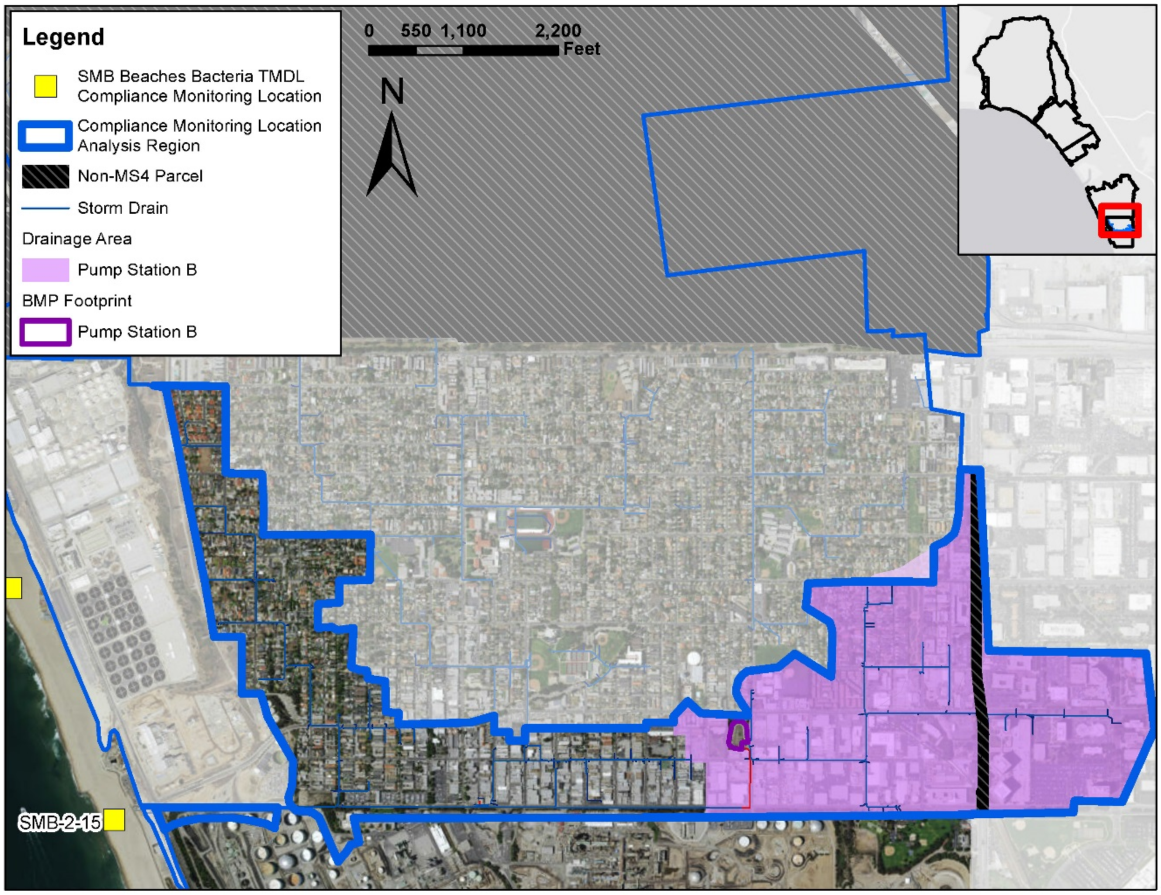

Figure 21. Modeled Regional/Centralized BMPs within Subwatershed 2-15

4 RAA RESULTS/DEMONSTRATION OF COMPLIANCE

4.1 Wet Weather - Bacteria

By implementing the steps described above, TLRs were developed for each modeled subwatershed. TLRs range from 0 to 53 percent of baseline annual fecal coliform loads for TMDL year 1995 and are depicted in **Figure 22** and listed in **Table 10**. A 0 percent TLR resulted in some subwatersheds (2-12, 2-14, and South of 2-15). These subwatersheds had the lowest exceedance rates, produced very little runoff, and/or had few years with exceedance days greater than allowable exceedance days (maximum three of nine years, often exceeding by just one exceedance day).

TLRs are presented for all subwatersheds within the MS4, including both open beach and point zero CMLs. As discussed previously, TLRs for subwatersheds located between two point zero CMLs, but not representing an open beach site, were calculated based on the historical compliance of the two adjacent CMLs.

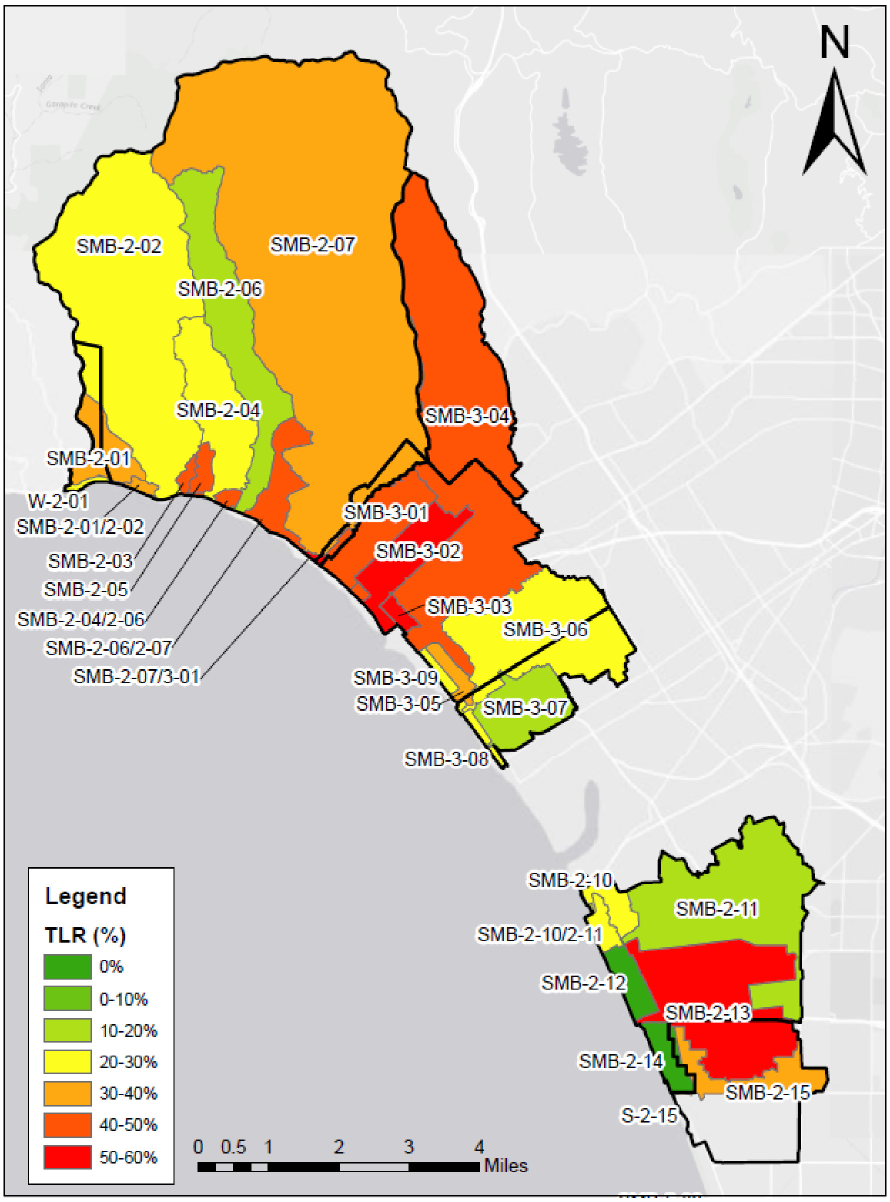

Figure 22. Target Load Reductions for Fecal Coliform for each Modeled Subwatershed

Table 10. Target Load Reductions for Fecal Coliform for each Modeled Subwatershed for TMDL Year 1995

Subwatershed ID	Subwatershed Name	2003 -2013 Historical Exceedance Frequency	Allowable Discharge Days	Diversion Flowrate	Baseline Condition for the Critical Year			Allowed Conditions for the Critical Year[2]			Target Load Reduction for the Critical Year	
		(Daily Rainfall>0.10-in)	(Daily Rainfall>0.10-in)	(cfs)	Runoff Volume (ac-ft)	Average Pollutant Concentration[1] (MPN/100mL)	Load[+] (10^{12} MPN)	Runoff Volume (ac-ft)	Average Pollutant Concentration[1] (MPN/100mL)	Load[+] (10^{12} MPN)	Absolute Load Reduction (10^{12} MPN)	% of Baseline Annual Load
West of 2-01*	West of 2-01	78%	22	0.40	30	8,700	3.2	30	6,300	2.3	0.90	29%
SMB-2-01	Castlerock (Parker Mesa) Storm Drain	78%	22	15	330	26,000	110	330	18,000	75	33	31%
Between 2-01 and 2-02*	Between 2-01 and 2-02	81%	21	1.3	48	20,000	12	48	13,000	7.7	4.2	36%
SMB-2-02	Santa Ynez Storm Drain	85%	20	50	1,400	14,000	240	1,400	11,000	190	49	21%
SMB-2-03	Will Rogers State Beach at 17200 PCH, open beach	64%	26	5.2	180	26,000	59	180	16,000	35	24	41%
SMB-2-06	Bay Club Storm Drain	79%	23	3.8	120	30,000	42	120	17,000	25	18	42%
SMB-2-04	Pulga Canyon Storm Drain	72%	24	26	1,500	18,000	330	1,500	13,000	230	94	29%
Between 2-04 and 2-05*	Between 2-04 and 2-06	73%	23	1.9	56	8,600	5.9	56	4,400	3.0	2.9	49%
SMB-2-05	Temescal Storm Drain	73%	22	16	420	20,000	100	420	16,000	81	21	20%
Between 2-05 and 2-07*	Between 2-06 and 2-07	77%	21	17	420	24,000	120	420	13,000	64	60	48%
SMB-2-07	Santa Monica Canyon wave wash, Will Rogers State Beach	81%	21	91	5,300	11,000	690	5,300	6,800	440	250	36%
Between 2-07 and 3-01*	Between 2-07 and 3-01	74%	23	0.70	20	27,000	6.6	20	14,000	3.3	3.3	50%
SMB-3-01	Montana Avenue Storm Drain	67%	26	23	740	27,000	250	740	16,000	150	100	41%
Between 3-01 and 3-02*	Between 3-01 and 3-02	70%	24	0.50	19	17,000	4.1	19	9,600	2.3	1.8	44%
SMB-3-02	Wilshire Boulevard Storm Drain, Santa Monica	73%	23	38	930	19,000	220	930	8,900	100	120	53%
SMB-3-03	Santa Monica Municipal Pier at Storm Drain, open beach	70%	24	5.6	130	45,000	73	130	21,000	35	39	52%
SMB-3-04	Santa Monica Beach at Pico/Kenter Storm Drain	75%	23	180	4,800	24,000	1,400	4,800	13,000	770	670	47%
SMB-3-09	Strand Street Extended, open beach	52%	33	1.4	90	21,000	24	90	16,000	18	6.3	26%
SMB-3-05	Ashland Avenue Storm Drain (Venice)	59%	29	5.1	200	23,000	56	200	14,000	35	21	37%
SMB-3-06	Rose Avenue Storm Drain on Venice Beach	57%	30	40	2,200	23,000	600	2,200	16,000	420	180	30%
SMB-3-07	Venice City Beach at Brooks Storm Drain (projection of Brooks Avenue)	48%	35	8.6	940	21,000	240	940	17,000	200	44	18%
SMB-3-08	Venice Pavilion at projection of Windward Avenue, open beach	53%	32	1.8	110	15,000	21	110	11,000	15	5.9	28%
SMB-2-10	Dockweiler State Beach at Culver Blvd. Storm Drain	54%	32	3.1	200	22,000	53	200	16,000	38	15	28%
Between 2-10 and 2-11*	Between 2-10 and 2-11	51%	33	0.70	76	13,000	12	76	10,000	9.5	2.7	22%
SMB-2-11	North Westchester Storm Drain	48%	36	28	2,700	14,000	460	2,700	11,000	380	87	19%
SMB-2-12	World Way Extended, open beach	38%	45	0.0	88	940	1	88	900	1.0	0.0	0%
SMB-2-13	Imperial Highway Storm Drain (Dockweiler)	67%	26	110	2,600	6,600	220	2,600	3,200	100	110	52%
SMB-2-14	Opposite Hyperion Plant, 1 mile, open beach	31%	55	0.0	990	17,000	200	990	17,000	200	0.0	0%
SMB-2-15	Grand Avenue Storm Drain	59%	29	17	700	24,000	200	700	15,000	130	76	37%
South of SMB-2-15*	South of SMB-2-15	59%	29	0.0	3.7	400	0.017	3.7	400	0.017	0.0	0%

[1] Average pollutant concentrations are estimated as the total annual load divided by the total annual runoff volume.

[2] RAA demonstration is made based on the achievement of the TLR values in terms of absolute load removed by the proposed suite of BMPs in each analysis region. The target load reductions in terms of runoff volume and concentration are shown for informational purposes only.

[*] Subwatersheds that are between CMLs use the average exceedance rate of the adjacent CML sites

[+] CMLs that include State/Federal lands use the baseline load with these areas excluded.

Results of the RAA are presented in **Tables 11 and 12** below, for interim compliance (2018) and final compliance (2021), respectively. The interim compliance deadline for the SMBBB TMDL requires a 50 percent reduction in exceedance days; this will be met by achieving 50 percent of the TLR in each subwatershed, through a combination of non-structural, distributed green streets BMPs, and existing and fast-tracked centralized/regional BMPs. Assuming a phased implementation, it was assumed that 50 percent of the proposed distributed green streets BMPs would be implemented in all subwatersheds between 2015 and 2018, and 50 percent would be implemented between 2018 and 2021. In subwatershed that needed additional load reductions beyond the default to meet the interim targets, the implementation of a higher relative percentage (greater than 50 percent) of distributed BMPs before 2018 was prioritized first, and fast-tracking specific planned or proposed regional BMPs was prioritized second. In subwatersheds where no distributed green streets BMPs are necessary to meet the final compliance deadlines, regional BMPs were prioritized to reduce redundant load reductions. However, in subwatershed 2-11, a small number of distributed green streets BMPs (5 pecent of single family and commercial areas) were added rather than fast-tracking the large-scale regional projects, which would meet the interim and final targets is constructed alone. Alternatively, if the regional projects can be fast-tracked to be operable by 2018, then no distributed green streets BMPs would be required. The incremental load reduction between Penmar Phase I (existing) and Penmar Phase II (planned) is negligible. Therefore, the full load reduction applicable to Penmar Phase II has been applied to the interim compliance deadline/target.

As shown in the summary tables below, the TLRs are met in all subwatersheds, with varying levels of non-structural, distributed, green streets BMPs and regional/centralized BMPs. On a SMB EWMP Group watershed-wide basis, at the time of the interim compliance deadline (2018), a 22 percent load reduction is estimated, which is greater than the TLR of 18 percent. At the time of the final compliance deadline (2021), 2021, a 42 percent load reduction is estimated, which is greater than the TLR of 35 percent. The load reduction attributable to individual regional BMPs in each subwatershed are provided in **Attachment E**. Detailed results for all BMPs in terms of volume, concentration, and load for each WBPC and analysis region can be found in the electronic data files submitted along with the J2J3 SMB EWMP. An example illustrating the modeling results of applicable pollutant concentrations at the downstream outlet of the watershed system is also included in the electronic data files.

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.

Table 11. Fecal Coliform Modeling Results, by 2018 (Interim Compliance Deadline)

Subwatershed	Average Load Reductions (% of baseline annual load)							Interim TLR (50% of Final TLR)
	Non-Structural BMPs (Non-Modeled)	Public Retrofit Incentives + Redevelopment	Non-MS4	Regional BMPs	Distributed Green Streets BMPs	Distributed Green Streets Implementation Level (or basis for load reduction)	Total Achieved	
West of 2-01	2.5%	2%	6%	0%	5%	10% SFR/COMM	15%	15%
SMB-2-01	2.5%	4%	0.03%	0%	10%	12.5% SFR/COMM	17%	15%
Between 2-01 and 2-02	2.5%	3%	3%	0%	10%	22.5% SFR/COMM	20%	18%
SMB-2-02	2.5%	4%	0.3%	0%	4%	26% SFR/COMM	11%	10%
SMB-2-03	2.5%	3%	1%	0%	16%	30% SFR/COMM	22%	20%
SMB-2-05	2.5%	3%	0.5%	0%	17%	27.5% SFR/COMM	22%	21%
SMB-2-04	2.5%	3%	0.05%	0%	11%	25% SFR/COMM	16%	14%
Between 2-04 and 2-06	2.5%	2%	2%	0%	20%	17.5% MFR	26%	25%
SMB-2-06	2.5%	2%	0.02%	0%	5%	10% SFR/COMM	10%	10%
Between 2-06 and 2-07	2.5%	3%	0.02%	0%	20%	35% SFR/COMM	25%	24%
SMB-2-07	2.5%	3%	0.05%	16%	0%	N/A	21%	18%
Between 2-07 and 3-01	2.5%	2%	5%	0%	17%	27.5% SFR/COMM	26%	25%
SMB-3-01	2.5%	3%	0.3%	13%	6%	10% SFR/COMM	24%	21%
Between 3-01 and 3-02	2.5%	2%	7%	0%	13%	22.5% SFR/COMM	24%	22%
SMB-3-02	2.5%	2%	0.03%	13%	15%	22.5% SFR/COMM + 10% MFR	32%	27%
SMB-3-03	2.5%	2%	0.05%	46%	0%	N/A	50%	26%
SMB-3-04	2.5%	2%	0.1%	0.5%	20%	36% SFR/COMM	25%	23%
SMB-3-09	2.5%	2%	0%	39%	0%	N/A	44%	13%
SMB-3-05	2.5%	2%	0%	79%	0%	N/A	83%	19%
SMB-3-06	2.5%	2%	1%	5%	4%	7.5% SFR/COMM	15%	15%
SMB-3-07	2.5%	2%	3%	9%	0%	N/A	15%	9%
SMB-3-08	2.5%	2%	0%	0%	11%	12.5% SFR/COMM	15%	14%
SMB-2-10	2.5%	2%	2%	0%	9%	17.5% SFR/COMM	15%	14%
Between 2-10 and 2-11	2.5%	3%	0.02%	0%	8%	12.5% SFR/COMM	13%	11%
SMB-2-11	2.5%	2%	3%	0%	3%	5% SFR/COMM	10%	9%
SMB-2-12	2.5%	0%	4%	0%	0%	N/A	6%	0%
SMB-2-13	2.5%	2%	6%	35%	0%	N/A	45%	26%
SMB-2-14	2.5%	2%	0%	0%	0%	N/A	4%	0%
SMB-2-15	2.5%	2%	0.05%	31%	0%	N/A	35%	19%
South of SMB-2-15	2.5%	22%	0%	0%	0%	N/A	24%	0%
Total for entire SMB EWMP Group Area	**2.5%**	**4%**	**1%**	**8%**	**8%**	**N/A**	**22%**	**18%**

Table 12. Fecal Coliform Modeling Results, by 2021 (Final Compliance Deadline)

Subwatershed	Average Load Reductions (% of baseline annual load)							TLR
	Non-Structural BMPs (Non-Modeled)	Public Retrofit Incentives + Redevelopment	Non-MS4	Regional BMPs	Distributed Green Streets BMPs	Distributed Implementation Level	Total Achieved	
West of 2-01	5%	3%	12%	0%	9%	20% SFR/COMM	29%	29%
SMB-2-01	5%	6%	0.1%	0%	20%	25% SFR/COMM	32%	31%
Between 2-01 and 2-02	5%	4%	6%	0%	21%	45% SFR/COMM	36%	36%
SMB-2-02	5%	6%	0.6%	4%	7%	40% SFR/COMM	22%	21%
SMB-2-03	5%	4%	2%	0%	32%	60% SFR/COMM	43%	41%
SMB-2-05	5%	4%	1%	0%	33%	55% SFR/COMM	44%	42%
SMB-2-04	5%	4%	0.1%	0%	22%	50% SFR/COMM	31%	29%
Between 2-04 and 2-06	5%	2%	4%	0%	40%	35% MFR	51%	49%
SMB-2-06	5%	3%	0.04%	8%	5%	10% SFR/COMM	22%	20%
Between 2-06 and 2-07	5%	4%	0.03%	0%	40%	70% SFR/COMM	49%	48%
SMB-2-07	5%	5%	0.1%	44%	0%	N/A	53%	36%
Between 2-07 and 3-01	5%	2%	10%	0%	34%	55% SFR/COMM	51%	50%
SMB-3-01	5%	4%	0.5%	23%	11%	20% SFR/COMM	43%	41%
Between 3-01 and 3-02	5%	2%	13%	0%	26%	45% SFR/COMM	46%	44%
SMB-3-02	5%	2%	0.1%	18%	29%	45% SFR/COMM + 20% MFR	55%	53%
SMB-3-03	5%	2%	0.1%	46%	0%	N/A	53%	52%
SMB-3-04	5%	3%	0.2%	7%	33%	60% SFR/COMM	48%	47%
SMB-3-09	5%	2%	0%	39%	0%	N/A	47%	26%
SMB-3-05	5%	2%	0%	79%	0%	N/A	86%	37%
SMB-3-06	5%	3%	2%	11%	8%	15% SFR/COMM	30%	30%
SMB-3-07	5%	2%	5%	9%	0%	N/A	21%	18%
SMB-3-08	5%	2%	0%	0%	21%	25% SFR/COMM	28%	28%
SMB-2-10	5%	3%	4%	0%	17%	35% SFR/COMM	29%	28%
Between 2-10 and 2-11	5%	4%	0.03%	0%	16%	25% SFR/COMM	25%	22%
SMB-2-11	5%	3%	6%	38%	3%	5% SFR/COMM	54%	19%
SMB-2-12	5%	0%	7%	0%	0%	N/A	12%	0%
SMB-2-13	5%	3%	12%	35%	0%	N/A	55%	52%
SMB-2-14	5%	3%	0%	0%	0%	N/A	8%	0%
SMB-2-15	5%	2%	0.1%	31%	0%	N/A	38%	37%
South of SMB-2-15	5%	27%	0%	0%	0%	N/A	32%	0%
Total for entire SMB EWMP Group Area	**5%**	**3%**	**2%**	**17%**	**15%**	**N/A**	**42%**	**35%**

A summary of structural BMP volumes proposed to meet the TLRs is provided in **Table 13** for both green streets distributed BMPs and regional BMPs. Volumes are presented for the final compliance deadline only (2021). The distributed green streets BMP volumes have been calculated assuming the design parameters presented in Section 3.4, and assuming an average runoff coefficient for each subwatershed. The regional/centralized volumes reflect the modeled BMPs, with associated volumes, presented in Section 3.5.

Table 13. Summary of Proposed Structural BMP Volumes

Subwatershed	Distributed Green Streets BMPs (ac-ft)	Regional/Centralized BMP (ac-ft)
West of 2-01	0.03	-
SMB-2-01	1.49	-
Between 2-01 and 2-02	0.30	-
SMB-2-02	6.05	6.08
SMB-2-03	0.58	-
SMB-2-05	1.70	-
SMB-2-04	6.71	-
Between 2-04 and 2-06	0.43	-
SMB-2-06	0.40	5.53
Between 2-06 and 2-07	5.60	-
SMB-2-07	-	63.7
Between 2-07 and 3-01	0.17	-
SMB-3-01	3.52	8.48
Between 3-01 and 3-02	0.10	-
SMB-3-02	5.62	7.35
SMB-3-03	-	3.67
SMB-3-04	54.5	25.1
SMB-3-09	-	0.79
SMB-3-05	-	9.39
SMB-3-06	6.51	15.3
SMB-3-07	-	0.82
SMB-3-08	0.10	-
SMB-2-10	1.10	-
Between 2-10 and 2-11	0.27	-
SMB-2-11	1.49	37.3
SMB-2-12	-	-
SMB-2-13	-	3.43
SMB-2-14	-	-
SMB-2-15	-	29.6
South of SMB-2-15	-	-
Total	**96.7 (31% of total)**	**217 (69% total)**

4.2 Wet Weather – Lead

Wet weather load reductions attributable to the BMPs in Subwatershed 2-07 are quantified in **Table 14**. An 11 percent load reduction is estimated as a result of the modeled and non-modeled non-structural and structural BMPs. The target load reduction is 0 percent, so reasonable assurance has been demonstrated.

Table 14. Lead Modeling Results in SMB 2-07 Subwatershed, 2021

Compliance Monitoring Location	Average Load Reductions (% of baseline annual load)							TLR
	Non-Structural BMPs (Non-Modeled)	Public Retrofit Incentives + Redevelopment	Non-MS4	Regional BMPs	Distributed Green Streets BMPs	Distributed Implementation Level	Total Achieved	
SMB-2-07	5%	2%	0%	4%	0%	N/A	11%	0%

4.3 Debris

Compliance with the Debris TMDL will be met through a phased retrofit of all catch basins throughout the SMB EWMP area to meet each interim compliance deadline (20% load reduction per year between 2016 and 2019) as well as the final compliance deadline (100% load reduction) in 2020. Consistent with the City's Trash Monitoring and Reporting Plan (TMRP) (City of Los Angeles Department of Public Works, 2012), "vertical insert[s] with 5-mm openings and flow activated opening screen covers are the best suited for implementation within the City to achieve compliance with Trash TMDLs". Catch basins exempt from retrofitting are those that meet one or more of the following criteria:

- Catch basins within the service area of the Low-Flow Diversions (LFDs), and CDS units, as LFDs and CDS units are full capture devices;
- Catch basins that are not structurally feasible for installation of screen covers or inserts (e. g, catch basin curb faces less than 5 inches; catch basin depth less than 18 inches; catch basins located in hydraulic sump areas).

4.4 PCBs and DDTs

The Santa Monica Bay TMDL for DDTs and PCBs developed waste load allocations (WLAs) for stormwater throughout the Santa Monica Bay watershed. Because the SMB EWMP group area contribution is not distinctly defined in the TMDL, the WLAs assigned to the entire Santa Monica Bay watershed management area (WMA) as a whole are being used for this discussion. Table 6-3 in the TMDL lists the existing annual DDT and PCB loads as compared to the annual maximum allowable loads. The existing TMDL-estimated loads for all of Santa Monica Bay and most of the individual watersheds are lower than the maximum allowable loads. As such, the WLAs for the entire Santa Monica Bay WMA were set equal to the existing estimates of annual MS4 loads for DDTs and PCBs as 28 grams per year (g/yr) and 145 g/yr, respectively. Therefore, consistent with the TMDL, it is assumed that there is a zero required load reduction for PCBs and DDTs in MS4 discharges, and reasonable assurance is demonstrated. While DDTs and PCBs were not quantified here (and neither were any surrogate parameters, such as TSS), the TMDL WLA is zero load reduction for the MS4 permittees in this watershed. However, in spite of this zero required load reduction, the BMPs proposed in this EWMP are expected to reduce sediment and sediment-associated pollutants such as DDTs and PCBs, so the non-quantified but greater-than-zero anticipated BMP load reductions for DDTs and PCBs will exceed the TMDL WLA. Therefore, compliance with the TMDL-based permit limits for DDTs and PCBs has been demonstrated through this narrative RAA evaluation.

As part of the adaptive management process based on monitoring data collected through the approved CIMP, additional structural and/or non-structural BMPs may be proposed if needed. Additionally, if the loads are found to be higher than estimated, but still less than the maximum allowable loads, there may be potential for the WLA to be revised.

4.5 Dry Weather

Table 15 outlines the qualitative analysis conducted for 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 freshwater surface discharges to the surf zone during year-round dry weather days. Compliance with the SMBBB TMDL at SMB 2-14 is met by the lack of MS4 outfalls within that subwatershed, such that no MS4 discharges are possible (See Figure 23). Compliance with the SMBBB TMDL at SMB 2-15 is met through the observation of no non-stormwater, dry weather flows from the point zero CML. Reasonable assurance at SMB 2-12 and 3-9 is yet to be determined, pending the results of the non-stormwater outfall screening.

Since the dry weather compliance deadlines for the dry weather TMDL have passed, this analysis is provided for informational purposes only, and is not intended to support or justify a new compliance schedule, additional non-structural or structural BMPs, or an evaluation of whether any newly proposed BMPs will provide a dry weather benefit. The SMB EWMP Group's dry weather compliance approach is to eliminate 100 percent of non-exempt dry weather MS4 discharges through a combination of existing low flow diversions and a suite of new enhanced non-structural source controls (e.g., water conservation incentives, enhanced IDDE efforts, and enhanced education/outreach and inspection/enforcement to address sources of non-stormwater flow) and source investigations following dry weather outfall screening. By eliminating flows, this is equivalent to 100 percent load reduction for all pollutants, thereby demonstrating reasonable assurance of meeting all applicable Permit limitations during dry weather. Elimination of discharges is a pathway for compliance with RWLs and WQBELs in the MS4 permit (per section VI.E.2.e.i.(3)); without discharges there can be no "cause or contribute" to receiving water issues.

Table 15. Dry Weather RAA Evaluation

CML	Effective LFD at Beach?	WMG MS4 Outfall Absent?	Summer and Winter Dry Weather Anti-Degradation AED?	Non-Stormwater MS4 Discharges Absent?
SMB 2-1	Yes	Dry Weather RA Demonstrated		
SMB 2-2	Yes	Dry Weather RA Demonstrated		
SMB 2-3	Yes	Dry Weather RA Demonstrated		
SMB 2-4	Yes	Dry Weather RA Demonstrated		
SMB 2-5	Yes	Dry Weather RA Demonstrated		
SMB 2-6	Yes	Dry Weather RA Demonstrated		
SMB 2-7	Yes	Dry Weather RA Demonstrated		
SMB 2-8	Yes	Dry Weather RA Demonstrated		
SMB 2-9	Yes	Dry Weather RA Demonstrated		
SMB 2-10	Yes	Dry Weather RA Demonstrated		
SMB 2-11	Yes	Dry Weather RA Demonstrated		
SMB 3-1	Yes	Dry Weather RA Demonstrated		
SMB 3-2	Yes	Dry Weather RA Demonstrated		
SMB 3-3	Yes	Dry Weather RA Demonstrated		
SMB 3-4	Yes	Dry Weather RA Demonstrated		
SMB 2-13	Yes	Dry Weather RA Demonstrated		
SMB 3-5	Yes	Dry Weather RA Demonstrated		
SMB 3-6	Yes	Dry Weather RA Demonstrated		
SMB 3-7	Yes	Dry Weather RA Demonstrated		
SMB 3-8	Yes	Dry Weather RA Demonstrated		
SMB 2-14	No	Yes*	Dry Weather RA Demonstrated	
SMB 2-15	Yes**	Dry Weather RA Demonstrated		
SMB 2-12	No	No	No	Pending
SMB 3-9	No	No	No	Pending

*There are no documented MS4 storm drains within the SMB 2-14 subwatershed (See Figure 23).

** Although located approximately 0.75 miles from the beach, this LFD is upstream of the Chevron Facility, diverting all dry weather runoff from the EWMP Area into the El Segundo sewer collection system. Chevron, which operates under a separate stormwater permit, is not part of the Santa Monica Bay J23 EWMP Group. In addition, observations of the CML outfall consistently confirm that the outfall is buried under sand during dry weather. Observations made during the dry weather screening on February 10, 2014 also confirmed that no dry weather flows were present at the outfall.

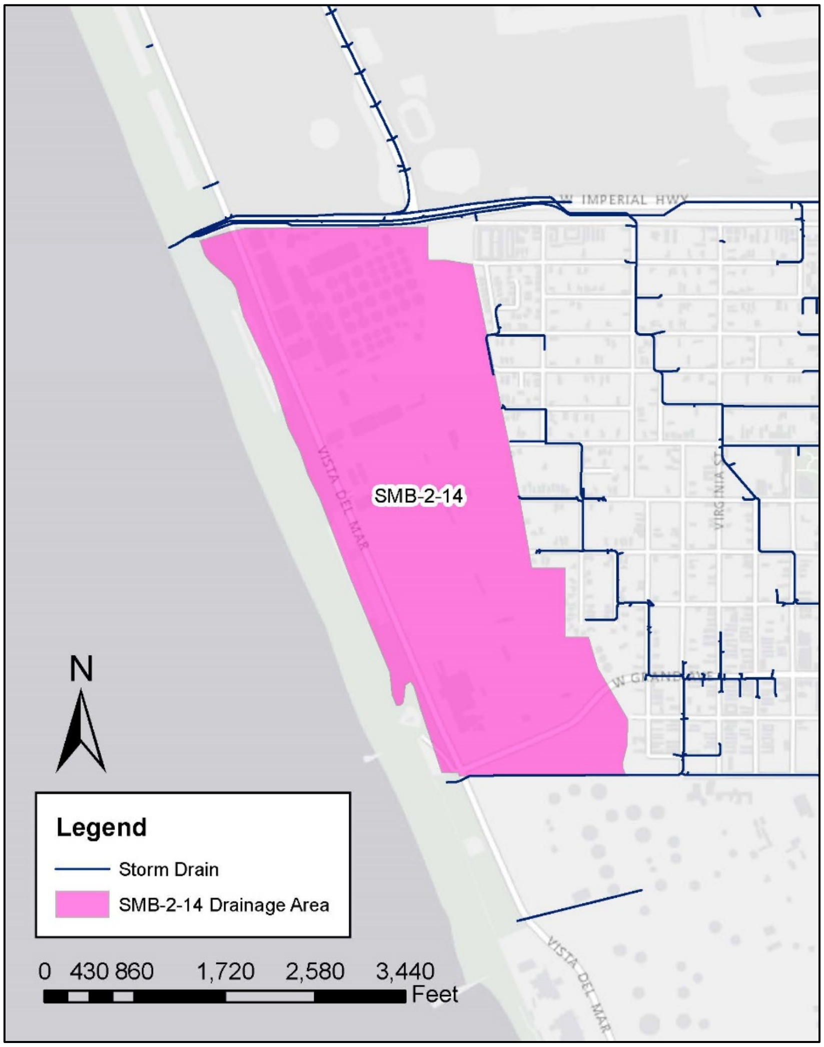

Figure 23. SMB-2-14 Drainage Area Storm Drain Analysis

4.6 Multiple Benefits

Not only is reasonable assurance demonstrated for the water quality objectives, but the proposed projects also provide multiple benefits beyond pollutant load reduction. Such benefits include:

- Neighborhood Greening
    1. Improved aesthetics
    2. Reduced heat-island effects
- Water Conservation/Supply
    1. Supplemental onsite local water supply

    2. Reduced reliance on potable water supply
- Groundwater Recharge
- Public Education/Awareness
    1. Visible projects distributed throughout SMB EWMP Group area
    2. Options for educational materials to be posted at construction and completed sites

Additionally, it can be estimated in the 1995 critical year that:

- About 95,000 acre-feet of rain falls on the watershed in an average year;
- Approximately one third of that rain becomes runoff from the watershed (33,500 acre-feet); and
- About 11 percent of that runoff is retained by the EWMP BMPs (3,500 acre-feet) on average within 1995.

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ATTACHMENT A

SUBWATERSHED DETAILS

Table A-1. Percentage of Subwatershed within each Jurisdiction

Subwatershed	Open Beach or Point Zero CML	County of Los Angeles	City of Los Angeles	City of Santa Monica	City of El Segundo
West of 2-01	N/A	95%	5.2%	0%	0%
SMB-2-01	Point zero	51%	49%	0%	0%
Between 2-01 and 2-02	N/A	0%	100%	0%	0%
SMB-2-02	Point zero	3.1%	97%	0%	0%
SMB-2-03	Open beach	0%	100%	0%	0%
SMB-2-04	Point zero	0%	100%	0%	0%
Between 2-04 and 2-06	N/A	0%	100%	0%	0%
SMB-2-05	Point zero	0%	100%	0%	0%
SMB-2-06	Point zero	0%	100%	0%	0%
Between 2-06 and 2-07	N/A	0%	100%	0%	0%
SMB-2-07	Open beach	0%	98%	2%	0%
Between 2-07 and 3-01	N/A	0%	50%	50%	0%
SMB-3-01	Point zero	0%	0%	100%	0%
Between 3-01 and 3-02	N/A	0%	0%	100%	0%
SMB-3-02	Point zero	0%	0%	100%	0%
SMB-3-03	Open beach	0%	0%	100%	0%
SMB-3-04	Point zero	0%	60%	40%	0%
SMB-3-09	Open beach	0%	0%	100%	0%
SMB-3-05	Point zero	0%	7%	93%	0%
SMB-3-06	Point zero	0%	35%	65%	0%
SMB-3-07	Point zero	0%	100%	0.3%	0%
SMB-3-08	Open beach	0%	100%	0%	0%
SMB-2-10	Point zero	0%	100%	0%	0%
Between 2-10 and 2-11	N/A	0%	100%	0%	0%
SMB-2-11	Point zero	0%	100%	0%	0%
SMB-2-12	Open beach	0%	100%	0%	0%
SMB-2-13	Point zero	0%	61%	0%	39%
SMB-2-14	Open beach	0%	88%	0%	12%
SMB-2-15	Point zero	0%	1%	0%	99%
South of 2-15	N/A	0%	0%	0%	100%

N/A = Not applicable as subwatershed does not directly reflect a single compliance monitoring location (CML).

ATTACHMENT B

SBPAT LAND USE EMCS

Table B-1. Proposed SBPAT EMCs for SMB EWMP Watersheds – Arithmetic Estimates of the Lognormal Summary Statistics (means with standard deviations in parentheses)[a]

Land Use	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	Diss Cu µg/L	Tot Cu µg/L	Tot Pb µg/L	Diss Zn µg/L	Tot Zn µg/L	Fecal Col. #/100mL
Single Family Residential	124.2 (184.9)	0.40 (0.30)	0.32 (0.21)	0.49 (0.64)	0.78 (1.77)	2.96 (2.74)	9.4 (9.0)	18.7 (13.4)	11.3 (16.6)	27.5 (56.2)	71.9 (62.4)	31,100[b] (94,200)
Commercial	67.0 (47.1)	0.40 (0.33)	0.29 (0.25)	1.21 (4.18)	0.55 (0.55)	3.44 (4.78)	12.3 (10.2)	31.4 (25.7)	12.4 (34.2)	153.4 (96.1)	237.1 (150.3)	51,600 (173,400)[c]
Industrial	219.2 (206.9)	0.39 (0.41)	0.26 (0.25)	0.6 (0.95)	0.87 (0.96)	2.87 (2.33)	15.2 (14.8)	34.5 (36.7)	16.4 (47.1)	422.1 (534.0)	537.4 (487.8)	3,760 (4,860)
Education (Municipal)	99.6 (122.7)	0.30 (0.17)	0.26 (0.2)	0.4 (0.99)	0.61 (0.67)	1.71 (1.13)	12.2 (11.0)	19.9 (13.6)	3.6 (4.9)	75.4 (52.3)	117.6 (83.1)	11,800[d] (23,700)
Transportation	77.8 (83.8)	0.68 (0.94)	0.56 (0.82)	0.37 (0.68)	0.74 (1.05)	1.84 (1.44)	32.40 (25.5)	52.2 (37.5)	9.2 (14.5)	222.0 (201.7)	292.9 (215.8)	1,680 (456)
Multi-Family Residential	39.9 (51.3)	0.23 (0.21)	0.20 (0.19)	0.50 (0.74)	1.51 (3.06)	1.80 (1.24)	7.40 (5.70)	12.1 (5.60)	4.5 (7.80)	77.5 (84.1)	125.1 (101.1)	11,800[e] (23,700)
Agriculture (row crop)	999.2 (648.2)	3.34 (1.53)	1.41 (1.04)	1.65 (1.67)	34.40 (116.30)	7.32 (3.44)	22.50 (17.50)	100.1 (74.8)	30.2 (34.3)	40.1 (49.1)	274.8 (147.3)	60,300 (153,000)
Vacant / Open Space	216.6 (1482.8)	0.12 (0.31)	0.09 (0.27)	0.11 (0.25)	1.17 (0.79)	0.96 (0.9)	0.60 (1.90)	10.6 (24.4)	3.0 (13.1)	28.1 (12.9)	26.3 (69.5)	484[f] (806)

[a] EMC statistics are calculated based on 1996-2000 data for Los Angeles County land use sites (Los Angeles County, 2000), except for agriculture which are based on Ventura County MS4 EMCs (Ventura County, 2003) and fecal coliform which are based on 2000-2005 SCCWRP Los Angeles region land use data (SCCWRP, 2007b). These EMC datasets are summarized in the SBPAT User's Guide (Geosyntec, 2012).

[b] The fecal coliform EMC for the single-family residential land use is based on SCCWRP dataset for "low-density residential."

The default log distribution best fit summary statistics for this land use-pollutant combination produced an unreasonably high deviation, therefore

[c] the arithmetic estimate of the log mean was held constant while the log summary statistics were recomputed based on the log CoV for SFR (SCCWRP's LDR EMC)

[d] Multi Family Residential EMC used since educational land use site not available in the SCCWRP fecal coliform dataset.

[e] The fecal coliform EMC for the multi-family residential land use is based on SCCWRP dataset for "high-density residential."

[f] Open space fecal coliform EMC statistics based on *E. coli* data (divided by 0.85 to adjust to fecal coliform) for Arroyo Sequit reference watershed, or 11 samples collected between December 2004 and April 2006. Data used by Regional Board for Santa Clara River Bacteria TMDL and taken from (SCCWRP, 2005) and (SCCWRP 2007a).

Table B-2. Data Summary for SBPAT Default LA County Land Use EMC Datasets[a]

Land Use		TSS	TP	DP	NH3	NO3	TKN	Diss Cu	Tot Cu	Tot Pb	Diss Zn	Tot Zn	Fecal Col.
Commercial	Count	31	32	33	33	33	36	40	40	40	40	40	5
	% ND	0%	3%	3%	21%	21%	3%	15%	0%	45%	10%	0%	20%
Industrial	Count	53	55	56	57	56	57	61	61	61	61	61	6
	% ND	0%	5%	9%	19%	5%	0%	15%	0%	43%	7%	0%	0%
Transportation	Count	75	71	71	74	75	75	77	77	77	77	77	2
	% ND	0%	1%	4%	27%	20%	0%	1%	0%	52%	6%	0%	0%
Education	Count	51	49	49	52	51	51	54	54	54	54	54	NA
	% ND	0%	0%	2%	35%	24%	0%	19%	0%	76%	39%	9%	NA
Multi-Family Residential	Count	45	38	38	46	46	50	54	54	54	54	54	7
	% ND	2%	3%	3%	24%	26%	0%	37%	7%	72%	41%	9%	0%
Single Family Residential	Count	41	42	42	44	43	46	48	48	48	48	48	4
	% ND	0%	0%	0%	16%	30%	0%	40%	4%	52%	81%	44%	0%
Agriculture (row crop)	Count	20	18	18	21	19	17	18	21	21	21	21	5
	% ND	0%	0%	0%	0%	5%	0%	0%	0%	0%	10%	0%	0%
Vacant / Open Space	Count	48	46	44	48	50	50	52	52	57	52	52	11
	% ND	2%	41%	57%	67%	2%	0%	90%	38%	88%	96%	77%	0%

[a] EMC data are based on 1996-2000 data for Los Angeles County land use sites (Los Angeles County, 2000), except for agriculture which are based on Ventura County MS4 EMCs (Ventura County, 2003) and fecal coliform which are based on 2000-2005 SCCWRP Los Angeles region land use data (SCCWRP, 2007b). These EMC datasets are summarized in the SBPAT User's Guide (Geosyntec, 2012). Open space fecal coliform EMC based on 2004-2006 SCCWRP data for Arroyo Sequit reference watershed, taken from (SCCWRP, 2005) and (SCCWRP 2007a).

ATTACHMENT C

SBPAT BMP EFFLUENT DATA

Table C-1. Summary of Number of Data Points and Percent Non-Detects for BMP Effluent Concentration Data from the International BMP Database

BMP		TSS	TP	DP	NH3	NO3	TKN	DCu	TCu	TPb	DZn	TZn	FC
Bioretention	Count	193	249	164	184	259	201	NA	39	48	15	48	29
	%ND	10%	5%	4%	18%	3%	2%	NA	18%	60%	0%	35%	0%
Vegetated Swales (Bioswales)	Count	354	364	249	225	372	324	82	309	308	72	373	92
	%ND	1%	1%	0%	17%	1%	0%	4%	3%	39%	6%	23%	0%
Hydrodynamic Separators (not updated - original SBPAT analysis, 2008)	Count	199	170	58	69	59	77	89	99	95	99	174	31
	%ND	7%	3%	33%	28%	3%	5%	17%	0%	8%	18%	7%	3.2%
Media Filters	Count	409	403	244	215	391	374	186	361	341	221	433	185
	%ND	7%	6%	14%	24%	2%	6%	7%	12%	21%	19%	13%	0%
Detention Basins	Count	299	275	116	94	213	185	170	198	209	163	189	190
	%ND	1%	3%	16%	6%	7%	4%	32%	31%	50%	17%	15%	0%
Retention Ponds	Count	723	654	618	423	626	496	213	536	646	212	593	137
	%ND	4%	3%	6%	8%	6%	3%	26%	21%	30%	15%	7%	0%
Wetland Basins/Retention Ponds (combined)	Count	1028	932	862	681	872	680	228	684	767	227	770	158
	%ND	4%	3%	6%	7%	7%	2%	25%	20%	28%	14%	8%	0%

Table C-2. International BMP Database Arithmetic Mean Estimates of BMP Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu µg/L	TCu µg/L	TPb µg/L	DZn µg/L	TZn µg/L	FC #/100 mL
Constructed Wetland / Retention Pond (with Extended Detention)[1]	38.3	0.19	0.11	0.18	0.42	1.20	5.3	6.7	7.2	22.1	35.3	1.01E+04
Constructed Wetland / Retention Pond (without Extended Detention)[2]	32.9	0.17	0.09	0.17	0.38	1.20	5.3	6.2	12.0	22.6	38.0	9.89E+03
Dry Extended Detention Basin[3]	42.3	0.37	0.26	0.16	0.61	2.40	6.5	11.4	14.4	33.7	78.4	1.41E+04
Hydrodynamic Separator[4]	98.1	0.50	0.06	0.30	0.67	2.07	13.1	16.7	12.7	78.4	107.4	2.68E+04
Media Filter[5]	22.3	0.14	0.07	0.18	0.74	0.98	8.3	11.0	4.6	34.7	37.6	5.89E+03
Sub-surface Flow Wetland[6]	18.1	0.06	0.06	0.09	0.27	0.87	4.6	4.6	0.7	20.9	25.8	PR=90%
Treatment Plant[7]	2.0	0.00	0.00	0.00	0.27	0.01	1.0	1.0	4.4	5.0	5.0	2.00E+00
Vegetated Swale (Bioswale)[8]	27.1	0.28	0.17	0.09	0.43	0.87	9.6	10.1	6.4	33.3	33.3	8.00E+04
Bioretention[9]	18.1	0.14	0.07	0.18	0.37	0.98	8.3	8.8	4.2	34.7	37.6	5.89E+03
Bioretention w/o underdrain	Volume reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

[1] Based on retention pond IBD category (basis per Geosyntec 2008)
[2] Based on combined wetland basin and retention pond IBD categories (basis per Geosyntec 2008)
[3] Strictly detention basin category from the IBD
[4] From Geosyntec, 2008
[5] Includes non-bio media filters (e.g., sand filters)
[6] Lowest of all IBD categories; except for Fecal Coliform where 90% removal is used. The 90% removal is based on USEPA, 1993, which states that SSF wetlands are generally capable of a 1 to 2 log reduction in fecal coliforms.
[7] Secondary Drinking Water Standards or Minimum of all BMP types, whichever is less
[8] Strictly from vegetated swale category from the IBD
[9] Effluent quality assigned to treated underdrain discharge is based on the better performing characteristics of the "media filter" and "bioretention" categories for each pollutant.

Table C-3. International BMP Database Arithmetic Standard Deviations of BMP Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu µg/L	TCu µg/L	TPb µg/L	DZn µg/L	TZn µg/L	FC #/100 mL
Constructed Wetland / Wetpond (with Extended Detention)	76.80	0.253	0.357	0.234	0.787	0.688	4.288	9.710	12.96	42.46	61.96	3.23E+04
Constructed Wetland / Wetpond (without Extended Detention)	71.14	0.228	0.313	0.375	0.750	0.848	4.196	8.849	123.0	41.88	85.57	3.08E+04
Dry Extended Detention Basin	87.36	0.673	0.439	0.183	1.173	5.029	6.656	19.96	56.01	64.68	137.9	4.15E+04
Hydrodynamic Separator	236.5	1.237	0.093	0.880	1.198	3.737	11.98	11.98	25.70	137.4	137.4	2.16E+05
Media Filter	40.73	0.168	0.099	0.382	0.852	1.213	13.75	17.20	10.02	142.2	100.3	1.27E+04
Sub-surface Flow Wetland	30.66	0.145	0.088	0.145	0.552	0.594	3.504	3.504	1.845	142.2	17.16	5.37E+02
Treatment Plant	2.00	0.003	0.003	0.006	0.552	0.030	3.000	3.000	10.97	15.00	15.00	1.00E+00
Vegetated Swale (Bioswale)	35.12	0.311	0.239	0.145	0.905	0.872	7.749	9.429	15.36	28.49	34.86	1.19E+06
Bioretention	30.66	0.168	0.099	0.382	0.552	1.213	13.75	11.12	4.84	100.3	100.3	1.27E+04
Bioretention w/o underdrain	Volume reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

Table C-4. International BMP Database Arithmetic Irreducible of BMP Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu µg/L	TCu µg/L	TPb µg/L	DZn µg/L	TZn µg/L	FC #/100 mL
Constructed Wetland / Wetpond (with Extended Detention)	1.358	0.034	0.010	0.019	0.011	0.499	1.387	1.387	0.429	1.000	2.933	4
Constructed Wetland / Wetpond (without Extended Detention)	1.300	0.030	0.009	0.012	0.010	0.520	1.267	1.267	0.400	1.075	3.000	5.4
Dry Extended Detention Basin	5.460	0.089	0.523	0.336	0.026	3.650	1.153	1.274	0.435	8.396	8.396	19.6
Hydrodynamic Separator	5.543	0.023	0.172	0.014	1.299	3.576	3.340	3.340	1.351	17.793	17.793	3295
Media Filter	1.487	0.026	0.010	0.013	0.064	0.210	0.995	1.298	0.372	1.000	2.000	13.1
Sub-surface Flow Wetland	1.268	0.025	0.006	0.009	0.008	0.141	1.000	1.000	0.089	1.000	2.933	4
Treatment Plant	0.500	0.001	0.001	0.001	0.008	0.001	0.100	0.100	0.255	0.500	0.500	1
Vegetated Swale (Bioswale)	2.000	0.079	0.040	0.009	0.056	0.141	2.708	2.708	0.434	5.720	5.720	9.53E+04
Bioretention	1.605	0.026	0.010	0.013	0.050	0.210	0.995	1.524	0.836	1.000	2.000	13.1
Bioretention w/o underdrain	Volume reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

ATTACHMENT D

EXAMPLE RAA CALCULATIONS

Example TLR Calculations

To better illustrate the TLR calculation process, the following example scenario was developed for compliance monitoring location (CML) 2-11 for TMDL year 1995.

Steps 1-2: Calculate the exceedance frequency and allowable discharge days

The monitoring data in the receiving water of the subwatershed draining to CML 2-11 was evaluated for exceedances of the TMDL FIB limits over all samples and only samples taken during days with precipitation greater than 0.1 inches. To determine the allowable discharge days for 2-11, the 17 TMDL allowable exceedance days was divided by the exceedance frequency of samples taken during days with precipitation greater than 0.1 inches. The results of this analysis are shown in the table below.

Historical Exceedance Frequency (All events)	Historical Exceedance Frequency (Daily rainfall > 0.10")	Allowable Discharge Days (Based on exceedance frequency with daily rainfall > 0.10")
23%	48%	36

Steps 3-4: Model the subwatershed in SWMM5 and size a retention BMP to only bypass during the allowable discharge days

The subwatershed was modeled in SWMM5 and resulted in 46 discharge days (i.e., midnight – midnight 24-hour periods where discharge occurred). To reduce the baseline 46 discharge days to the allowable 36 discharge days, the diversion flowrate to a hypothetical retention BMP was iteratively sized until these two numbers were equal. This process resulted in a retention BMP with a diversion flowrate of 52 cubic feet per second (cfs).

Steps 5-8: Model the hypothetical retention BMP and the baseline condition in SBPAT and compare the FC loads to determine the TLR

The baseline condition for the 2-11 subwatersheds and the hypothetical retention BMP with a diversion flowrate of 52 cfs were modeled in SBPAT for the TMDL year 1995. The table below shows the results of this modeling.

Average MS4 Baseline FC Load (10^12 MPN)	Average FC Load assuming hypothetical retention BMP (10^12 MPN)	MS4 Baseline FC Load Reduced (10^12 MPN)	% MS4 Baseline FC Load Reduced
465	378	87	19%

Example BMP Performance

As discussed in the SMB EWMP RAA Memo, BMPs were modeled in SBPAT in order to demonstrate a reasonable assurance of achieving the estimated target load reductions for each subwatershed. Modeled BMPs included programmatic, distributed, and regional BMPs, as discussed in Section 3 of the RAA Memo. Although a variety of BMPs are modeled in SBPAT, the different BMPs achieve pollutant load reduction via one of two primary methods: volume loss (e.g., via capture and use, infiltration, and/or evapotranspiration) or volume treatment (e.g., via filtration). Both types of BMPs were modeled as part of the SMB EWMP.

An example of daily influent and effluent[10] BMP performance results is provided here for a flow-through based BMP and an infiltration-based BMP for the 90th percentile critical year (1995). Flow volume, pollutant concentration, and load results were generated from the quantification analysis component of the SBPAT model, which:

- Calculates and tracks inflows to BMPs, treated discharge, bypassed flows, evaporation, and infiltration at each 10 minute time step;
- Distinguishes between individual runoff events by defining six-hour minimum inter-event time in the rainfall record, yet tracks inter-event antecedent conditions;
- Tracks volume through BMPs and summarizes and records these metrics by storm event; and
- Produces a table of each BMP's hydrologic performance, including concentration and load metrics by storm event, and consolidates these outputs on an annual basis.

Figure D-1 shows the modeled influent and effluent fecal coliform results for the flow-through distributed green streets BMPs, which are proposed to treat flows from 60 percent of single family residential and commercial land uses in the SMB-3-04 subwatershed (See Section 4.1). Similarly, Figure D-2 shows the modeled influent and effluent fecal coliform results for the infiltration-based regional BMP at Memorial Park, which is proposed to treat flows from the SMB-3-04 subwatershed (See Section 3.5.7). Fecal coliform is the controlling pollutant for the subwatershed shown in this example.

The flow-through BMP example (Figure D-1) demonstrates that pollutant load reduction here is primarily achieved through concentration reduction (i.e., treatment), with minor contribution from volume reduction (the only volume loss is due to soil storage and evapotranspiration). The infiltration-based BMP example (Figure D-2) demonstrates that pollutant load reduction here is primarily due to volume reduction achieved through infiltration (which completely removes this

[10] Effluent results are a combination of treated BMP effluent and untreated bypass for each BMP. The determination of what flows are treated and what flows are bypassed is a function of BMP design parameters, rainfall-runoff patterns, and antecedent conditions.

water volume and associated pollutant mass). In these figures, concentrations are shown as zero when there is no volume (for example, when influent is completely infiltrated for a storm such that there is no effluent discharge from the BMP).

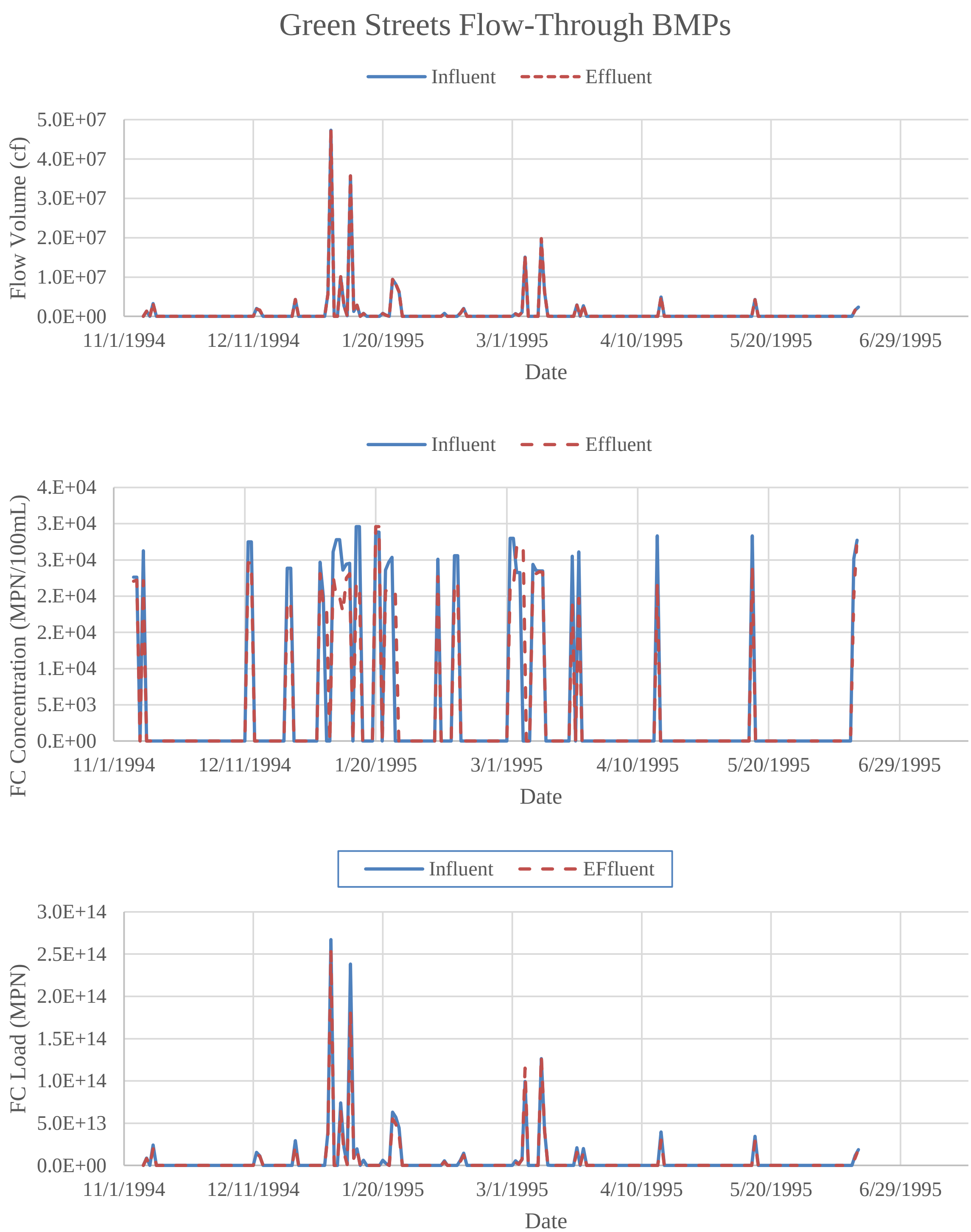


Figure D-1. Time-Series Results of Flow-Through Distributed Green Streets BMPs Proposed for the SMB-3-04 Subwatershed

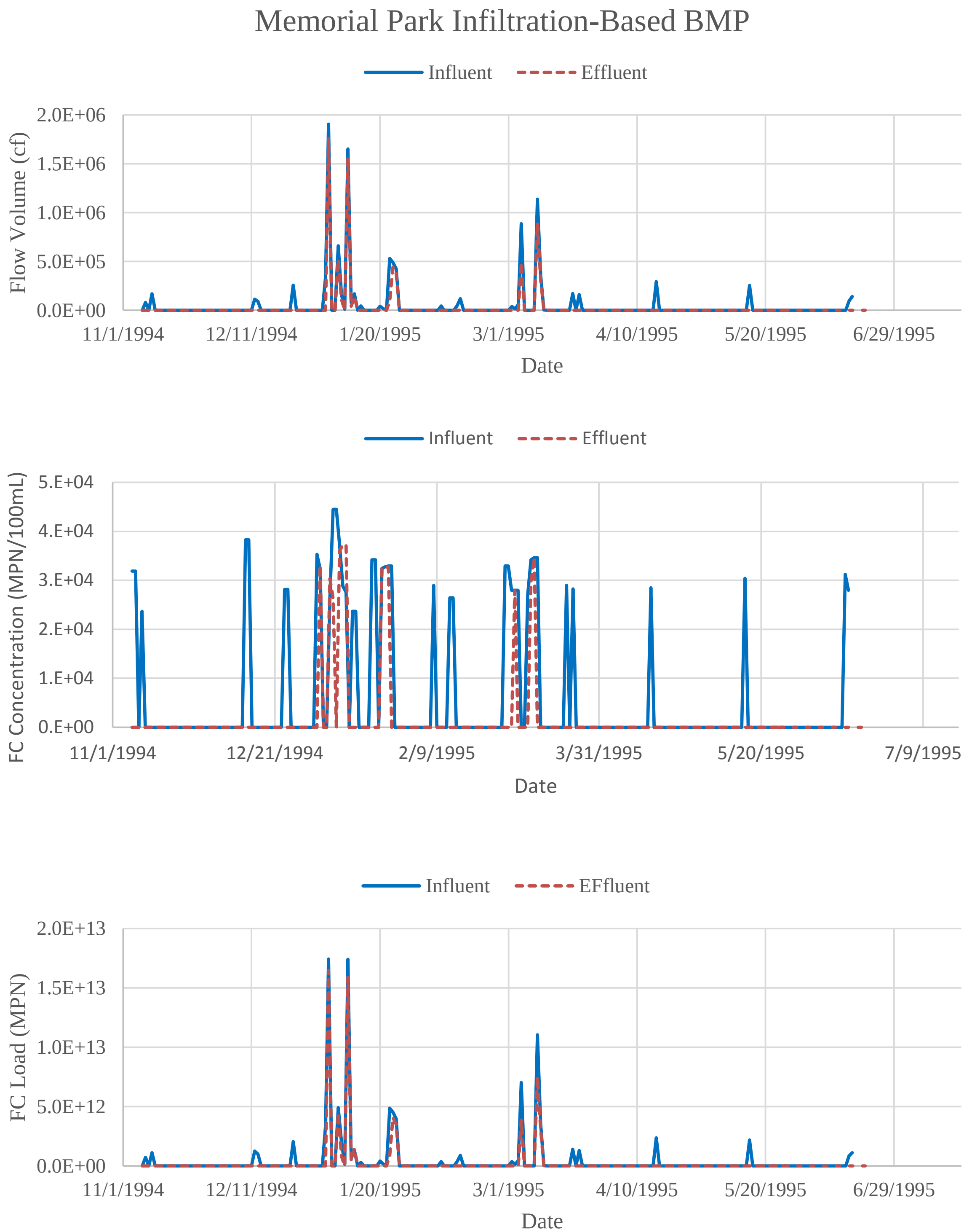


Figure D-2. Time-Series Results of Infiltration-Based Regional BMP Proposed for the SMB-3-04 Subwatershed

Example Compliance Demonstration

Figure D-3 provides an example illustration of the volume, pollutant load, and pollutant concentration reductions achieved by the total combination of existing and proposed structural and non-structural BMPs in the SMB EWMP Area. On the far left side of Figure D-3, the modeled runoff volume, fecal coliform load, and fecal coliform concentration for the baseline condition in the SMB-3-04 subwatershed are presented. Moving to the right along the x-axis of Figure D-3, each set of bars demonstrates the cumulative effectiveness of the various BMP types on effluent volume, concentration, and load. For example, since a 5 percent pollutant load and concentration reduction is assumed for the non-modeled programmatic BMPs in the SMB EWMP Area, the second set of bars demonstrates a 5 percent reduction in fecal coliform concentration and load, while the runoff volume remains unchanged. Moving to the next set of bars, the cumulative effect of the public retrofit incentives and redevelopment BMPs results in a slight reduction in runoff volume, fecal coliform concentration, and fecal coliform load. Existing and proposed structural and non-structural BMPs implemented prior to the interim compliance date (2018) are represented to the left of the vertical black line in the figure, while the BMPs implemented after the interim compliance date and prior to the final compliance year (2021) are presented to the right of this vertical line.

For the SMB-3-04 subwatershed, the example demonstrates that the estimated allowed load (i.e., the baseline load minus the target load reduction) is achieved during the critical year by the cumulative effect of the modeled BMPs, as described in Section 4. Programmatic BMPs, public incentives and redevelopment, existing/planned BMPs, and proposed BMPs are all expected to reduce runoff volume, fecal coliform concentrations, and fecal coliform loads compared to existing (baseline) conditions, with the largest percent concentration and load reduction achieved by the proposed BMPs.

The order of the BMPs in Figure D-3 does not represent a proposed schedule or suggested order of implementation, but is provided as an example to demonstrate how all BMPs collectively achieve pollutant load reduction until compliance demonstration is achieved (i.e., when the target load reductions are met or exceeded by the modeled BMP load reductions).

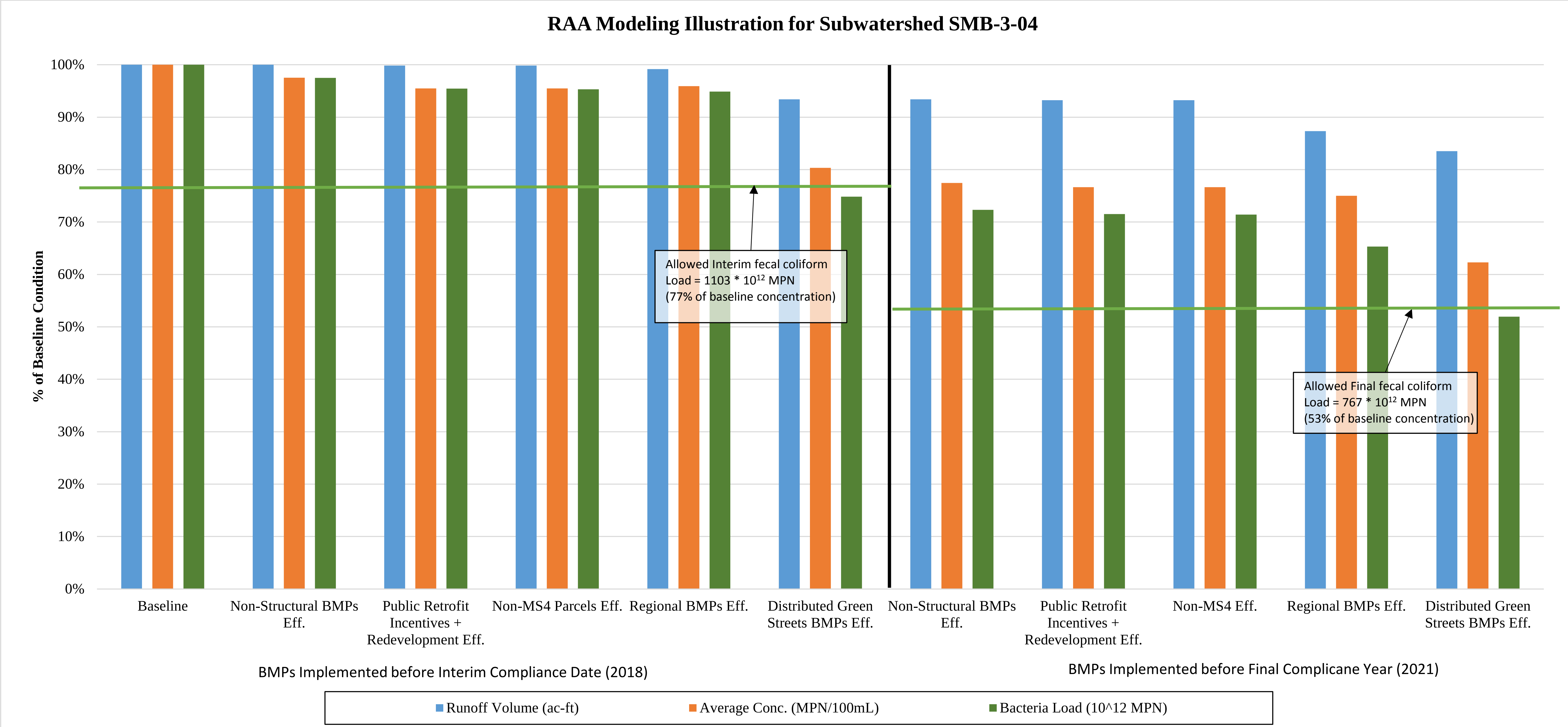


Figure D-3. RAA Modeling Example Illustration: Total Annual Volumes, Annual Average Concentrations, and Total Annual Loads Shown for Multiple Modeled BMP Scenarios for the Interim and Final Compliance Deadlines

ATTACHMENT E

LOAD REDUCTIONS ATTRIBUTABLE TO REGIONAL BMP

Table E-1. Existing, Planned, and Proposed Regional BMP Fecal Coliform Load Reductions

Subwatershed	Modeled Regional/Centralized BMP ID	Lead Agency	BMP Status	Load Reduction Credit Applied (Proposed Implementation Deadline) 2018 (Interim Compliance Deadline)	2021 (Final Compliance Deadline)	Average Load Reductions (% of subwatershed baseline annual load)
2-02	RBMP20_SantaYnez	Los Angeles	Planned		X	4%
	RBMP23_2-2ParkingLot	Los Angeles	Proposed		X	0.08%
2-06	RBMP08_Temescal	Los Angeles	Planned		X	8%
2-07	RBMP47_RivieraLg85	Los Angeles	Planned	X		15%
	RMBP40b_RivieraBarrancaSW	Los Angeles	Proposed		X	26%
	RBMP17_Mandeville	Los Angeles	Planned		X	2%
	RBMP43_OldOakRd	Los Angeles	Existing	X		2%
	RBMP48_Rustic85	Los Angeles	Proposed		X	0.7%
3-01	RBMP30_GooseEggPark	Santa Monica	Proposed		X	2%
	RBMP31_RooseveltElem	Santa Monica	Proposed	X		13%
	RBMP29_SanVicenteMedian	Santa Monica	Proposed		X	8%
3-02	RBMP32_ReedPark	Santa Monica	Proposed	X		13%
	RBMP33_LincolnMiddleSch	Santa Monica	Proposed		X	5%
3-03	RBMP16a_CleanBeachesPier	Santa Monica	Planned	X		46%
3-04	RBMP44_Brentwood85	Los Angeles	Planned		X	1%
	RBMP51_Memorial85	Santa Monica	Proposed		X	3%
	RBMP52_SMCivicAud85	Santa Monica	Proposed		X	1%
	RBMP16b_CleanBeachesPK	Santa Monica	Planned		X	0.01%
	RBMP11_LosAmigos	Santa Monica	Proposed		X	1%
	RBMP53_SMHSBuilt	Santa Monica	Existing	X		0.5%
3-05	RBMP37_3-5ParkingLot	Santa Monica	Proposed	X		79%
3-06	RMBP38_OlympicHigh	Santa Monica	Proposed		X	3%
	RBMP13_Ozone	Santa Monica	Proposed	X		4%
	RBMP10_PenmarPh2*	Los Angeles	Planned	X		0.6%
	RMBP39_WillRodgersElem	Santa Monica	Proposed		X	3%
3-07	RBMP01b_GrandBlvdIMF	Los Angeles	Existing	X		4%
	RBMP21b_GrandBlvdIIMF	Los Angeles	Existing	X		5%
	RBMP03_Westminster	Los Angeles	Existing	X		0.06%
	RBMP45_Oakwood85	Los Angeles	Planned		X	0.6%
3-09	RBMP18_CrescentBay	Los Angeles	Proposed	X		39%
2-11	RBMP19_WestchesterPark	Los Angeles	Planned		X	17%
	RBMP09_WestchesterLAX	Los Angeles	Planned		X	22%
2-13	RBMP02_ImperialHwy	El Segundo	Existing	X		0.02%
	RBMP42_ImperialStrip	El Segundo	Planned	X		32%
	RBMP50_Recreation85	El Segundo	Proposed	X		3%
2-15	RBMP49_PumpStationB85	El Segundo	Proposed	X		31%

*The incremental load reduction between Penmar Phase I (existing) and Penmar Phase II (planned) is negligible. Therefore, the full load reduction applicable to Penmar Phase II has been applied to the interim compliance deadline/target.

APPENDIX B

CONCEPT REPORT

1 Regional EWMP Projects

The Santa Monica Bay (SMB) Enhanced Watershed Management Program (EWMP) will include regional EWMP projects that retain and infiltrate or beneficially reuse all stormwater runoff from the 85^{th}-percentile, 24-hour storm event for the drainage area tributary to the project. Through an extensive screening process and coordination with the SMB EWMP Group (Group), eight (8) proposed regional EWMP project sites were selected for conceptual design for inclusion in the EWMP plan. Best Management Practice (BMP) types have been selected and sized for each of the eight sites. Based on the conceptual designs, preliminary cost estimates were developed.

The location and BMP type of the eight proposed regional EWMP projects are summarized in **Table 1-1** and **Figure 1** shows the location of the projects within the SMB EWMP Group area.

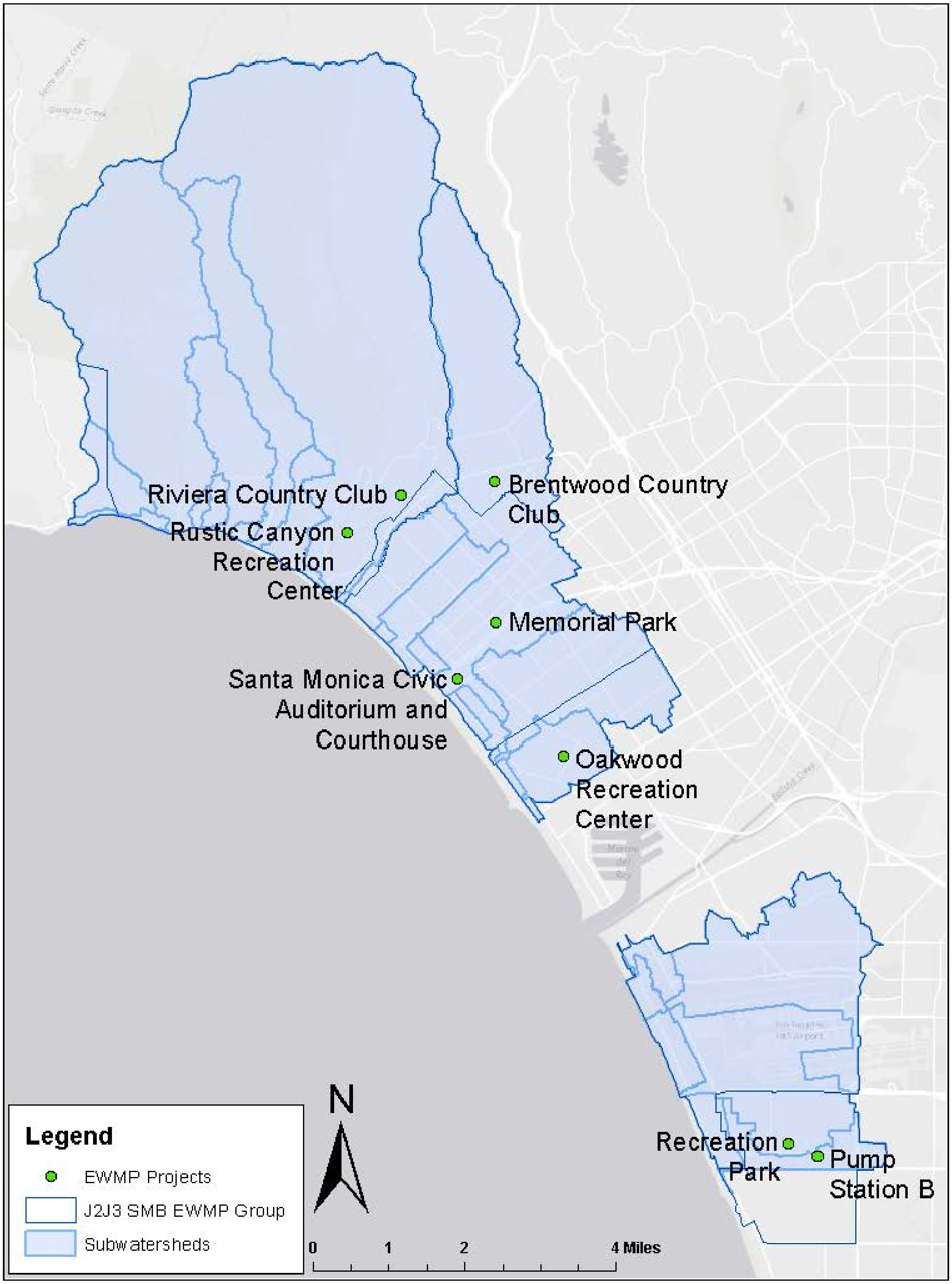
Table 1-1
Summary of Regional EWMP Projects

Regional EWMP Project	BMP Type	Jurisdiction	Address / Location
Brentwood Country Club	Storage, Use, and infiltration	City of Los Angeles	590 S Burlingame Ave Los Angeles, CA 90049
Oakwood Recreation Center	Storage and Use	City of Los Angeles	767 California Ave Venice, CA 90291
Riviera Country Club	Storage, Use, and infiltration	City of Los Angeles	1250 Capri Dr Pacific Palisades, CA 90272
Rustic Canyon Recreation Center	Subsurface Infiltration	City of Los Angeles	601 Latimer Rd Santa Monica, CA 90402
Line B Pump Station	Surface Infiltration	City of El Segundo	201-223 Center St El Segundo, CA 90245
Recreation Park	Subsurface Infiltration	City of El Segundo	401 Sheldon St El Segundo, CA 90245
Memorial Park	Storage and Use	City of Santa Monica	1401 Olympic Boulevard Santa Monica, CA 90404
Santa Monica Civic Auditorium and Courthouse	Subsurface Infiltration	City of Santa Monica	1855 Main Street, Santa Monica, CA 90401

1.1 PROJECT DESIGN CRITERIA

A conceptual level design was developed for each of the regional EWMP projects that include the selection of BMP type, preliminary sizing, configuration, and diversion pipeline alignment. Based on discussions with the Group and industry standards, the criteria and assumptions presented provided the basis for the conceptual designs. During the actual design and implementation phase of the projects, these assumptions should be reevaluated.

Figure 1
Regional EWMP Project Locations



Per Los Angeles' MS4 Permit requirements, all projects were sized to retain and infiltrate the 85th-percentile, 24-hour storm event for the drainage area tributary to the project (Regional Board, 2012). Where feasible, BMPs were configured within the site's open areas to avoid removal of trees and existing facilities. Based on discussions with the Group, the following BMP types were selected:

Surface Infiltration

- Line B Pump Station

Subsurface Infiltration

- Santa Monica Civic Auditorium and Courthouse
- Recreation Park
- Rustic Canyon Recreation Center

Storage, Irrigation Use, & Infiltration

- Brentwood Country Club
- Oakwood Recreation Center
- Riviera Country Club
- Memorial Park

The surface infiltration facility (Line B Pump Station) is an existing detention basin that will be converted by removing the concrete lining at the bottom of the basin to allow infiltration. Based on discussions with and recommendations from the Greater Los Angeles County Vector Control District, a 96-hour drawdown time was selected for vector control. To eliminate this constraint, a floating cover is recommended to allow the use of the full depth available.

Subsurface infiltration facilities were sized to infiltrate the 85th-percentile, 24-hour storm volume. Storage facilities were sized to store the 85th-percentile, 24-hour storm volume. For the purposes of cost estimating, 60-inch perforated aluminized steel type II corrugated metal pipe (CMP) was selected as the system for subsurface infiltration BMPs and storage BMPs. Subsurface infiltration CMP systems are also assumed to use backfill with 40% porosity that contributes to the total BMP volume.

Diversion pipelines were selected to pull from nearby, upstream existing storm drains to deliver the 85th-percentile, 24-hour storm volume to the site by gravity. For the purposes of cost estimating, diversion pipelines were assumed to be constructed of reinforced concrete pipe (RCP). The preliminary alignments of diversion pipelines were selected to utilize streets and avoid crossing major obstacles (e.g. open channels, railways, highways). A diversion structure would be constructed at the point of diversion to deliver the 85th-percentile, 24-hour storm volume to the site and allow higher flows to bypass into the existing storm drain infrastructure. For the conceptual cost estimate, pretreatment is based on CDS Hydrodynamic Separation systems (Contech, 2015).

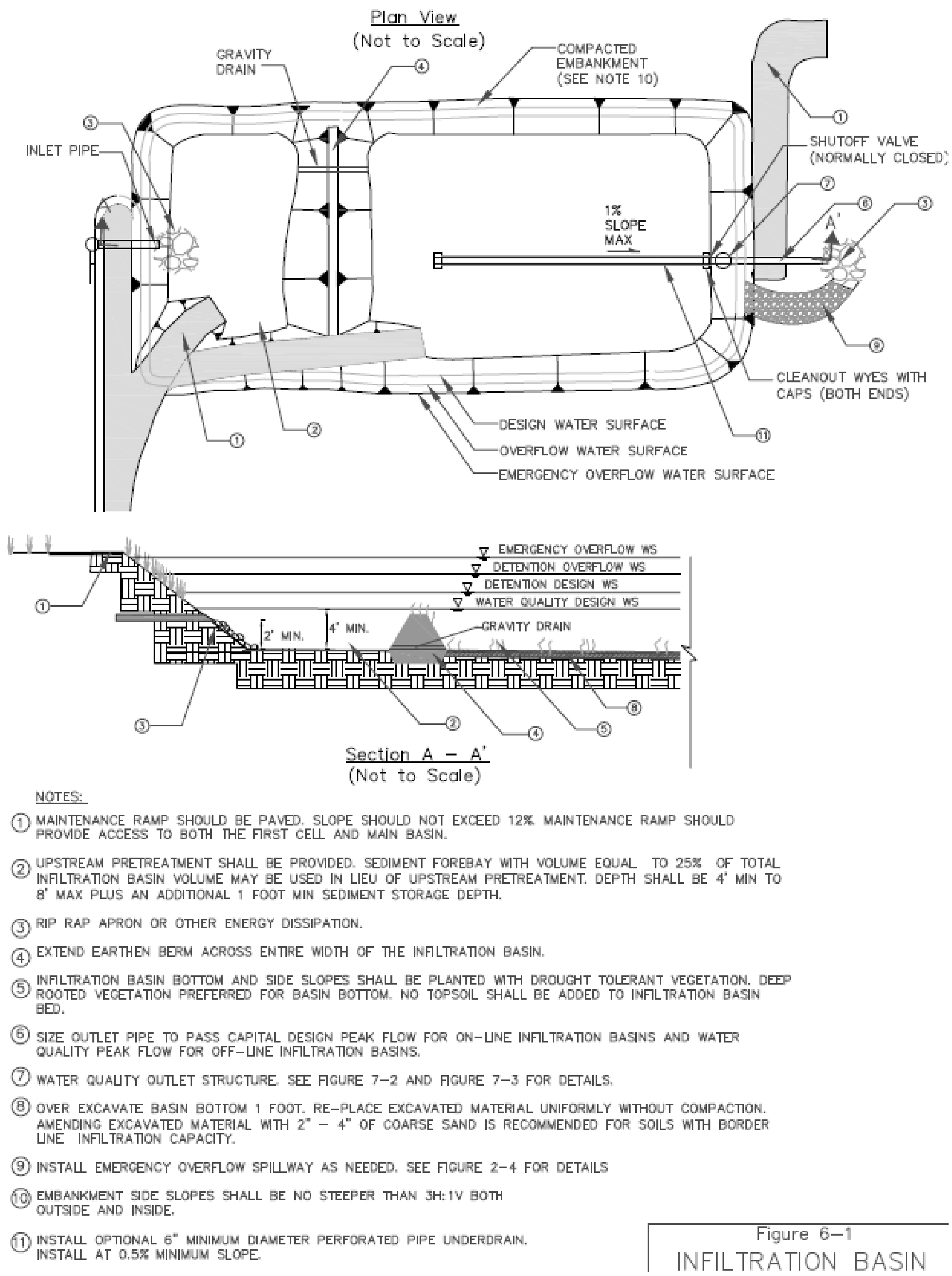
1.2 PROJECT COMPONENTS

The regional EWMP projects consist of surface infiltration basins, subsurface infiltration systems, and storage facilities. Each of the projects will include a diversion pipe to deliver water to the site from existing storm drains. Additionally, each site will include educational components and low impact development (LID) components to provide multi-benefit features to the projects. Major components of the conceptual projects are discussed below.

1.2.1 Surface Infiltration Basins

Surface infiltration basins will consist of retention basins designed to allow for infiltration of stormwater into the subsurface. The major construction components of surface infiltration basins include excavation, earthwork, inlets/outlets, and energy dissipation (e.g., riprap). Surface infiltration basins are sized to provide a 96-hour drawdown time, following vector control recommendations, based on the underlying soils potential to infiltrate. Drawdown time governs the maximum depth of the basin and, consequently, the footprint of the basin. Drawdown time can be increased if additional vector control options are considered. An example schematic of an infiltration basin is shown in **Figure 2** (LACDPW, 2009).

Figure 2
Conceptual Infiltration Basin Schematic (LACDPW, 2009)

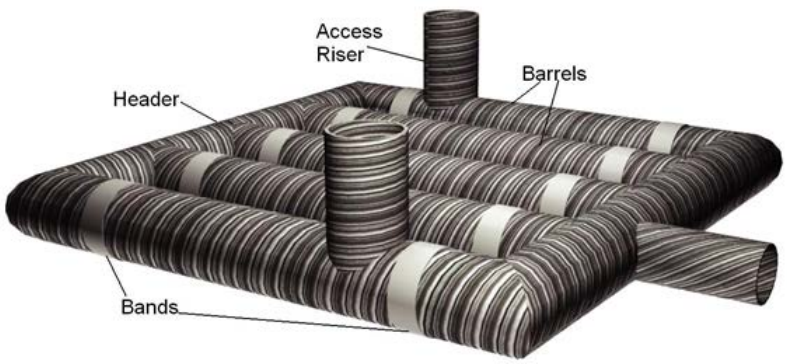


1.2.2 Subsurface Infiltration Systems

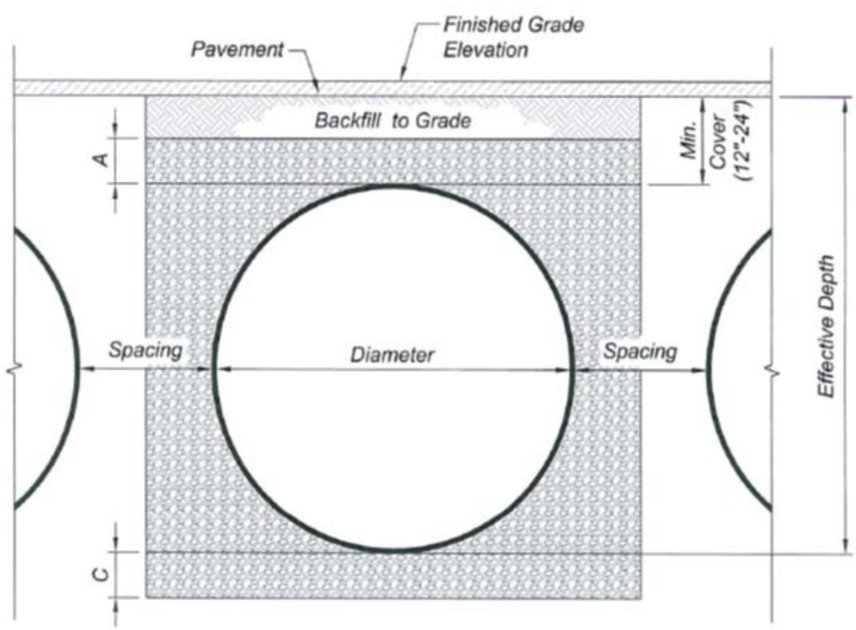
Subsurface infiltration basins consist of underground storage systems designed to infiltrate stormwater into subgrade soils. Subsurface infiltration basins require structures to be placed underneath the site and backfilled to the existing site grade. Such structures are available in a variety of sizes and material types, including plastic, concrete, and metal. For the purposes of cost estimating, 60-inch CMP was assumed as the subsurface infiltration structure material type. Based on discussions with the manufacturer, the subsurface infiltration basin can be configured in a variety of shapes to match site requirements. A diversion pipe would convey stormwater to CMP headers for distribution through the subsurface infiltration basin. Access risers will be provided for operations and maintenance. Design considerations include vector control, such as sealed lids to restrict insect access. An example concept of subsurface infiltration using CMP is depicted in **Figure 3** (Contech, 2015).

Figure 3
Conceptual Subsurface Infiltration System Using CMP (modified from Contech, 2015)

Plan View



Section View



1.2.3 Storage, Use, & Infiltration Facilities

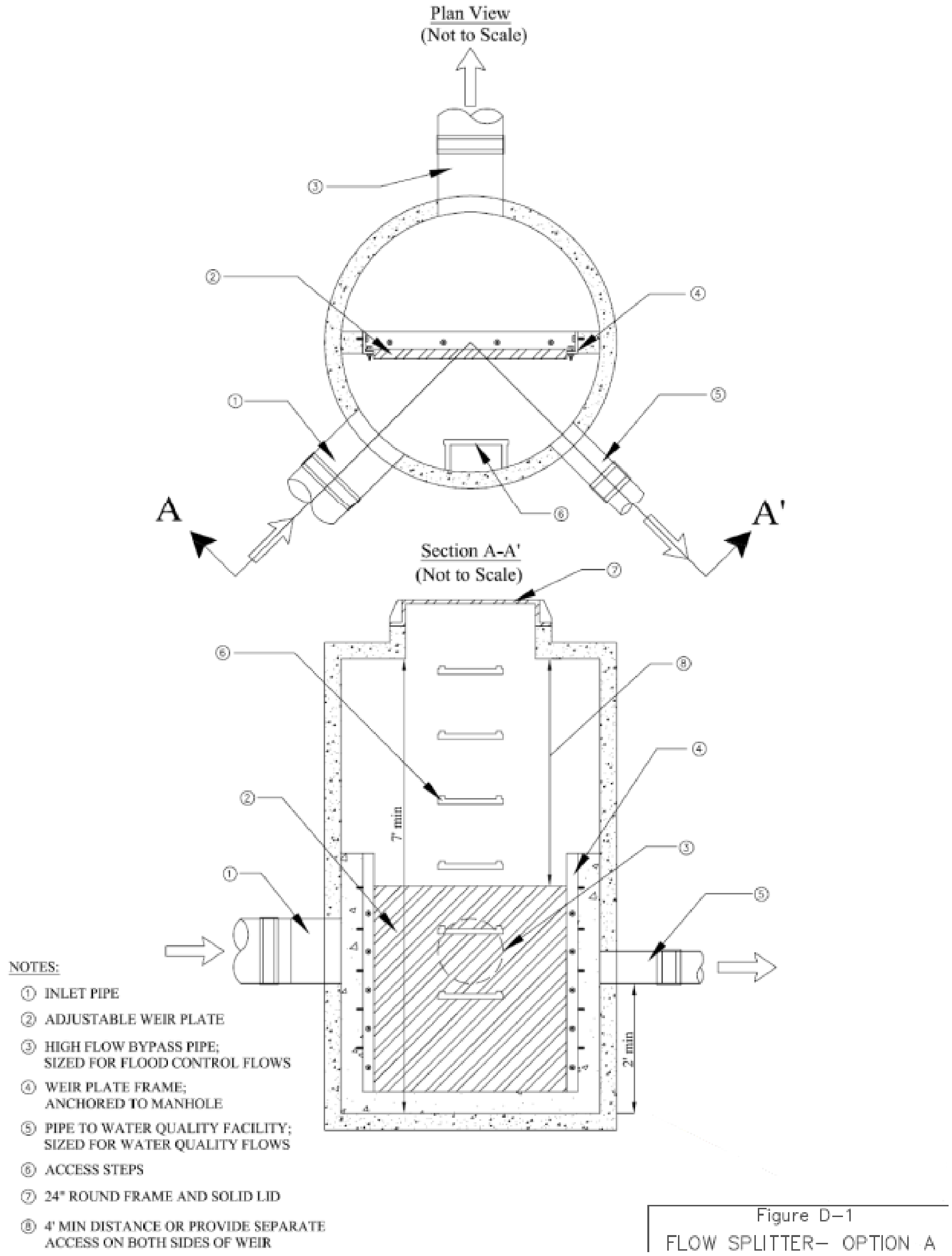
Similar to subsurface infiltration systems, subsurface stormwater storage facilities are consist of underground storage systems designed to detain stormwater below the existing site grade. Subsurface storage facilities require structures to be placed underneath the site and backfilled to the existing site grade. Such structures are available in a variety of sizes and material types, including plastic, concrete, and metal. For the purposes of cost estimating, 60-inch CMP was assumed as the subsurface storage structure material type. Based on discussions with the manufacturer, subsurface storage facilities can be configured in a variety of shapes to match site requirements. A diversion pipe would convey stormwater to CMP headers for distribution throughout the storage system. Access risers will be provided for operations and maintenance. A photograph of a CMP detention system being installed at a real site is shown on **Figure 4** (Contech, 2015). In addition to CMP storage, a chlorine contact tank and pump station is required to disinfect and deliver treated stormwater for irrigation use.

Figure 4
Photograph Storage/Detention System Using CMP (Contech, 2015)

1.2.4 Diversion Structure and Piping

To deliver water to the sites, diversion structures and piping will be constructed to connect existing storm drains to the BMP. Diversion structures are designed to convey the required water quality flow to the BMP and allow excess flows to bypass through the existing storm drain. Diversion structures may be constructed in a manhole or subsurface tank and include hydraulic controls (e.g., weirs) and/or mechanical controls (e.g., valves and rubber dams). For the purposes of cost estimating, it was assumed that diversion pipelines would be constructed of RCP. Adequate hydraulic head is required to deliver water to the BMP by gravity. A hydraulic analysis must be conducted to confirm hydraulic limitations of the diversion structure and pipeline during the full-scale design phase. An example diversion structure is shown in **Figure 5** (LACDPW, 2009).

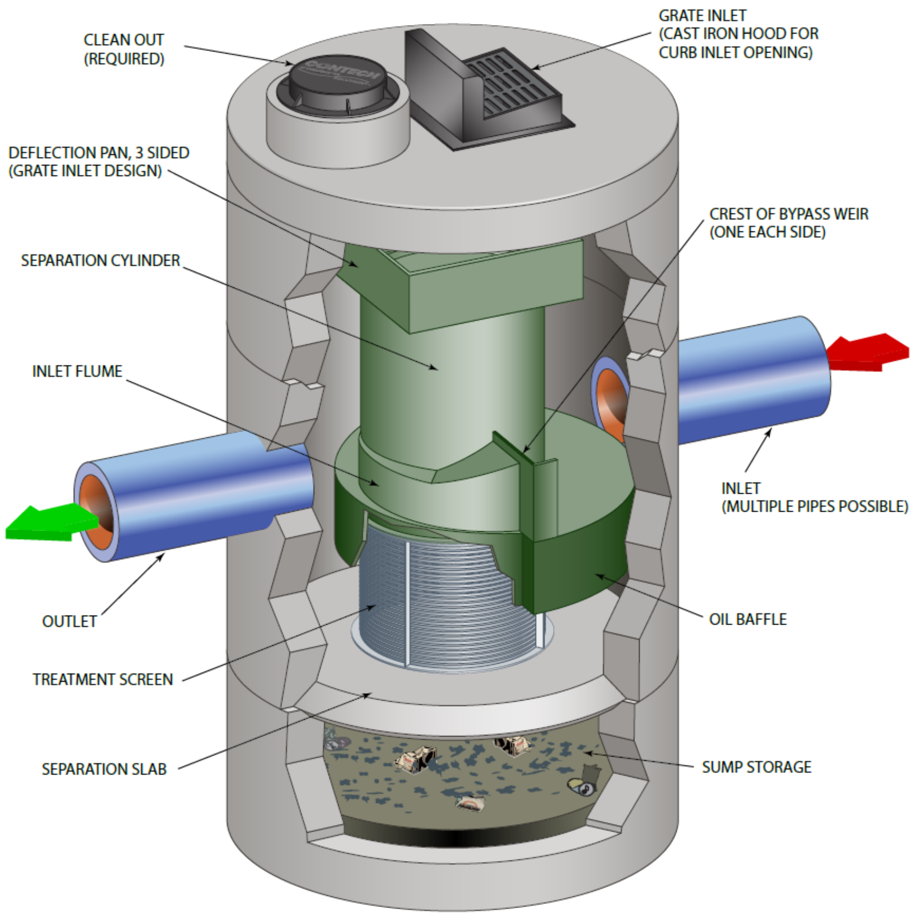
Figure 5
Conceptual Diversion Structure Drawing



1.2.5 Pretreatment Facilities

Pretreatment of storm water runoff is an important component of both surface and subsurface infiltration facilities and provides benefits for storage facilities. Removal of sediment, trash, and debris will greatly reduce maintenance required for the infiltration facilities and increase the useful life of the BMP. Pretreatment can also reduce the maintenance associated with storage facilities. There are a variety of technologies available for treating runoff, including hydrodynamic separators, mechanical filters, and biofilters. For the purposes of these conceptual designs, a hydrodynamic separator (swirl chamber type system) is chosen to remove sediment and debris in stormwater prior to being conveyed to each regional EWMP project. As depicted in **Figure 6**, continuous deflection separators (CDS) units are pre-cast units placed downstream of drain inlets to capture sediment and debris, and can be manufactured in a variety of configurations. These underground units create a vortex of water that allows water to escape through the screen, while contaminants are deflected into the sump, and later removed. The CDS units are intended to screen litter, fine sand, and larger particles that can have other pollutants adsorbed to them. They can act as a first screen influence for trash and debris, vegetative material, oil and grease, and heavy metals. Multiple units in parallel may be required for high flows.

Figure 6
Example CDS Pretreatment Unit (Contech, 2015)



1.3 PROJECT SIZING AND CONFIGURATION

Calculations were performed to determine the approximate size required to capture the 85th-percentile, 24-hour storm volume for each of the sites. A layout was developed for each of the projects to site the BMP footprint and diversion pipeline on an aerial photograph of the site.

The 85th-percentile, 24-hour storm volume was determined using the County of Los Angeles Modified Rational Method,

$$V = \frac{A \times P \times C_d}{12},$$

where V is the 85th-percentile, 24-hour storm volume in acre-feet, A is the drainage area in acres, P is the precipitation depth corresponding to the 85th-percentile, 24-hour storm in inches per hour, and C_d is the developed runoff coefficient,

$$C_d = 0.9 \times Imp + C_u \times (1 - Imp)\,,$$

where C_d is the developed runoff coefficient, Imp is the impervious percentage of the drainage area, and C_u is the undeveloped runoff coefficient (assumed to be a constant 0.1).

Infiltration rates for each site were determined using GIS soils data and soil infiltration curves from the County of Los Angeles, Department of Public Works Hydrology Manual (LACDPW, 2006 and County of Los Angeles, 2014). Additional data will be gathered during geotechnical sampling of the sites. **Table 1-2** summarizes the Rational Method inputs for each site. **Table 1-3** presents the capture volumes and infiltration rates used to size the BMPs for each site.

Sizing of subsurface infiltration basins and subsurface storage facilities was calculated using the Contech CMP Detention System – Rectangular DYODSTM tool (Contech, 2015). The sizing of subsurface infiltration basins and storage facilities is shown in **Table 1-4**. Estimated excavation and backfill volumes were developed for each site and are summarized in **Table 1-5**.

Table 1-2
Rational Method Inputs

Regional EWMP Project	Drainage Area (acres)	85th-Percentile, 24-hour Storm Rainfall Depth[1] (inches)	Percent Impervious Area[2] (%)	Developed Runoff Coefficient[3] (-)	85th-Percentile, 24-hour Storm Volume (acre-feet)
Brentwood Country Club	173.6	1.07	21.6	0.27	4.2
Oakwood Recreation Center	14.5	1.07	63.6	0.61	0.8
Riviera Country Club	32.7[5]	1.03	14.1	0.21	4.1[6]
Rustic Canyon Recreation Center	50.1	0.97	16.1	0.23	0.9
Line B Pump Station	262.2	0.93	78.3	0.73	14.8
Recreation Park	41.5	0.92	73.2	0.69	2.2[4]
Memorial Park	135.9	1.06	83.6	0.77	9.2
Santa Monica Civic Auditorium and Courthouse	88.0	1.04	61.5	0.59	4.5

[1] From LA County Department of Public Works GIS (http://dpw.lacounty.gov/wrd/hydrologygis/).
[2] From LA County Department of Public Works as part of the WMMS package (http://dpw.lacounty.gov/wmd/wmms/).
[3] Assumes undeveloped runoff coefficient of 0.1.
[4] Scaled to include the storm volume generated from Recreation Park itself.
[5] Drainage area of 324.7 acres is a portion of the larger intended drainage area of 4590.6 acres
[6] 85th-percentile 24-hour storm volume is calculated based on detailed expected storage quantities obtained from Concept Summary – Rivera Country Club Stormwater BMP Project

Table 1-3
Conceptual Design Inputs

Regional EWMP Project	Total Size (acres)	85th-Percentile, 24-hour Storm Volume (acre-feet)	Infiltration Rate (inches per hour)	Estimated Diversion Pipe Diameter (inches)[1]	Estimated Diversion Pipe Length (feet)
Brentwood Country Club	129.3	4.2	n/a[2]	18	190
Oakwood Recreation Center	3.6	0.8	n/a[2]	12	750
Riviera Country Club	158.2	3.1	n/a[2]	24	620
Rustic Canyon Recreation Center	8.1	0.9	0.36	12	3,680
Line B Pump Station	2.2	14.8	0.72	n/a[3]	0[4]
Recreation Park	19.7	2.2	0.72	18	1,240
Memorial Park	10.3	9.2	n/a[2]	30	1,830

Santa Monica Civic Auditorium and Courthouse	6.9	4.5	0.63	24	130

[1] Sized for peak velocity of 10 feet per second assuming peak flow rate is one-third the 85th-percentile, 24-hour storm volume over one hour.
[2] Not applicable for storage projects.
[3] No diversion pipe necessary, Line B Pump Station Project uses existing storm drain infrastructure.
[4] Assumes no additional piping necessary as stormwater in the drainage area is already conveyed to this location.

Table 1-4
CMP Infiltration/Storage Sizing[1]

Regional EWMP Project	85th Percentile Volume (cubic feet)	Pipe Storage (cubic feet)	Backfill Storage (cubic feet)	Depth to Invert (feet)	Number of CMP Pipes	Total Length (feet)	Total Width (feet)
Brentwood Country Club	183,912	184,088	0[3]	7	12	781	90
Oakwood Recreation Center	34,310	34,400	0[3]	25	11	159	82
Riviera Country Club Client Revised	180,468	n/a[6]	n/a[6]	n/a[6]	n/a[6]	n/a[6]	n/a[6]
Rustic Canyon Recreation Center	40,401	28,323	12,272[3]	7	10	144	75
Line B Pump Station	n/a[5]						
Recreation Park	94,376	66,121	28,807[4]	7	20	168	150
Memorial Park	401,875	402,742	0[3]	7	52	394	390
Santa Monica Civic Auditorium and Courthouse	196,739	137,121	59,916[4]	7	28	249	210

[1] Developed using Contech CMP Detention System – Rectangular DYODSTM tool (Contech, 2015). Additional information on the tool is available at http://www.conteches.com/products/stormwater-management/detention-and-infiltration/cmp-detention-and-infiltration.aspx#2004317-technical-info.
[2] Depth to CMP invert assumes at minimum two feet of cover; actual depth will change due to diversion pipe slope requirements and other site-specific requirements that will be identified in subsequent design phases.
[3] No backfill storage for storage BMPs.
[4] Assumes backfill media has a porosity of 40%.
[5] Not applicable for Line B Pump Station.
Assumptions: (1) 60-inch CMP pipes; (2) 30-inch spacing between CMP pipes per AISI standards; and (3) two feet of clearance between site grade and top of CMP system.
[6] A detailed concept report has been developed for Riviera Country Club that utilizes an existing 350,000 tank and a new 1 MG tank. Please refer to Appendix H for further details.

Table 1-5
Estimated Excavation and Backfill Volumes of BMP

Regional EWMP Project	Total Excavation (cubic yards)	Structural Backfill (cubic yards)	Backfill to Grade (cubic yards)
Brentwood Country Club[1]	19,417	7,421	5,178
Oakwood Recreation Center[1]	12,314	1,382	9,658
Riviera Country Club Client Revised	6,000[3]	n/a[4]	n/a[4]

Rustic Canyon Recreation Center[1]	2,980	1,136	795
Line B Pump Station[2]	4,343	4,343	0
Recreation Park[1]	6,977	2,667	1,860
Memorial Park[1]	42,629	16,345	11,368
Santa Monica Civic Auditorium and Courthouse[1]	18,355	5,548	3,864

[1] Developed using Contech CMP Detention System – Rectangular DYODSTM tool (Contech, 2015). Additional information on the tool is available at http://www.conteches.com/products/stormwater-management/detention-and-infiltration/cmp-detention-and-infiltration.aspx#2004317-technical-info.
[2] Assumes excavation of 21,000 square foot base at a depth of 5 feet and 8 inches for media backfill (2 inches of pea gravel, 5 feet of washed gravel, and 6 inches of sand).
[3] Phase I of Riviera Country Club utilizes an existing 350,000 gallon tank. Phase II consists of a new 1 MG tank. This excavation quantity consists of excavation volume required for 1 MG tank. See Appendix H for details on Riviera Country Club Concept Report
[4] CMP not used for Riviera Country Club, please refer to Appendix H for details on Riviera Country Club concept report.

1.4 CONCEPTUAL DESIGN ILLUSTRATIONS

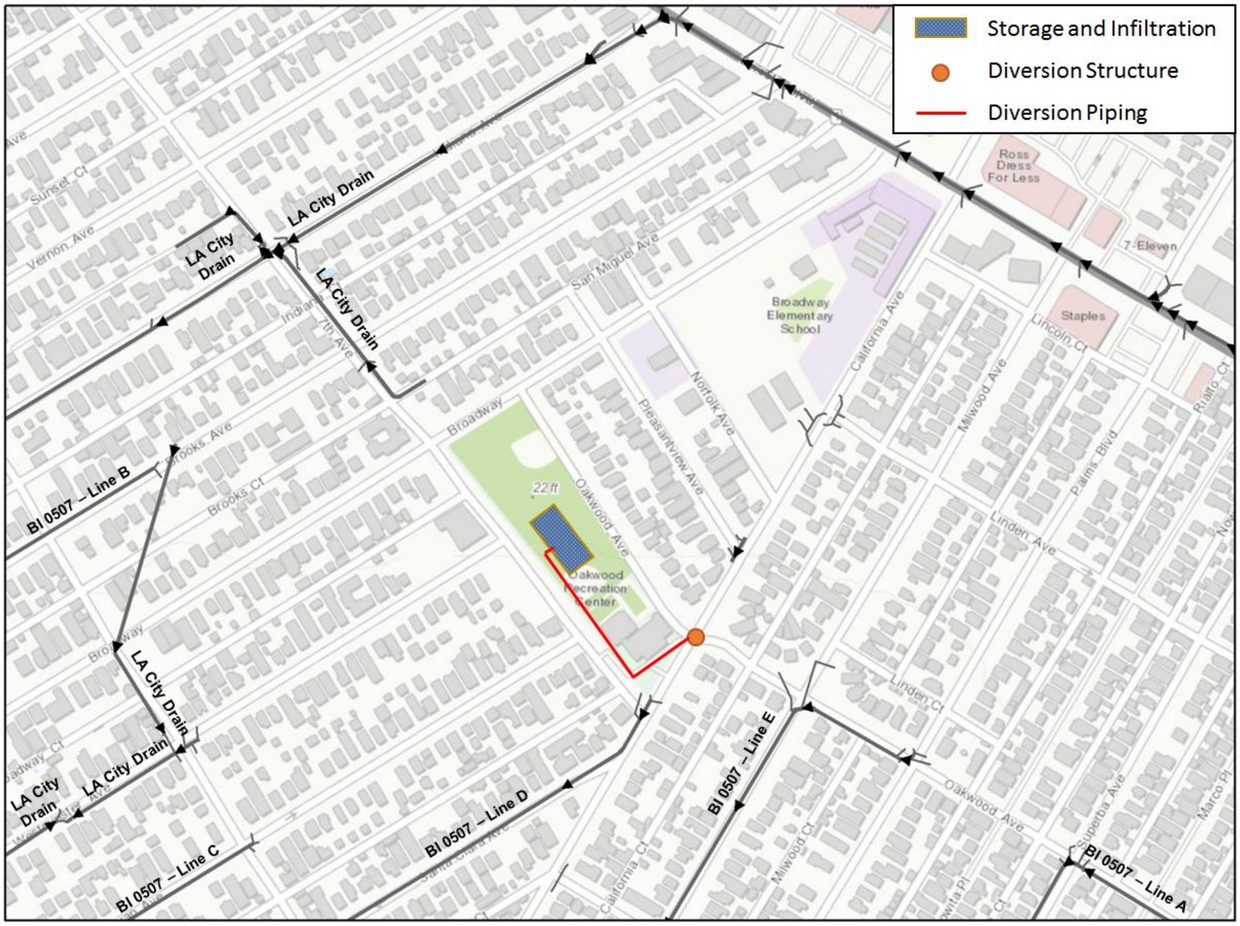
Project concepts are illustrated in this section. Each Regional EWMP Project is shown with conceptual locations of BMPs, diversion piping, and other project elements.

1.4.1 Brentwood Country Club

The conceptual design for the Brentwood Country Club Regional EWMP Project consists of diversion of stormwater from a city storm drain adjacent the Brentwood Line BI 0042. Stormwater is conveyed by gravity and stored in a 60-inch CMP storage system for later irrigation use.

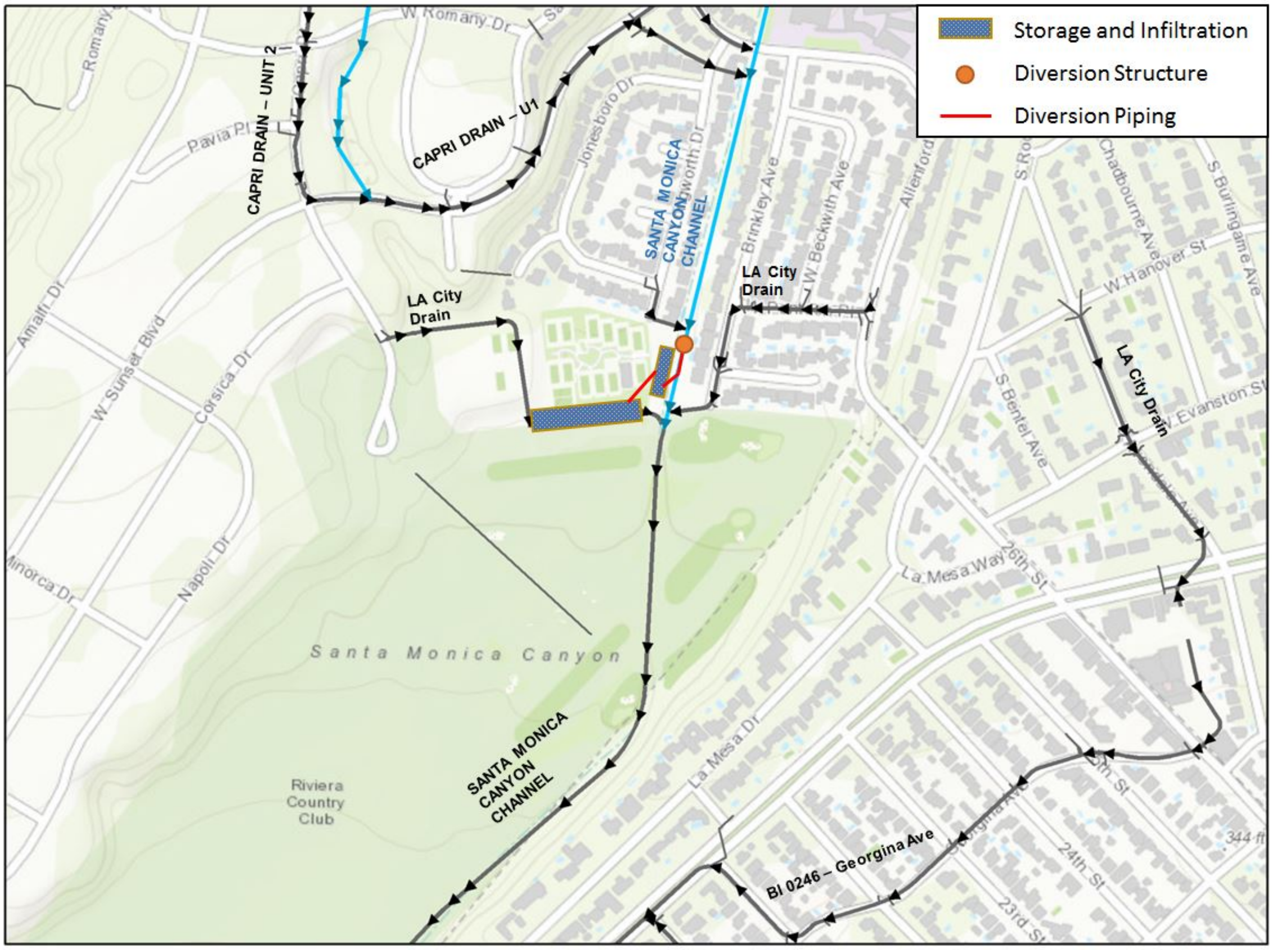
1.4.2 Oakwood Recreation Center

The conceptual design for the Oakwood Recreation Center Regional EWMP Project consists of diversion of stormwater from surface street runoff or a city storm drain; the storm drains in this area need to be verified. Stormwater is conveyed by gravity and stored in a 60-inch CMP storage system for later irrigation use.



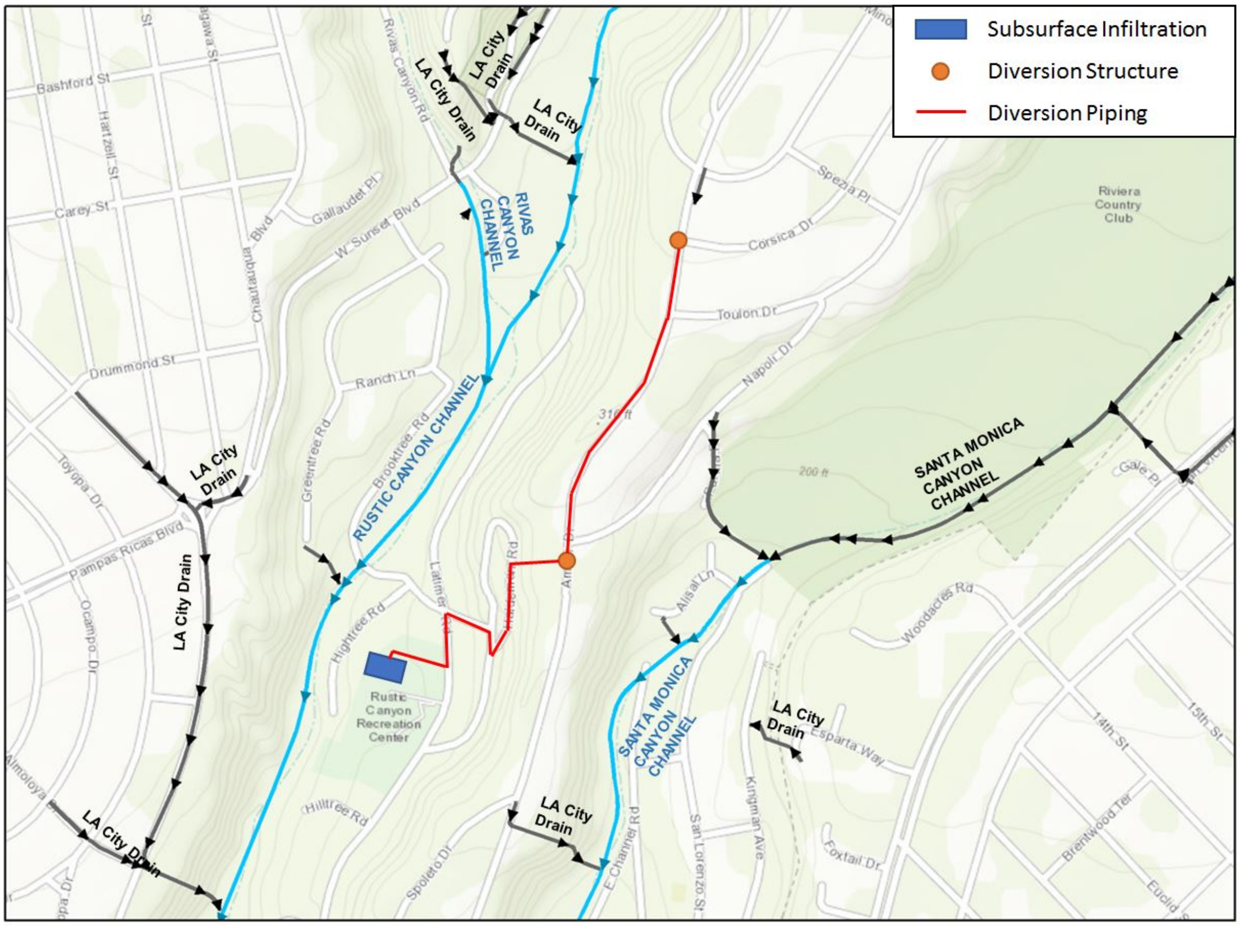
1.4.3 Riviera Country Club

The conceptual design for the Riviera Country Club Regional EWMP Project consists of diversion of stormwater from Santa Monica Canyon Channel. This Regional Project is divided into two phases: Phase I uses an existing 350,000 gallon tank for dry and wet weather flows and Phase II consists of a new additional 1 million gallon (MG) tank for storage and infiltration. This project will also provide for a water feature/infiltration parallel to the channel



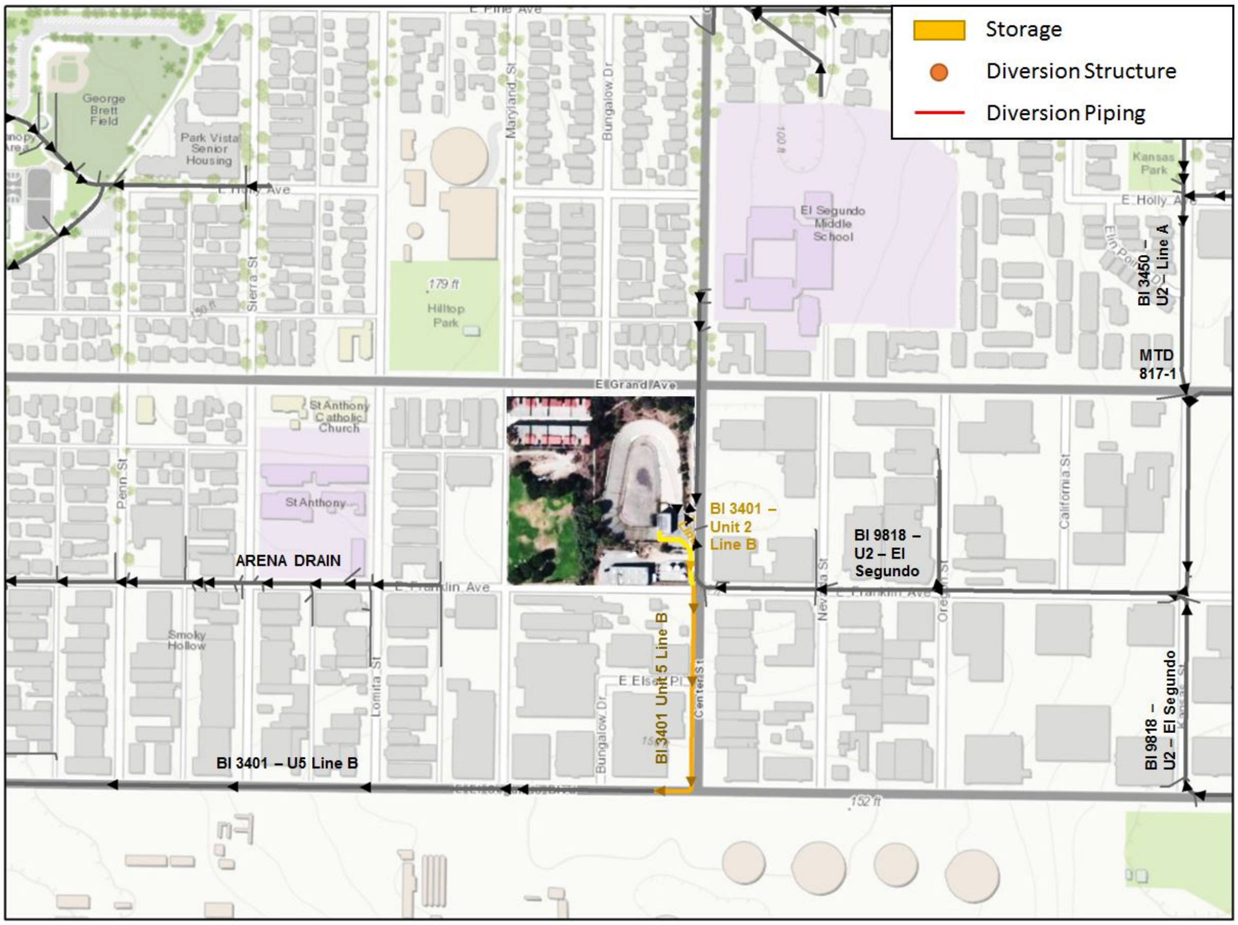
1.4.4 Rustic Canyon Recreation Center

The conceptual design for the Rustic Canyon Recreation Center Regional EWMP Project consists of diversion of stormwater from two city storm drains northeast of the park. The northern diversion point is chosen because of the larger drainage area contribution at the location; flow from this point drains south and east to the Santa Monica Canyon Channel. It is rerouted along Amalfi Drive and meets the second diversion point that will divert flow to Rustic Canyon Recreation Center. Stormwater is conveyed by gravity and infiltrated via a 60-inch CMP infiltration system.



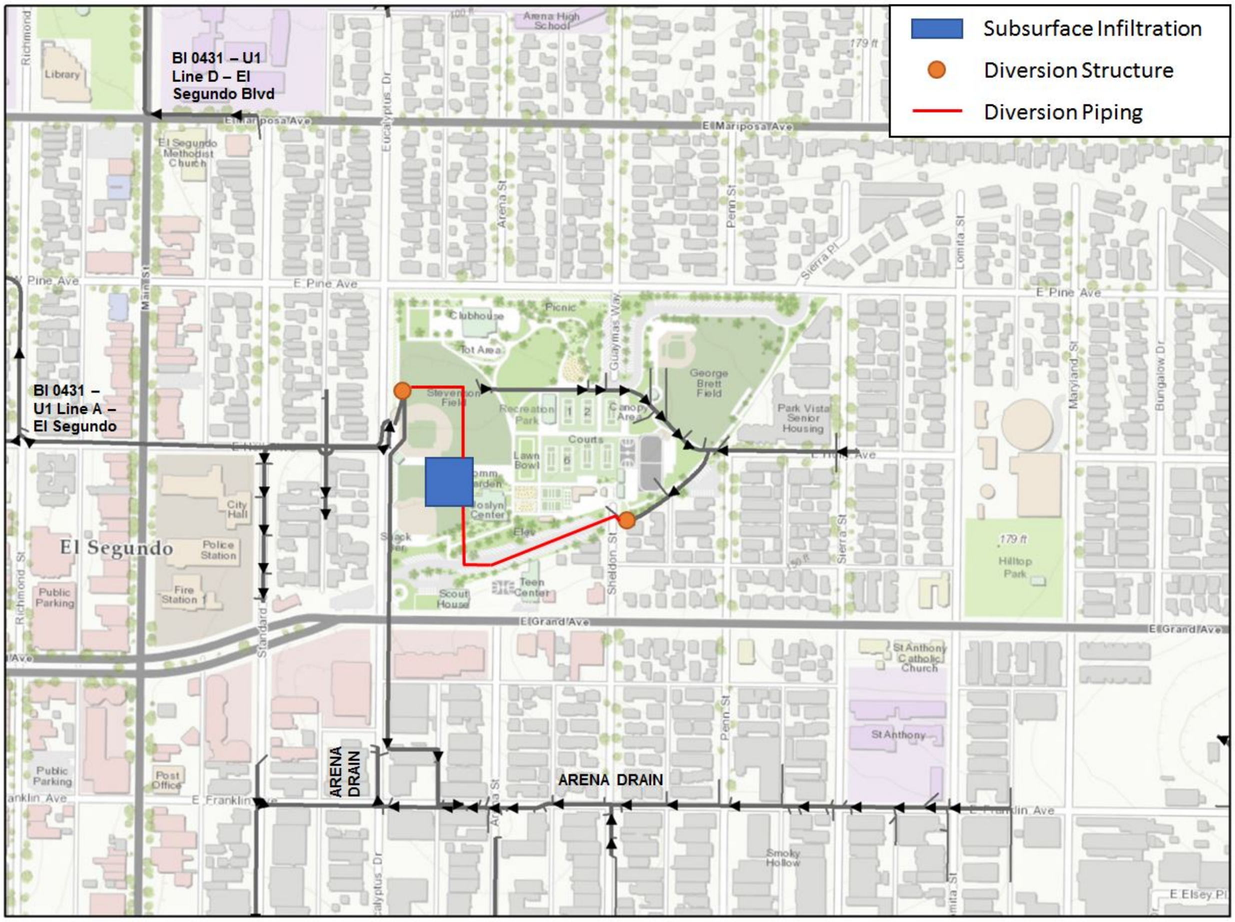
1.4.5 Line B Pump Station

The conceptual design for the Line B Pump Station Regional EWMP Project consists of using the existing detention basin at the site and replacing the basin invert's concrete base with a media fill optimized for infiltration. Areas east of the site currently drain to the detention basin, via Line BI 9818-U2 and others, and no additional diversions are necessary. Stormwater is conveyed by gravity for infiltration. A floating cover will be installed to allow the use of the full depth of the existing basin without restrictions due to vector control; additionally, the existing pump station can be used to send stormwater to the drain along El Segundo Blvd if needed.



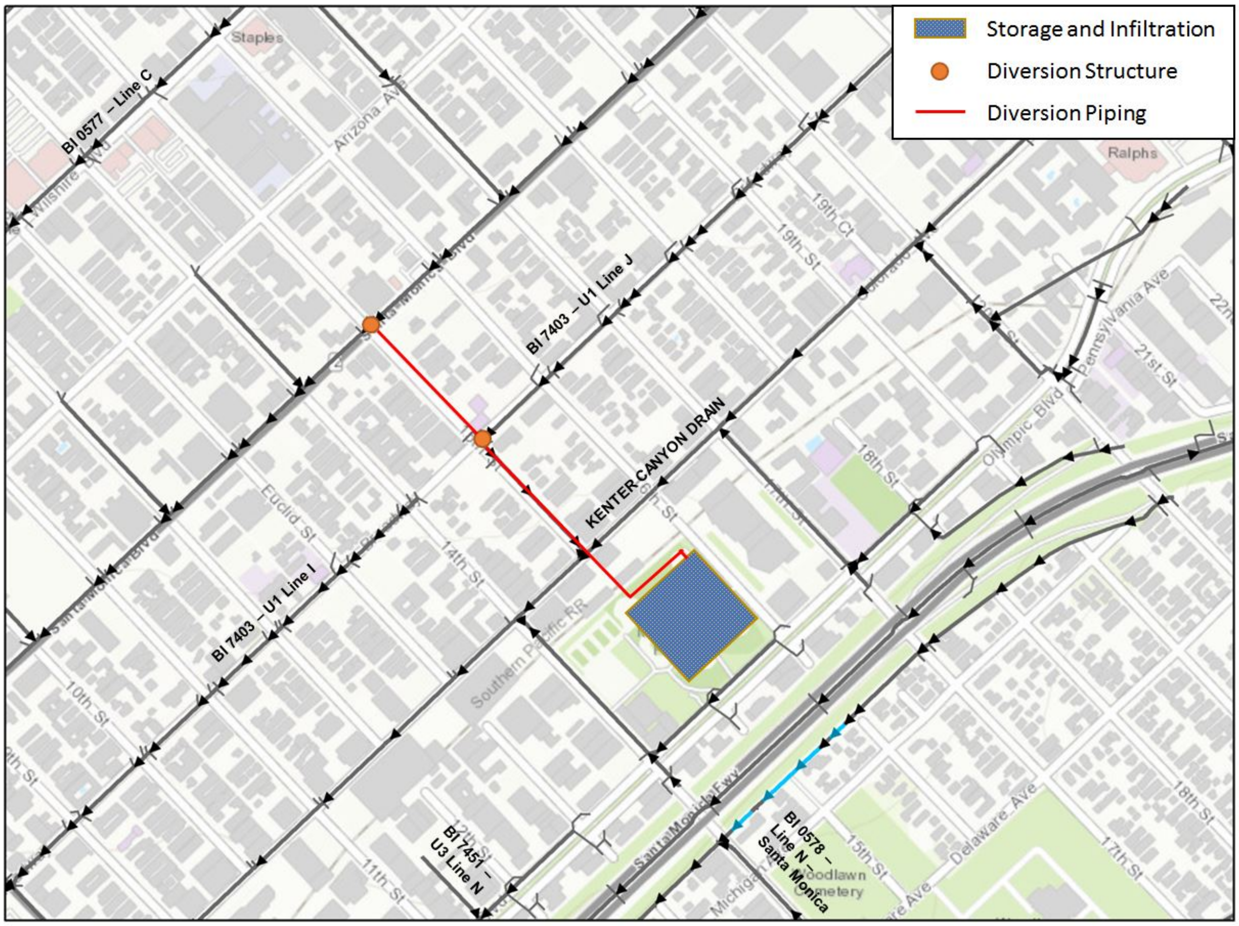
1.4.6 Recreation Park

The conceptual design for the Recreation Park Regional EWMP Project consists of diversion of stormwater from two city storm drains northeast of the park. Stormwater is conveyed by gravity and infiltrated via a 60-inch CMP infiltration system.



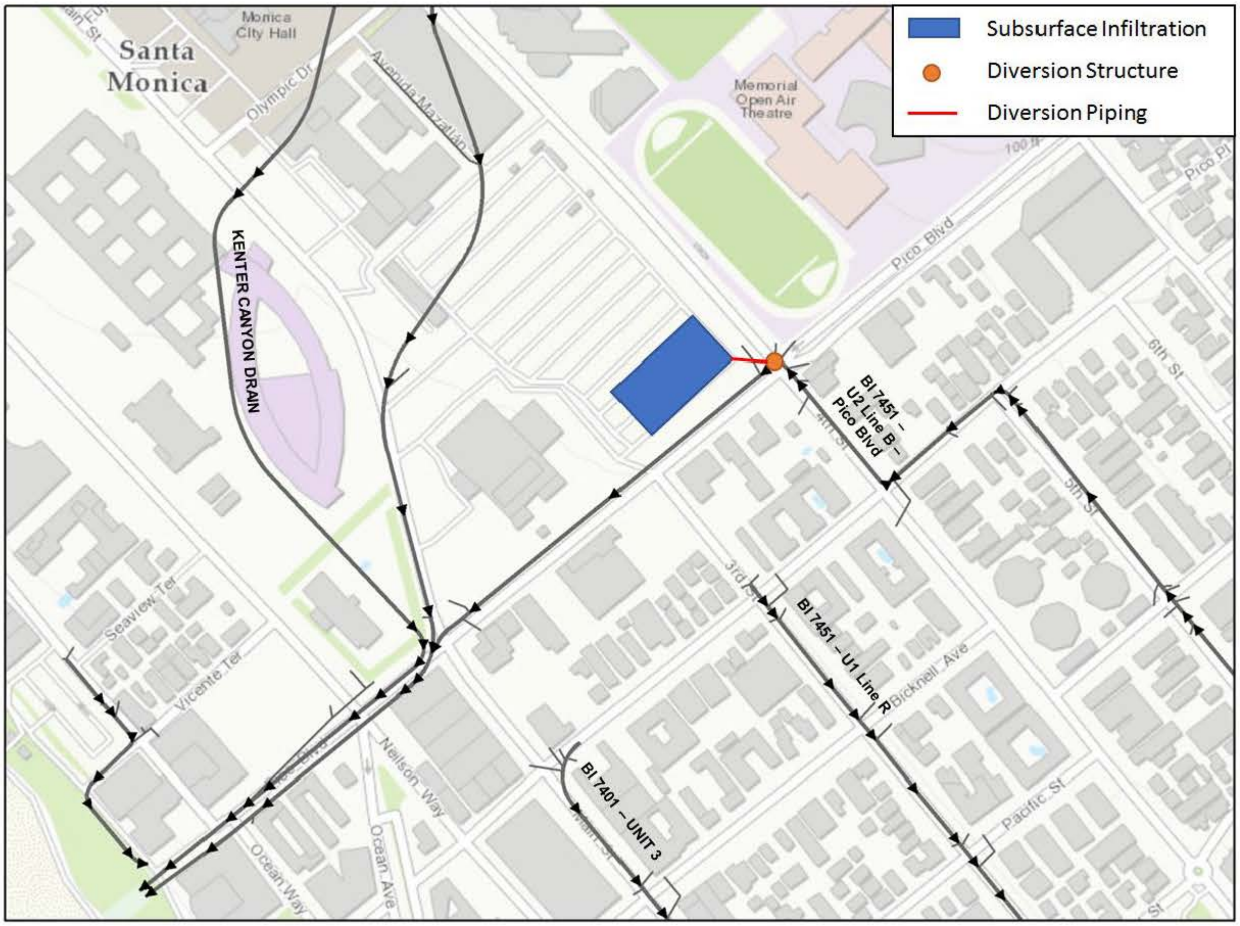
1.4.7 Memorial Park

The conceptual design for the Memorial Park Regional EWMP Project consists of diversion of stormwater from BI 7403-U1 Line J and a city storm drain. Stormwater is conveyed by gravity and stored in a 60-inch CMP storage system for later irrigation use.



1.4.8 Santa Monica Civic Auditorium and Courthouse

The conceptual design for the Recreation Park Regional EWMP Project consists of diversion of stormwater from BI 0249-U2 Line B (along Pico Blvd.). Stormwater is conveyed by gravity and infiltrated via a 60-inch CMP infiltration system.



1.5 COST ESTIMATES

The order-of-magnitude estimates presented are consistent with Class 5 estimates per Association for the Advancement of Cost Engineering International (AACEI) guidelines (AACEI, 2011). Engineering, design, permitting, and support services are based on percentage of the order-of-magnitude construction cost estimate. The AACEI describes a Class 5 cost estimate as follows:

> *Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. Typically, engineering is from 2% to 10% complete. They are often prepared for strategic planning purposes market studies assessment of viability project location studies and long range capital planning. Virtually all Class 5 estimates use stochastic estimating methods such as cost curves capacity factors and other parametric techniques. Expected accuracy ranges are from –20% to –50% on the low side and +30% to 100% on the high side, depending on technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. As little as 1 hour or less to perhaps more than 200 hours may be spent preparing the estimate based on the project and estimating methodology*

1.5.1 Basis of Cost

Based on the conceptual sizing and layout presented in previous sections, order-of-magnitude cost estimates were developed for each project using the unit costs of similar stormwater BMPs described in the *Multi-Pollutant TMDL Implementation Plan for the Unincorporated County Area of Los Angeles River Watershed* (LACDPW, 2010). Unit costs were verified and modified based on recent construction experience for similar projects. Unit costs from the report were escalated from the report's 2009 estimates to 2015 values using the Engineering News-Record (ENR) Building and Construction Cost Index (ENR, 2015). **Table 1-6** presents the unit costs for the major construction components of the conceptual designs.

Table 1-6
Conceptual Design Major Components Unit Costs

Construction Component	Unit Cost
Mobilization[1]	10% of construction total
Site Preparation[1]	$6,000 per acre
Excavation and Removal	$30.00 per cubic yard
Asphalt/Base Removal	$9.60 per cubic yard
Reinforced Concrete Pipe[1]	$16.00 per diameter (inch) per length (foot)
Gravel Sub-base	$115.00 per cubic yard
Backfill Material[1]	$20.00 per cubic yard
Landscaping[1]	$5.00 per square foot
60-inch Corrugated Metal Pipe[2]	$150,000 per acre-foot
Media	$36.00 per cubic yard
Planning/Project Management[1]	20% of total construction costs
Design and Permitting (Centralized)[1]	15% of total construction costs
Contingency for Planning Estimate (Centralized)	25% of total construction costs

Notes:

[1] Unit costs have been modified from TMDL Implementation Plan based on recent construction experience for similar projects.
[2] Material costs for the 60-inch CMP used in subsurface infiltration basins were provided by Contech Engineering Solutions. Costs include CDS pretreatment.

1.5.2 Assumptions for Cost Estimates

Several assumptions were made to develop the order-of-magnitude cost estimates. As planning-level estimates, the costs presented are based on the conceptual understanding of the projects to date and are subject to change pending the development and design of the projects. Several assumptions were included in the *Multi-Pollutant TMDL Implementation Plan for the Unincorporated County Area of Los Angeles River Watershed* (LACDPW, 2010). The assumptions used in the development of the referenced report apply to the cost estimates developed in this TM. These assumptions have been modified based on the specific aspects of the regional EWMP projects and are presented below for reference.

1.5.2.1 Planning/Project Management

Additional administrative costs will be required to administer, manage, and coordinate the project's implementation and are included with the planning costs. Administrative costs can vary widely with the complexity of the project, but for purposes of comparison, a value of 20 percent of the capital costs is assumed for planning.

1.5.2.2 Design/Permitting

Meeting regulatory requirements and obtaining environmental permits will be required for construction implementation. The applicability of many regulations for a specific project depends on its site or design characteristics.

Designing structural BMPs requires collecting data, analyzing it, and preparing documents that can be used for constructing a project. Data collection will include geotechnical investigations, field investigation of existing utilities (potholing), and a topographic survey for mapping. The design deliverables are project plans and specifications that can be bid by a contractor for construction. Engineering costs can vary widely depending on the complexity of the project. For the purposes of the cost estimates, a fixed rate of 15 percent was applied to the centralized BMP construction costs to estimate the design /permitting cost.

1.5.2.3 Construction

Construction costs are based on the BMPs major components. Assumptions used in estimating costs are provided below.

- Mobilization: Mobilization costs are highly variable depending on the magnitude of the project. A mobilization factor of 10 percent was included.
- Site Preparation: Site preparation includes various tasks associated with preparing site for construction, such as security and setback controls, removal and storage or existing items, and preparation of construction staging areas.
- Excavation and removal: Excavation and removal costs include the cost of excavating the volume of soil required to provide the required storage, hauling the removed dirt off-site, and disposal at an appropriate facility. The estimate is based on previous concept-level Los Angeles Department of Public Works and North Carolina State University estimates (LACDPW, 2010).
- Asphalt/Base Removal: Costs are included for areas that can be implemented as a retrofit. The estimate is based on data from R.S. Means (LACDPW, 2010).

- Reinforced Concrete Pipe: Costs were derived from RSMeans and are included to estimate the costs for constructing a storm drain extension of or to bypass an existing storm drain system.
- Gravel Sub-base: A gravel sub-base consisting of a washed No. 57 stone typically used as a base for roads and any construction. The estimate is based on quotes from vendors for No. 57 stone and R.S. Means (LACDPW, 2010).
- Landscaping: One of the benefits of distributed BMPs is that they can be integrated into the site plan and often incorporated into the landscaping. Landscaping costs were estimated using data from North Carolina State University (LACDPW, 2010).
- Contingency: Because some of the project components have not been fully defined at this preliminary stage, a contingency factor of 25 percent has been applied to the construction costs to estimate the total construction costs and capture expected but as yet unidentified additional costs. The costs could arise from site-specific field conditions such as those associated with utility relocations, dewatering, and erosion and sedimentation control. At this stage of project development, the contingency also includes an allowance for such items as field facilities and construction scheduling, which might be required but are not specifically itemized.

1.5.3 Cost Estimates for Regional EWMP Projects

The total project costs for the regional EWMP projects are summarized in **TABLE 1-7.** It is important to note that these costs only consist of the initial capital costs to construct the projects as well as operation and maintenance costs for an assumed 20 year life.

Table 1-7
Summary of Regional EWMP Project Cost Estimates

Regional EWMP Project	Total Project Cost
Brentwood Country Club	$6,244,768
Oakwood Recreation Center	$1,165,003
Riviera Country Club[1]	$5,857,000
Rustic Canyon Recreation Center	$1,371,824
Line B Pump Station	$21,833,225
Recreation Park	$3,204,556
Memorial Park	$13,645,744
Santa Monica Civic Auditorium and Courthouse	$6,680,311
Total Cost of Regional EWMP Projects	$58,703,847

[1]Total project cost for Regional EWMP Project based on Riviera Country Club Concept Summary provided in Appendix H.

APPENDIX C
FIELD INVESTIGATION / ENVIRONMENTAL CHECKLIST

Enhanced Watershed Management Program for the City of Los Angeles
Regional Project Environmental Study Checklist

Site Name: Brentwood Country Club (BCC)	**Date: 3/3/15**
	Personnel: Andrew Payne

Site Address/Location: 590 S Burlingame Ave, Los Angeles, CA 90049

General Notes:

- Brentwood Country Club (BCC) includes an 18-hole golf course, driving range, tennis courts, swimming pool, club house, and club amenities. The northeast boundary of BCC property is located at the intersection of Burlingame Ave and San Vicente Boulevard. A gate located at that intersection will provide access for a drill rig to the Area of Interest (AOI). The AOI is located approximately 1,800 feet east of access gate at the driving range. The BCC is located within residential neighborhood but busy area of Los Angeles.

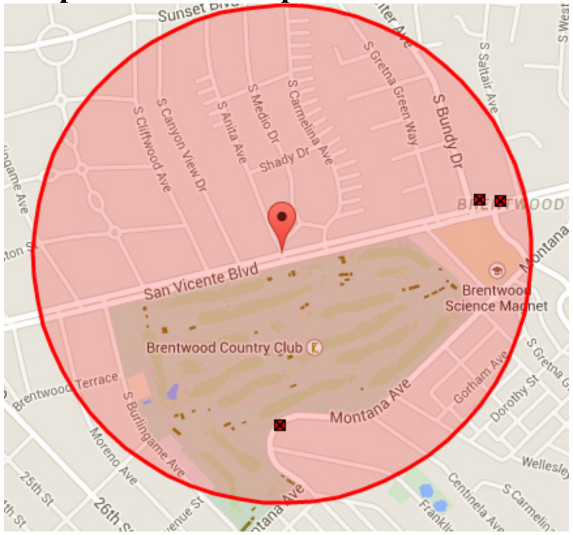
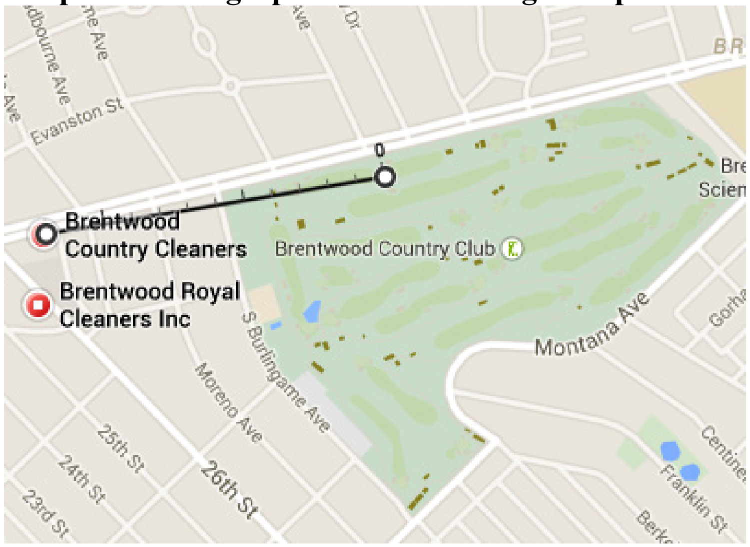
Environmental Factor – AESTHETICS		
Finding: Grass and concrete path along golf course.	**Potential Impact: Moderate impact to grass and path.**	**Graphic/Photo: View looking west adjacent to AOI (on right), driving range in background.** 
Finding: Grass and concrete path along golf course.	**Potential Impact: Moderate impact to grass and path.**	**Graphic/Photo: View looking south of golf course and topography immediately south of AOI.** 

Environmental Factor – AGRICULTURAL/FOREST RESOURCES		
Finding: No Ag/Forest resources at BCC during visit.	**Potential Impact: Unknown/None**	**Graphic/Photo: None.**

Environmental Factor – AIR QUALITY/GHG EMISSIONS		
Finding: Trees at AOI.	**Potential Impact: Moderate to high.** **Impacts to trees can be managed by positioning the CPT rig outside of tree canopy and drip line.**	**Graphic/Photo: View looking east at tree canopy at AOI.** 

Environmental Factor – BIOLOGICAL RESOURCES		
Finding: Trees are located near the AOI.	**Potential Impact: Low to moderate.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: View NE at AOI.** 
Finding: Trees are located near the AOI.	**Potential Impact: Low to moderate.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: View of alternate AOI.** 

Finding: Birds were active in the tree canopy at the AOI.	**Potential Impact: Low.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: None.**
Environmental Factor – CULTURAL RESOURCES		
Finding: No cultural resources observed during site visit.	**Potential Impact: Unknown.**	**Graphic/Photo: None.**

<table>
<tr><th colspan="3">Environmental Factor – GEOLOGY/SOILS/HAZARDOUS MATERIALS</th></tr>
<tr>
<td>Finding: No apparent issues during initial site visit. Three former/closed case cleanup sites located within ½ mile of AOI (Geotracker).</td>
<td>Potential Impact: Low to moderate.</td>
<td>Graphic/Photo: Graphic cut from Geotracker.

</td>
</tr>
<tr>
<td>Finding: No apparent issues during initial site visit. Two dry cleaners located within ½ mile to the west of AOI At BCC; GW depth is reported to be less than 25 feet below ground surface and flow direction varies form N/NW to S/SW (GW info Geotracker).</td>
<td>Potential Impact: low to moderate.</td>
<td>Graphic/Photo: graphic cut from Google Maps.

</td>
</tr>
</table>

<table>
<tr>
<td>Finding: The Charnock fault is mapped inferred less than three miles east but no extensive information is reported. The Palos Verde Fault Zone is located off shore to the west with reported activity in last 15,000 years. The Newport-Inglewood Fault is located less than 10 miles to the east. USGS reports approximately 3-5 earthquakes in the last 11,000 years with a recurrence interval of 1,200 to 3,000 years. (Southern California Earthquake Data Center Caltech website). Liquefaction found as factor during preliminary information gathering.</td>
<td>Potential Impact: Low to moderate during earthquake.

(Graphic cut from USGS interactive fault map of Southern California. Dotted green lines are inferred faults).</td>
<td>Graphic/Photo: Interactive Fault Map (USGS).

</td>
</tr>
<tr>
<td colspan="3">Environmental Factor – HYDROLOGY/WATER QUALITY</td>
</tr>
<tr>
<td>Finding: Notes regarding location of cleanup sites and dry cleaners in proximity of AOI.</td>
<td>Potential Impact: Low to moderate impact to GW via cleanup sites or dry cleaner.</td>
<td>Graphic/Photo: None.</td>
</tr>
</table>

Finding: Stormwater system.	**Potential Impact: Low.**	**Graphic/Photo: View looking west at stormwater dissipator and drainage.** 
Finding: Stormwater system.	**Potential Impact: Low.**	**Graphic/Photo: View looking southwest at stormwater dissipator and drainage.** 

Environmental Factor – LAND USE/PLANNING		
Finding: AOI is adjacent to active golf course.	**Potential Impact: Low to moderate impact to work at AOI.**	**Graphic/Photo: View west near AOI.** 

Environmental Factor – NOISE		
Finding: Impact to BCC members, workers and nearby residents.	**Potential Impact: Low.**	**Graphic/Photo: None.**

Environmental Factor – PUBLIC SERVICES/RECREATION		
Finding: BCC is a private country club.	**Potential Impact: None.**	**Graphic/Photo: None.**

Environmental Factor – TRANSPORTATION/TRAFFIC		
Finding: BCC is located within a light commercial and residential area of Los Angeles; traffic is low to high.	**Potential Impact: Low.**	**Graphic/Photo: None.**

Finding: Members and workers.	**Potential Impact: Low to moderate.**	**Graphic/Photo: None.**
Environmental Factor – UTILITIES/SERVICE SYSTEMS		
Finding: Utilities located on BCC property.	**Potential Impact: Low.**	**Graphic/Photo: View of stormwater system.** 

Finding: Below and above ground electrical, water, sewer or fiber optic lines.	Potential Impact: Low to moderate. Close proximity to residents, the potential for below ground utilities is expected. Dig alert and subsurface planning will be utilized in pre-subsurface tasks.	Graphic/Photo: Photo looking NW near corner of Burlingame and San Vicente; aboveground power lines parallel to San Vicente in background. 

Enhanced Watershed Management Program for the City of Los Angeles
Regional Project Environmental Study Checklist

Site Name: Santa Monica Civic Center Parking Lot	**Date: 2/25/15**
	Personnel: Andrew Payne

Site Address/Location: NW corner of 4th Street and Pico Boulevard, Santa Monica, CA

General Notes:

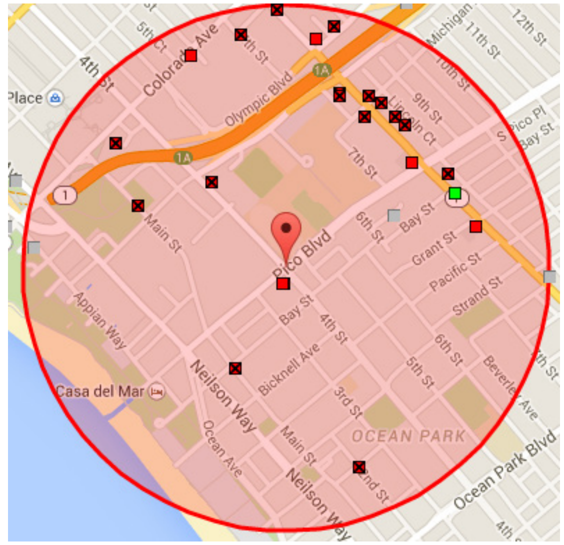
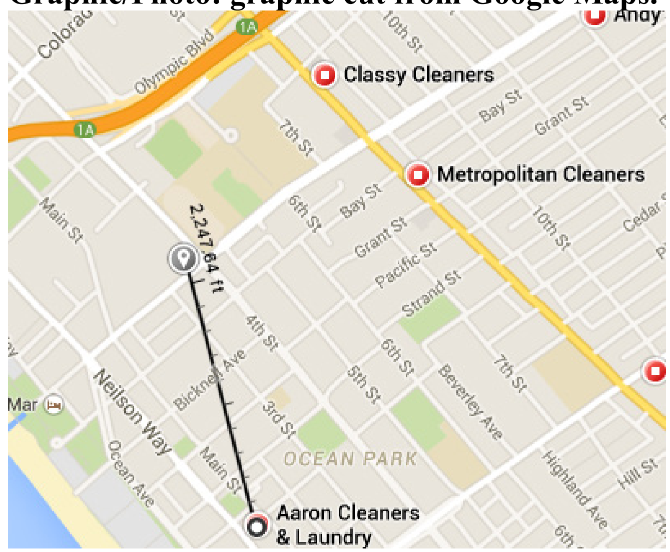
- Large parking lot for Civic Center. Area of Interest (AOI) is SE corner of the main parking area. The proposed drilling location/AOI is open and easily accessible for a drill rig and is a feasible design BMP. The Civic Center is located within the busy downtown area of Santa Monica which is commercial and residential.

Environmental Factor – AESTHETICS		
Finding: SE corner of parking lot Area of Interest (AOI).	**Potential Impact: Low.**	**Graphic/Photo: View looking east at SE corner of parking lot.** 
Environmental Factor – AGRICULTURAL/FOREST RESOURCES		
Finding: No observed Ag/Forest resources at civic center during visit.	**Potential Impact: Unknown/None.**	**Graphic/Photo: None.**

<table>
<tr><th colspan="3">Environmental Factor – AIR QUALITY/GHG EMISSIONS</th></tr>
<tr><td>Finding: Santa Monica High School located east of AOI.</td><td>Potential Impact: Low to moderate – High School across 4th St from AOI.</td><td>Graphic/Photo: View looking NE across 4th St at Santa Monica High School.
</td></tr>
<tr><th colspan="3">Environmental Factor – BIOLOGICAL RESOURCES</th></tr>
<tr><td>Finding: Trees are located near the AOI.</td><td>Potential Impact: Low.

CPT rig can be positioned to minimize impact.</td><td>Graphic/Photo: View looking east at trees near AOI.
</td></tr>
</table>

Finding: No nesting birds were observed upon visit.	**Potential Impact: Low.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: None.**
Environmental Factor – CULTURAL RESOURCES		
Finding: No cultural resources observed during site visit.	**Potential Impact: Unknown.**	**Graphic/Photo: None.**

Environmental Factor – GEOLOGY/SOILS/HAZARDOUS MATERIALS		
Finding: Gas station located to the south of the AOI across Pico Blvd. Six open case cleanup sites and 20 former/closed sites are located within ½ mile of the civic Center (Geotracker).	**Potential Impact: Low to moderate.**	**Graphic/Photo: graphic cut from SWRCB Geotracker website.** 
Finding: No apparent issues during initial site visit. Three dry cleaners located within ½ mile to the north and NW of the park; GW depth is reported to be 40 to 50 feet below ground surface and flow direction is S/SW (GW info Geotracker).	**Potential Impact: Low to moderate.**	**Graphic/Photo: graphic cut from Google Maps.** 

Finding: The Charnock fault is mapped inferred less than three miles east but no extensive information is reported. The Palos Verde Fault Zone is located off shore to the west with reported activity in last 15,000 years. The Newport-Inglewood Fault is located less than 10 miles to the east. USGS reports approximately 3-5 earthquakes in the last 11,000 years with a recurrence interval of 1,200 to 3,000 years. (Southern California Earthquake Data Center Caltech website).	**Potential Impact: Low to moderate during earthquake.** **(Graphic cut from USGS interactive fault map of Southern California. Dotted green lines are inferred faults).**	**Graphic/Photo: Interactive fault map (USGS).** 

Environmental Factor – HYDROLOGY/WATER QUALITY

Finding: Notes regarding location of cleanup sites and dry cleaners in proximity of park.	**Potential Impact: Low to moderate impact to GW via cleanup sites or dry cleaner.**	**Graphic/Photo: None.**

Environmental Factor – LAND USE/PLANNING		
Finding: Work at AOI should not impact use but no parking signage should be used.	**Potential Impact: No to low impact potential parking lot use.**	**Graphic/Photo: None.**

Environmental Factor – NOISE		
Finding: Drill rig noise may impact Santa Monica High School to the east of AOI.	**Potential Impact: Low to moderate.**	**Graphic/Photo: None.**

Environmental Factor – PUBLIC SERVICES/RECREATION		
Finding: AOI is located in open parking lot that is near corner of active streets.	**Potential Impact: Low impact to parking usage or pedestrians.**	**Graphic/Photo: None.**

Environmental Factor – TRANSPORTATION/TRAFFIC		
Finding: AOI is in low traffic parking lot. Area of Santa Monica is busy.	**Potential Impact: Low.**	**Graphic/Photo: View west along Pico near AOI.** 

Environmental Factor – UTILITIES/SERVICE SYSTEMS		
Finding: Aboveground lights in parking lot.	**Potential Impact: Low.**	**Graphic/Photo: View north at AOI/parking lot.** 
Finding: Belowground electrical, water, sewer or fiber optic lines.	**Potential Impact: Low to moderate. Close proximity to residents, the potential for below ground utilities is expected. Dig alert and subsurface planning will be utilized in pre-subsurface tasks.**	**Graphic/Photo: See above photo.**

Enhanced Watershed Management Program for the City of Los Angeles
Regional Project Environmental Study Checklist

Site Name: Line B Pump Station	**Date: 2/23/15**
	Personnel: Andrew Payne

Site Address/Location: 223 Center Street, El Segundo, CA

General Notes:

- Park includes open grass area, backstop for baseball or softball, horseshoe pits, and picnic areas. Overall the park is mainly an open grass area. The northwest corner of this small park is most feasible Area of Interest (AOI) to sample soil and/or design BMP. The park is located within a light industrial, commercial and residential neighborhood in El Segundo. Residential areas are located to north and west. An active oil pump is located just outside of the park boundary to the north/northeast. LA County Flood Control District facility (Hyperion – SCE Generating Station) to the east of the park property.

Environmental Factor – AESTHETICS

Finding: Open area in NW portion of park is good potential Area of Interest (AOI).	**Potential Impact: Low to moderate impact to grass field, schedule for any sports scheduled to be played at park in grass area.**	**Graphic/Photo: View looking NW at grass area AOI.** 
Finding: Picnic area in southern portion of park.	**Potential Impact: Low to moderate impact to grass field.**	**Graphic/Photo: View looking north at park picnic area.** 

Environmental Factor – AGRICULTURAL/FOREST RESOURCES

Finding: No observed Ag/Forest resources at park during visit.	**Potential Impact: Unknown/None**	**Graphic/Photo: None.**

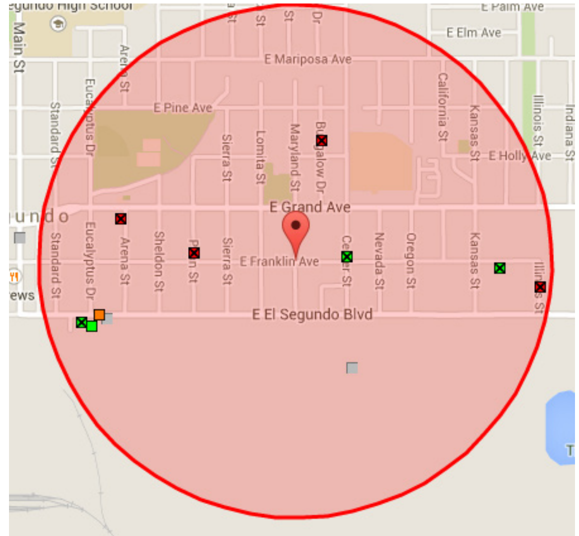
Environmental Factor – AIR QUALITY/GHG EMISSIONS

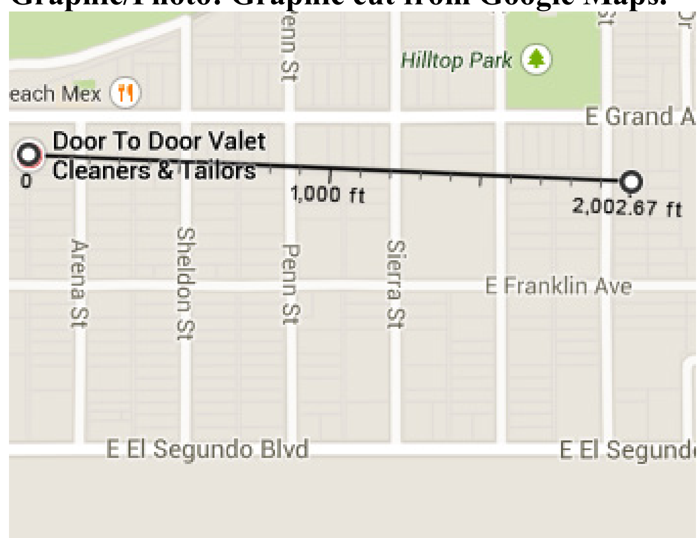
Finding: Residential neighborhood located north and NW of park.	**Potential Impact: Low to moderate – residences in close proximity to AOI and park boundary.**	**Graphic/Photo: View looking north at park with residential housing to the north and across Maryland Street to west (on left).** 

Environmental Factor – BIOLOGICAL RESOURCES

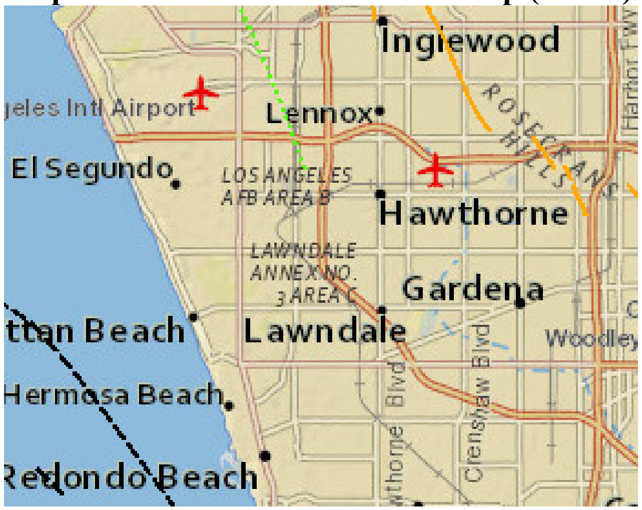
Finding: Trees are located on north and south areas of park and near AOI.	**Potential Impact: Low.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: View looking NW at trees near AOI.** 
Finding: Trees are located south of grass area AOI.	**Potential Impact: Low.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: View looking west at trees along south side of park.** 

Finding: No nesting birds were observed upon visit.	**Potential Impact: Low.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: None.**
Environmental Factor – CULTURAL RESOURCES		
Finding: No cultural resources observed during site visit.	**Potential Impact: Unknown.**	**Graphic/Photo: None.**

<table>
<tr><th colspan="3">Environmental Factor – GEOLOGY/SOILS/HAZARDOUS MATERIALS</th></tr>
<tr>
<td>Finding: No apparent issues during initial site visit. Three open case cleanup sites and nine former/closed sites are located within ½ mile of the park (Geotracker).</td>
<td>Potential Impact: Low to moderate.</td>
<td>Graphic/Photo: Graphic cut from SWRCB Geotracker website.


</td>
</tr>
<tr>
<td>Finding: No apparent issues during initial site visit. Closest dry cleaner approximately ¼ to ½ mile to the west of the park; GW depth and direction in area is unknown (Google).</td>
<td>Potential Impact: Low.</td>
<td>Graphic/Photo: Graphic cut from Google Maps.


</td>
</tr>
</table>

Finding: **The Charnock fault is mapped inferred less than three miles east but no extensive information is reported. The Palos Verde Fault Zone is located off shore to the west with reported activity in last 15,000 years. The Newport-Inglewood Fault is located less than 10 miles to the east. USGS reports approximately 3-5 earthquakes in the last 11,000 years with a recurrence interval of 1,200 to 3,000 years. (Southern California Earthquake Data Center Caltech website).**	**Potential Impact: Low to moderate during earthquake.** **(Graphic cut from USGS interactive fault map of Southern California. Dotted green lines are inferred faults).**	**Graphic/Photo: Interactive Fault Map (USGS).** 

Environmental Factor – HYDROLOGY/WATER QUALITY

Finding: Notes regarding location of cleanup sites and dry cleaners in proximity of park.	**Potential Impact: Low to moderate impact to GW via cleanup sites or dry cleaner.**	**Graphic/Photo: see above in previous section.**

Finding: SCE Generating station/Hyperion pump station just east of park property.	**Potential Impact: Moderate to high.**	**Graphic/Photo: Station facility.** 
Finding: Active oil pump located just outside fence north of park.	**Potential Impact: Moderate to high.**	**Graphic/Photo: Oil pump.** 

Environmental Factor – LAND USE/PLANNING		
Finding: Open area is AOI. Soil testing should not impact use but schedule of park services should be determined.	**Potential Impact: Low to moderate impact potential to field usage.**	**Graphic/Photo: View north of open area.** 
Environmental Factor – NOISE		
Finding: Drill rig noise may impact residents located near park to the north and west.	**Potential Impact: Moderate.**	**Graphic/Photo: View NW at residential housing.** 

Environmental Factor – PUBLIC SERVICES/RECREATION		
Finding: Park uses include general recreation, baseball, and potentially soccer.	**Potential Impact: Low impact to sports/recreations at park.**	**Graphic/Photo: None**

Environmental Factor – TRANSPORTATION/TRAFFIC		
Finding: park is located within a light industrial, commercial and residential area, but traffic is low. **If parking along street is needed for drill rig support vehicle, then no parking signage may be necessary.**	**Potential Impact: Low.**	**Graphic/Photo: None.**

Environmental Factor – UTILITIES/SERVICE SYSTEMS		
Finding: Storm/sewer and water located in SW corner of park property.	**Potential Impact: Low potential.**	**Graphic/Photo: View north along Maryland St at manhole and water valve.** 
Finding: Below and above ground electrical, water, sewer or fiber optic lines.	**Potential Impact: Low to moderate. Close proximity to residents, the potential for below ground utilities is expected. Dig alert and subsurface planning will be utilized in pre-subsurface tasks.**	**Graphic/Photo: View west along Franklin Ave at power lines.** 

Enhanced Watershed Management Program for the City of Los Angeles Regional Project Environmental Study Checklist	
Site Name: Memorial Park	**Date: 2/25/15** **Personnel: Andrew Payne**
Site Address/Location: 1401 Olympic Boulevard, Santa Monica, CA	

General Notes:

- Park includes open grass areas, multiple baseball and softball fields, gymnasium with basketball courts, tennis courts, skate park, parking lot, and picnic areas. The park is large and generally flat with gentle slope to south and west. The lowest point in park is near skate park and southern boundary of park. Grass areas on the west side of park near parking lot and gym and the east side of the park would be accessible for a drill rig and are the most feasible Areas of Interest (AOI) to sample soil. The park is located within a commercial and residential neighborhood in El Segundo. The park is located within a light industrial, commercial and residential.

Environmental Factor – AESTHETICS

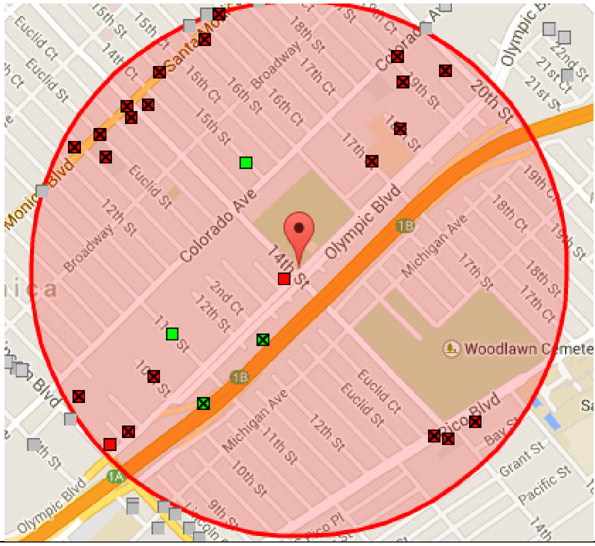
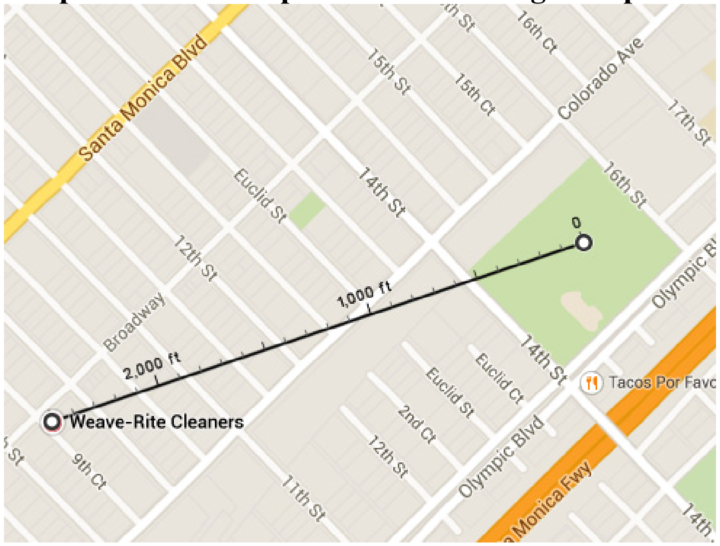
Finding: Open area in east portion of park is a potential Area of Interest (AOI).	**Potential Impact: Low to moderate impact to grass.** **If parking on street is needed then proper signage will be necessary as 16th is busy and metered parking.**	**Graphic/Photo: View looking north along 16th St at grass area along east side of park.** 
Finding: Grass area near parking lot on west side of park is a potential AOI.	**Potential Impact: Low to moderate impact to grass area.**	**Graphic/Photo: View looking west/NW at grass area.** 

Environmental Factor – AGRICULTURAL/FOREST RESOURCES		
Finding: No observed Ag/Forest resources at park during visit.	**Potential Impact: Unknown/None**	**Graphic/Photo: None.**

Environmental Factor – AIR QUALITY/GHG EMISSIONS		
Finding: Area of park is in light industrial, commercial and residential area of Santa Monica.	**Potential Impact: Low.**	**Graphic/Photo: View looking south along 14th St. at area west of park.** 

Environmental Factor – BIOLOGICAL RESOURCES		
Finding: Trees are located near AOI on west side of park. However drill rig can be positioned to minimize impact.	**Potential Impact: Low.**	**Graphic/Photo: View looking N/NE at trees on west side of park near AOI.** 
Finding: Trees are located near AOI east side of park. However drill rig and/or can be positioned to minimize impact.	**Potential Impact: Low.**	**Graphic/Photo: View looking N/NE at trees along east side of park near AOI.** 

Finding: No nesting birds were observed upon visit. However drill rig can be positioned to minimize impact.	**Potential Impact: Low.**	**Graphic/Photo: None.**
Environmental Factor – CULTURAL RESOURCES		
Finding: Nothing observed during site visit.	**Potential Impact: Unknown.**	**Graphic/Photo: None.**

Environmental Factor – GEOLOGY/SOILS/HAZARDOUS MATERIALS		
Finding: No apparent issues during initial site visit. Four open case cleanup sites and twenty-seven former/closed sites are located within ½ mile of the park (Geotracker).	**Potential Impact: Low to moderate.**	**Graphic/Photo: Graphic cut from SWRCB Geotracker website.** 
Finding: No apparent issues during initial site visit. One dry cleaner located less than 1/2 mile to the west/WSW of the park; GW depth and direction in area is unknown (Google).	**Potential Impact: Low to moderate.**	**Graphic/Photo: Graphic cut from Google Maps.** 

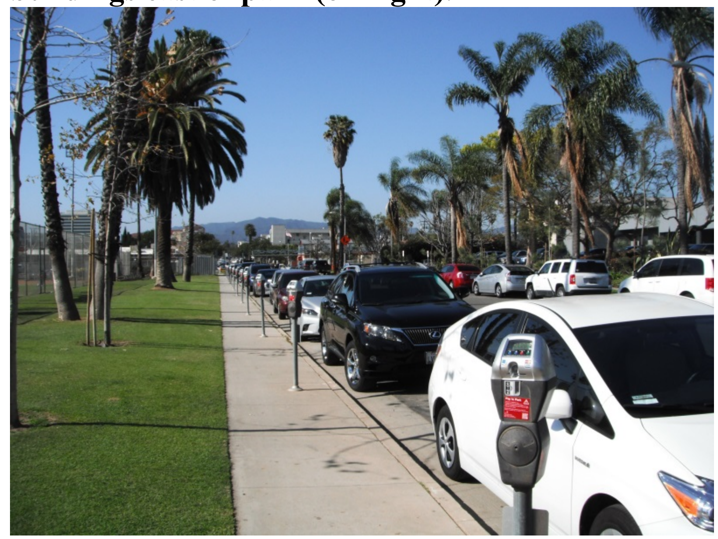
Finding: The Santa Monica Fault is located/mapped on and offshore less than three miles to the north/NW. USGS reports approximately 2-3 earthquakes in the last 17,000 years with a recurrence interval of 7,000 to 8,000 years. The Newport-Inglewood Fault is located less than 10 miles to the east. USGS reports approximately 3-5 earthquakes in the last 11,000 years with a recurrence interval of 1,200 to 3,000 years. The Palos Verde Fault Zone is located off shore to the SW with reported activity in last 15,000 years. (Southern California Earthquake Data Center Caltech website).	**Potential Impact:** Low to moderate during earthquake. (Graphic cut from USGS interactive fault map of Southern California. Dotted green lines are inferred faults).	**Graphic/Photo:** Interactive Fault Map (USGS). 

Environmental Factor – HYDROLOGY/WATER QUALITY

Finding: Notes regarding location of cleanup sites and dry cleaners in proximity of park. Depth to groundwater is between 50 and 60 feet below ground surface and flow is reported to the SW (Geotracker).	**Potential Impact:** Low to moderate impact to GW via cleanup sites or dry cleaner.	**Graphic/Photo:** See above in previous section.

Environmental Factor – LAND USE/PLANNING		
Finding: Soil testing and/or construction should not impact use but schedule of park services should be determined.	**Potential Impact: Low to moderate impact potential to parking along 16th St if utilizing parking spaces.**	**Graphic/Photo: View NW at AOI on east side of park.** 
Finding: Soil testing and/or construction should not impact use but schedule of park services should be determined.	**Potential Impact: Low to moderate impact potential to park usage on west side of park.**	**Graphic/Photo: View west at AOI on west side of park.** 

Environmental Factor – NOISE

Finding: Drill rig noise may impact business east of park.	**Potential Impact: Low. Park is located in a busy area of Santa Monica.**	**Graphic/Photo: View looking north along 16th St, office buildings east of park (on right).** 
Finding: Drill rig noise may impact park pedestrians.	**Potential Impact: Low to moderate. Park is located in a busy area of Santa Monica.**	**Graphic/Photo: View looking north at tennis courts.** 

Environmental Factor – PUBLIC SERVICES/RECREATION		
Finding: Park uses include general recreation, baseball/softball, tennis, skate park, and basketball.	**Potential Impact: Low impact to sports/recreations at park.**	**Graphic/Photo: View looking north at baseball field.** 

Environmental Factor – TRANSPORTATION/TRAFFIC		
Finding: Park is located within a light industrial, commercial and residential area; traffic is moderate to heavy. **If parking along street is needed for drill rig support vehicle, then no parking signage will be necessary.**	**Potential Impact: Low.**	**Graphic/Photo: None.**

Environmental Factor – UTILITIES/SERVICE SYSTEMS		
Finding: Utilities at and near park.	**Potential Impact: Low to moderate.**	**Graphic/Photo: View north at AOI on west side of park.** 
Finding: Below and above ground electrical, water, sewer or fiber optic lines.	**Potential Impact: Low to moderate. The potential for below ground utilities is expected. Dig alert and subsurface planning will be utilized in pre-subsurface tasks.**	**Graphic/Photo: See photo above.**

Enhanced Watershed Management Program for the City of Los Angeles
Regional Project Environmental Study Checklist

Site Name: Oakwood Recreation Center	**Date: 2/25/15**
	Personnel: Andrew Payne

Site Address/Location: 767 California Avenue, Venice, CA

General Notes:

- Park includes open grass area, baseball and softball fields, a day care recreation building, small parking lot, and picnic areas. The park is small and the NW portion of grass area would be accessible for a drill rig and are the most feasible Areas of Interest (AOI) to sample soil and/or design BMP. The park is located within a residential neighborhood in Venice, but close to busy commercial area.

Environmental Factor – AESTHETICS		
Finding: NW corner of open grass area/park good potential Area of Interest (AOI).	**Potential Impact: Low to moderate impact to grass field, schedule for any sports scheduled to be played at park in grass area.**	**Graphic/Photo: View looking NW at grass area AOI.** 

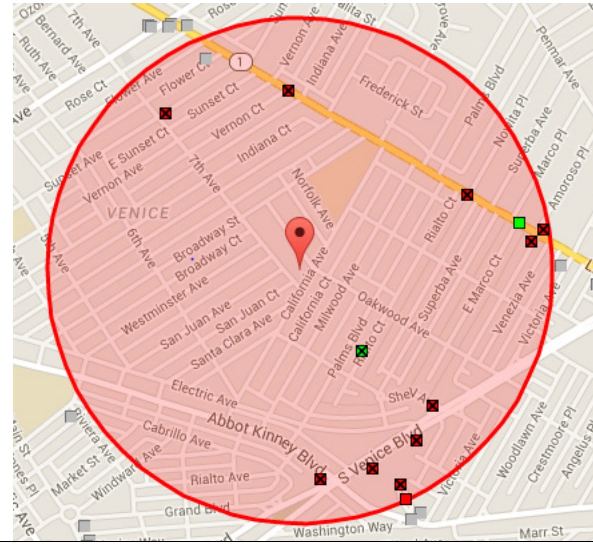
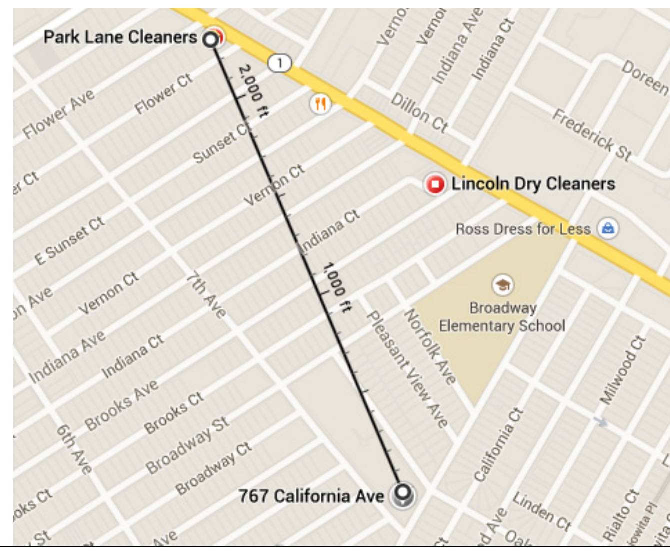
Environmental Factor – AGRICULTURAL/FOREST RESOURCES		
Finding: No observed Ag/Forest resources at park during visit.	**Potential Impact: Unknown/None**	**Graphic/Photo: None.**

Environmental Factor – AIR QUALITY/GHG EMISSIONS		
Finding: Residential neighborhood located north, east and west.	**Potential Impact: Low to moderate – residences in close proximity to AOI and park boundary.**	**Graphic/Photo: View looking north along Oakwood Ave at neighborhood.** 

Environmental Factor – BIOLOGICAL RESOURCES		
Finding: Trees are located near the AOI. However drill rig and/or construction can be positioned to minimize impact.	**Potential Impact: Low.**	**Graphic/Photo: View looking north at trees near AOI in NW corner of park (see photo above).**

Finding: No nesting birds were observed upon visit. However drill rig and/or construction can be positioned to minimize impact.	**Potential Impact: Low.**	**Graphic/Photo: None.**
Environmental Factor – CULTURAL RESOURCES		
Finding: Nothing observed during site visit.	**Potential Impact: Unknown.**	**Graphic/Photo: None.**

Environmental Factor – GEOLOGY/SOILS/HAZARDOUS MATERIALS

Finding: No apparent issues during initial site visit. Three open case cleanup sites and six former/closed sites are located within ½ mile of the park (Geotracker).	**Potential Impact: Low to moderate.**	**Graphic/Photo: Graphic cut from SWRCB Geotracker website.** 
Finding: No apparent issues during initial site visit. Two dry cleaners located within ½ mile to the north and NW of the park; GW depth is reported to be less than 25 feet below ground surface and flow direction varies form N/NW to S/SW (GW info Geotracker).	**Potential Impact: Low to moderate.**	**Graphic/Photo: Graphic cut from Google Maps.** 

Finding: The Charnock fault is mapped inferred less than three miles east but no extensive information is reported. The Palos Verde Fault Zone is located off shore to the west with reported activity in last 15,000 years. The Newport-Inglewood Fault is located less than 10 miles to the east. USGS reports approximately 3-5 earthquakes in the last 11,000 years with a recurrence interval of 1,200 to 3,000 years. (Southern California Earthquake Data Center Caltech website). Liquefaction found as factor during preliminary information gathering.	**Potential Impact: Low to moderate during earthquake.** **(Graphic cut from USGS interactive fault map of Southern California. Dotted green lines are inferred faults).**	**Graphic/Photo: Interactive Fault Map (USGS).** 

Environmental Factor – HYDROLOGY/WATER QUALITY

Finding: Notes regarding location of cleanup sites and dry cleaners in proximity of park.	**Potential Impact: Low to moderate impact to GW via cleanup sites or dry cleaner.**	**Graphic/Photo: See above in previous section.**

Environmental Factor – LAND USE/PLANNING		
Finding: Open area is AOI. Soil testing and/or construction should not impact use but schedule of park services should be determined.	**Potential Impact: Low to moderate impact potential to open area usage at NW AOI.**	**Graphic/Photo: View east at NW AOI.** 
Environmental Factor – NOISE		
Finding: Drill rig noise may impact residents located near park to the north, east and west.	**Potential Impact: Moderate.**	**Graphic/Photo: View looking NW at residential housing (see above).**

Environmental Factor – PUBLIC SERVICES/RECREATION		
Finding: Park uses include general recreation, baseball/softball, and soccer.	**Potential Impact: Low impact to sports/recreations at park.**	**Graphic/Photo: View looking west at baseball field.** 

Environmental Factor – TRANSPORTATION/TRAFFIC		
Finding: Park is located within a light commercial and residential area; traffic is low to moderate. **If parking along street is needed for drill rig support vehicle, then no parking signage may be necessary.**	**Potential Impact: Low.**	**Graphic/Photo: None.**

Environmental Factor – UTILITIES/SERVICE SYSTEMS		
Finding: Utilities located near park.	**Potential Impact: Low potential.**	**Graphic/Photo: View north along 7th Ave at storm drain (foreground), power lines and lights for street and park.** 
Finding: Below and above ground electrical, water, sewer or fiber optic lines.	**Potential Impact: Low to moderate. Close proximity to residents, the potential for below ground utilities is expected. Dig alert and subsurface planning will be utilized in pre-subsurface tasks.**	**Graphic/Photo: See above photo.**

Enhanced Watershed Management Program for the City of Los Angeles
Regional Project Environmental Study Checklist

Site Name: Recreation Park	**Date: 2/23/15**
	Personnel: Andrew Payne

Site Address/Location: 401 Sheldon Street, El Segundo, CA

General Notes:

- Park includes open grass areas, multiple baseball and softball fields, batting cages, eight tennis courts, roller hockey rink, two recreation buildings, a community garden, a day care recreation building, two parking lots, horseshoe pits, shuffle boarding, a teen center and Skate Park, and picnic areas. The park is large and hilly with the SW area being lowest in elevation. Grass areas in the NW and central portion of park near tennis courts and northern parking lot would be accessible for a drill rig and both feasible Areas of Interest (AOI) to sample soil. The park is located within a commercial and residential neighborhood in El Segundo. The park is located within a residential and commercial area of El Segundo.

Environmental Factor – AESTHETICS

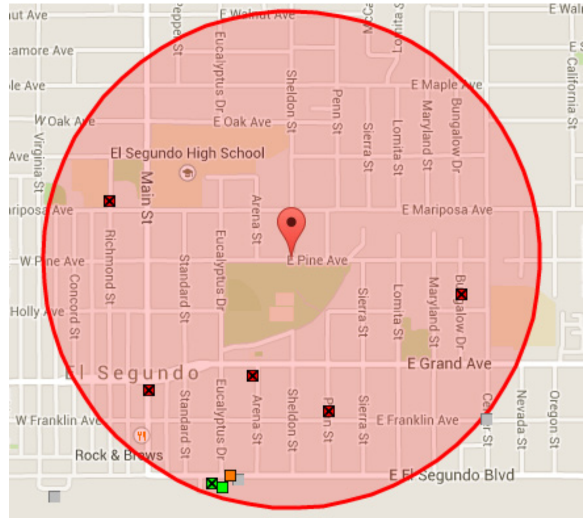
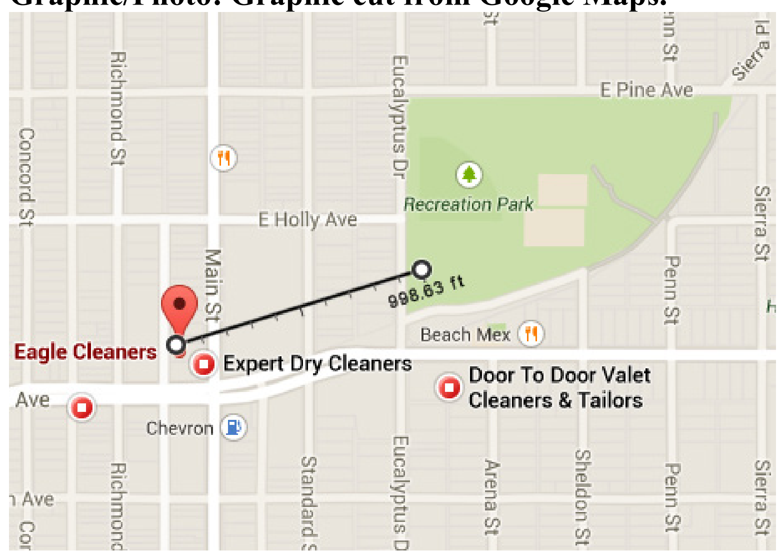
Finding: Open area tennis courts and northern parking lot is good potential Area of Interest (AOI).	**Potential Impact: Low to moderate impact to grass field, schedule for any sports scheduled to be played at park in grass area.**	**Graphic/Photo: View looking SW at grass area AOI (just west of tennis courts).** 
Finding: Open area in NW portion of park is good potential AOI.	**Potential Impact: Low to moderate impact to grass field.**	**Graphic/Photo: View looking E/NE at open grass area (Day care recreation building in background).** 

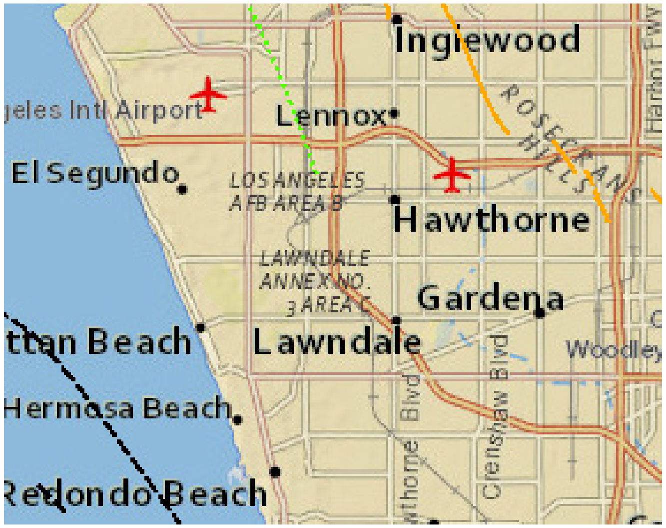
Environmental Factor – AGRICULTURAL/FOREST RESOURCES		
Finding: No observed Ag/Forest resources at park during visit.	**Potential Impact: Unknown/None**	**Graphic/Photo: None.**

Environmental Factor – AIR QUALITY/GHG EMISSIONS		
Finding: Residential neighborhood located north, east and west.	**Potential Impact: Low to moderate – residences in close proximity to AOI and park boundary.**	**Graphic/Photo: View looking east along Pine St. at neighborhood. Park to the south (on right).** 

Environmental Factor – BIOLOGICAL RESOURCES		
Finding: Trees are located on north and south areas of park and near AOI.	**Potential Impact: Low.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: View looking SE at trees near AOI in NW corner of park.** 
Finding: Trees are located near grass area AOI.	**Potential Impact: Low.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: View looking east at trees near AOI by tennis courts and northern parking lot.** 

Finding: No nesting birds were observed upon visit. However drill rig and/or construction can be positioned to minimize impact.	**Potential Impact: Low.**	**Graphic/Photo: None.**
Environmental Factor – CULTURAL RESOURCES		
Finding: Nothing observed during site visit.	**Potential Impact: Unknown.**	**Graphic/Photo: None.**

Environmental Factor – GEOLOGY/SOILS/HAZARDOUS MATERIALS		
Finding: No apparent issues during initial site visit. Three open case cleanup sites and six former/closed sites are located within ½ mile of the park (Geotracker).	**Potential Impact: Low to moderate.**	**Graphic/Photo: Graphic cut from SWRCB Geotracker website.** 
Finding: No apparent issues during initial site visit. Four dry cleaners located less than ¼ mile to the west of the park; GW depth and direction in area is unknown (Google).	**Potential Impact: Low to moderate.**	**Graphic/Photo: Graphic cut from Google Maps.** 

Finding: The Charnock fault is mapped inferred less than three miles east but no extensive information is reported. The Palos Verde Fault Zone is located off shore to the west with reported activity in last 15,000 years. The Newport-Inglewood Fault is located less than 10 miles to the east. USGS reports approximately 3-5 earthquakes in the last 11,000 years with a recurrence interval of 1,200 to 3,000 years. (Southern California Earthquake Data Center Caltech website).	**Potential Impact: Low to moderate during earthquake.** **(Graphic cut from USGS interactive fault map of Southern California. Dotted green lines are inferred faults).**	**Graphic/Photo: Interactive Fault Map (USGS).** 
Environmental Factor – HYDROLOGY/WATER QUALITY		
Finding: Notes regarding location of cleanup sites and dry cleaners in proximity of park.	**Potential Impact: Low to moderate impact to GW via cleanup sites or dry cleaner.**	**Graphic/Photo: See above in previous section.**

Environmental Factor – LAND USE/PLANNING		
Finding: Open area is AOI. Soil testing and/or construction should not impact use but schedule of park services should be determined.	**Potential Impact: Low to moderate impact potential to open area usage at NW AOI.**	**Graphic/Photo: View east at NW AOI.** 
Finding: AOI is open grass area. Soil testing and/or construction should not impact use but schedule of park services should be determined.	**Potential Impact: Low to moderate impact potential to open area usage at AOI.**	**Graphic/Photo: view SE at east AOI.** 

Environmental Factor – NOISE		
Finding: Drill rig noise may impact residents located near park to the north, east and west.	**Potential Impact: Moderate.**	**Graphic/Photo: View looking south at residential housing (on right).** 
Finding: Drill rig noise may impact residents, pedestrians and workers.	**Potential Impact: Low to moderate.**	**Graphic/Photo: None.**

Environmental Factor – PUBLIC SERVICES/RECREATION		
Finding: Park uses include general recreation, baseball/softball, roller hockey, tennis, and potentially soccer.	**Potential Impact: Low impact to sports/recreations at park.**	**Graphic/Photo: View looking north at park.** 

Environmental Factor – TRANSPORTATION/TRAFFIC		
Finding: Park is located within a light commercial and residential area; traffic is low to moderate. **If parking along street is needed for drill rig support vehicle, then no parking signage may be necessary.**	**Potential Impact: Low.**	**Graphic/Photo: None.**

Environmental Factor – UTILITIES/SERVICE SYSTEMS		
Finding: Transformer in NW corner of park property near NW AOI.	**Potential Impact: Low.**	**Graphic/Photo: View north along Eucalyptus Dr at transformer near NW AOI.** 
Finding: Below and above ground electrical, water, sewer or fiber optic lines.	**Potential Impact: Low to moderate. Close proximity to residents, the potential for below ground utilities is expected. Dig alert and subsurface planning will be utilized in pre-subsurface tasks.**	**Graphic/Photo: View north at lights and power lines.** 

Enhanced Watershed Management Program for the City of Los Angeles Regional Project Environmental Study Checklist	
Site Name: Riviera Country Club (RCC)	**Date: 3/3/15** **Personnel: Andrew Payne**
Site Address/Location: 1250 Capri Drive, Los Angeles, CA 90272	

General Notes:

- Riviera Country Club (RCC) includes an 18-hole golf course, driving range, tennis courts, swimming pool, club house, club amenities and is located in a residential neighborhood. A gate located at that south end of Longworth Drive will provide access for a drill rig to the Area of Interest (AOI) for soil sampling. The AOI is located in the northeast corner of RCC property. The Santa Monica Canyon Channel runs northeast to southwest through the RCC property. The former creek that is now the concrete lined channel flooded several times in the 1960's to 1970's. The Army Core of Engineers (ACOE) installed the concrete lined channel as a result of the flooding.

Environmental Factor – AESTHETICS		
Finding: Access road and graveled area AOI.	**Potential Impact: Low impact.**	**Graphic/Photo: View looking southwest at AOI (gravel area), driving range in background.** 
Finding: Grass and concrete path along golf course.	**Potential Impact: Moderate impact to grass and path.**	**Graphic/Photo: View looking southwest along 13th hole and at barranca (former creek); south of AOI.** 

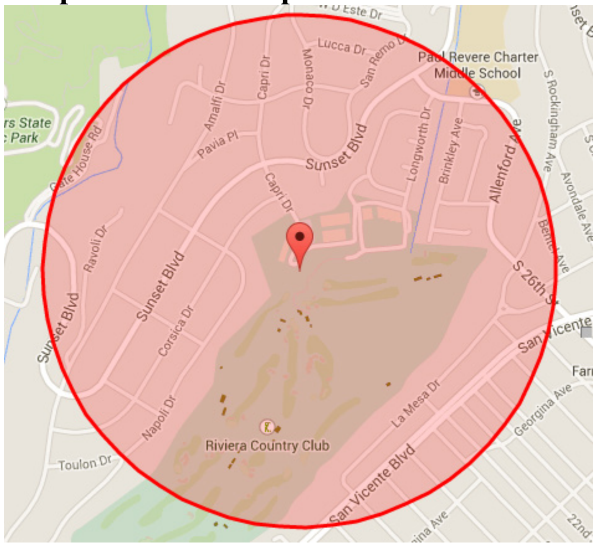
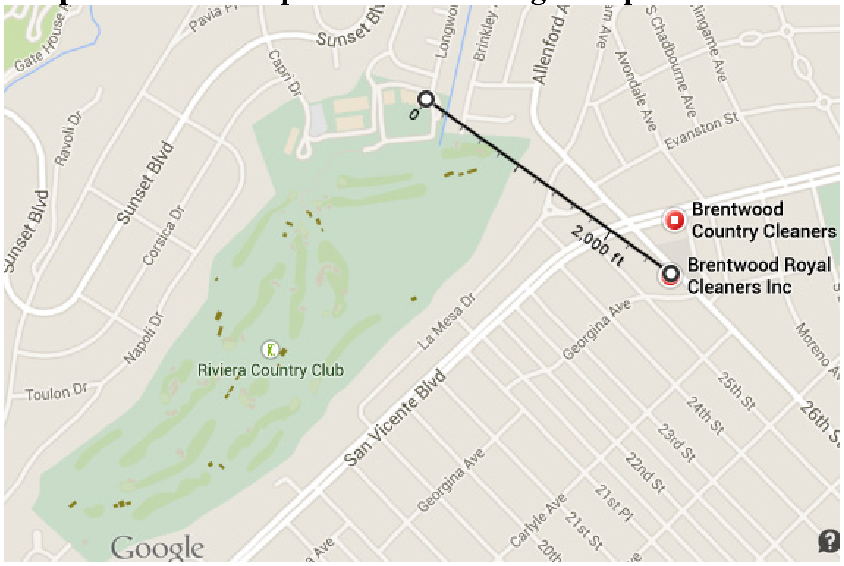
Environmental Factor – AGRICULTURAL/FOREST RESOURCES		
Finding: No Ag/Forest resources at RCC during visit.	**Potential Impact: Unknown/None**	**Graphic/Photo: None.**

Environmental Factor – AIR QUALITY/GHG EMISSIONS		
Finding: Trees at AOI.	**Potential Impact: Low to moderate.** **Impacts to trees can be managed by positioning the CPT rig outside of tree canopy and drip line.**	**Graphic/Photo: View looking southwest at AOI (gravel area), trees near AOI driving range in background.** 

Finding: Residents adjacent to AOI.	**Potential Impact: Low to moderate.** **CPT rig can be positioned to minimize impacts.**	**Graphic/Photo: View looking southwest at AOI (gravel area), trees near AOI driving range in background.** 
Environmental Factor – BIOLOGICAL RESOURCES		
Finding: Trees are located near the AOI.	**Potential Impact: Low to moderate.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: (See photo above).**

Finding: Birds were observed at RCC.	**Potential Impact: Low.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: None.**
Environmental Factor – CULTURAL RESOURCES		
Finding: Nothing observed during site visit.	**Potential Impact: Unknown.**	**Graphic/Photo: None.**

Environmental Factor – GEOLOGY/SOILS/HAZARDOUS MATERIALS

Finding: No apparent issues during initial site visit. No cleanup sites located within ½ mile of AOI (Geotracker).	**Potential Impact: Low.**	**Graphic/Photo: Graphic cut from Geotracker.** 
Finding: No apparent issues during initial site visit. Two dry cleaners located within ½ mile to the SE of AOI at RCC; GW depth is unknown at AOI but in area is reported to be less than 25 feet below ground surface and flow direction varies form N/NW to S/SW (GW info Geotracker).	**Potential Impact: Low to moderate.**	**Graphic/Photo: Graphic cut from Google Maps.** 

Finding: The Charnock fault is mapped inferred less than three miles east but no extensive information is reported. The Palos Verde Fault Zone is located off shore to the west with reported activity in last 15,000 years. The Newport-Inglewood Fault is located less than 10 miles to the east. USGS reports approximately 3-5 earthquakes in the last 11,000 years with a recurrence interval of 1,200 to 3,000 years. (Southern California Earthquake Data Center Caltech website). Liquefaction found as factor during preliminary information gathering.	Potential Impact: Low to moderate during earthquake. (Graphic cut from USGS interactive fault map of Southern California. Dotted green lines are inferred faults).	Graphic/Photo: Interactive Fault Map (USGS). 

Environmental Factor – HYDROLOGY/WATER QUALITY

Finding: Notes regarding location of cleanup sites and dry cleaners in proximity of AOI.	Potential Impact: Low to moderate impact to GW via cleanup sites or dry cleaner.	Graphic/Photo: See above in previous section.

Finding: Stormwater system.	**Potential Impact: Low.**	**Graphic/Photo: View looking south point where Santa Monica Cyn channel diverts beneath RCC.** 
Finding: Stormwater system.	**Potential Impact: Low.**	**Graphic/Photo: View looking southwest at stormwater catch basin/inlet that discharges into Santa Monica Cyn channel beneath RCC at the 13th hole.** 

Finding: Stormwater system.	**Potential Impact: Low.**	**Graphic/Photo: View looking SW at Santa Monica Cyn channel off RCC property at the 6th hole.** 
Environmental Factor – LAND USE/PLANNING		
Finding: AOI is adjacent to active golf course.	**Potential Impact: Low.**	**Graphic/Photo: View north/NE along the 8th hole (barranca on left).** 

Environmental Factor – NOISE		
Finding: Impact to RCC members, workers and nearby residents.	**Potential Impact: Low to moderate.**	**Graphic/Photo: View looking west at tennis courts near AOI.** 
Environmental Factor – PUBLIC SERVICES/RECREATION		
Finding: RCC is a private country club.	**Potential Impact: None.**	**Graphic/Photo: None.**

Environmental Factor – TRANSPORTATION/TRAFFIC		
Finding: BCC is located within a residential neighborhood in a busy area of Los Angeles; traffic is low to high.	**Potential Impact: Low.**	**Graphic/Photo: None.**
Finding: Members and workers.	**Potential Impact: Low to moderate.**	**Graphic/Photo: None.**

Environmental Factor – UTILITIES/SERVICE SYSTEMS		
Finding: Utilities located on RCC property.	**Potential Impact: Low.**	**Graphic/Photo: View of underground stormwater system and pump house.** 
Finding: Below ground electrical, water, sewer or fiber optic lines. No above ground power lines in vicinity of AOI.	**Potential Impact: Low to moderate. Close proximity to residents, tennis court lighting, and the potential for below ground utilities is expected. Dig alert and subsurface planning will be utilized in pre-subsurface tasks.**	**Graphic/Photo: None.**

Enhanced Watershed Management Program for the City of Los Angeles Regional Project Environmental Study Checklist	
Site Name: Rustic Canyon Recreation Center	**Date: 3/3/15** **Personnel: Andrew Payne**
Site Address/Location: 601 Latimer Drive, Pacific Palisades, CA	

General Notes:

- Overall the park consists of a recreation center, tennis courts, basketball courts, baseball/softball fields, picnic areas, a playground, day care center, and parking lot. The northwest corner of this small park is most feasible Area of Interest (AOI) to sample soil and/or design BMP. If CPT rig cannot access AOI, then parking lot may be utilized for sampling. The park is located within a residential neighborhood in Pacific Palisades.

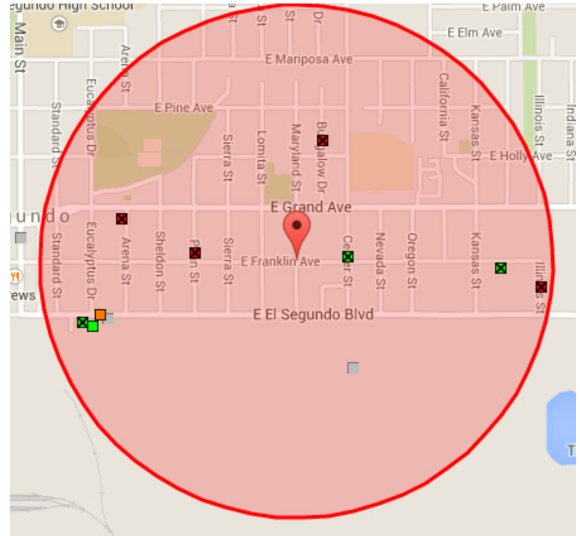
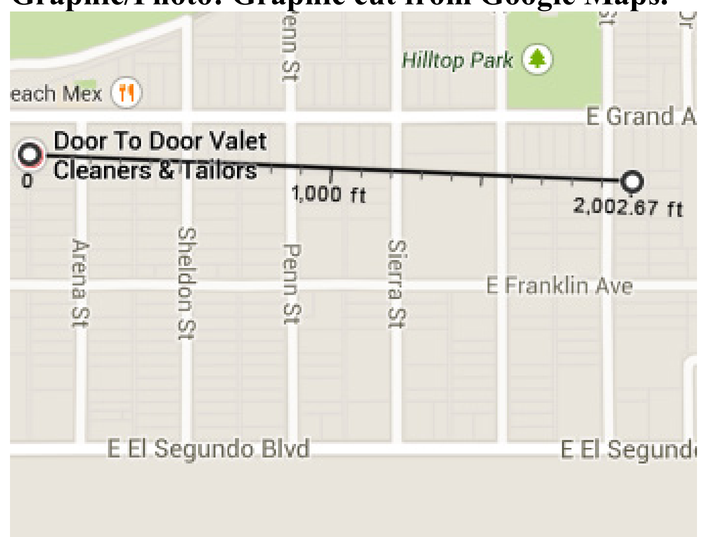
Environmental Factor – AESTHETICS		
Finding: Open area in NW portion of park is good potential Area of Interest (AOI).	**Potential Impact: Low to moderate impact to grass field, schedule for any sports scheduled to be played at park in grass area.**	**Graphic/Photo: View looking north at grass area AOI and tennis courts in background.** 
Finding: Picnic area, tennis, basketball and playground.	**Potential Impact: Low.**	**Graphic/Photo: View looking east at picnic area, basketball court and playground in background.** 

Environmental Factor – AGRICULTURAL/FOREST RESOURCES		
Finding: No observed Ag/Forest resources at park during visit.	**Potential Impact: Unknown/None**	**Graphic/Photo: None.**

Environmental Factor – AIR QUALITY/GHG EMISSIONS		
Finding: Park located within residential neighborhood.	**Potential Impact: Low to moderate – residences in close proximity to AOI and park boundary.**	**Graphic/Photo: View looking north/NNW open grass area; residential neighborhood beyond trees.** 

Finding: Trees at and around park.	**Potential Impact: Low to moderate - trees in close proximity to AOI and park boundary.** **Position CPT rig to minimize any impacts.**	**Graphic/Photo: View looking south open grass area.** 
Environmental Factor – BIOLOGICAL RESOURCES		
Finding: Trees are located all around park and near AOI.	**Potential Impact: Low.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: (See photo above).**

Finding: No nesting birds were observed upon visit.	**Potential Impact: Low.** **CPT rig can be positioned to minimize impact.**	**Graphic/Photo: None.**
Environmental Factor – CULTURAL RESOURCES		
Finding: Nothing observed during site visit.	**Potential Impact: Unknown.**	**Graphic/Photo: None.**

Environmental Factor – GEOLOGY/SOILS/HAZARDOUS MATERIALS		
Finding: No apparent issues during initial site visit. Three open case cleanup sites and nine former/closed sites are located within ½ mile of the park (Geotracker).	**Potential Impact: Low to moderate.**	**Graphic/Photo: Graphic cut from SWRCB Geotracker website.** 
Finding: No apparent issues during initial site visit. Closest dry cleaner approximately ¼ to ½ mile to the west of the park; GW depth and direction in area is unknown (Google).	**Potential Impact: Low.**	**Graphic/Photo: Graphic cut from Google Maps.** 

Finding: The Charnock fault is mapped inferred less than three miles east but no extensive information is reported. The Palos Verde Fault Zone is located off shore to the west with reported activity in last 15,000 years. The Newport-Inglewood Fault is located less than 10 miles to the east. USGS reports approximately 3-5 earthquakes in the last 11,000 years with a recurrence interval of 1,200 to 3,000 years. (Southern California Earthquake Data Center Caltech website).	**Potential Impact:** Low to moderate during earthquake. (Graphic cut from USGS interactive fault map of Southern California. Dotted green lines are inferred faults).	**Graphic/Photo:** Interactive Fault Map (USGS). 
Environmental Factor – HYDROLOGY/WATER QUALITY		
Finding: Notes regarding location of cleanup sites and dry cleaners in proximity of park.	**Potential Impact:** Low to moderate impact to GW via cleanup sites or dry cleaner.	**Graphic/Photo:** None.

Finding: Access road into AOI and stormwater drainage.	**Potential Impact: Low.**	**Graphic/Photo: Access road; storm drains near access road.** 
Environmental Factor – LAND USE/PLANNING		
Finding: Open area is AOI. Soil testing should not impact use but schedule of park services should be determined.	**Potential Impact: Low to moderate impact potential to field usage.**	**Graphic/Photo: View north of AOI.** 

Environmental Factor – NOISE		
Finding: Residents and day care near AOI.	**Potential Impact: Low to moderate.**	**Graphic/Photo: View looking east at AOI, tennis courts and neighborhood (background).** 

Environmental Factor – PUBLIC SERVICES/RECREATION		
Finding: Park uses include general recreation, baseball, and potentially soccer.	**Potential Impact: Low impact to sports/recreations at park.**	**Graphic/Photo: None.**

Environmental Factor – TRANSPORTATION/TRAFFIC

Finding	Potential Impact	Graphic/Photo
Finding: park is located within a residential neighborhood traffic is low to moderate. **Streets are narrow in this neighborhood.**	**Potential Impact: Low to moderate.**	**Graphic/Photo: View of neighborhood street.** 

Environmental Factor – UTILITIES/SERVICE SYSTEMS

Finding	Potential Impact	Graphic/Photo
Finding: Below and above ground electrical, water, sewer or fiber optic lines.	**Potential Impact: Low to moderate. Close proximity to residents, the potential for below ground utilities is expected. Dig alert and subsurface planning will be utilized in pre-subsurface tasks.**	**Graphic/Photo: View NE at Rustic Cyn Rec. center building.** 

APPENDIX D

GEOTECHNICAL EVALUATION

GEOTECHNICAL EVALUATION
LOS ANGELES BUREAU OF SANITATION
ENHANCED WATERSHED
MANAGEMENT PROGRAM
BRENTWOOD, SANTA MONICA,
AND EL SEGUNDO SITES
LOS ANGELES COUNTY, CALIFORNIA
MWH JOB NO. 10503614

PREPARED FOR:

MWH Americas, Inc.
19900 MacArthur Boulevard, Suite 250
Irvine, California 92616

PREPARED BY:

Ninyo & Moore
Geotechnical and Environmental Sciences Consultants
5710 Ruffin Road
San Diego, California 92123

April 24, 2015
Project No. 107910001

April 24, 2015
Project No. 107910001

Mr. Thomas McCarthy
MWH Americas, Inc.
19900 MacArthur Boulevard, Suite 250
Irvine, California 92616

Subject: Geotechnical Evaluation
Los Angeles Bureau of Sanitation
Enhanced Watershed Management Program
Brentwood, Santa Monica, and El Segundo Sites
Los Angeles County, California
MWH Job No. 10503614

Dear Mr. McCarthy:

In accordance with your authorization and our proposal dated February 9, 2015, we have performed a geotechnical evaluation for the proposed Los Angeles Bureau of Sanitation Enhanced Watershed Management Program at four sites within the southwestern portion of Los Angeles County, California. This report presents geotechnical data obtained by Ninyo & Moore relative to the proposed project. We appreciate the opportunity to be of service on this project.

Sincerely,
NINYO & MOORE

William Morrison, PE, GE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
WILLIAM R. MORRISON
No. 2468
Exp. 12/31/16
GEOTECHNICAL
STATE OF CALIFORNIA

Gregory T. Farrand, PG, CEG
Principal Geologist

REGISTERED GEOLOGIST
GREGORY T. FARRAND
No. 1037
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

NMM/WRM/GTF/gg

Distribution: (1) Addressee (via e-mail)

5710 Ruffin Road ▪ San Diego, California 92123 ▪ Phone (858) 576-1000 ▪ Fax (858) 576-9600

San Diego ▪ Irvine ▪ Los Angeles ▪ Rancho Cucamonga ▪ Oakland ▪ San Francisco ▪ San Jose ▪ Sacramento
Las Vegas ▪ Phoenix ▪ Tucson ▪ Prescott Valley ▪ Denver ▪ Houston

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1. INTRODUCTION

In accordance with your authorization and our proposal dated February 9, 2015, we have performed a geotechnical evaluation for four proposed storm water infiltration sites in the southwestern portion of Los Angeles County, California. Specifically, the evaluated sites are located in the communities of Brentwood, Santa Monica, and El Segundo (Figure 1). This report presents a compilation of background geotechnical data and subsurface geotechnical data obtained from the sites.

2. SCOPE OF SERVICES

Ninyo & Moore's scope of services for this project included review of pertinent background data, performance of a geologic reconnaissance, and subsurface exploration with regard to the proposed project. Specifically, we performed the following tasks:

- Review of readily available background materials, including State of California Seismic Hazards Zones maps, State of California Earthquake Fault Zone maps (Alquist-Priolo Special Studies Zones maps), other published geologic maps and literature, in-house information, stereoscopic aerial photographs, and plans provided by the client.

- Performance of a site reconnaissance to observe the existing conditions at the site and to mark the proposed boring locations for utility clearance. Mark-out of potential existing underground utilities was conducted through Underground Service Alert (USA).

- Performing a subsurface exploration consisting of advancing and logging one cone penetrometer test (CPT) sounding at each of the four sites being considered for construction of storm water infiltration facilities. The CPTs were advanced to depths up to 30 feet using a truck-mounted rig.

- Compiling the data obtained from our background research and subsurface exploration.

- Preparing this report that presents geotechnical data obtained from our background review, site reconnaissance, and subsurface exploration at each of the project sites, along with preliminary evaluation of potential geotechnical factors that could affect the conceptual design of the project.

3. PROJECT AND SITE DESCRIPTIONS

The purpose of our evaluation is to assist MWH Americas (MWH) and the City of Los Angeles Bureau of Sanitation (LA BOS) in developing an Enhanced Watershed Management Program (EWMP) for the southwestern portion of Los Angeles, California. Our services are intended to help support feasibility analyses being conducted by MWH and LA BOS for Better Management Practices (BMPs) at specific locations as part of the EWMP. We understand that the BMPs will help to reduce the impact of storm water and non-storm water discharges on the area.

The project is planned at four separate sites located within the southwestern portion of Los Angeles County, California (Figures 1 and 2). One site is situated in the Brentwood area, two sites are located in Santa Monica, and one site is located in El Segundo. The name, location (including latitude and longitude), and approximate elevation of each of the four sites are presented below in Table 1.

Table 1 – Site Name and Location

Site Name	Address	Approximate Elevation (above MSL)	Approximate Latitude	Approximate Longitude
Brentwood Country Club	590 S. Burlingame Avenue Los Angeles, California 90049	345 feet	34.049254º N	118.485852º W
Rustic Canyon Recreation Center	601 Latimer Road Santa Monica, California, 90402	155 feet	34.038803º N	118.515019º W
Santa Monica Civic Center	4th Street and Pico Boulevard Santa Monica, California 90401	65 feet	34.009665º N	118.487675º W
Recreation Park	401 Sheldon Street El Segundo, California 90245	85 feet	33.921421º N	118.411928º W

Note:
MSL – Mean Sea Level

The site located at the Santa Monica Civic Center consists of an AC paved parking lot with planters landscaped with trees and shrubs. The other project sites are located in park areas developed with grass fields, paved and unpaved walking areas, restroom and/or recreation center buildings, asphalt concrete (AC) paved parking lots, and other associated appurtenances.

4. FIELD EXPLORATION

Our geotechnical field exploration of the proposed storm water infiltration facility sites included a geologic reconnaissance and subsurface exploration conducted on April 13 and April 20, 2015. The subsurface exploration consisted of the performance of four CPT soundings (CPT-1 through CPT-4) to depths of up to approximately 30 feet below existing grades. One CPT sounding was performed at each site. The CPT soundings were performed using a truck-mounted CPT rig. The CPTs were backfilled with dry concrete materials. The locations for each CPT were designated by MWH, and are presented on Figures 3 through 6. Logs of the CPT soundings are presented in Appendix A.

5. GEOLOGY AND SUBSURFACE CONDITIONS

Our findings regarding regional and site geology, and groundwater conditions at the four project sites are provided in the following sections.

5.1. Regional and Geologic Setting

The subject sites are located within the western portion of the Los Angeles Basin, which is included in the Transverse Ranges Geomorphic Province. This geomorphic province encompasses an area that extends approximately 320 miles from the Pacific Ocean at Point Arguello, west of Santa Barbara, to the Joshua Tree National Monument east of Palm Springs. The province is up to 60 miles wide along the Los Angeles-Ventura County line and narrows to about 40 miles at its western end. The Los Angeles Basin has been divided into four structural blocks which are generally bounded by prominent fault systems: the Northwestern Block, the Southwestern Block, the Central Block, and the Northeastern Block (Norris and Webb, 1990). The project sites are located in the Southwestern Block, which is generally bounded the Newport-Inglewood fault along the east and the Pacific Coastline along the west. The Southwestern Block is underlain by up to approximately 20,500 feet of Miocene-age or younger marine deposits over basement rock consisting of the Catalina Schist.

5.2. Site Geology

Our review of the referenced geologic maps and literature indicates that the subject sites are underlain by Holocene to Pleistocene alluvial and terrace deposits (Campbell et al., 2014; Jennings, 2010b; Saucedo et al., 2003). As described in the literature, these deposits consist of unconsolidated to moderately indurated gravel, sand, silt, and clay. Geologic units encountered during our reconnaissance and subsurface exploration of the project sites included fill soils and alluvium. Generalized descriptions of the soils encountered are provided Table 2. Logs of the CPT soundings are presented in Appendix A. A geologic map of the region is presented on Figure 7.

Table 2 – Subsurface Conditions

Site Name	CPT Number	Depth Explored (feet)	Encountered soils	Groundwater Depth
Brentwood Country Club	CPT-1	30.5 feet	Interbedded very stiff fine grained, silty clay to clay, and sand to silty sand	Not encountered
Rustic Canyon Recreation Center	CPT-2	11.2 feet (refusal)	Interbedded clayey silt to silty clay, sand to silty sand, and sand	Not encountered
Santa Monica Civic Center	CPT-3	16.4 feet (refusal)	Interbedded clay, silty clay to clay, clayey silt to silty clay, sand to silty sand, and sand	Not encountered
Recreation Park	CPT-4	24.1 feet (refusal)	Interbedded sand to silty sand and sand	Not encountered

5.3. Groundwater

Groundwater was not encountered in our CPT soundings. According to our review of readily available groundwater data (Geotracker, 2015), groundwater has been measured at a depth of approximately 44.5 feet in the vicinity of the Santa Monica Civic Center site. Recent groundwater data was not available at the other three sites. We have also reviewed records of historical data (CGS, 1997b; CGS, 1998a; CGS, 1998b). Based on our review, the historic high groundwater depth is approximately 10 feet at the Rustic Canyon Recreation Center site, approximately 30 feet at the Santa Monica Civic Center site, and approximately 40 feet at the Brentwood County Club and Recreation Park sites. Fluctuations in the groundwater level and perched conditions typically occur due to variations in precipitation, ground surface topography, subsurface stratification, irrigation, and other factors.

6. FAULTING AND SEISMICITY

Based on our review of published geologic maps, no active fault traces are mapped underlying the project sites. The project sites are not located within a State of California Earthquake Fault Zone (Alquist-Priolo Special Studies Zone, Hart and Bryant, 1997). However, the project sites are located in a seismically active area, as is the majority of southern California, and the potential for strong ground motion in the project area is considered significant during the design life of the proposed improvements. The approximate locations of major faults in the region and their geographic relationships to the sites are shown on Figure 8. Table 3 lists the nearest principal known active fault to each project site, the maximum magnitude M_{max}, and the fault types as published for the CGS by Cao et al. (2003). The approximate fault to site distance was calculated from the USGS National Seismic Hazard Maps - Fault Parameters website (USGS, 2008)

Table 3 – Principal Active Faults

Site Name	Nearest Active Fault	Distance (miles) [1,2]	Moment Magnitude/ Fault Type [2]
Brentwood County Club	Santa Monica	0.7	6.6/B
Rustic Canyon Recreation Center	Santa Monica	0.3	6.6/B
Santa Monica Civic Center	Santa Monica	1.5	6.6/B
Recreation Park	Palos Verdes	4.1	7.3/B

Notes:
[1] USGS (2008)
[2] Cao, et al. (2003)

In general, hazards associated with seismic activity include ground surface rupture and liquefaction. These hazards are discussed in the following sections.

6.1. Surface Fault Rupture

The probability of damage due to surface ground rupture is relatively low due to the lack of known active faults crossing the project sites. Surface ground cracking related to shaking from distant events is not considered a significant hazard, although it is a possibility.

6.2. Liquefaction

Liquefaction is the phenomenon in which loosely deposited, granular soils and some fine-grained soils located below the water table undergo rapid loss of shear strength when subjected to strong earthquake-induced ground shaking. Ground shaking of sufficient duration can result in a loss of grain-to-grain contact due to a rapid rise in pore water pressure causing the soil to behave as a fluid for a short period. Liquefaction is known generally to occur in saturated or near-saturated cohesionless soils at depths shallower than 50 feet below the ground surface. Factors known to influence liquefaction potential include composition and thickness of soil layers, grain size, relative density, groundwater level, degree of saturation, and both intensity and duration of ground shaking.

According to the Seismic Hazard Zones Map for the Topanga, Beverly Hills, and Venice Quadrangles, (CGS, 1997a; CGS1999a; CGS 1999b), the four project sites are not mapped as being in areas susceptible to liquefaction. No groundwater was encountered in the CPTs performed at the project sites. Based on this data, we consider the potential for seismic-induced liquefaction to be low at the four project sites.

7. FINDINGS & CONCLUSIONS

As discussed above, our geotechnical services were performed to help MWH and LA BOS evaluate the preliminary feasibility of onsite storm water infiltration systems at each of the 4 sites explored. Based on our communications with MWH, we understand that the preliminary criteria at each site is related to the presence of groundwater or dense materials providing to refusal to CPT equipment within 30 feet of the ground surface. As such, our scope of services included the performance of cone penetration soundings to a depth of 30 feet or refusal. We understand that storm water infiltration facilities being considered for each site are conceptual at this time. Based on the information obtained from our geotechnical evaluation, the following findings and conclusions have been made:

- The project sites are underlain by fill and alluvial soils. The encountered soils consisted of observed to consist of soils that ranged in size from clay to sand.

- Groundwater was not encountered in our CPT soundings. According to our review of readily available groundwater data (Geotracker, 2015), groundwater has been measured at a depth of approximately 44.5 feet in the vicinity of the Santa Monica Civic Center site. Based on our review of historical records, the historic high groundwater depth is approximately 10 feet at the Rustic Canyon Recreation Center site, approximately 30 feet at the Santa Monica Civic Center site, and approximately 40 feet at the Brentwood County Club and Recreation Park sites.

- With the exception of our CPT performed at the Brentwood Country Club, the CPTs met refusal at depths of less than 30 feet. CPT sounding refusal generally occurs where consolidated layers, cobbles, or debris inhibit deeper penetration of the CPT equipment.

- Based on our review of published geologic maps, there are no known active faults or landslides underlying the project sites. Review of geological literature indicates that the four project sites are not located in areas that have been mapped as being susceptible to liquefaction. We consider the potential for seismic-induced liquefaction to be low.

- In-place infiltration testing was not performed as part of our geotechnical services. However, based on published correlations between CPT data of soil and permeability (Robertson and Cabal, 2014), we estimate permeability values at the four project sites to range from approximately 10^{-1} to 10^{-6} cm/sec. The approximate permeability values estimated at each project site based on the CPT data are presented in Table 4 below. The estimated values can be utilized for preliminary evaluation purposes. Actual design of storm water infiltration devices should be in accordance with the County of Los Angeles guidelines (2014) and should be based on field infiltration testing at each site.

Table 4 – Estimated Permeability

Site Name	CPT Number	Depth Explored (feet)	Estimated Permeability* (cm/sec)
Brentwood Country Club	CPT-1	30.5 feet	1×10^{-2} (sand) – 1×10^{-6} (sand and silt mixture)
Rustic Canyon Recreation Center	CPT-2	11.2 feet (refusal)	1×10^{-1} (sand) – 1×10^{-5} (sand mixture)
Santa Monica Civic Center	CPT-3	16.4 feet (refusal)	1×10^{-2} (sand) – 1×10^{-5} (sand and silt mixture)
Recreation Park	CPT-4	24.1 feet (refusal)	1×10^{-2} (sand) – 1×10^{-4} (sand mixture)

Note:
*Derived from Robertson and Cabal (2014)

8. PRELIMINARY RECOMMENDATIONS

As noted above we understand that the Better Management Practices (BMPs) associated with the proposed City of Los Angeles Bureau of Sanitation EWMP Project are conceptual at this time. As such, details regarding the types and construction of the BMPs (if any) are not known at this time for any of the sites. We recommend that the geotechnical information presented herein be utilized during the evaluation of the feasibility of the devices associated with the EWMP project at each site. The design of BMPs should be performed in accordance with County of Los Angeles (2014) guidelines.

Once the type and general construction of the devices is better defined, Ninyo & Moore should review the devices' preliminary design. At that time, supplemental recommendations may be provided.

9. LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this geotechnical report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the preliminary conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for feasibility and preliminary design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other ge-geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our preliminary conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified, and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no controls.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

10. REFERENCES

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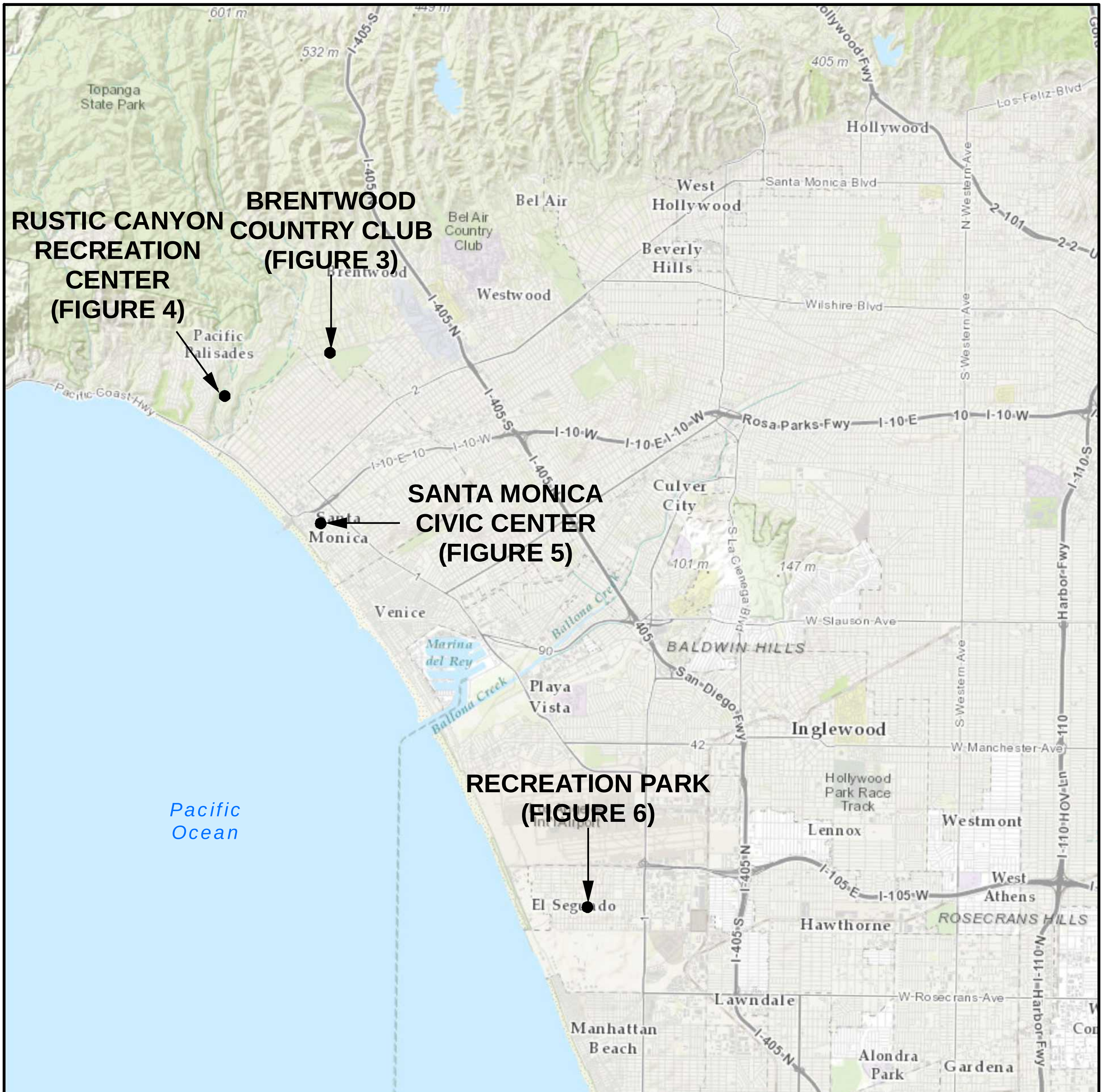
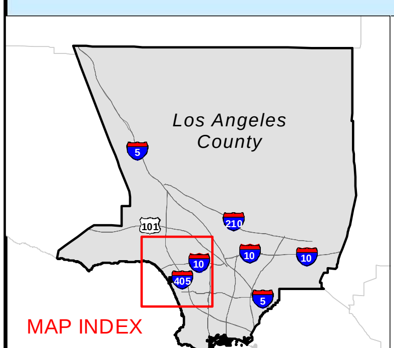


SOURCE: ESRI WORLD TOPO, 2015



N

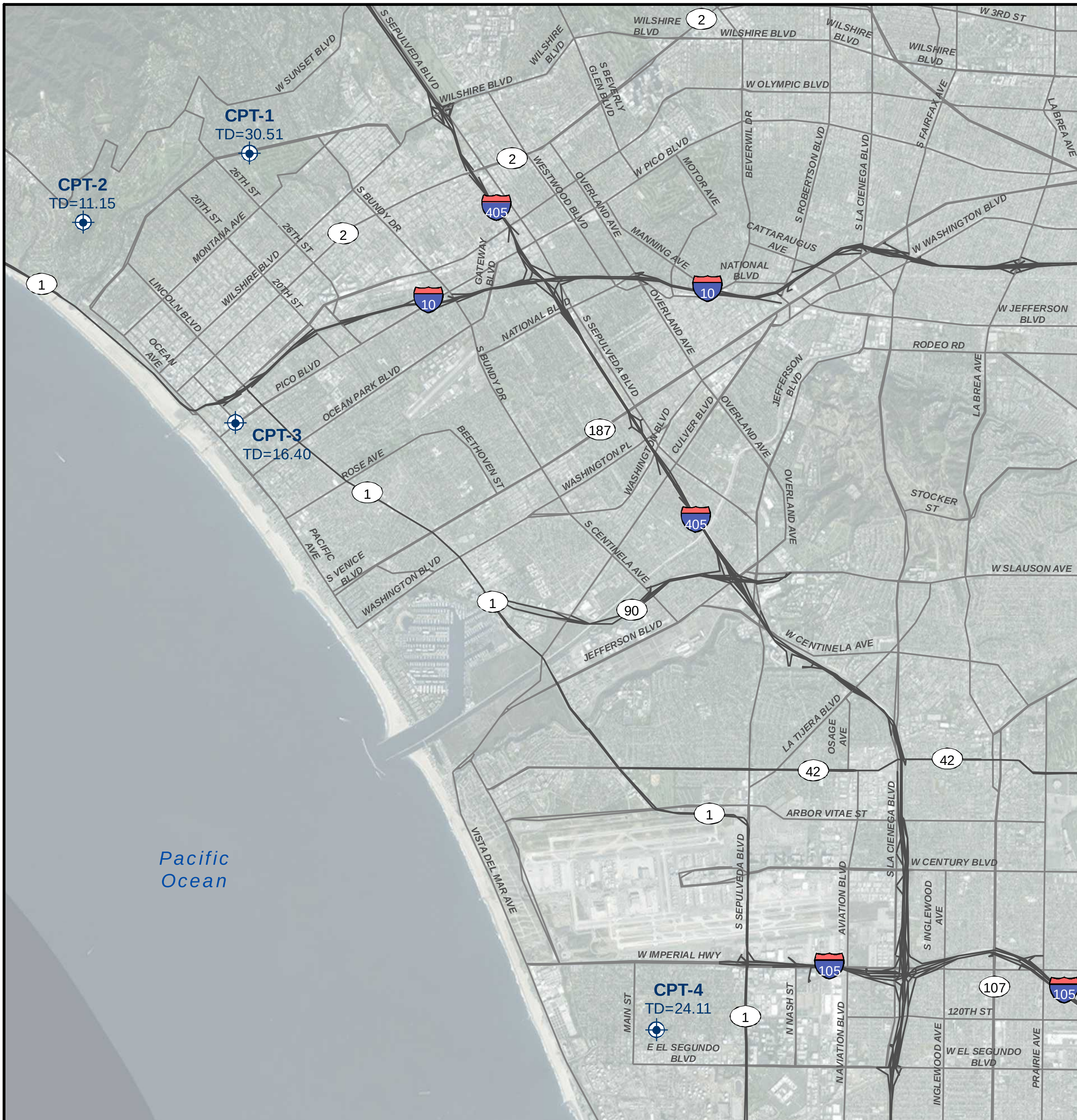
SCALE IN FEET

0 12,000 24,000

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE

Ninyo & Moore		SITE LOCATIONS	FIGURE
PROJECT NO.	DATE	ENHANCED WATERSHED MANAGEMENT BRENTWOOD, SANTA MONICA, AND EL SEGUNDO SITES LOS ANGELES COUNTY, CALIFORNIA	1
107910001	4/15		

1_107910001_SL.mxd 4/23/2015 11:01:25 AM JDL



SOURCE: ESRI WORLD IMAGERY, 2015

LEGEND

CPT-4
TD=24.11

CONE PENETRATION TEST
TD=TOTAL DEPTH IN FEET

N

SCALE IN FEET

0 7,500 15,000

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

2_107910001_SP.mxd 4/23/2015 JDL

Ninyo & Moore

AERIAL SITE PLAN/REGIONAL MAP

ENHANCED WATERSHED MANAGEMENT
BRENTWOOD, SANTA MONICA, AND EL SEGUNDO SITES
LOS ANGELES COUNTY, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107910001	4/15	2

SOURCE: ESRI WORLD IMAGERY, 2015

LEGEND

CPT-1
TD=30.51
CONE PENETRATION TEST
TD=TOTAL DEPTH IN FEET

N

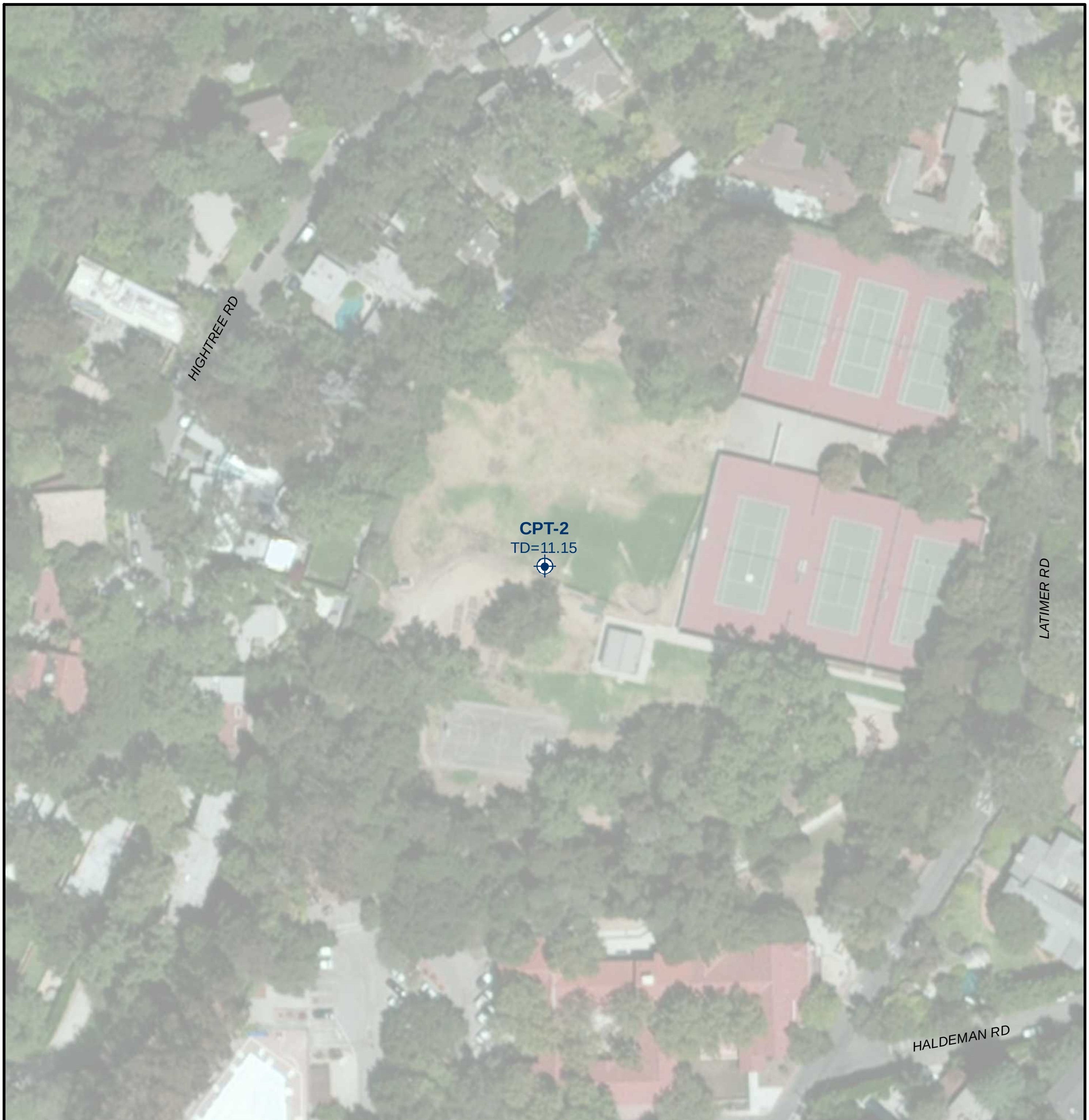
SCALE IN FEET

0 100 200

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore		**TEST LOCATION - BRENTWOOD COUNTRY CLUB**	FIGURE
PROJECT NO.	DATE	ENHANCED WATERSHED MANAGEMENT BRENTWOOD, SANTA MONICA, AND EL SEGUNDO SITES LOS ANGELES COUNTY, CALIFORNIA	**3**
107910001	4/15		

3_107910001_CPT1.mxd 4/23/2015 JDL



SOURCE: ESRI WORLD IMAGERY, 2015

LEGEND

CPT-2
TD=11.15
CONE PENETRATION TEST
TD=TOTAL DEPTH IN FEET

N

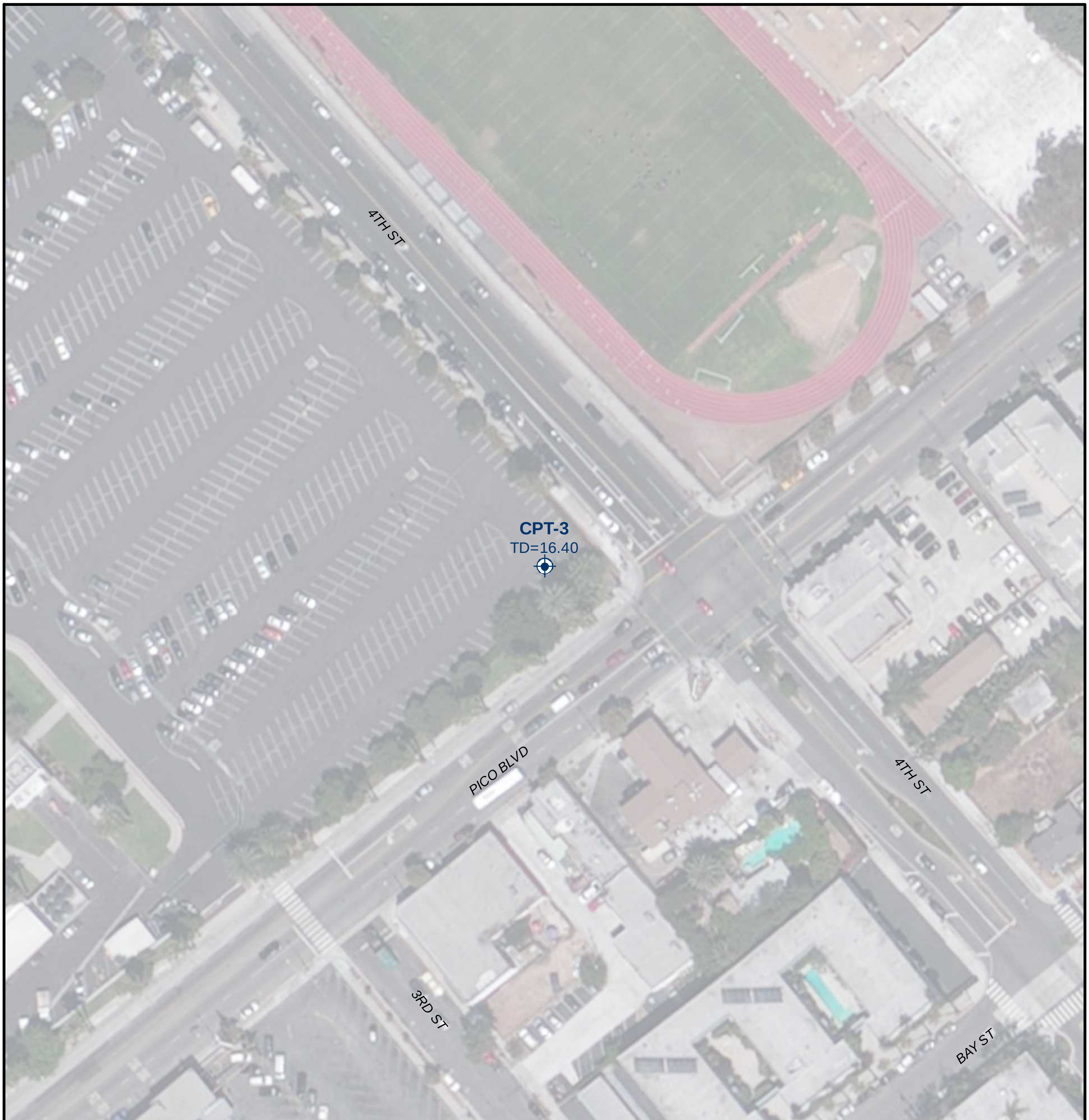
SCALE IN FEET

0 100 200

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

4_107910001_CPT2.mxd 4/23/2015 JDL

Ninyo & Moore		TEST LOCATION - RUSTIC CANYON RECREATION CENTER	FIGURE
PROJECT NO.	DATE	ENHANCED WATERSHED MANAGEMENT BRENTWOOD, SANTA MONICA, AND EL SEGUNDO SITES LOS ANGELES COUNTY, CALIFORNIA	4
107910001	4/15		



SOURCE: ESRI WORLD IMAGERY, 2015

LEGEND

CPT-3
TD=16.40
CONE PENETRATION TEST
TD=TOTAL DEPTH IN FEET

N

SCALE IN FEET
0 100 200

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

5_107910001_CPT3.mxd 4/23/2015 JDL

Ninyo & Moore		TEST LOCATION - SANTA MONICA CIVIC CENTER	FIGURE
PROJECT NO.	DATE	ENHANCED WATERSHED MANAGEMENT BRENTWOOD, SANTA MONICA, AND EL SEGUNDO SITES LOS ANGELES COUNTY, CALIFORNIA	5
107910001	4/15		

SOURCE: ESRI WORLD IMAGERY, 2015

LEGEND

CPT-4
TD=24.11
CONE PENETRATION TEST
TD=TOTAL DEPTH IN FEET

N

SCALE IN FEET
0 100 200

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

6_107910001_CPT4.mxd 4/23/2015 JDL

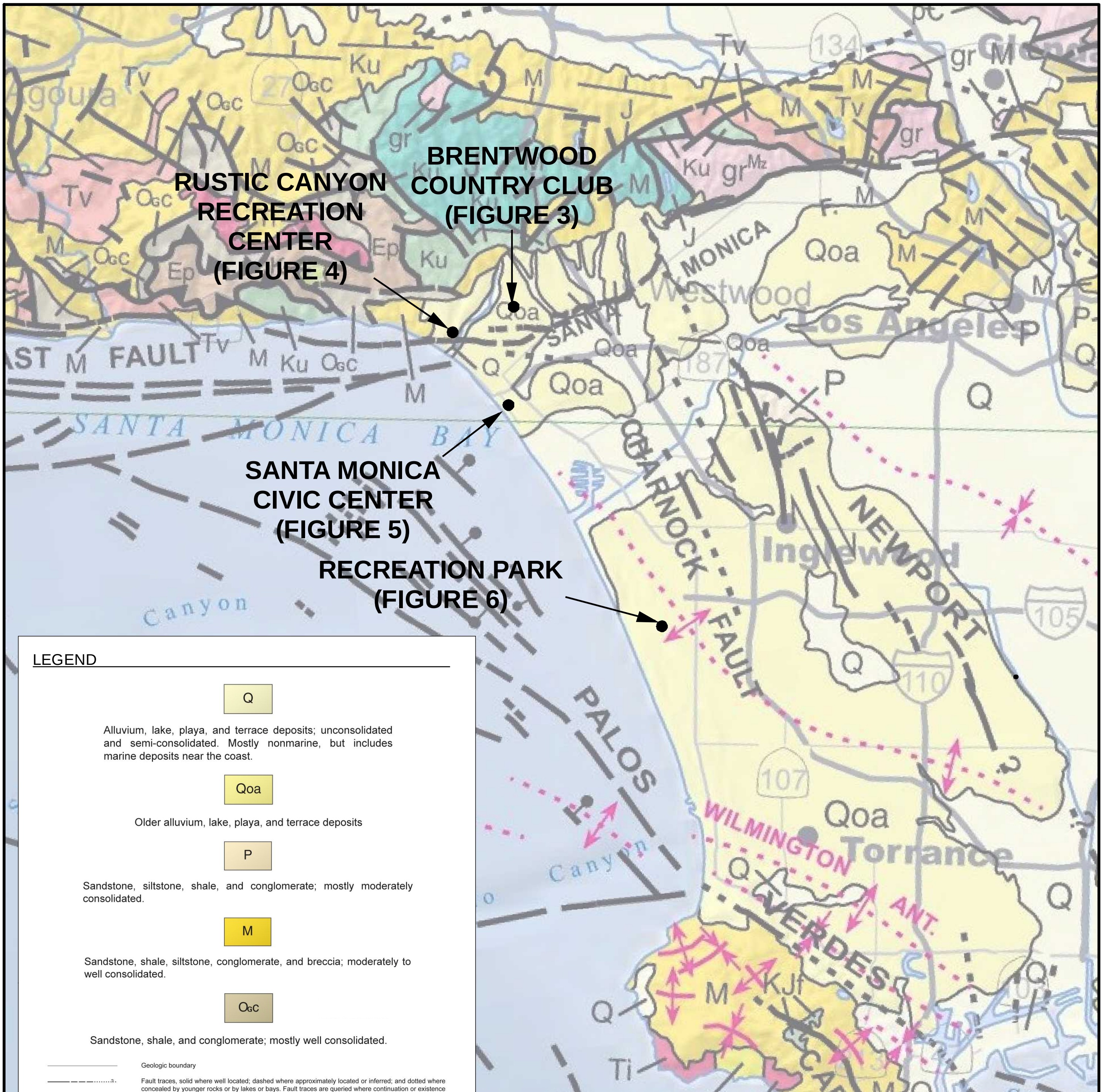
Ninyo & Moore

TEST LOCATION - RECREATION PARK

PROJECT NO.	DATE
1079100012	4/15

ENHANCED WATERSHED MANAGEMENT
BRENTWOOD, SANTA MONICA, AND EL SEGUNDO SITES
LOS ANGELES COUNTY, CALIFORNIA

FIGURE
6



LEGEND

Q — Alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated. Mostly nonmarine, but includes marine deposits near the coast.

Qoa — Older alluvium, lake, playa, and terrace deposits

P — Sandstone, siltstone, shale, and conglomerate; mostly moderately consolidated.

M — Sandstone, shale, siltstone, conglomerate, and breccia; moderately to well consolidated.

OGC — Sandstone, shale, and conglomerate; mostly well consolidated.

Geologic boundary

Fault traces, solid where well located; dashed where approximately located or inferred; and dotted where concealed by younger rocks or by lakes or bays. Fault traces are queried where continuation or existence is uncertain. Many concealed faults in the Great Valley are based on maps of selected subsurface horizons, so locations shown are approximate and may indicate structural trends only. For faults color-coded according to recency of movement, see FAULT ACTIVITY MAP OF CALIFORNIA, GEOLOGIC DATA MAP SERIES, MAP NO. 6 (2010).

Ball and bar on downthrown side (relative or apparent).

Arrows indicate direction of lateral movement (relative or apparent).

Thrust fault (barbs on upper plate), solid where well located; dashed where approximately located or inferred; and dotted where concealed by younger rocks or by lakes or bays. Fault surface generally dips less than 45 degrees, but locally may have been subsequently steepened.

Regional strike and dip of stratified rocks.

Regional strike and dip of stratified rocks (overturned).

Anticlinal fold.

Synclinal fold.

Dotted offshore and where concealed under alluvium in the Great Valley and elsewhere. Arrow indicates direction of plunge. Concealed folds may be confined to certain units, and their location may be approximate.

Monoclinal fold.

Structural discontinuity in the offshore region.

Volcano or cinder cone.

SOURCE: JENNINGS, C.W., UPDATED 2010, GEOLOGIC MAP OF CALIFORNIA, CALIFORNIA GEOLOGICAL SURVEY

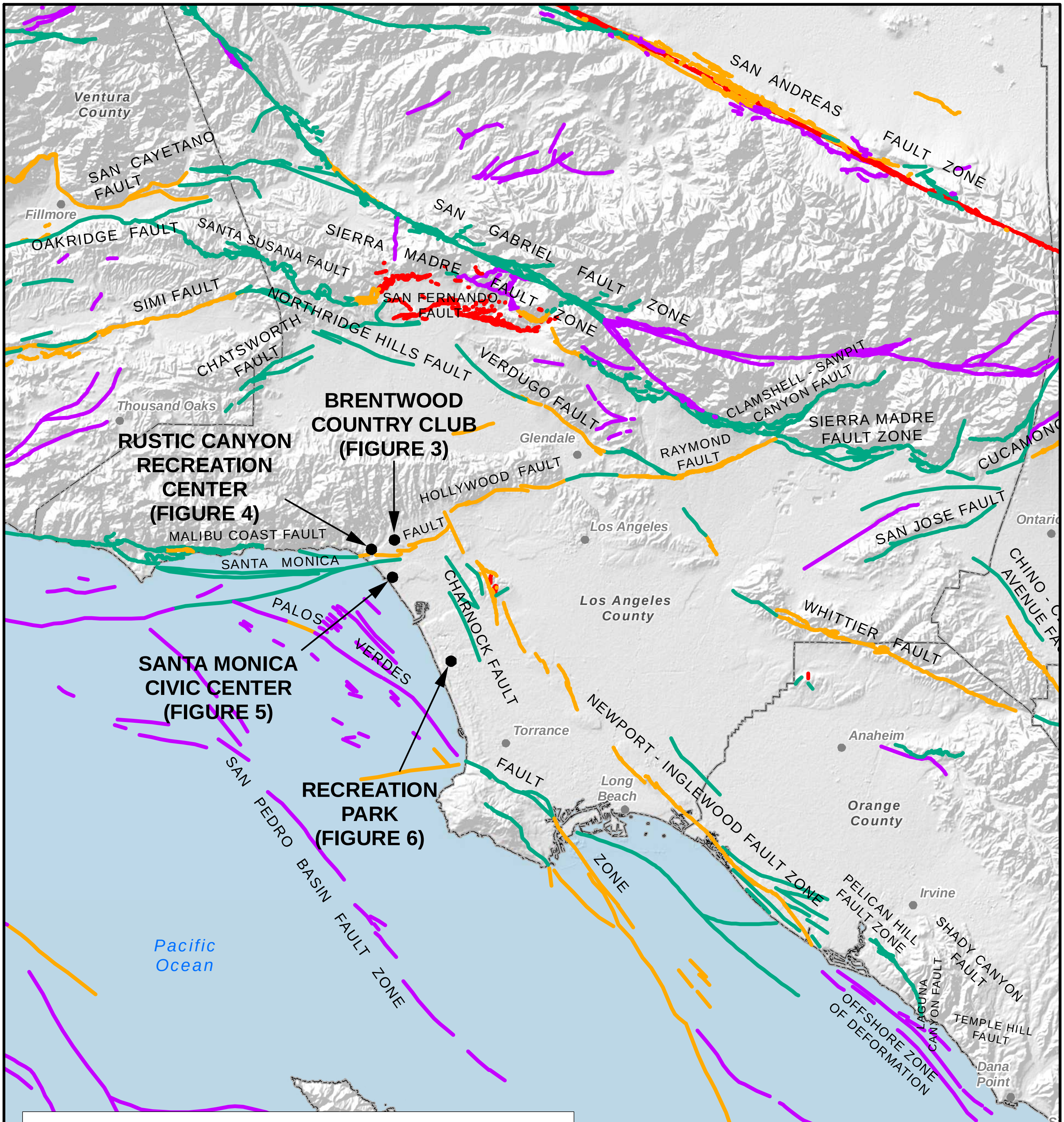
N

SCALE IN FEET

0 20,000 40,000

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE

Ninyo & Moore		GEOLOGY	FIGURE
PROJECT NO.	DATE	ENHANCED WATERSHED MANAGEMENT BRENTWOOD, SANTA MONICA, AND EL SEGUNDO SITES LOS ANGELES COUNTY, CALIFORNIA	7
107910001	4/15		



LEGEND

CALIFORNIA FAULT ACTIVITY

- HISTORICALLY ACTIVE
- HOLOCENE ACTIVE
- LATE QUATERNARY (POTENTIALLY ACTIVE)
- QUATERNARY (POTENTIALLY ACTIVE)
- STATE/COUNTY BOUNDARY

DATA SOURCE: U.S. GEOLOGICAL SURVEY AND CALIFORNIA GEOLOGICAL SURVEY, 2006, QUATERNARY FAULT AND FOLD DATABASE FOR THE UNITED STATES, ACCESSED 2011, FROM USGS WEB SITE: HTTP//EARTHQUAKES.USGS.GOV/REGIONAL/QFAULTS/.

N

SCALE IN MILES

0 10 20

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

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Ninyo & Moore		FAULT LOCATIONS	FIGURE
PROJECT NO.	DATE	ENHANCED WATERSHED MANAGEMENT BRENTWOOD, SANTA MONICA, AND EL SEGUNDO SITES LOS ANGELES COUNTY, CALIFORNIA	8
107910001	4/15		

APPENDIX A

CPT DATA

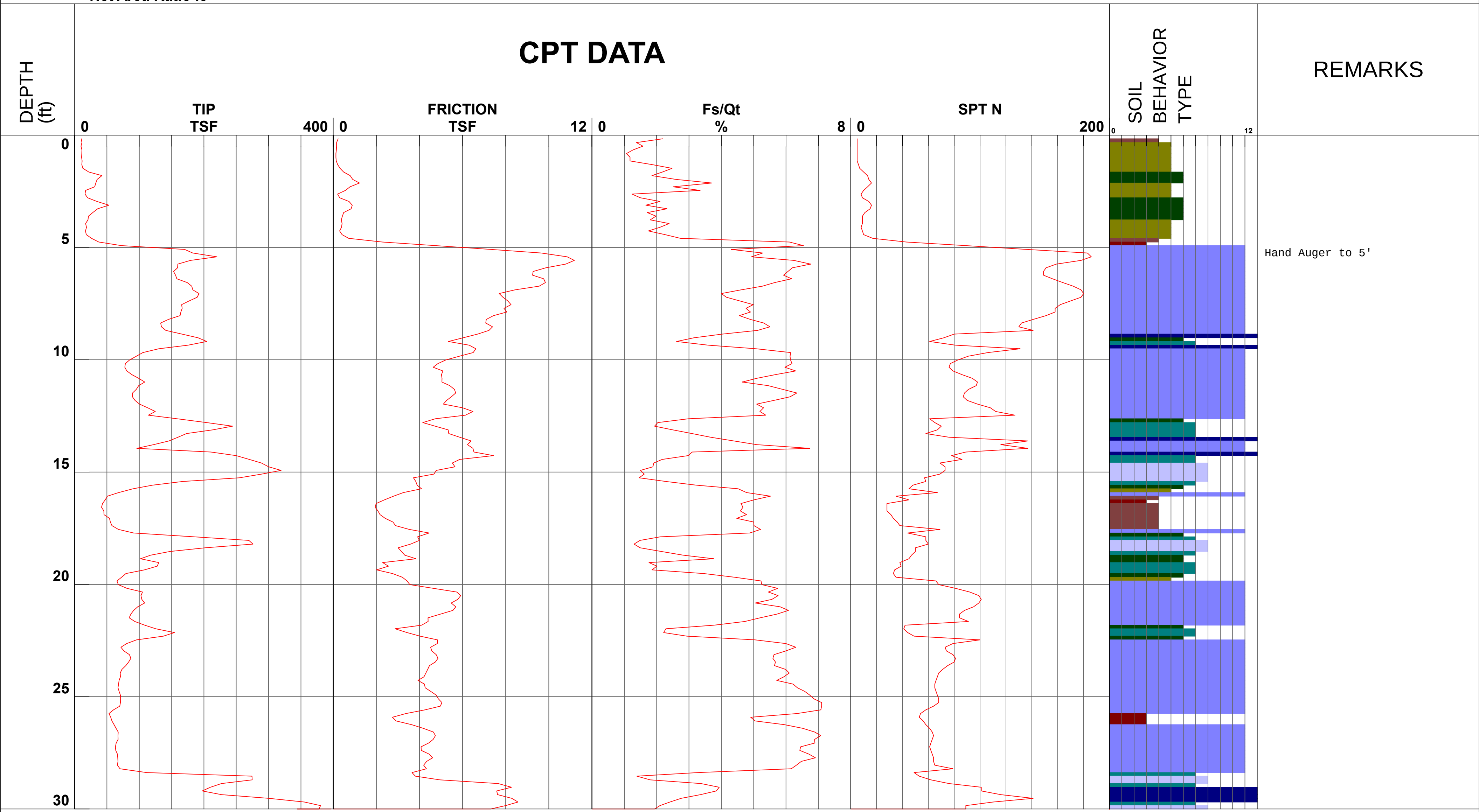
Field Procedure for Cone Penetration Testing

The cone penetration testing (CPT) described in this report was conducted in general accordance with ASPT D 5778. The cone penetrometer assembly used for this project consisted of a conical tip and a cylindrical friction sleeve. The conical tip had an apex angle of 60 degrees and a diameter of approximately 1.4 inches resulting in a projected cross-sectional area of approximately 1.5 square inches. The cylindrical friction sleeve was approximately 5.25 inched long and had an outside diameter of approximately 1.4 inches, resulting in a surface area of approximately 23 square inches. The interior of the CPT probe was instrumented with strain gauges that allowed simultaneous measurement of cone tip and friction sleeve resistance during penetration. The cone was hydraulically pushed into the soil using the reaction mass of a specially designed 23-ton truck at a constant rate of approximately 4 feet per minute while the cone tip resistance and sleeve friction resistance were recorded at an approximately 2-inch interval and stored in digital form. The computer generated logs presented in the following pages include cone resistance, friction resistance, friction ratio, equivalent SPT blow counts, and interpreted soil types. The soil type interpretations were based on the method proposed by Robertson and Campanella (1989).

Ninyo & Moore

Project	Brentwood Country Club	Operator	RC-BH	Filename	SDF(359).cpt
Job Number	107910001	Cone Number	DSG0906	GPS	
Hole Number	CPT-01	Date and Time	4/13/2015 8:08:42 AM	Maximum Depth	30.51 ft
EST GW Depth During Test		>30.51 ft			

Net Area Ratio .8



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

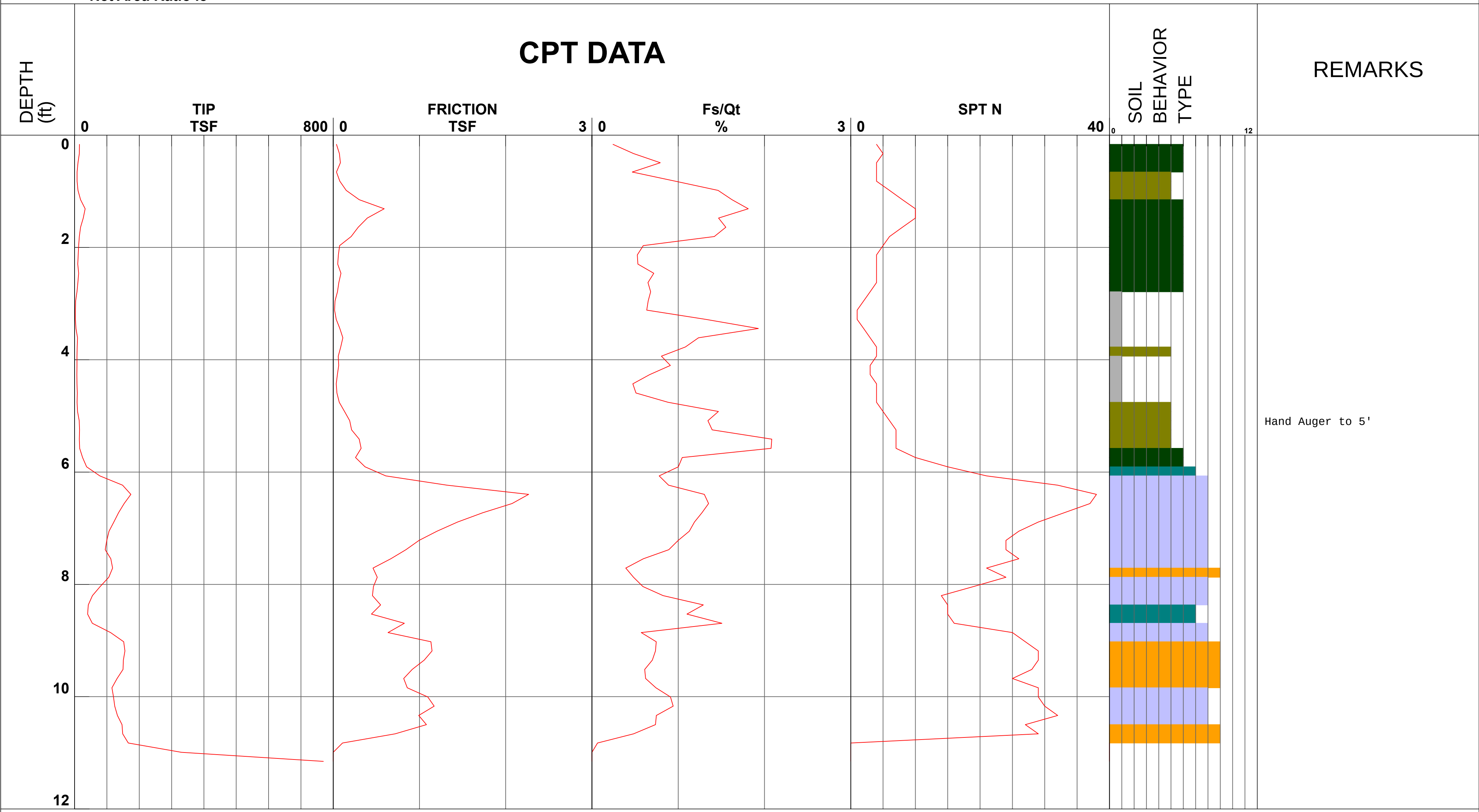
S*Soil behavior type and SPT based on data from UBC-1983

Ninyo & Moore

Project	Rustic Canyon Rec center	Operator	RC-BH	Filename	SDF(360).cpt
Job Number	107910001	Cone Number	DSG0906	GPS	
Hole Number	CPT-02	Date and Time	4/13/2015 9:42:34 AM	Maximum Depth	11.15 ft
EST GW Depth During Test		>11.15 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Appendix D-26

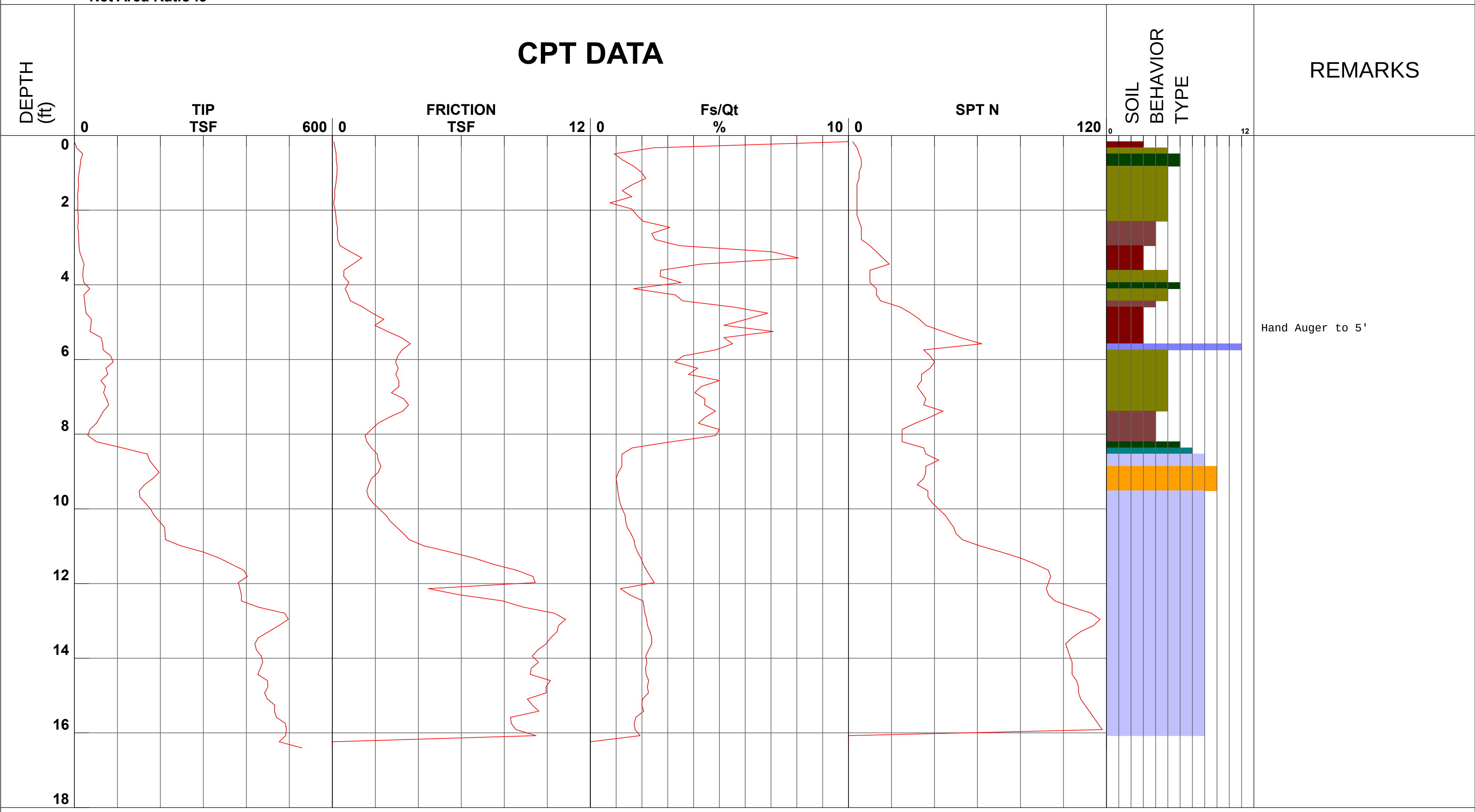
Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Ninyo & Moore

Project	Civic Center Parking Lot	Operator	RC-BH	Filename	SDF(362).cpt
Job Number	107910001	Cone Number	DSG0906	GPS	
Hole Number	CPT-03	Date and Time	4/13/2015 12:25:56 PM	Maximum Depth	16.40 ft
EST GW Depth During Test		>16.40 ft			

Net Area Ratio .8



■ 1 - sensitive fine grained
■ 2 - organic material
■ 3 - clay
■ 4 - silty clay to clay
■ 5 - clayey silt to silty clay
■ 6 - sandy silt to clayey silt
■ 7 - silty sand to sandy silt
■ 8 - sand to silty sand
■ 9 - sand
■ 10 - gravelly sand to sand
■ 11 - very stiff fine grained (*)
■ 12 - sand to clayey sand (*)

Appendix D-27

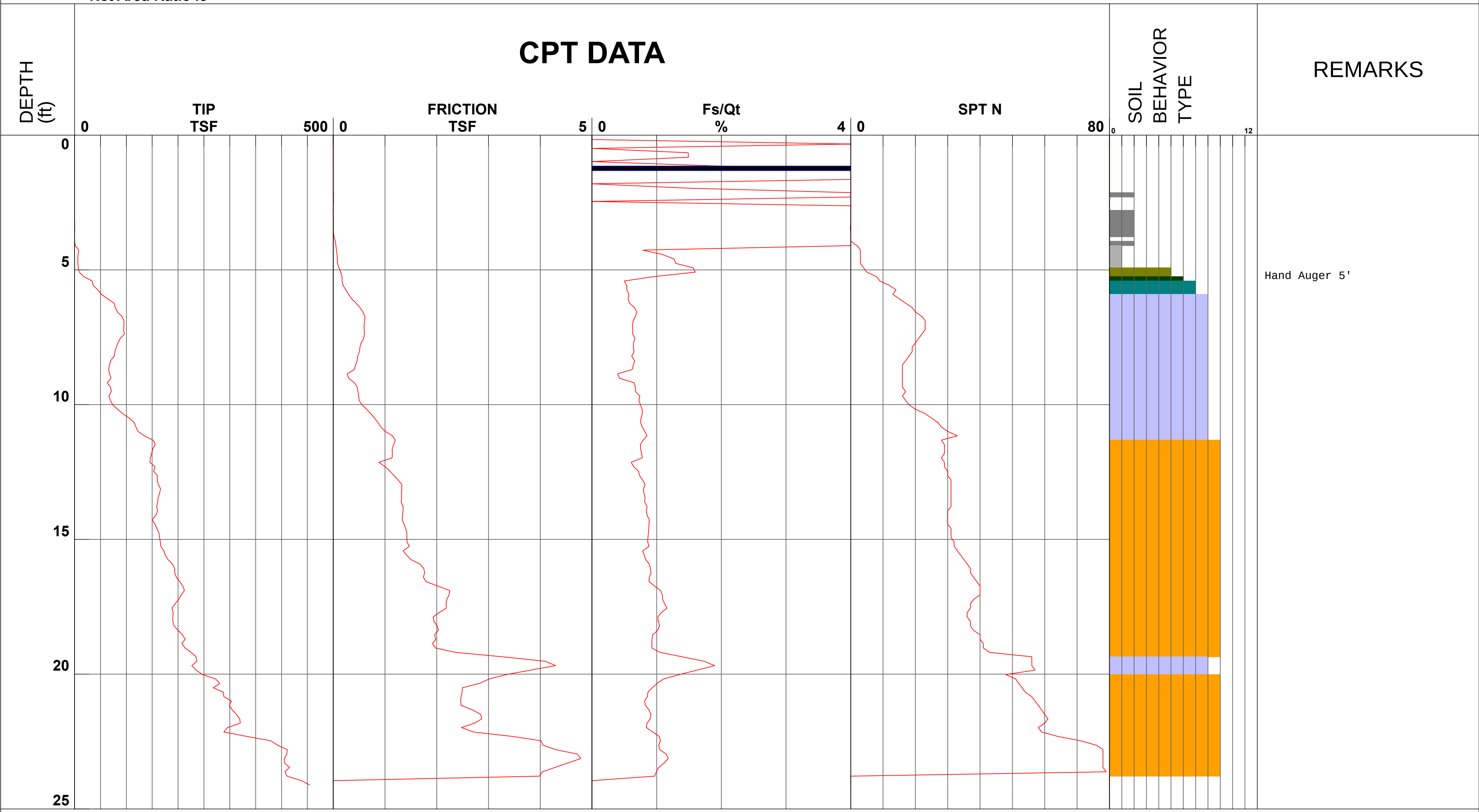
Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Ninyo & Moore

Project	LA BOS	Operator	RC-BH	Filename	SDF(383).cpt
Job Number	107910001	Cone Number	DDG1281	GPS	
Hole Number	CPT-04	Date and Time	4/20/2015 8:45:25 AM	Maximum Depth	24.11 ft
EST GW Depth During Test		>24.11 ft			

Net Area Ratio .8



1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

APPENDIX E

LEGAL AUTHORITY CERTIFICATION

CITY OF LOS ANGELES

CALIFORNIA

BOARD OF PUBLIC WORKS MEMBERS

KEVIN JAMES
PRESIDENT

MONICA RODRIGUEZ
VICE PRESIDENT

MATT SZABO
PRESIDENT PRO TEMPORE

MICHAEL R. DAVIS
COMMISSIONER

BARBARA ROMERO
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ERIC GARCETTI
MAYOR

BUREAU OF SANITATION

ENRIQUE C. ZALDIVAR
DIRECTOR

TRACI J. MINAMIDE
CHIEF OPERATING OFFICER

VAROUJ S. ABKIAN
ADEL H. HAGEKHALIL
ALEXANDER E. HELOU
ASSISTANT DIRECTORS

LISA B. MOWERY
CHIEF FINANCIAL OFFICER

1149 SOUTH BROADWAY, 10TH FLOOR
LOS ANGELES, CA 90015
TEL: (213) 485-0587
FAX: (213) 485-3939
WWW.LACITYSAN.ORG

January 22, 2015

Mr. Sam Unger, Executive Officer
Los Angeles Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Attention Mr. Ivar Ridgeway

Dear Mr. Unger:

CERTIFICATION BY LEGAL COUNSEL FOR THE CITY OF LOS ANGELES CONFIRMING LEGAL AUTHORITY TO IMPLEMENT THE PROVISIONS OF THE MUNICIPAL STORMWATER PERMIT

I write pursuant to Part VI(A)(2)(b) of Order No. R4-2012-0175,otherwise known as the Municipal Separate Stormwater Sewer System (MS4) Permit (the "Order"). Part VI(A)(2)(b) of the Permit provides:

> *"Each Permittee must submit a statement certified by its chief legal counsel that the Permittee has the legal authority within its jurisdiction to implement and enforce the requirements contained in 40 CFR §122.26(d) (2) (i) (AF) and this Order."*

The Office of the City Attorney of the City of Los Angeles (City), serving as its legal counsel, certifies that the City has the legal authority within its jurisdiction to implement and enforce the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and of the Order. This correspondence addresses all legal authority requirements as listed in the Order. Subsequently, annual certification by our office will be included in the Stormwater Annual Report as required by the Order.

Order Part VI(A)(2)(b)(i) - "Citation of applicable municipal ordinances or other appropriate legal authorities and their relationship to the requirements of 40 CFR §122.26(d) (2) (i) (A-F) and this Order"

Below is a list of applicable Los Angeles Municipal Code (LAMC) provisions that provide the requisite legal authorities:

LAMC 64.70 General Provisions.
LAMC 64.70.01 Definitions and Abbreviations.
LAMC 64.70.02 Pollutant Discharge Control.
LAMC 64.70.03 Elimination of Illicit Discharges and Illicit Connections.
LAMC 64.70.05 Authority to Inspect.
LAMC 64.70.06 Authority to Arrest and Issue Citations.
LAMC 64.70.07 Enforcement.
LAMC 64.70.08 Remedies Not Exclusive.
LAMC 64.70.09 Liability for Costs of Correction Arising from Unlawful Discharge.
LAMC 64.70.10 Disposition of Money Collected.
LAMC 64.70.11 Stormwater and Urban Runoff Pollution Education.
LAMC 64.70.12 Construction and Application.
LAMC 64.70.13 Severability.
LAMC 64.72 Stormwater Pollution Control Measures for Development Planning and Construction Activities.
LAMC 64.72.01 Authority of the Board of Public Works.
LAMC 64.72.02 Funds Collected from Waiver.
LAMC 64.72.03 Supplemental Provisions.
LAMC 64.72.04 Authority to Inspect and Enforce Stormwater Pollution Control Measures.
LAMC 64.72.05 LID Plan Check Fees.

In addition, statewide regulations provide further legal authorities with respect to intergovernmental authorities, specifically:

California Government Code §6502
California Government Code §23004

Relationship of Applicable Ordinances and Other Legal Authorities to the Requirements of 40CFR §122.26(d)(2)(i)(a-F) and the Order

The table below indicates the basic relationship between the "Legal Authority" requirements listed in Section VI(A)(2)(b) of the Order and the existing legal statutes that provide this legal authority.

Legal Authority Required by Permit	City/State Legal Provisions
VI.A.2.i. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.	LAMC 64.70.02.B LAMC 64.70.02.C.1.a LAMC 64.70.02.D LAMC 64.70.03.A
ii. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A	LAMC 64.70.03.A
iii. Prohibit and eliminate illicit discharges and illicit connections to the MS4	LAMC 64.70.03.A LAMC 64.70.03.B
iv. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4	LAMC 64.70.03.A
v. Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows)	LAMC 64.70.03.A LAMC 64.70.07
vi. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders	LAMC 64.70.05.B.4 LAMC 64.70.05.B.6
vii. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees	California Government Code §6502 California Government Code §23004
viii. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation	California Government Code §6502 California Government Code §23004

ix. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4	LAMC 64.70.05.A LAMC 64.70.05.B LAMC 64.72.04.B
x. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations	LAMC 64.70.02.D
xi. Require that structural BMPs are properly operated and maintained	LAMC 64.70.02.D
xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4	LAMC 64.70.05.B.3
VI.A.b.ii. Identification of the local administrative and legal procedures available to mandate compliance with applicable municipal ordinances identified in subsection (i) above and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system.	The local administrative and legal procedures available to mandate compliance with the above LAMC provisions are specified in the provisions themselves with key enforcement provisions being LAMC 64.70.06 and LAMC 64.70.07

The City is in the process of updating the LAMC with respect to its stormwater regulations. These changes will be reported with the 2014-2015 annual report.

Very truly yours,

JOHN CARVALHO, Deputy City Attorney
City's Attorney Office

WPDCR9163

COUNTY OF LOS ANGELES
OFFICE OF THE COUNTY COUNSEL

648 KENNETH HAHN HALL OF ADMINISTRATION
500 WEST TEMPLE STREET
LOS ANGELES, CALIFORNIA 90012-2713

JOHN F. KRATTLI
County Counsel

TELEPHONE
(213) 974-1923
FACSIMILE
(213) 687-7337
TDD
(213) 633-0901

December 16, 2013

Mr. Samuel Unger, P.E., Executive Officer
California Regional Water Quality Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

Attention: Mr. Ivar Ridgeway

Re: Certification By Legal Counsel For Los Angeles County Flood Control District's Annual Report

Dear Mr. Unger:

Pursuant to the requirements of Part VI(A)(2)(b) of Order No. R4-2012-0175 (the "Order"), the Office of the County Counsel of the County of Los Angeles makes the following certification in support of the Annual Report of the Los Angeles County Flood Control District ("LACFCD"):

<u>Certification Pursuant To Order Part VI(A)(2)(b)</u>

"*Each Permittee must submit a statement certified by its chief legal counsel that the Permittee has the legal authority within its jurisdiction to implement and enforce the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and this Order.*"

LACFCD has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order.

<u>Order Part VI(A)(2)(b)(i)</u>

"*Citation of applicable municipal ordinances or other appropriate legal authorities and their relationship to the requirements of 40 CFR §122.26(d)(2)(i)(A-F) and this Order*"

Citations Of Applicable Ordinances Or Other Legal Authorities

Although many portions of State law, the Charter of the County of Los Angeles, the Los Angeles County Code and LACFCD's Flood Control District Code ("Code") are potentially applicable to the implementation and enforcement of these requirements, the primary applicable laws and ordinances are as follows:

Los Angeles County Code, Title 12, Chapter 12.80 STORMWATER AND RUNOFF POLLUTION CONTROL, including:

§12.80.010 - §12.80.360 Definitions

§12.80.370 Short title.

§12.80.380 Purpose and intent.

§12.80.390 Applicability of this chapter.

§12.80.400 Standards, guidelines and criteria.

§12.80.410 Illicit discharges prohibited.

§12.80.420 Installation or use of illicit connections prohibited.

§12.80.430 Removal of illicit connection from the storm drain system.

§12.80.440 Littering and other discharge of polluting or damaging substances prohibited.

§12.80.450 Stormwater and runoff pollution mitigation for construction activity.

§12.80.460 Prohibited discharges from industrial or commercial activity.

§12.80.470 Industrial/commercial facility sources required to obtain a NPDES permit.

§12.80.480 Public facility sources required to obtain a NPDES permit.

§12.80.490 Notification of uncontrolled discharges required.

§12.80.500 Good housekeeping provisions.

§12.80.510 Best management practices for construction activity.

§12.80.520 Best management practices for industrial and commercial facilities.

§12.80.530 Installation of structural BMPs.

§12.80.540 BMPs to be consistent with environmental goals.

§12.80.550 Enforcement—Director's powers and duties.

§12.80.560 Identification for inspectors and maintenance personnel.

§12.80.570 Obstructing access to facilities prohibited.

§12.80.580 Inspection to ascertain compliance—Access required.

§12.80.590 Interference with inspector prohibited.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.80.650 Conflicts with other code sections.

§12.80.660 Severability.

§12.80.700 Purpose.

§12.80.710 Applicability.

§12.80.720 Registration required.

§12.80.730 Exempt facilities.

§12.80.740 Certificate of inspection—Issuance by the director.

§12.80.750 Certificate of inspection—Suspension or revocation.

§12.80.760 Certificate of inspection—Termination.

§12.80.770 Service fees.

§12.80.780 Fee schedule.

§12.80.790 Credit for overlapping inspection programs.

§12.80.800 Annual review of fees.

Los Angeles County Code, Title 12, Chapter 12.84 LOW IMPACT DEVELOPMENT STANDARDS, including:

§12.84.410 Purpose.

§12.84.420 Definitions.

§12.84.430 Applicability.

§12.84.440 Low Impact Development Standards.

§12.84.445 Hydromodification Control.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Los Angeles County Code, Title 22 PLANNING AND ZONING, Part 6 ENFORCEMENT PROCEDURES, including:

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

Los Angeles County Code, Title 26 BUILDING CODE, including:

§26.103 Violations And Penalties

§26.104 Organization And Enforcement

§26.105 Appeals Boards

§26.106 Permits

§26.107 Fees

§26.108 Inspections

LACFCD Code Chapter 21 - STORMWATER AND RUNOFF POLLUTION CONTROL including:

§21.01 Purpose and Intent

§21.03 Definitions

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.19 Conflicts With Other Code Sections

§21.21 Severability

§21.23 Violation a Public Nuisance

California Government Code §6502

California Government Code §23004

California Water Code §8100 *et. seq.*

Relationship Of Applicable Ordinances Or Other Legal Authorities To The Requirements of 40 CFR §122.26(d)(2)(i)(A-F) And The Order

Although, depending upon the particular issue, there may be multiple ways in which particular sections of the County of Los Angeles' ordinances, LACFCD's ordinances, and statutes relate to the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order, the table below indicates the basic relationship with Part VI(A)(2)(a) of the Order:

Order Part VI(A)(2)(a) Items	**Primary Applicable Ordinance/Statute**
i. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.450 [construction] §12.80.460 [industrial and commercial] §12.80.470 and .480 [industrial and commercial NPDES requirements] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
ii. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited] LACFCD Code: §21.07 Prohibited Discharges
iii. Prohibit and eliminate illicit discharges and illicit connections to the MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.420 [illicit connections prohibited] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(a) Items	**Primary Applicable Ordinance/Statute**
iv. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.440 [littering and other polluting prohibited] LACFCD Code: §19.07 Interference With or Placing Obstructions, Refuse, Contaminating Substances, or Invasive Species in Facilities Prohibited §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
v. Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows).	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.620 [nuisance abatement] §12.80.635 [violation penalty]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§12.80.640 [penalties not exclusive] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties] §26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §19.11 Violation a Public Nuisance §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.19 Conflicts With Other Code Sections §21.23 Violation a Public Nuisance
vi. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.	Same as item v., above
vii. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.	California Government Code §6502 California Government Code §23004
viii. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation.	California Government Code §6502 California Government Code §23004
ix. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4.	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.80.620 [nuisance abatement] §12.80.635 [violation penalty] §12.80.640 [penalties not exclusive] §22.60.380 [enforcement.] §26.106 [permits] §26.108 [inspections]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
x. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations.	Los Angeles County Code: §12.80.450 [construction mitigation] §12.80.500 [good housekeeping practices] §12.80.510 [construction BMPs] §12.80.520 [industrial/commercial BMPs] §12.84.440 [LID standards] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
xi. Require that structural BMPs are properly operated and maintained.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.23 Violation a Public Nuisance
xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(b)(ii)

"*Identification of the local administrative and legal procedures available to mandate compliance with applicable municipal ordinances identified in subsection (i) above and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system.*"

The local administrative and legal procedures available to mandate compliance with the above ordinances are specified in those ordinances, particularly in:

Los Angeles County Code:

§12.80.550 Enforcement—Director's powers and duties.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Title 26, §103 Violations And Penalties

Title 26, §104 Organization And Enforcement

Title 26, §105 Appeals Boards

Title 26, §106 Permits

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

LACFCD Code:

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.23 Violation a Public Nuisance

LACFCD attempts to first resolve each enforcement action administratively. However, the above cited ordinances also provide LACFCD with the authority to pursue such actions in the judicial system as necessary.

Very truly yours,

JOHN F. KRATTLI
County Counsel

By Judith A. Fries
JUDITH A. FRIES
Principal Deputy County Counsel
Public Works Division

JAF:jyj

COUNTY OF LOS ANGELES
OFFICE OF THE COUNTY COUNSEL
648 KENNETH HAHN HALL OF ADMINISTRATION
500 WEST TEMPLE STREET
LOS ANGELES, CALIFORNIA 90012-2713

JOHN F. KRATTLI
County Counsel

TELEPHONE
(213) 974-1923
FACSIMILE
(213) 687-7337
TDD
(213) 633-0901

December 16, 2013

Mr. Samuel Unger, P.E., Executive Officer
California Regional Water Quality Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

Attention: Mr. Ivar Ridgeway

Re: Certification By Legal Counsel For County of Los Angeles' Annual Report

Dear Mr. Unger:

Pursuant to the requirements of Part VI(A)(2)(b) of Order No. R4-2012-0175 (the "Order"), the Office of the County Counsel of the County of Los Angeles makes the following certification in support of the Annual Report of the County of Los Angeles ("County"):

Certification Pursuant To Order Part VI(A)(2)(b)

"*Each Permittee must submit a statement certified by its chief legal counsel that the Permittee has the legal authority within its jurisdiction to implement and enforce the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and this Order.*"

The County has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order.

Order Part VI(A)(2)(b)(i)

"*Citation of applicable municipal ordinances or other appropriate legal authorities and their relationship to the requirements of 40 CFR §122.26(d)(2)(i)(A-F) and this Order*"

Citations Of Applicable Ordinances Or Other Legal Authorities

Although many portions of State law, the Charter of the County of Los Angeles and the Los Angeles County Code are potentially applicable to the implementation and enforcement of these requirements, the primary applicable laws and ordinances are as follows:

Los Angeles County Code, Title 12, Chapter 12.80 STORMWATER AND RUNOFF POLLUTION CONTROL, including:

§12.80.010 - §12.80.360 Definitions

§12.80.370 Short title.

§12.80.380 Purpose and intent.

§12.80.390 Applicability of this chapter.

§12.80.400 Standards, guidelines and criteria.

§12.80.410 Illicit discharges prohibited.

§12.80.420 Installation or use of illicit connections prohibited.

§12.80.430 Removal of illicit connection from the storm drain system.

§12.80.440 Littering and other discharge of polluting or damaging substances prohibited.

§12.80.450 Stormwater and runoff pollution mitigation for construction activity.

§12.80.460 Prohibited discharges from industrial or commercial activity.

§12.80.470 Industrial/commercial facility sources required to obtain a NPDES permit.

§12.80.480 Public facility sources required to obtain a NPDES permit.

§12.80.490 Notification of uncontrolled discharges required.

§12.80.500 Good housekeeping provisions.

§12.80.510 Best management practices for construction activity.

§12.80.520 Best management practices for industrial and commercial facilities.

§12.80.530 Installation of structural BMPs.

§12.80.540 BMPs to be consistent with environmental goals.

§12.80.550 Enforcement—Director's powers and duties.

§12.80.560 Identification for inspectors and maintenance personnel.

§12.80.570 Obstructing access to facilities prohibited.

§12.80.580 Inspection to ascertain compliance—Access required.

§12.80.590 Interference with inspector prohibited.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.80.650 Conflicts with other code sections.

§12.80.660 Severability.

§12.80.700 Purpose.

§12.80.710 Applicability.

§12.80.720 Registration required.

§12.80.730 Exempt facilities.

§12.80.740 Certificate of inspection—Issuance by the director.

§12.80.750 Certificate of inspection—Suspension or revocation.

§12.80.760 Certificate of inspection—Termination.

§12.80.770 Service fees.

§12.80.780 Fee schedule.

§12.80.790 Credit for overlapping inspection programs.

§12.80.800 Annual review of fees.

Los Angeles County Code, Title 12, Chapter 12.84 LOW IMPACT DEVELOPMENT STANDARDS, including:

§12.84.410 Purpose.

§12.84.420 Definitions.

§12.84.430 Applicability.

§12.84.440 Low Impact Development Standards.

§12.84.445 Hydromodification Control.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Los Angeles County Code, Title 22 PLANNING AND ZONING, Part 6 ENFORCEMENT PROCEDURES, including:

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

Los Angeles County Code, Title 26 BUILDING CODE, including:

§26.103 Violations And Penalties

§26.104 Organization And Enforcement

§26.105 Appeals Boards

§26.106 Permits

§26.107 Fees

§26.108 Inspections

California Government Code §6502

California Government Code §23004

Relationship Of Applicable Ordinances Or Other Legal Authorities To The Requirements of 40 CFR §122.26(d)(2)(i)(A-F) And The Order

Although, depending upon the particular issue, there may be multiple ways in which particular sections of the County's ordinances and State law relate to the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order, the table below indicates the basic relationship with Part VI(A)(2)(a) of the Order:

Order Part VI(A)(2)(a) Items	**Primary Applicable Ordinance/Statute**
i. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.	§12.80.410 [illicit discharge prohibited]; §12.80.450 [construction] §12.80.460 [industrial and commercial] §12.80.470 and .480 [industrial and commercial NPDES requirements] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions]

Order Part VI(A)(2)(a) Items	**Primary Applicable Ordinance/Statute**
	§22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties] §26.104 [enforcement] §26.106 [permits] §26.108 [inspections]
ii. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.	§12.80.410 [illicit discharge prohibited]
iii. Prohibit and eliminate illicit discharges and illicit connections to the MS4.	§12.80.410 [illicit discharge prohibited]; §12.80.420 [illicit connections prohibited]
iv. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.	§12.80.410 [illicit discharge prohibited]; §12.80.440 [littering and other polluting prohibited]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
v. Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows).	§12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.620 [nuisance abatement] §12.80.635 [violation penalty] §12.80.640 [penalties not exclusive] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties] §26.104 [enforcement] §26.106 [permits] §26.108 [inspections]
vi. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.	Same as item v., above

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
vii. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.	California Government Code §6502 and §23004
viii. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation.	California Government Code §6502 and §23004
ix. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4.	§12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.80.620 [nuisance abatement] §12.80.635 [violation penalty] §12.80.640 [penalties not exclusive] §22.60.380 [enforcement.] §26.106 [permits] §26.108 [inspections]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
x. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations.	§12.80.450 [construction mitigation] §12.80.500 [good housekeeping practices] §12.80.510 [construction BMPs] §12.80.520 [industrial/commercial BMPs] §12.84.440 [LID standards] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections]
xi. Require that structural BMPs are properly operated and maintained.	§12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections]
xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.	§12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections]

Order Part VI(A)(2)(b)(ii)

"*Identification of the local administrative and legal procedures available to mandate compliance with applicable municipal ordinances identified in subsection (i) above and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system.*"

The local administrative and legal procedures available to mandate compliance with the above ordinances are specified in those ordinances, particularly in:

§12.80.550 Enforcement—Director's powers and duties.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Title 26, §103 Violations And Penalties

Title 26, §104 Organization And Enforcement

Title 26, §105 Appeals Boards

Title 26, §106 Permits

Title 22 PLANNING AND ZONING, Part 6 ENFORCEMENT PROCEDURES, including:

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

The County attempts to first resolve each enforcement action administratively. However, the above cited ordinances also provide the County with the authority to pursue such actions in the judicial system as necessary.

Very truly yours,

JOHN F. KRATTLI
County Counsel

By Judith A. Fries
JUDITH A. FRIES
Principal Deputy County Counsel
Public Works Division

JAF:jyj

City of El Segundo

November 18, 2014

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013-1105

RE: Legal Authority Certification for the City of El Segundo to Implement and Enforce the Requirements of LARWQCB Order R4-2012-0175

Dear Mr. Unger:

The City of El Segundo submits this statement in its capacity as a co-permittee under LARWQCB Order R4-2012-0175 (NPDES No. CAS004001) (the "MS4 Permit"), in accordance with Part VI.A.2 of the MS4 Permit.

I am the City Attorney of the City of El Segundo, California. In that capacity, I state that it is my opinion that the City has adequate legal authority to implement and enforce the requirements in the MS4 Permit, consistent with the requirements set forth in the regulations implementing the Clean Water Act (40 CFR § 122.26(d)(2)(i)(A-F)), and to the extent permitted by state and federal law and subject to the limitations on municipal action under the California and United States Constitutions.

The primary source of the City's authority is Article 11, § 7 of the California Constitution. The City also has authority under California Water Code § 13002 to adopt and enforce regulations conditioning, restricting and limiting activities which might degrade the quality of waters of the State. In accordance with these laws, the City adopted El Segundo Municipal Code ("ESMC") Chapters 5-4 and 5-7 which include the City's regulations enabling it to implement the MS4 Permit. As the City transitions to the new EWMP requirements, these regulations may be amended to implement the new programs. Nevertheless, the City has already the legal authority as required under Part VI.A.2 of the MS4 Permit.

California law also authorizes the City to require the use of control measures to prevent or reduce the discharge of pollutants and ensure that such control measures are properly operated and maintained. The City's regulatory authority is supplemented by the California Environmental Quality Act ("CEQA") process by allowing the City to impose enforceable mitigation measures on development projects. As a general law city and municipal corporation, the City may enter into contracts that enable it to carry out its necessary functions including, without limitation, the ability to enter into interagency agreements to control the contribution of pollutants from one portion of the shared MS4 to another.

Pursuant to ESMC Chapters 1-2, 1-2A, and § 5-4-11, the City's regulations may be enforced administratively, civilly and criminally. The ESMC also provides various procedures to modify and/or revoke city-issued permits for unlawful and/or environmentally disruptive activity.

Consequently, it is my opinion that the City has adequate legal authority to implement and enforce the requirements in the MS4 Permit. Please do not hesitate to contact me should you have any questions or need any additional information

Very truly yours,
Mark D. Hensley, City Attorney

By: ______________________
Karl H. Berger,
Assistant City Attorney

City of
Santa Monica®

Office of the City Attorney
City Hall
1685 Main Street
Room 310
Santa Monica
CA 90407-2200

Marsha Jones Moutrie
City Attorney

December 23, 2014

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles REgion
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: ***City of Santa Monica's Statement of Legal Authority***

Dear Mr. Unger:

This letter is provided as the City of Santa Monica's Statement of Legal Authority required with its Annual Report pursuant to Part VI.A.2.b of the California Regional Water Quality Control Board, Los Angeles Region, Order Number R4-2012-0175 ("Order") for NPDES Permit Number CA2004001. The City has all of the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2013 through June 30, 2014, as permitted by law. In accordance with the Order, the citations to the Santa Monica Municipal Code ("SMMC") for each of the requirements of Part VI.A.2.a are as follows:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

SMMC Chapter 5.20, Sections 5.20.010 through 5.20.620; and SMMC Chapter 7.10, Sections 7.10.010 through 7.10.080.

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

SMMC Chapter 5.20, Sections 5.20.010 through 5.20.620; and SMMC Chapter 7.10, Sections 7.10.010 through 7.10.080.

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

SMMC Chapter 5.20, Sections 5.20.010 through 5.20.620; and SMMC Chapter, Chapter 7.10, Sections 7.10.010 through 7.10.080.

tel: 310 458-8336 • fax: 310 395-6727

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

SMMC Chapter 5.20, Sections 5.20.010 through 5.20.620; and SMMC Chapter 7.10, Sections 7.10.010 through 7.10.080.

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

SMMC Chapter 5.20, Sections 5.20.010 through 5.20.620; and SMMC Chapter, Chapter 7.10, Sections 7.10.010 through 7.10.080.

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

SMMC Chapter 5.20, including Sections 5.20.430 (Inspections and sampling), 5.20.330 (Monitoring facilities), 5.20.450 (Search warrants), and 5.20.500 (Notice of Violation); and SMMC Chapter 7.10, including 7.10.070 (Enforcement and penalties).

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees.*

See generally, SMMC Chapter 5.20 and Chapter 7.10.

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation.*

See generally, SMMC Chapter 5.20 and Chapter 7.10.

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4.*

SMMC Chapter 5.20, including Sections 5.20.430 (Inspections and sampling), 5.20.330 (Monitoring facilities), 5.20.450 (Search warrants), and 5.20.500 (Notice of Violation); and SMMC Chapter 7.10, including 7.10.070 (Enforcement and penalties).

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations.*

SMMC Chapter 5.20, Sections 5.20.010 through 5.20.620; and SMMC Chapter 7.10, Sections 7.10.010 through 7.10.080.

xi. *Require that structural BMPs are properly operated and maintained.*

SMMC Chapter 5.20, Sections 5.20.010 through 5.20.620; and SMMC Chapter 7.10, Sections 7.10.010 through 7.10.080.

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

SMMC Chapter 5.20, Sections 5.20.010 through 5.20.620; and SMMC Chapter 7.10, Sections 7.10.010 through 7.10.080.

In response to Part VI.A.2.b.ii of the Order, the local administrative and legal procedures available to mandate compliance under Chapter 7.10 are set forth in SMMC Section 7.10.070 (Enforcement and penalties) and Section 7.10.080 (Additional best management practice requirements), and under Chapter 5.20 are set forth in Sections 5.20.500 (Notice of Violation), 5.20.510 (Consent Orders), 5.20.520 (Show Cause Hearing), 5.20.530 (Compliance Orders), 5.20.540 (Cease and Desist Orders), 5.20.550 (Liability for Costs of Correction Arising From Unlawful Discharge), 5.20.560 (Industrial Wastewater Permit Suspension or Revocation Order), 5.20.570 (Disconnection of Nonpermitted Violators), 5.20.580 (Additional Emergency Remedial Measures), 5.20.590 (Injunctive Relief), 5.20.600 (Civil Liability), 5.20.610 (Criminal Prosecution), and 5.20.620 (Water Supply Severance). Enforcement actions are possible administratively and through the judicial system.

Please do not hesitate to contact me if you have any questions.

Sincerely,

Marsha Jones Moutrie

MARSHA JONES MOUTRIE
City Attorney

MJM/bcm

APPENDIX F

EXISTING AND POTENTIAL

CONROL MEASURES

TECHNICAL MEMORANDUM

To:	Santa Monica Bay EWMP Group	**Date:**	January 11, 2016
From:	MWH Team	**Reference:**	10503614
Subject:	DRAFT – Existing and Potential Control Measures(Technical Memorandum 2.2)		

1 INTRODUCTION

The National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit Order No. R4-2012-0175 (Permit) was adopted on November 8, 2012, by the Los Angeles Regional Water Quality Control Board (Regional Board) and became effective December 28, 2012. This Permit replaced the previous MS4 permit (Order No. 01-182). The purpose of the Permit is to ensure the MS4s in the County of Los Angeles) are not causing or contributing to exceedances of water quality objectives set to protect the beneficial uses in the receiving waters in the Los Angeles region. The Permit allows the Permittees to customize their stormwater programs through the development and implementation of a Watershed Management Program (WMP) or an Enhanced Watershed Management Program (EWMP) to achieve compliance with receiving water limitations (RWL) and water quality-based effluent limits (WQBEL). Following the adoption of the Permit, City of Los Angeles (City) conducted discussions with the other MS4 permittees to develop a collaborative approach for the EWMP across all watersheds within the City. In October of 2013, the City contracted with the MWH Team to develop the EWMP for the Santa Monica Bay Watershed (consisting of Jurisdictional Groups 2 and 3, or JG2/JG3) and a WMP for the City's portion of Jurisdictional Group 7 (JG7). The MWH Team consists of MWH Americas, Inc., Geosyntec Consultants, Inc., California Watershed Engineering, Co., M2 Resource Consulting, Inc., TDC Environmental, LLC, and Ninyo & Moore. It should be noted that the documentation for JG7 will be provided under a separate cover and therefore is not included as part of this EWMP work. The MS4 permittees within the Santa Monica Bay Watershed are the City, City of Santa Monica, City of El Segundo, Unincorporated areas of the County of Los Angeles (County), and the Los Angeles County Flood Control District (LACFCD). This group of JG2/JG3 MS4 permittees is referred to as the Santa Monica Bay EWMP Group (SMB EWMP Group).

The City developed guidance documents, or Concept Memos (City, 2013), for each of the EWMP development technical memorandum (TM) to provide consistency in nomenclature and content across the four watersheds.

In accordance with the Permit Section VI.C.5.b, the scope of work, and the Concept Memo, the MWH Team has performed the activities outlined in Task 2.2 and developed this Draft Existing and Potential Control Measures TM. The purpose of this TM is to initiate the planning process for stormwater best management practices (BMPs) under the SMB EWMP. This TM documents existing and planned stormwater BMPs and provides a process for identifying and evaluating additional control measures. The goal of this TM is to provide a logical sequence to BMP planning that will become part of the EWMP and will be used as part of the Reasonable Assurance Analysis (RAA). This TM incorporates the several components of the Permit and is organized as follows:

- **Section 2– Structural Best Management Practices (BMP) Categories and Design Characteristics:** the purpose of this section is to establish a consistent nomenclature for describing structural BMPs and compiling BMP information. This section presents the categories and sub-categories of structural BMPs. To the extent possible, the nomenclature represents established categories consistent with the Permit. The established categories were used to compile BMP information, and will also be used later in the EWMP process to identify additional/potential BMP projects.
- **Section 3 –Compiled Information on Existing and Planned BMPs:** the purpose of this section is to present a compiled list of potential and planned BMPs for the watershed. This section presents the information submitted by the SMB EWMP Group regarding the BMPs located in JG2 and JG3. In addition to information submitted by the SMB EWMP Group, a literature review of existing BMP information was completed. Multiple planning documents considered relevant to the EWMP were reviewed, and concepts for planned stormwater BMPs were compiled. The "planned Regional BMPs" are not necessarily funded at this time and constructed of these BMPs depend of the identification of funding source in the future. In this Section, both existing and planned BMPs are presented in maps and tables. It is anticipated that each group member of the SMB EWMP Group will review the compiled BMP information, verify that their jurisdiction is accurately represented, and provide any additional available information on BMPs.
- **Section 4 –Analysis of Structural BMP Performance Data:** the purpose of this section is to present an analysis of data from the International BMP Database (IBD) on the performance of various stormwater BMPs. This database contains information on the influent and effluent conditions for the various stormwater BMPs. In conjunction with the analysis of data from the International BMP Database, **Section 4**also presents local BMP data that has been provided by the SMB EWMP Group. This information will be used during EWMP development to determine which stormwater BMPs may be implemented. BMP performance data will also be used to support the RAA effort.
- **Section 5 – Process for Identifying Additional Regional EWMP Projects:** the purpose of this section is to outline the process that will be used during the EWMP to identify additional Regional Projects. The EWMP process emphasizes identifying BMPs able to capture to the 85^{th} percentile, 24-hour storm, or regional EWMP projects. A process is established for evaluating regional BMPs from existing planning documents and identifying additional regional EWMP projects (beyond those identified in planning documents).
- **Section 6 – Process for Customization of Minimum Control Measures (MCMs):** the purpose of this section is to present the process for MCM customization that may be implemented. The Permit allows for customization of MCMs, if justified. Some members for the SBM EWMP Group may elect to customize their MCMs.

The following attachments are also included in this TM:

- **Attachment A1 – Detailed List of Existing Regional BMPs**
- **Attachment A2 – Detailed List of Planned Regional BMPs**
- **Attachment A3 – Detailed List of Existing Distributed BMPs**
- **Attachment A4 – Unified Annual Stormwater Report 2011-2012 Appendix B**
- **Attachment A5 – Unified Annual Stormwater Report 2011-2012 Appendix C**

2 STRUCTURAL BEST MANAGEMENT PRACTICE CATEGORIES AND DESIGN CHARACTERISTICS

As part of the development of the EWMP, the Permit specifies that BMPs are expected to ensure stormwater discharges meet discharge limits as established in the Permit and to reduce overall impacts to receiving waters from stormwater and non-stormwater runoff.

BMPs are control measures. Control measures are grouped into two broad categories, structural and institutional. Institutional BMPs are source control measures that prevent the release of flow/pollutants or transport of pollutants within the MS4 area, but do not involve construction of physical facilities. MCMs (such as street sweeping) are a subset of institutional BMPs. Institutional BMPs is normally utilized to address runoff close to the source from a limited number of parcels. This section specifically summarizes the performance of structural BMPs.

Structural BMPs are control measures that involve construction to alter the hydrology or water quality of incoming stormwater or non-stormwater. There are two categories of structural BMP, regional and distributed. Regional BMPs are structural BMPs designed to treat runoff from a large drainage area that is expected to include multiple parcels and various land uses. Distributed BMPs are structural BMPs designed to treat runoff from smaller drainage areas. Regional and distributed structural BMPs are further defined by the subcategories as identified in **Table 2-1.**Detailed descriptions of structural BMPs are provided in the following sections.

The following subsections list specific types of regional and distributed structural BMPs. For each type, their category and subcategory are listed (from **Table 2-1**) as well as a brief description.

Table 2-1
Nomenclature for Categories and Subcategories of Structural BMPs

Category	Subcategory	Example BMP Types
Regional BMPs[1]	Infiltration	Surface infiltration basin, subsurface infiltration gallery
	Detention	Surface detention basin, subsurface detention gallery, large-scale cisterns
	Constructed Wetland	Constructed wetland, flow-through/linear wetland, subsurface flow wetlands
	Treatment Facilities	Facilities designed to treat runoff from and return it to the receiving water.
	Low Flow Diversions	BMPs that divert runoff to the sanitary sewer (normally dry weather or non-storm water only).
Distributed BMPs	Site-Scale Detention	Dry detention pond, wet detention pond, detention chambers, small-scale cisterns, rain barrels, downspout redirect, etc.
	Green Infrastructure	Biofiltration includes vegetated BMPs with underdrains
		Bioretention includes vegetated BMPs without underdrains
		Permeable pavement, porous pavement, permeable pavers, etc.
		Green streets (often an aggregate of bioretention, biofiltration and/or permeable pavement)
		Infiltration BMPs include non-vegetated dry wells, infiltration trenches, etc.
		Bioswales include vegetative filter strips and vegetative swales
		Rainfall harvest (rain barrels, green roofs and cisterns)

	Flow-through Treatment BMPs	Treatment BMPs with a minor (or non-existent) infiltration component, often modular/vault-type BMPs including cartridge media filters
	Source Control Structural BMPs	Catch basin inserts, screens, hydrodynamic separators, trash enclosures, etc.

[1] The term "regional BMP" does not necessarily indicate that the project can capture the 85th percentile storm, as described in the Permit. A nomenclature for regional BMPs that can capture the 85th percentile storm will be useful to the EWMP process. The term "regional EWMP projects" is recommended for those regional BMPs that are expected to be able to capture the 85th percentile storm.

2.1 Infiltration Basin

Category/Subcategory: Regional BMPs/Infiltration, Distributed BMPs/Green Infrastructure

An infiltration basin typically consists of an earthen basin (i.e., pervious soft bottom, or without impervious barrier inhibiting loss of surface waters into subsurface soils) constructed in naturally pervious soils (Type A or B soils). A forebay settling basin or separate treatment control measure may be provided as pretreatment and to facilitate maintenance. An infiltration basin functions by retaining the stormwater quality design volume and allowing the retained runoff to percolate into the underlying native soils over a specified period of time, avoiding or mitigating potential adverse effects of standing water (e.g., vectors). This is a full-capture / zero discharge approach, meaning there is no discharge from the BMP and all influent is infiltrated at the BMP.

2.2 Dry Extended Detention Basins

Category/Subcategory: Regional BMPs/Detention, Distributed BMPs/Site Scale Detention

Dry extended detention basins are basins whose outlets have been designed to detain the stormwater quality design volume for 36 to 48 hours to provide treatment through sedimentation with some volume loss due to infiltration and soil soaking (and evaporation/evapotranspiration). Dry extended detention basins do not have a permanent pool and are designed to drain completely between storm events. Limited biological and physiochemical treatment processes are typically provided due to lack of vegetation or constant presence of water necessary to support microbes, but detention basin performance is expected to increase with vegetation due to the breakdown of some pollutants by microbes growing on the vegetated substrate (e.g., stems and leaves). These basins can also be used to provide hydromodification and/or flood control by modifying the outlet control structure and providing additional detention storage. The slopes, bottom, and forebay of dry extended detention basins are typically vegetated. Without the addition of a sand filter beneath the basin, considerable stormwater volume reduction can still occur, depending on the infiltration capacity of the subsoil.

2.3 Subsurface Flow Wetlands

Category/Subcategory: Regional BMPs/Constructed Wetland, Distributed BMPs/Flow-Through Treatment BMPs

Subsurface flow wetlands have a history of highly-effective implementation for tertiary treatment of wastewater, and are considered a "natural treatment system" with particular effectiveness with bacteria and pathogen reduction. Subsurface flow wetlands have not been extensively studied for stormwater treatment effectiveness and, though applied research exists, the IBD currently does not contain data with regard to their performance. Subsurface flow treatment processes within sub-surface flow wetlands range from simple physical filtration mechanisms to complex chemical adsorption and microbial transformation. With the addition of a detention basin for settling of coarse materials, subsurface flow wetlands can be considered an advanced treatment system nearly comparable (though less reliable) than a conventional wastewater treatment plant and would be expected to remove pollutants (e.g., TSS) at least as effectively as constructed surface flow wetlands.

2.4 Constructed Surface Flow Wetlands

Category/Subcategory: Regional BMPs/Constructed Wetland

A constructed surface flow wetland is a system consisting of a sediment forebay and one or more permanent micro-pools with aquatic vegetation covering a significant portion of the basin. Constructed surface flow wetlands typically include components such as an inlet with energy dissipation, a sediment forebay for settling out coarse solids and to facilitate maintenance, a base with shallow sections (1 to 2 feet deep) planted with emergent vegetation, deeper areas or micro pools (3 to 5 feet deep), and a water quality outlet structure. The interactions between the incoming stormwater runoff, aquatic vegetation, wetland soils, and the associated physical, chemical, and biological unit processes are a fundamental part of constructed surface wetlands. Constructed wetlands provide multiple biological and physiochemical treatment processes associated with aerobic and anaerobic soil zones, submerged and emergent vegetation, and associated microbial activities.

2.5 Low-Flow Diversions

Category/Subcategory: Regional BMPs/Low-Flow Diversions

Low-flow diversions (LFDs) are structural BMPs that divert and redirect urban stormwater runoff away from the MS4 and to the sanitary sewer system primarily during dry weather. In some cases low flow diversions also function during wet weather, thereby reducing a portion of the wet weather runoff volume (and associated pollutant load) transported downstream.

2.6 Treatment Facility

Category/Subcategory: Regional BMPs/Treatment Facilities

This BMP type includes the complete or partial diversion of the 24-hour 85^{th} percentile design storm to a treatment plant for disinfection. Conventional treatment practices, while more common for the treatment of dry weather urban runoff than stormwater runoff due in part to capacity and energy requirements, are considered to be the most effective at removing pollutants since they are highly engineered systems with designs driven by the constituents of concern.

2.7 Cisterns

Category/Subcategory: Distributed BMPs/Green Infrastructure/Rainfall Harvest

Cisterns are a harvest-and-use BMP. Captured water is infiltrated or reused for irrigation, and the associated pollutant loads with the captured volume will essentially be removed if infiltrated. Cisterns also decrease pollutant mobility and decrease downstream BMP storage capacity. For example, by diverting rooftop runoff that would otherwise be discharged to the street or directly to the storm drain, the transport of pollutants to receiving waters would be reduced by a cistern. Because cisterns are typically a full-capture BMP, the pollutant removal effectiveness of cisterns is considered comparable to infiltration basins. The reuse regulations currently in place limit the use of water stored in cisterns in the SMB EWMP Group area for uses other than landscape irrigation, with the exception of the City of Santa Monica, which allows for some indoor uses such as toilet flushing.

2.8 Bioretention/Biofiltration

Category/Subcategory:

- Distributed BMPs/Green Infrastructure/Bioretention
- Distributed BMPs/Green Infrastructure/Biofiltration
- Distributed BMPs/Flow-Through Treatment BMPs
- Regional BMPs/Infiltration

Bioretention stormwater treatment facilities are landscaped shallow depressions that slow capture and filter stormwater runoff. These facilities function as a soil- and plant-based filtration device that removes pollutants through a variety of natural physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plantings. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. An optional gravel layer can be added below the planting soil to provide additional storage volume for infiltration. Bioretention is typically designed without an underdrain to serve as a retention BMP in areas of high soil permeability – runoff treated via filtration would infiltrate to the underlying soils after leaving the unit. Bioretention with an underdrain (or "biofiltration") is a treatment control measure that can be used for areas with low permeability native soils or steep slopes, to allow for the treatment of runoff through filtration despite impermeable underlying soils. Bioretention can also be designed with a raised underdrain (or "bioinfiltration"), and would function more as an infiltration / full-capture BMP.

2.9 Bioswales

Category/Subcategory: Distributed BMPs/Green Infrastructure/Bioswales

Bioswales (also known as vegetated swales) are open, shallow channels with low-lying vegetation covering the side slopes and bottom topography that collect and slowly convey runoff to downstream discharge points. Bioswales provide pollutant removal through settling and filtration in the vegetation (usually grasses) lining the channels, thereby allowing for stormwater volume reduction through infiltration and evapotranspiration, reduction in the flow velocity, and conveyance of stormwater runoff. The vegetation in the bioswale can vary depending on its location, depending on the design criteria outlined in this section.

2.10 Green Roofs

Category/Subcategory: Distributed BMPs/Green Infrastructure/Rainfall Harvest

Green roofs (also known as eco-roofs and vegetated roof covers) are roofing systems that layer a soil/vegetative cover over a waterproof membrane. Green roofs rely on highly-porous media and moisture retention layers to treat runoff via biofiltration, store intercepted precipitation, and support vegetation that can reduce the volume of stormwater runoff via evapotranspiration. Cisterns can also be incorporated into green roof design to receive the filtered runoff and store it for on-site use.

2.11 Permeable Pavements

Category/Subcategory: Distributed BMPs/Green Infrastructure/Permeable Pavement

Permeable, pervious, or porous pavements are infiltration-type BMPs that contain significant voids to allow water to pass through to a crushed stone base. These BMPs come in a variety of forms; they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or a poured-in-place solution (pervious concrete or porous asphalt). All permeable pavements with a stone reservoir base treat stormwater and remove sediments and metals to some degree. While conventional pavement results in increased rates and volumes of surface runoff, permeable pavements (when properly constructed and maintained) allow some of the stormwater to percolate through the pavement and enter the soil below. This process facilitates groundwater recharge while providing the structural and functional features needed for the roadway, parking lot, or sidewalk. The paving surface, subgrade, and installation requirements of permeable pavements are more complex than those for conventional asphalt or concrete surfaces. For permeable pavements to function properly over an expected life span of 15 to 20 years, they must be properly sited, carefully designed and installed, as well as periodically maintained. Failure to protect permeable pavement areas from construction-related or other sediment loads can result in premature clogging and failure.

2.12 Media Filters

Category/Subcategory: Distributed BMPs/Flow-through Treatment BMPs

Media filters consist of sand filters, compost filters, cartridge filters, and any other BMP designed with filtration media that absorbs pollutants. The treatment pathway is vertical (downward through the sand or media) to a perforated underdrain system that is connected to the downstream storm drainage system or to an infiltration facility. As stormwater or dry weather urban runoff passes through the sand, pollutants are trapped in the small pore spaces between sand grains or are adsorbed to the sand surface.

2.13 Hydrodynamic Separators

Category/Subcategory: Distributed BMPs/Source Control Structural BMPs

Hydrodynamic separation devices are devices that remove trash, debris, and coarse sediment from incoming flows using screening, gravity settling, and centrifugal forces generated by forcing the influent into a circular motion. By having the water move in a circular fashion, rather than a straight line, it is possible to obtain significant removal of suspended sediments and attached pollutants with less space as compared to wet vaults and other settling devices. Several types of hydrodynamic separation devices are also designed to remove floating oils and grease using sorbent media.

3 EXISTING AND PLANNED STRUCTURAL BMPS

This section summarizes available information regarding existing regional and distributed structural BMPs within the SMB EWMP Group area. In order to compile information regarding existing BMPs, a data request was distributed to the SMB EWMP Group. In addition to the BMP information provided by group members, a review of available literature was also completed. Sources of the compiled information are listed below:

- Data received from the SMB EWMP Group consisted of:
  - City of Santa Monica BMPs – Private and City Owned
  - Standard Urban Stormwater Mitigation Plan (SUSMP) Low Impact Development (LID) Data (June 2006 – September 2013)
  - Santa Monica Bay Watershed regional BMP Projects (PDF)
  - Low Flow Development Project Information (as of January 2008)
- Review of available literature consisted of:
  - Online Project Tracking and Integration System (OPTI) Database
  - Proposition O Clean Water Bond Program Project Progress Report (as of August 2013)
  - LA Sanitation Green Infrastructure Projects List (as of December 2012)
  - Projects for 5-Year Expenditure Plan - Santa Monica Bay, Ballona Creek, Marina Del Rey, Dominguez Channel
  - 2011-2012 Annual Stormwater Report (Los Angeles County Department of Public Works)

3.1 Existing Regional BMPs

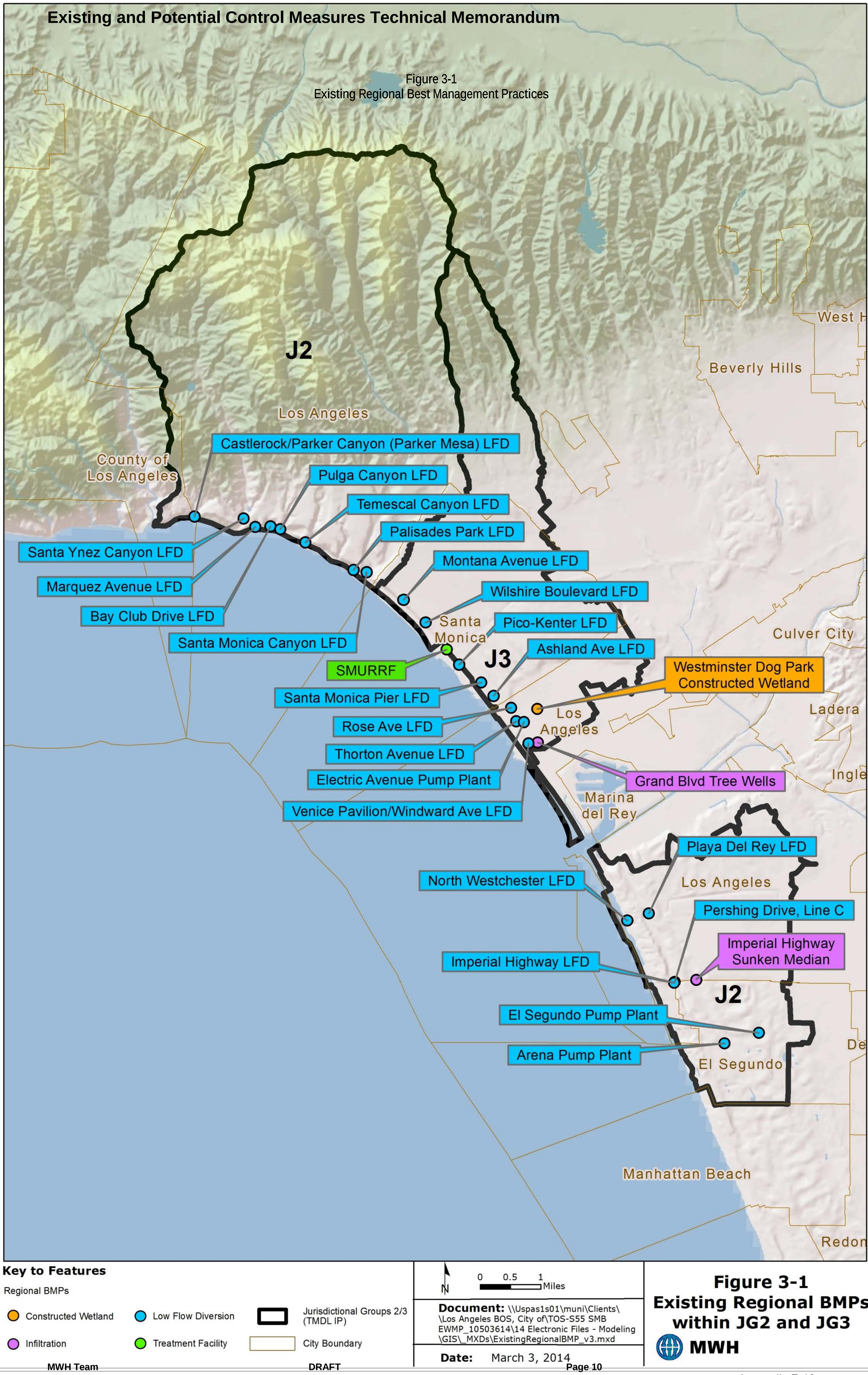
Table 3-1 summarizes regional BMPs identified within the SMB EWMP Group area. The locations of existing regional BMPs are shown on **Figure 3-1** and include a total of twenty six regional BMPs. A detailed list of existing regional BMPs is included in **Attachment A1**. Within this table, several projects are developed jointly by multiple Permittees. A total of 27 projects were constructed, 23 of which are LFDs, 2 are infiltration BMPs, 1 is a constructed wetland, and 1 is a treatment facility.

Table 3-1
Summary of Existing Regional Best Management Practices[1] by Permittee and Type

Permittee	Total BMPs Reported[7]	Number of Existing Regional BMPs Reported by Permittee			
		Infiltration	Constructed Wetland	Treatment Facility	Low-Flow Diversion[2]
El Segundo	-	-	-	-	-
Los Angeles	12	2	1	1[3]	9[4,5]
Santa Monica	5	-	-	1[3]	4[4]
County[6]	-	-	-	-	-
LACFCD[6]	13	-	-	-	13[4,5]

[1] Regional BMPs summarized in this table do not necessarily meet the Permit's criterion of capturing the 85th percentile, 24-hour storm volume to be considered a Regional EWMP Project.
[2] Low-Flow Diversions capture and divert 100% of dry flow.
[3] The Santa Monica Urban Runoff Recycling Facility (SMURRF) is a joint project between the City and City of Santa Monica.
[4] The Pico-Kenter LFD is a joint project between LACFCD, the City, and the City of Santa Monica.
[5] The Imperial Highway LFD is a joint project between LACFCD and the City.
[6] Data sources contain conflicting information in regard to LACFCD and County ownership of LFDs. In this table, all LFDs with this conflict have been listed with LACFCD as the responsible permittee.
[7] This column represents the number of BMPs for which each permittee has ownership/partial ownership. As double counting occurs when multiple permittees have ownership of a project, the numbers in each column should not be added to determine the total number of physical BMPs.

Figure 3-1
Existing Regional Best Management Practices



3.2 Existing Distributed BMPs

Table 3-2 summarizes existing distributed BMPs identified within the SMB EWMP Group area. The existing distributed BMPs that were provided with location data are mapped in **Figure 3-2**. Existing distributed BMPs include a total of 340 BMPs within the SMB EWMP Group area of the City of Los Angeles, and 1,872 existing distributed BMPs within the City of Santa Monica. The BMPs identified in the City Santa Monica reflect both city-owned and privately-owned BMPs. Information for existing distributed BMPS owned by City of Santa Monica was provided at a higher level of detail (i.e., with latitude and longitude coordinates) than information for privately-owned BMPs within the City of Santa Monica. **Table 3-2** summarizes the currently available data. **Attachment A3** provides a detailed summary of the existing distributed BMPs.

Table 3-2
Existing Distributed Best Management Practices by Permittee and BMP Type

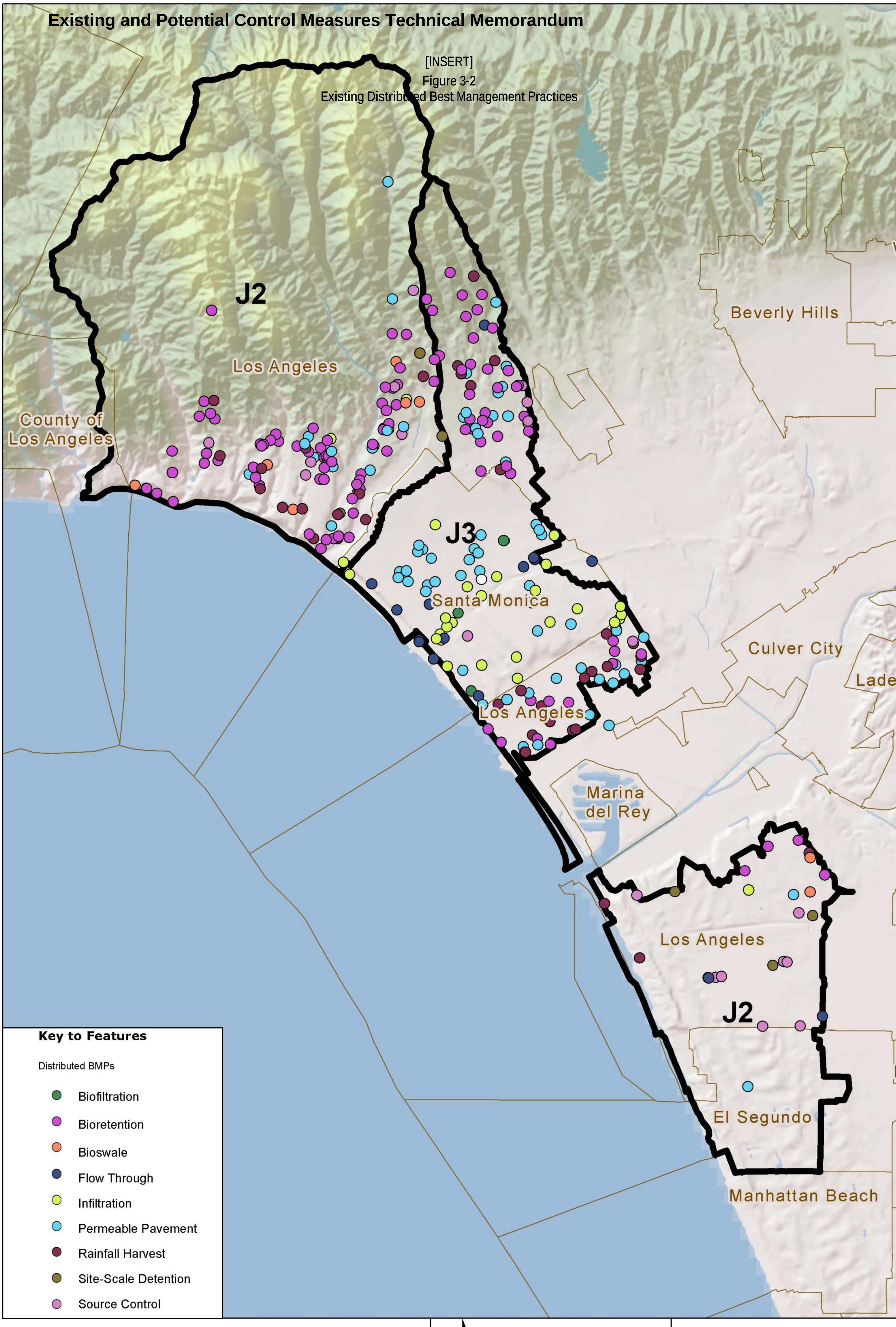
Permittee[2]	Number of Existing Distributed BMPs Reported by Permittee										
			Green Infrastructure								
	Total BMPs Reported	Site-Scale Detention	Bioretention	Biofiltration	Permeable Pavement	Bioswale	Infiltration	Rainfall Harvest	Flow Through	Source Control	Unknown[1]
El Segundo[3]	-	-	-	-	-	-	-	-	-	-	-
Los Angeles	340	14	168	-	51	11	9	44	11	31	-
Santa Monica	1872	-	1	230	89	-	1,329	1	101	-	67
County[3]	-	-	-	-	-	-	-	-	-	-	-
LACFCD[3]	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**2212**	**14**	**169**	**230**	**140**	**11**	**1,338**	**45**	**112**	**31**	**67**

[1] BMPs listed as "unknown" are those for which a BMP category was not specified in the data.
[2] BMPs were assigned to Permittee by geographic location in the instance that ownership information was not available.
[3] Distributed BMP data for El Segundo, the County, and LACFCD were not available for summary. Please see Attachment A4 and Attachment A5 to review the BMPs summarized for these Permittees in the 2011-2012 Unified Annual Stormwater Report.

3.3 Installed and Maintained Best Management Practices

Appendix B of the 2011-2012 Unified Annual Stormwater Report, published by the Los Angeles County Department of Public Works (Los Angeles County Department of Public Works, 2012), lists the number of BMPs installed by the cities of El Segundo, Los Angeles, and Santa Monica, and the County and LACFCD in 2011 and 2012, and Appendix C summarizes the BMPs maintained during the same time period. Appendix B and Appendix C of the 2011-2012 Unified Annual Stormwater Report are included in this document as Attachment A4 and Attachment A5, respectively. These documents are included as a reference and were not used by the MWH Team to account for existing BMPs installed and maintained within the SMB EWMP Group.

[INSERT]
Figure 3-2
Existing Distributed Best Management Practices



Note: This figure illustrates locations of existing distributed BMPs with known latitutde and longitude.

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Date: March 3, 2014

Figure 3-2
Existing Distributed BMPs within JG2 and JG3

MWH

3.4 Planned Regional BMPs

Table 3-4 lists the planned regional BMPs identified within the SMB EWMP Group area from the literature review and data provided by the Permittees. The locations of planned regional BMPs are shown in **Figure 3-3**, and include a total of six regional BMPs. A detailed list of the planned regional BMPs is included in **Attachment A2**.

Table 3-3
Planned Regional Best Management Practices[1] by Jurisdiction and BMP Type

City/Lead Agency	BMP Category	Project Name	Purpose	Location
City of Los Angeles	Detention; Treatment Facility	Penmar Water Quality Improvement Project	Capture and treat dry/wet weather runoff (Phase I); Treatment/disinfection system for stormwater to be used for landscape irrigation (Phase II)	1216 E. Rose Ave
City of Los Angeles	Low Flow Diversion	Santa Monica Bay Low Flow Diversion Upgrades Pkg 3 (Phase II)	Construct a relief sewer to comply with the bacteria TMDL winter dry-weather regulations	445 Pacific Coast Highway, Santa Monica
City of Los Angeles	Treatment Facility	Temescal Canyon Park Stormwater BMP (Phase II)	Treatment/disinfection system for stormwater to be used for landscape irrigation	15900 PCH
City of Los Angeles	Detention; Treatment Facility	Westchester Stormwater BMP	Capture and treat stormwater runoff from three existing stormdrains	Los Angeles World Airport
Los Angeles Conservation Corps	Other - Ecological	Coastal Habitat Restoration	Restore three acres of coastal dune habitat along Santa Monica Bay	Santa Monica Bay
SMB Restoration Foundation	Other - Ecological	Oyster Stock Enhancement in Santa Monica Bay Harbor to reduce total maximum daily loads	Improve water quality, reduce pollutants, and restore ecosystem health	Santa Monica Bay
City of Santa Monica	Detention	Marine Park (Penmar) Project	Unknown	Unknown
City of Santa Monica	Detention	Los Amigos Park Cistern	Unknown	Unknown
City of Santa Monica	Infiltration	Memorial Park, Beach Parking Lot	Unknown	Unknown
City of Santa Monica	Treatment Facility	Ozone Park, Los Amigos Park	Unknown	Unknown

[1] Regional BMPs summarized in this table do not necessarily meet the Permit's criterion of capturing the 85th percentile, 24-hour storm volume to be considered a Regional EWMP Project.

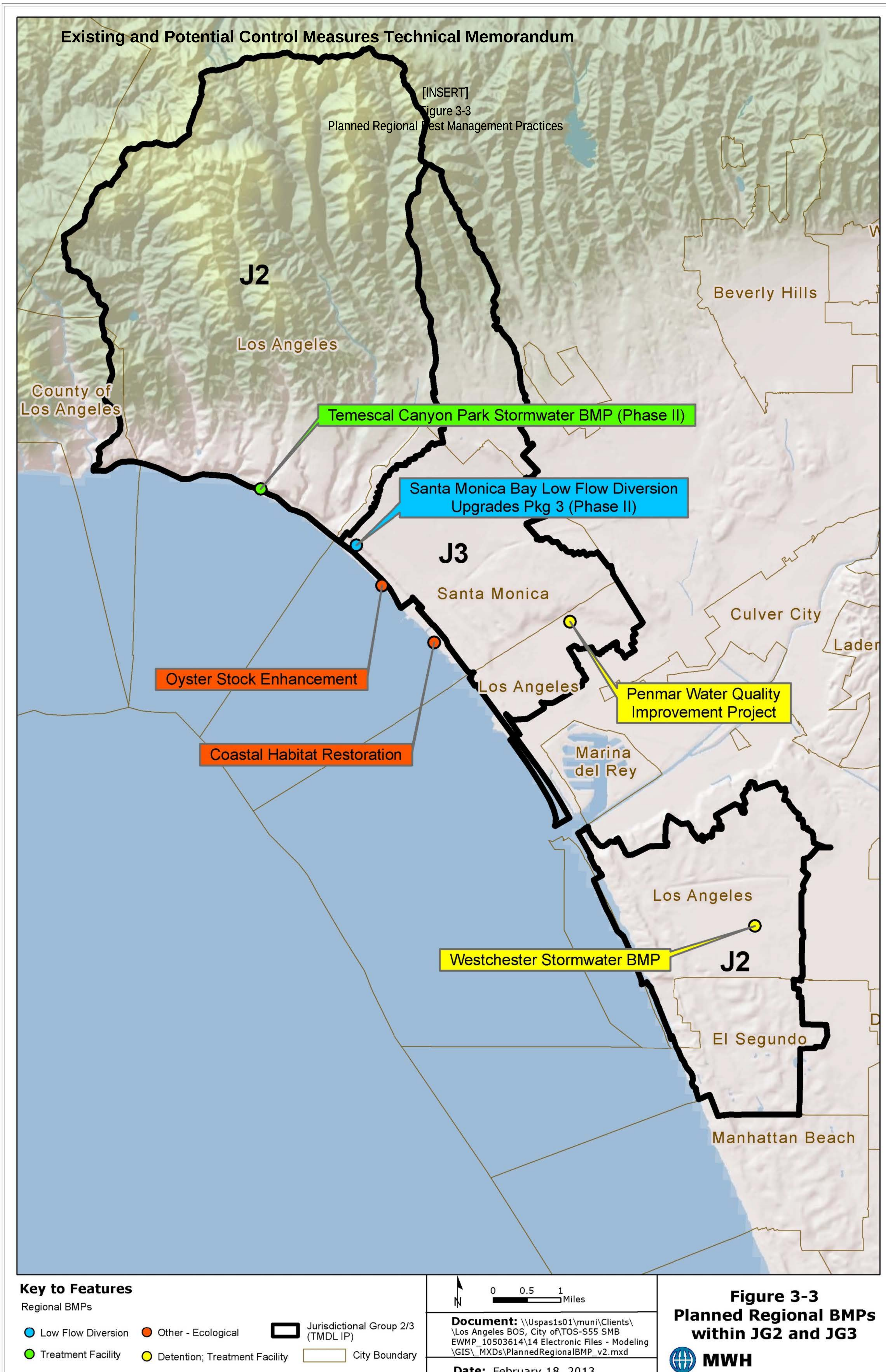


Figure 3-3
Planned Regional BMPs within JG2 and JG3

4 BMP PERFORMANCE ANALYSIS

Review and summary of BMP performance forms the basis for selection of BMPs to meet water quality requirements. Within the RAA approach, the assumptions and results of the BMP performance applied and modeling results must be consistent with the generated summary statistics for BMP performance.

The modeled performance of BMPs in the J2/J3 watersheds will be evaluated for the RAA as described in Section VI.C.5.b.iv(5) of the Permit, both in terms of volume capture (based on BMP design criteria) and predicted effluent quality (based on published values). The IBD is a comprehensive database and source of actual BMP performance information comprised of data from a peer-reviewed collection of studies that have monitored the effectiveness of a variety of BMPs in treating water quality pollutants for a variety of land use types. Research on characterizing BMP performance suggests that effluent quality (rather than percent removal, which assumes a linear influent-to-effluent relationship) is more reliable in modeling stormwater treatment (Strecker et al. 2001). Schueler (1996) also found in his evaluation of detention basins and stormwater wetlands that BMP performance is often limited by an achievable effluent quality, or "irreducible pollutant concentration"; acknowledging that a practical lower limit exists at which stormwater pollutants can be removed by any given technology. While there is likely a relationship between influent and effluent water quality for some BMPs and some constituent concentrations, analyses conducted to date do not support fixed percent removal values relative to influent quality for the following reasons (WWE and Geosyntec, 2007):

- Percent removal depends heavily on influent quality, and in the majority of cases, higher observed influent pollutant concentrations actually result in higher percent removals (i.e., observed effluent concentrations for most BMPs are relatively consistent, so the use of a pre-set percent removal would under-predict BMP performance when influent concentrations are high and over-predict BMP performance when influent concentrations are low)
- The variability in percent removal is often more broad than the variability in effluent pollutant concentration
- A high percent removal may still result in a high pollutant concentration, thereby leading to a false determination that BMPs are performing well, when they are actually not meeting the effluent limits
- Different percent removals can be calculated within the same dataset due to inconsistent percent removal calculations (i.e., event by event, mean of even percent removals, inflow median to outflow median, inflow load to outflow load, etc.)

For the reasons stated above, BMP influent data is not used to quantify BMP performance. Instead raw effluent data has been used to estimate the "irreducible pollutant concentration" attributable to each BMP that will be analyzed as part of the RAA.

Future studies may support a refinement to the assumption of effluent concentration-based BMP performance modeling, such as the development of more complex influent-effluent relationships (WWE and Geosyntec, 2007). However, it should be noted that the stochastic modeling approach accounts for, at least in part, the uncertainty of not knowing the relationship between influent and effluent concentrations because the BMP effluent distributions are based on a variety of BMP studies with a wide range of influent concentrations, representing a variety of tributary drainage area land use characteristics. Pollutant reductions should only be accounted for if the predicted influent is greater than the achievable effluent quality estimated for the modeled BMP (i.e., effluent equals influent [or land use-based] concentrations up until the influent concentration exceeds the effluent concentration). Therefore, influent (or land use event mean concentration based) concentrations are considered by the model since they are directly used to determine whether treatment occurs or not.

A November 2011 interim release of the IBD was analyzed in early 2012 for the purpose of developing BMP effluent statistics (this analysis utilized the same dataset used to produce the summary statistics contained in Geosyntec and WWE (2012). As with the estimation of land use event mean concentrations, final effluent values used to predict BMP performance were determined from the data contained in the IBD using a combination of regression-on-order statistics and the "bootstrap" method. The bootstrap approach randomly samples the dataset several thousand times and computes the desired statistic from the subset of data. Log-normality was also assumed for BMP effluent concentrations - this assumption has been confirmed previously through goodness-of-fit tests on the BMP effluent concentration data (Geosyntec, 2008). Statistics for effluent concentrations based on available water quality performance data were developed for the BMPs and constituents listed in **Table 4-1.**

Table 4-1
BMPs and Constituents Addressed[1]

BMPs	Constituents
Constructed Wetland / Retention Pond (with Extended Detention)	Total suspended solids (TSS)
Constructed Wetland / Retention Pond (without Extended Detention)	Total phosphorus (TP)
Dry Extended Detention Basin	Dissolved phosphorus as P (DP)[2]
Hydrodynamic Separator	Ammonia as N (NH3)
Media Filter	Nitrate as N (NO3)
Subsurface Flow Wetland	Total Kjeldahl nitrogen as N (TKN)
Treatment Plant	Dissolved copper (DCu)
Bioswale	Total copper (TCu)
Bioretention with underdrain	Total lead (TPb)
Bioretention (volume reduction only)	Dissolved zinc (DZn)
Cistern (volume reduction only)	Total zinc (TZn)
Green Roof (volume reduction only)	Fecal Coliform (FC)
Porous Pavement (volume reduction only)	
Low Flow Diversion (volume reduction only)	

[1]All constituents are addressed for all BMPs that provide treatment (i.e., excluding those identified as "volume reduction only")

[2]Dissolved phosphorus and orthophosphate data sets were combined to provide a larger data set and because the majority of orthophosphate is typically dissolved and many data sets either report dissolved phosphorus or orthophosphate, but not both.

Table 4-2 summarizes the number of effluent data points (individual storm events) and percent non-detects for the pollutants and BMP types of interest for which sufficient data were available. A large percentage of non-detects can bias the effluent statistics derived from the dataset (e.g., total lead for bioretention shows a 60 percent non-detect ratio). **Table 4-3** summarizes arithmetic averages and **Table 4-4** summarizes the arithmetic standard deviations of the BMP effluent concentrations that will be used in the RAA.

Consistent with IBD documentation (WWE and Geosyntec, 2007), BMP effluent concentrations are assumed to be limited by an "irreducible effluent concentration," or a minimum achievable concentration (Schuler, 1996). Lower limits are currently set at the 10^{th} percentile effluent concentration of BMP data in the IBD for each modeled BMP type for which the BMP data show statistically significant reductions between influent and effluent means. If the differences are not statistically significant or there is a statistically significant increase, the 90^{th} percentile is used as the minimum achievable effluent concentration, which essentially assumes no treatment except when influent to the BMP is very high. **Table 4-5** summarizes the irreducible effluent concentration estimates that are used in SBPAT to prevent treatment from occurring when influent concentrations are equal to or below these values.

A separate analysis of BMP performance statistics, limited to BMPs in California, was conducted in order to include potential metrics and variability associated with the Mediterranean climate of the Los Angeles

Basin. **Tables 4-6, 4-7, 4-8, and 4-9**, provide California-specific statistics for data points, arithmetic averages, arithmetic standard deviations, and irreducible concentrations, respectively.

California-specific data were extracted from the IBD in the following manner and utilizing a number of assumptions. The parameter listed as NOx as N was aggregated from Nitrate (NO3) as N and Nitrite (NO2) + Nitrate (NO3) as N datasets. NO3 data was used where possible, but if NO3 was not analyzed during storm at a BMP, yet NO2 + NO3 were analyzed, the NO2 + NO3 result is used instead. This assumes, as is often the case, that NO2 concentrations are very small compared to NO3. Additionally only data from the following BMPs were considered:

- Retention Ponds
- Retention Ponds + Wetland Basins
- Extended Dry Detention Basins
- Median Filters (specifically, Sand Filters)
- Manufactured Devices (e.g., Hydrodynamic Separators)
- Bioretention Cells
- Bioswales
- Subsurface Flow (SSF) Wetlands

In general, data from each BMP category can be selected directly from the IBD. However, some pre-processing was required to combine retention ponds and wetlands basins in a separate category of BMPs (listed second above). Additionally, the IBD currently has insufficient data for bioretention cells located in California.

After the selection, filtering, and pre-processing as described above, the data were divided into datasets defined by the unique combinations of BMP type and pollutant of concern. With each dataset, censored (i.e., non-detect) values were substituted using a regression-on-order statistics algorithm described in *Nondetects and Data Analysis* (Helsel 2005). This method of data ranking considers both the censored/uncensored status of the result and the detection limit of the censored data. Censored data were estimated from a lognormal distribution fit to the remaining uncensored results. Statistics were then computed from the regression-on-order substituted datasets and presented in the tables below.

Table 4-2
Summary of Number of Data Points and Percent Non-Detects (% ND) for Best Management Practice Effluent Concentration Data from the International Best Management Practice Database

BMP		TSS	TP	DP	NH3	NO3	TKN	DCu	TCu	TPb	DZn	TZn	FC
Bioretention	Count	193	249	164	184	259	201	NA	39	48	15	48	29
	%ND	10%	5%	4%	18%	3%	2%	NA	18%	60%	0%	35%	0%
Vegetated Swales (Bioswales)	Count	354	364	249	225	372	324	82	309	308	72	373	92
	%ND	1%	1%	0%	17%	1%	0%	4%	3%	39%	6%	23%	0%
Hydrodynamic Separators (not updated - original SBPAT analysis, 2008)	Count	199	170	58	69	59	77	89	99	95	99	174	31
	%ND	7%	3%	33%	28%	3%	5%	17%	0%	8%	18%	7%	3.2%
Media Filters	Count	409	403	244	215	391	374	186	361	341	221	433	185
	%ND	7%	6%	14%	24%	2%	6%	7%	12%	21%	19%	13%	0%
Detention Basins	Count	299	275	116	94	213	185	170	198	209	163	189	190
	%ND	1%	3%	16%	6%	7%	4%	32%	31%	50%	17%	15%	0%
Retention Ponds	Count	723	654	618	423	626	496	213	536	646	212	593	137
	%ND	4%	3%	6%	8%	6%	3%	26%	21%	30%	15%	7%	0%
Wetland Basins/Retention Ponds (combined)	Count	1028	932	862	681	872	680	228	684	767	227	770	158
	%ND	4%	3%	6%	7%	7%	2%	25%	20%	28%	14%	8%	0%

Note: Refer to Table 4-1 for explanation of abbreviations

Table 4-3
Arithmetic Mean Estimates of Best Management Practice Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Retention Pond (with Extended Detention)[1]	38.3	0.19	0.11	0.18	0.42	1.20	5.3	6.7	7.2	22.1	35.3	1.01E+04
Constructed Wetland / Retention Pond (without Extended Detention)[2]	32.9	0.17	0.09	0.17	0.38	1.20	5.3	6.2	12.0	22.6	38.0	9.89E+03
Dry Extended Detention Basin[3]	42.3	0.37	0.26	0.16	0.61	2.40	6.5	11.4	14.4	33.7	78.4	1.41E+04
Hydrodynamic Separator[4]	98.1	0.50	0.06	0.30	0.67	2.07	13.1	16.7	12.7	78.4	107.4	2.68E+04
Media Filter[5]	22.3	0.14	0.07	0.18	0.74	0.98	8.3	11.0	4.6	34.7	37.6	5.89E+03
Sub-surface Flow Wetland[6]	18.1	0.06	0.06	0.09	0.27	0.87	4.6	4.6	0.7	20.9	25.8	PR=90%
Treatment Plant[7]	2.0	0.00	0.00	0.00	0.27	0.01	1.0	1.0	4.4	5.0	5.0	2.00E+00
Vegetated Swale (Bioswale)[8]	27.1	0.28	0.17	0.09	0.43	0.87	9.6	10.1	6.4	33.3	33.3	8.00E+04
Bioretention[9]	18.1	0.14	0.07	0.18	0.37	0.98	8.3	8.8	4.2	34.7	37.6	5.89E+03
Bioretention w/o underdrain	Volume and load reduction											
Cistern	Volume and load reduction											
Green Roof	Volume and load reduction											
Porous Pavement	Volume and load reduction											
Infiltration Basin	Volume and load reduction											

Refer to Table 4-1 for explanation of abbreviations

[1] Based on retention pond IBD category (basis per Geosyntec 2008)

[2] Based on combined wetland basin and retention pond IBD categories (basis per Geosyntec 2008)

[3] Strictly detention basin category from the IBD

[4] From Geosyntec, 2008

[5] Includes non-bio media filters (e.g., sand filters)

[6] Lowest of all IBD categories; except for Fecal Coliform where 90% removal is used. The 90% removal is based on USEPA, 1993, which states that SSF wetlands are generally capable of a 1 to 2 log reduction in fecal coliforms.

[7] Secondary Drinking Water Standards or Minimum of all BMP types, whichever is less

[8] Strictly from vegetated swale category from the IBD

[9] Effluent quality assigned to treated underdrain discharge is based on the better performing characteristics of the “media filter” and “bioretention” categories for each pollutant.

Table 4-4
International Best Management Practice Database Arithmetic Standard Deviations of Best Management Practice Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Wetpond (with Extended Detention)	76.80	0.253	0.357	0.234	0.787	0.688	4.288	9.710	12.96	42.46	61.96	3.23E+04
Constructed Wetland / Wetpond (without Extended Detention)	71.14	0.228	0.313	0.375	0.750	0.848	4.196	8.849	123.0	41.88	85.57	3.08E+04
Dry Extended Detention Basin	87.36	0.673	0.439	0.183	1.173	5.029	6.656	19.96	56.01	64.68	137.9	4.15E+04
Hydrodynamic Separator	236.5	1.237	0.093	0.880	1.198	3.737	11.98	11.98	25.70	137.4	137.4	2.16E+05
Media Filter	40.73	0.168	0.099	0.382	0.852	1.213	13.75	17.20	10.02	142.2	100.3	1.27E+04
Sub-surface Flow Wetland	30.66	0.145	0.088	0.145	0.552	0.594	3.504	3.504	1.845	12.84	17.16	5.37E+02
Treatment Plant	2.00	0.003	0.003	0.006	0.552	0.030	3.000	3.000	10.97	15.00	15.00	1.00E+00
Vegetated Swale (Bioswale)	35.12	0.311	0.239	0.145	0.905	0.872	7.749	9.429	15.36	28.49	34.86	1.19E+06
Bioretention	30.66	0.168	0.099	0.382	0.552	1.213	13.75	11.12	4.84	100.3	100.3	1.27E+04
Bioretention w/o underdrain	Volume and load reduction											
Cistern	Volume and load reduction											
Green Roof	Volume and load reduction											
Porous Pavement	Volume and load reduction											
Infiltration Basin	Volume and load reduction											

Note: Refer to Table 4-1 for explanation of abbreviations

Table 4-5
International Best Management Practice Database Arithmetic Irreducible of Best Management Practice Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Wetpond (with Extended Detention)	1.358	0.034	0.010	0.019	0.011	0.499	1.387	1.387	0.429	1.000	2.933	4
Constructed Wetland / Wetpond (without Extended Detention)	1.300	0.030	0.009	0.012	0.010	0.520	1.267	1.267	0.400	1.075	3.000	5.4
Dry Extended Detention Basin	5.460	0.089	0.523	0.336	0.026	3.650	1.153	1.274	0.435	8.396	8.396	19.6
Hydrodynamic Separator	5.543	0.023	0.172	0.014	1.299	3.576	3.340	3.340	1.351	17.793	17.793	3295
Media Filter	1.487	0.026	0.010	0.013	0.064	0.210	0.995	1.298	0.372	1.000	2.000	13.1
Sub-surface Flow Wetland	1.268	0.025	0.006	0.009	0.008	0.141	1.000	1.000	0.089	1.000	2.933	4
Treatment Plant	0.500	0.001	0.001	0.001	0.008	0.001	0.100	0.100	0.255	0.500	0.500	1
Vegetated Swale (Bioswale)	2.000	0.079	0.040	0.009	0.056	0.141	2.708	2.708	0.434	5.720	5.720	9.53E+04
Bioretention	1.605	0.026	0.010	0.013	0.050	0.210	0.995	1.524	0.836	1.000	2.000	13.1
Bioretention w/o underdrain	Volume and load reduction											
Cistern	Volume and load reduction											
Green Roof	Volume and load reduction											
Porous Pavement	Volume and load reduction											
Infiltration Basin	Volume and load reduction											

Note: Refer to Table 4-1 for explanation of abbreviations

Table 4-6
Summary of Number of Data Points and Percent Non-Detects for Best Management Practice Effluent Concentration Data from the International Best Management Practice Database (California Data Only)

BMP	Quantity	TSS	TP	DP	NH3	TKN	DCu	TCu	TPb	DZn	TZn	FC
Wetland Basins/Retention Ponds (combined)	Count (N)	65	67	8	47	69	59	76	72	60	76	32
	%ND	3%	0%	0%	15%	0%	3%	1%	3%	2%	1%	0%
	N Studies	4	5	1	4	5	4	5	5	4	5	4
Retention Ponds	Count (N)	65	60	8	34	61	51	68	64	52	68	24
	%ND	3%	0%	0%	0%	0%	0%	0%	2%	0%	1%	0%
	N Studies	4	4	1	3	4	3	4	4	3	4	3
Extended Detention Basins	Count (N)	56	56	32	--	55	55	55	56	56	55	24
	%ND	0%	0%	0%	--	0%	0%	0%	0%	0%	0%	0%
	N Studies	4	4	4	--	4	4	4	4	4	4	4
Manufactured Devices (Hydrodymanic Separators & Others)	Count (N)	172	115	55	--	116	133	122	122	133	122	63
	%ND	5%	3%	5%	--	0%	7%	0%	0%	3%	0%	30%
	N Studies	12	9	8	--	9	10	9	9	10	9	3
Media (Sand) Filters	Count (N)	135	135	44	41	134	134	134	134	133	134	55
	%ND	18%	16%	9%	51%	6%	8%	3%	22%	26%	17%	13%
	N Studies	8	8	6	3	8	8	8	8	8	8	7
Bioretention	No California-Specific Data Available											

Notes: N = Number of or total count, ND = non-detect. Refer to Table 4-1 for explanation of abbreviations

Table 4-7
International Best Management Practice Database Arithmetic Mean Estimates of Best Management Practice Effluent Concentrations (California Data Only)

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Retention Pond (with Extended Detention)	170	0.479	0.332	0.477	2.27	1.57	4.85	10.4	4.38	21.5	41.2	2,980
Constructed Wetland / Retention Pond (without Extended Detention)	170	0.46	0.332	0.375	1.99	1.57	4.82	10.5	4.39	24.6	46.3	2,350
Dry Extended Detention Basin	47.8	0.316	0.135	--	1.01	1.94	13.2	24.6	26.6	62.6	121	5,700
Manufactured Devices	44.8	0.157	0.083	--	1.1	2.23	12.3	17.7	11.1	114	178	9,410
Media (Sand) Filter	11.7	0.161	0.152	0.47	0.829	1.18	5.46	8.13	1.99	20.3	30.5	2,260
Sub-surface Flow Wetland	11.7	0.161	0.083	0.47	0.829	1.18	4.85	8.13	1.99	20.3	41.2	PR=90%
Treatment Plant	2.0	0.00	0.00	0.00	0.27	0.01	1.0	1.0	4.4	5.0	5.0	2
Vegetated Swale (Bioswale)	47	0.564	0.51	--	1.31	2.06	12	18.6	30	46.3	76.5	16,400
Bioretention	No California-Specific Data Available											

Notes: PR= percent removal; sub-surface flow wetlands are not well represented by categories in the BMP database. A PR of 90 percent (1 log removal) was conservatively estimated for fecal coliform based on review of various SSF wetland studies. Refer to Table 4-1 for explanation of abbreviations

Table 4-8
International Best Management Practice Database Arithmetic Standard Deviations of Best Management Practice Effluent Concentrations (California Data Only)

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Wetpond (with Extended Detention)	229	0.54	0.456	0.434	4.48	0.919	5.07	10.5	4.59	17	40.6	6,380
Constructed Wetland / Wetpond (without Extended Detention)	229	0.515	0.456	0.407	4.1	0.901	4.83	10.1	4.41	20.9	44.2	5,640
Dry Extended Detention Basin	43.5	0.198	0.106	--	0.738	1.37	6.7	13.9	24.7	42.4	72.1	17,800
Hydrodynamic Separator	75.6	0.126	0.088	--	1.41	2.68	11.3	15.7	16.7	165	219	30,300
Media Filter	25.5	0.201	0.228	1.04	0.722	1.66	5.53	8.8	2.77	26	36	7,250
Sub-surface Flow Wetland	25.5	0.126	0.088	0.407	0.722	0.901	4.83	8.8	2.77	20.9	36	5,640
Treatment Plant	2	0.003	0.003	0.006	0.552	0.03	3	3	10.97	15	15	1.00E+00
Vegetated Swale (Bioswale)	40	0.584	0.614	--	2.61	1.38	7.38	11.9	34.3	44.4	52.8	43,500
Bioretention	No California-Specific Data Available											

Note: Refer to Table 4-1 for explanation of abbreviations

Table 4-9
International Best Management Practice Database Arithmetic Irreducible of Best Management Practice Effluent Concentrations (California Data Only)

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Wetpond (with Extended Detention)	416	0.108	0.709	1.17	0.093	0.61	1.75	3.4	0.403	3.3	10	33
Constructed Wetland / Wetpond (without Extended Detention)	416	0.116	0.709	0.0602	0.099	0.604	1.68	3.4	0.398	3.3	12.5	21
Dry Extended Detention Basin	16.5	0.1	0.286	--	0.308	0.824	24.2	10.4	7.55	123	46	300
Hydrodynamic Separator	2.0	0.0488	0.186	--	2.14	0.765	2.61	3.07	1.34	246	24.9	0.836
Media Filter	1.0	0.018	0.307	0.00686	0.2	0.16	0.764	1.2	0.178	1.21	2.3	0.876
Sub-surface Flow Wetland	1.0	0.018	0.186	0.007	0.093	0.16	0.764	1.2	0.178	1.21	2.3	0.876
Treatment Plant	0.5	0.001	0.001	0.001	0.008	0.001	0.1	0.1	0.255	0.5	0.5	1
Vegetated Swale (Bioswale)	12.9	0.189	0.14	--	0.38	3.64	4.48	8.56	5.53	20.4	28.9	50
Bioretention	No California-Specific Data Available											

Note: Refer to Table 4-1 for explanation of abbreviations

5 PROCESS FOR IDENTIFYING REGIONAL PROJECTS

The EWMP process emphasizes identifying regional EWMP projects, including BMPs that are able to capture the 85th percentile, 24-hour storm or regional EWMP projects. These regional projects include collaboration among Permittees and other partners on multi-benefit regional projects that, wherever feasible, retain all non-storm water runoff and all storm water runoff from the 85th percentile, 24-hour storm event for the drainage areas tributary to the projects, while also achieving other benefits such as flood control or water supply. This section presents the method that will be used to identify the potential regional projects during the EWMP process. The preliminary list of potential regional projects will be developed for the EWMP based on a review of existing watershed planning documents, including Total Maximum Daily Load (TMDL) Implementation Plans, Integrated Regional Water Management Plans, and other planning documents provided by the SMB EWMP Group. Along with this preliminary list, additional regional projects may be identified and considered for further evaluation. The process to identify additional regional projects and evaluate regional projects is illustrated schematically in **Figure5-1**. The steps enclosed by the solid black boundaries will occur first and then move to the right hand side of the schematic.

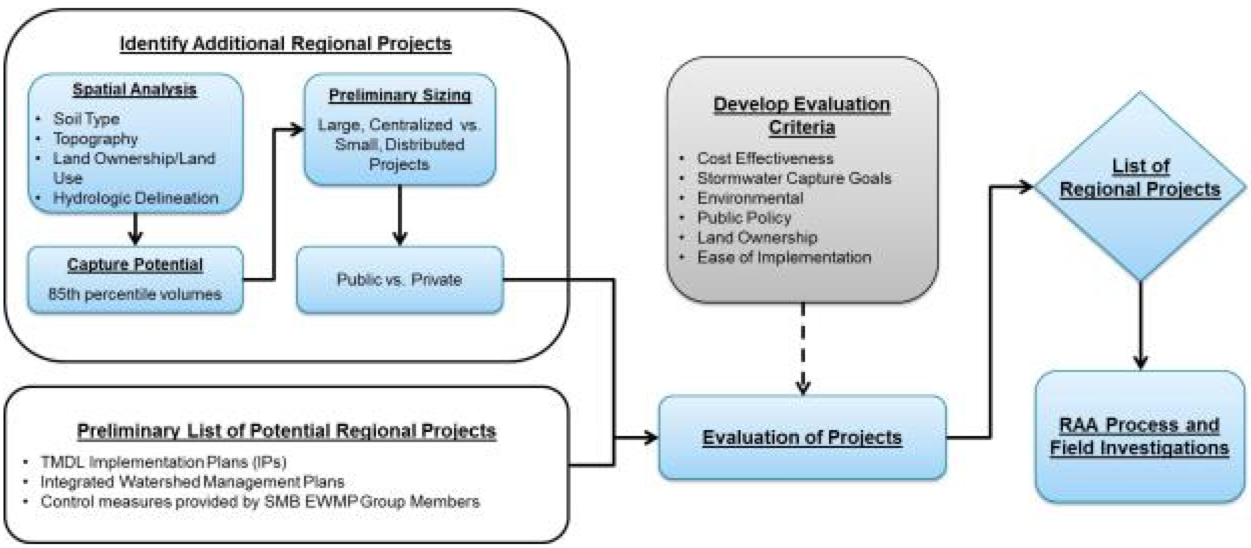


Figure 5-1
Process for Evaluating Regional EWMP Projects

5.1 Identification of Additional Regional Projects

Additional regional projects will be identified using a detailed spatial analysis, beginning with an initial spatial analysis of fatal flaws, and culminating with an identification of parcels potentially suitable for regional projects.

5.1.1 Initial Spatial Analysis

Initially, a preliminary screening will identify locations within the SMB EWMP Group area that can be eliminated from consideration because they are clearly unsuitable for the siting of regional projects. Potential fatal flaws include adverse conditions related to:

- **Soil Type.** Surface soils such as bedrock materials, clay, or other relatively impermeable substrate will prohibit the infiltration of storm water. Locations where these conditions exist will be considered less preferable during the initial screening for projects involving infiltration. However, capture or treatment for release and/or reuse may still be possible in these locations.
- **Topography.** Locations with slopes greater than 25 percent will be eliminated from further consideration because of the difficulty in constructing facilities in terrain with high relief. Additionally, areas in the headwaters of the watershed will be considered less preferable because of the paucity of stormwater runoff in these areas.
- **Unsuitable Land Ownership and/or Land Use Designations.** Land ownership and/or prior designation of land use of areas within the SMB EWMP jurisdictional areas that would prohibit regional projects will be considered less preferable. Areas that are owned by federal or state governments will be considered less preferable because of the difficulty of permitting and maintaining projects in these areas. Other considerations will include protected open spaces or wilderness areas which are less suitable for locating regional projects.

This initial spatial screening will result in identification of areas that may have the potential to meet the 85th percentile, 24-hour storm event capture volume requirement. These areas may be considered for further evaluation as potential regional EWMP project locations.

5.1.2 Capture Potential and Preliminary Sizing

The evaluation of capture potential is related to the sizing of projects necessary to capture the required volume of water at selected locations along storm water flow paths within the jurisdictional areas. Obviously, a few centralized locations at lower elevations in the watershed will require larger acreage and capture capacity than numerous distributed regional facilities located higher in the watershed. The intent of the capture potential analysis is to begin to frame the practicality of a few centralized projects and evaluate the practical requirement for a larger number of more distributed regional projects. Using typical infiltration rates, the size of a potential project can be evaluated if the volume of water to be captured is known. The next step in the progressive spatial analysis is to perform preliminary sizing of required facilities at key locations in the watershed in order to provide information as to the practicality of larger centralized projects.

5.1.3 Analysis of Specific Project Locations

Evaluation of specific parcels that may be suitable for additional regional project will begin with identification of specific parcels that are publically owned (i.e., parks, schools, flood control facilities, or other publicly-owned open spaces which may meet the area requirements identified in the evaluation of capture potential). If the number of publicly-owned parcels is not sufficient to meet anticipated capture potential, then privately-owned parcels with large open spaces such as parking lots will be considered.

Based on this analysis of specific project locations, a list of additional regional projects will be generated, which in combination, will have the potential to capture the 85th percentile, 24-hour storm event for the drainage area tributary to these locations. Information related to the projects will include the parcel location, parcel size, current ownership, and necessary infiltration capacity.

The list of additional projects generated as a result of this process will then be evaluated based on criteria developed by the MWH Team with input from SMB EWMP Group.

5.2 Evaluation Criteria Development

The list of potential and additional regional projects will be evaluated based on criteria developed with the input from SMB EWMP Group in order to determine the projects best suited for Regional EWMP Projects and achieving additional multi-benefit uses. **Table 5-1**identifies potential categories for evaluation criteria to prioritize projects and their ability to meet MS4 Permit requirements and SMB EWMP Group goals. These categories and considerations will be refined based on input from the SMB EWMP Group.

Table 5-1
Regional Project Evaluation Criteria

Criteria Category	Considerations
Cost Effectiveness	Life Cycle Cost Capital Cost Operations and Maintenance Cost Funding Options (Grants, State Revolving Fund, other funding)
Stormwater Capture Goals	Capacity or Volume of Water Captured Water Quality Groundwater Recharge/Infiltration Capacity Geographical Location
Environmental	Environmental Constraints Reduced Energy Consumption Consumption of Other Resources Multi-use Benefits
Public Policy Institutional Issues	Political Constraints Education/Outreach Political Support Partnerships
Land Ownership	Public vs. Private Land Acquisition Impediments
Ease of Implementation	Permitting Schedules (short term vs. long term) Constructability Site Accessibility

5.3 Ranking Potential Regional Projects

The list of potential and additional regional projects will be ranked in accordance with the evaluation criteria described previously and refined with input from the SMB EWMP Group. Ranking input will be collected through a survey that will be developed with input from the SMB EWMP Group and a summary of the results will be distributed by the MWH Team. Initially, ranking by category will be relatively simple, using qualitative weighting descriptions such as “favorable”, “moderately favorable”, and “not favorable”. Upon completion of the initial screening process and suitability analysis, aerials of each parcel were observed to further investigate each site. Each site was then given a ranking from 1 to 4. A ranking of 1 denoted no constraints and a high preference, and all parcels within the same rank were considered to be equal. The final ranking list was evaluated and discussed with the SMB EWMP Group for further analysis and parcel selection to be modeled within the RAA.

6 INSTITUTIONAL BMPS AND PROCESS FOR CUSTOMIZATION OF MINIMUM CONTROL MEASURES

The Permit requires the implementation of Minimum Control Measures (MCMs) in Parts VI.D.4 through VI.D.10. These MCMs are similar to the programs required under the previous MS4 Permit (Order No. 01-182).

Although the previous MS4 Permit required implementation of MCMs, some of the key modifications introduced by the current MS4 Permit related to MCMs include:

- The Permit calls for more outreach and education as part of the Public Information and Participation Program (PIPP). Permittees, for example, will be required to maintain a website with stormwater-related educational materials.
- Permittees are expected to record additional information on industrial and commercial facilities within their jurisdiction as part of their Industrial/Commercial Facilities Program. For example, industrial/commercial facilities records will need to list receiving waters for which each respective facility is tributary to.
- The Permit provides more detailed criteria on BMP sizing and specification for use in the Permittees' Planning and Land Development Program, formerly the Development Planning Program, and calls for annual reporting of implemented mitigation projects.
- An Erosion and Sediment Control Plan (ESCP), which includes elements of a Storm Water Pollution Prevention Plan (SWPPP), replaces the Local SWPPP (L-SWPPP) as a required document for construction activities meeting certain criteria as a prerequisite to building/grading permit issuance.
- The Permit also requires Permittees to use an electronic tracking system to track construction activities within their jurisdiction and mandates slightly more aggressive inspection schedules.
- The Public Agency Activities Program remains largely unchanged with the exception of requiring Permittees to inventory existing developments for BMP retrofitting opportunities.

A comprehensive comparison between program requirements of the previous and current MS4 Permit is summarized in Table. Permittee activities under the Storm Water Management Program are summarized in the Los Angeles County Unified Annual Stormwater Reports; the report for the most recent reporting year is available at http://ladpw.org/wmd/npdesrsa/annualreport/index.cfm.

Table 6-1
Comparison of Storm Water Management Program MCMs

Program Element	Activity	Previous Permit (Order No. 01-182)	Current Permit (Order No. R4-2012-0175)
Public Information and Participation Program	Public Education Program - advisory committee meeting (once per year)	x	
	"No Dumping" message on storm drain inlets (by 2/2/2004)	x	
	Reporting hotline for the public (e.g., 888-CLEAN-LA)	x	X
	Outreach and Education	x	X
	Make reporting info available to public	x	X
	Public service announcements, advertising, and media relations	x	X
	Public education materials - proper handling	x	X
	Public education materials - activity specific	x	X
	Educational activities and countywide events	x	X
	Quarterly public outreach strategy meetings (by 5/1/2002)	x	
	Constituent-specific outreach information made available to public	x	X
	Business Assistance Program	x	
	Educate and inform corporate managers about stormwater regulations	x	
	Maintain storm water websites		X
	Provide education materials to schools (50 percent of all K-12 children every two years)	x	X
	Provide principle permittee with contact information for staff responsible for storm water public educational activities (by 4/1/2002)	x	X
	Principal permittee shall develop a strategy to measure the effectiveness of in-school education programs	x	
	Principle permittee shall develop a behavioral change assessment strategy (by 5/1/2002)	x	
	Educate and involve ethnic communities and businesses (by 2/3/2003)	x	X
	Reporting hotline for the public (e.g., 888-CLEAN-LA)	x	X
Industrial/Commercial Facilities Program Industrial/Commercial Facilities Program	Track critical sources – restaurants	x	X
	Track critical sources - automotive service facilities	x	X
	Track critical sources – RGOs	x	X
	Track critical sources - nurseries and nursery centers		X
	Track critical sources – USEPA Phase I facilities	x	X
	Track critical sources - other federally-mandated facilities [40 Code of Federal Regulations (CFR) 122.26(d)(2)(iv)(C)]	x	X
	Track critical sources - other commercial/industrial facilities that Permittee determines may contribute substantial constituent load to MS4		X
	Facility information - name of facility	x	X
	Facility information - contact information of owner/operator	name only	X
	Facility information - address	x	X
	Facility information –North American Industry Classification System (NAICS) code		X
	Facility information –Standard Industrial Classification (SIC) code	x	X
	Facility information - narrative description of the activities performed and/or principal products produced	x	X
	Facility information - status of exposure of materials to storm water		X
	Facility information - name of receiving water		X
	Facility information - ID whether tributary to 303(d) listed water and generates constituents for which water is impaired		X
	Facility information - NPDES/general industrial permit status	x	X
	Facility information - No Exposure Certification status		X
	Update inventory of critical sources annually	x	X
	Business Assistance Program	optional	X
	Notify inventoried industrial/commercial sites on BMP requirement		once in 5 years
	Inspect critical commercial sources (restaurants, automotive service facilities, retail gasoline outlets and automotive dealerships)	twice in 5 years	twice in 5 years
	Inspect critical industrial sources (phase 1 facilities and federally-mandated facilities)	twice in 5 years[1]	twice in 5 years[2]
	Verify No Exposure Certifications of applicable facilities		X
	Verify Waste Discharge Identification (WDID) Number of applicable facilities	x	X
	Source control BMPs	x	X
	Provisions for Significant Ecological Areas (SEAs) (Environmentally Sensitive Areas (ESAs)	x[3]	X
	Progressive enforcement of compliance with stormwater requirements	x	X
	Interagency coordination	x	
Planning and Land Development Program	Peak flow control (post-development stormwater runoff rates, velocities, and duration)	x	x[4]
	Hydromodification Control Plan	in lieu of countywide peak flow control	
	SUSMP (by 3/3/03)	x	
	Volumetric treatment control (SWQDv) BMPs	x	X
	Flow-based treatment control BMPs	x	X
	Require implementation of post-construction Planning Priority Projects as treatment controls to mitigate storm water pollution (by 3/10/2003)	x	X
	Require verification of maintenance provisions for BMPs	x	X
	California Environmental Quality Act process update to include consideration of potential stormwater quality impacts	x	
	General Plan Update to include stormwater quality and quantity management considerations and policies	x	
	Targeted employee training of development planning employees	x	
	Bioretention and biofiltration systems		X
	SUSMP guidance document	x	
	Annual reporting of mitigation project descriptions		X
Development Construction Program	Erosion control BMPs	x	X
	Sediment control BMPs	x	X
	Non-storm water containment on project site	x	X
	Waste containment on project site	x	X
	Require preparation of a Local SWPPP for approval of permitted sites	x	X
	Inspect construction sites on as-needed basis		X

Program Element	Activity	Previous Permit (Order No. 01-182)	Current Permit (Order No. R4-2012-0175)
	Inspect construction sites equal to or greater than one acre	once during wet season	once every two weeks[5], monthly
	Electronic tracking system (database and/or Geographic Information System)		x
	Required documents prior to issuance of building/grading permit	L-SWPPP	ESCP/SWPPP
	Implement technical BMP standards		x
	Progressive enforcement	x	x
	Permittee staff training	x	x
Public Agency Activities Program	Public construction activities management	x	x
	Public facility inventory		x
	Inventory of existing development for retrofitting opportunities		x
	Public facility and activity management	x	x
	Vehicle maintenance, material storage facilities, corporation yard management	x	x
	Landscape, park, and recreational facilities management	x	x
	Storm drain operation and maintenance	x	x
	Streets, roads, and parking facilities maintenance	x	x
	Parking facilities management	x	x
	Emergency procedures	x	x
	Alternative treatment control BMPs feasibility study	x	
	Municipal employee and contractor training		x
	Sewage system maintenance, overflow, and spill prevention	x	
Illicit Connection/Illicit Discharge (IC/ID) Elimination Program	Implementation program	x	x
	MS4 Tracking (mapping) of permitted connections and illicit connections and discharges	x	x
	Procedures for conducting source investigations for IC/IDs	x	x
	Procedures for eliminating IC/IDs	x	x
	Procedures for public reporting of ID		x
	IC/ID response plan	x	x
	IC/IDs education and training for staff	x	x

1 Tier 2 facilities may be inspected less frequently if they meet certain criteria
2 Subject to change based on approved EWMP strategy
3 For environmentally sensitive areas and impaired waters
4 Maintain pre-project runoff flow rates via hydrologic control measures
5 Sites of threat to water quality or discharging to impaired water; frequency dependent on chance of rainfall

6.1 Compile Existing Minimum Control Measures

The Permit requires the continuation of existing MCMs until the EWMP is approved by the Regional Board. The existing MCMs, much like those proposed in the Permit, comprise six categories. A brief description of each Program MCM and the tasks associated with each are summarized below. The implementation summaries of the Program MCM tasks identified are available in the Unified Annual Stormwater Report published by the Los Angeles County Department of Public Works.

6.1.1 Public Information and Participation Program

The objectives of the PIPP are to measurably increase public knowledge, change waste disposal and runoff pollution generation behavior, and involve and engage target populations in stormwater pollution mitigation. Examples of existing MCM tasks required until the EWMP is approved and additional MCMs to be implemented post-approval include, but are not limited to, the following:

Existing MCMs (Order No. 01-182):

- Implementation of the PIPP program
- Convene an Advisory Committee
- Mark storm drain inlets with "No Dumping" message
- Maintain the 888-CLEAN-LA hotline
- Provide a list of reporting contacts to public through a website
- Media campaign for SWPPP
- Develop a strategy to educate ethnic communities about SWPPP
- Enhance outreach for proper disposal of cigarette butts
- Conduct educational activities within jurisdiction and participate in county-wide events
- Organize Public Outreach Strategy meetings quarterly
- Conduct Media Outreach
- Distribute SWPPP information to K-12 schools
- Coordinate and provide contact information for public education activities
- Develop a strategy to measure effectiveness of in-school programs
- Behavioral change assessment strategy towards SWPPP
- Coordinate watershed-specific pollution prevention outreach programs
- Corporate Outreach Program to target retail gas outlets and restaurant chains
- Coordinate an SWPPP program for a Business Assistance Program
- Develop a strategy to educate communities with horse stables

Additional MCMs (Order No. R4-2012-0175):

- Develop and maintain website that provides storm water pollution prevention information

6.1.2 Industrial/Commercial Facilities Program

The goal of the Industrial/Commercial Facilities Program is to track, inspect, and ensure compliance at industrial and commercial facilities that are critical sources of constituents in stormwater. Examples of existing MCM tasks required until the EWMP is approved and additional MCMs to be implemented post-approval include, but are not limited to, the following:

Existing MCMs (Order No. 01-182):

- Maintain a list of industrial/commercial facilities to be inspected
- Inspect/visit industrial/commercial facilities appropriately

- Initiate progressive enforcement for facilities failing to implement BMPs
- Inspect restaurants twice during Permit cycle

Additional MCMs (Order No. R4-2012-0175):

- Track any additional critical sources deemed a substantial contributor of constituent load to MS4
- Obtain facility information including the status of exposure of materials to storm water, name of receiving water and whether tributary and its constituents are listed
- Determine and verify No Exposure Certification status for any applicable facilities
- Notify inventoried industrial or commercial sites on BMP requirement

6.1.3 Development Planning Program

The Development Planning Program implements a set of requirements for development and redevelopment projects to minimize impacts from stormwater and urban runoff, maximize amount of pervious surfaces, minimize quantity of stormwater directed to impervious surfaces and the MS4, minimize parking lot pollution through BMPs, and reduce stormwater constituent loads in general. Examples of existing MCM tasks required until the EWMP is approved and additional MCMs to be implemented post-approval include, but are not limited to, the following:

Existing MCMs (Order No. 01-182):

- Implement a Development Planning Program that requires the SUSMP
- Develop peak flow control criteria
- Amend codes and ordinances to give legal effect to SUSMP changes
- Implement revised SUSMP
- Submit an Environmentally Sensitive Areas (ESAs)[1] delineation map to the Regional Board
- Implement SUSMP requirements for industrial/commercial projects greater than one acre
- Update California Environmental Quality Act (CEQA) guidelines to include specific stormwater related issues
- Update general plan to include specific stormwater related issues
- Train targeted employees in permit requirements for development planning
- Develop and make SUSMP guidelines available to the developer
- Develop a technical manual for the siting and design of BMPs

Additional MCMs (Order No. R4-2012-0175):

- Develop usage of bioretention and biofiltration systems
- Annually report mitigation project descriptions

[1] From Order No. 01-182: "Environmentally Sensitive Areas (ESAs)" means an area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments (California Public Resources Code § 30107.5). Areas subject to storm water mitigation requirements are: areas designated as Significant Ecological Areas by the County of ·Los Angeles (*Los Angeles County Significant Areas Study, Los Angeles County Department of Regional Planning (1976)* and amendments); an area designated as a Significant Natural Area by the California Department of Fish and Game's Significant Natural Areas Program, provided that area has been field verified by the Department of Fish and Game; an area listed in the Basin Plan as supporting the "Rare, Threatened, or Endangered Species (RARE)" beneficial use; and an area identified by a Permittee as environmentally sensitive.

6.1.4 Development Construction Program

Similar to the Development Planning Program, the Development Construction Program aims to control stormwater pollution from active construction sites. This program is implemented through sediment control measures, retention of construction-related materials and wastes, containment of non-stormwater runoff from washing and other activity, and erosion/slope controls. Examples of existing MCM tasks required until the EWMP is approved and additional MCMs to be implemented post-approval include, but are not limited to, the following:

Existing MCMs (Order No. 01-182):

- Implement a Development Construction Program
- Require proof of a Waste Discharger Identification (WDID) Number prior to filing Notice of Intent
- Require proof of an Notice of Intent and a copy of a Stormwater Pollution Prevention Plan (SWPPP) for a transfer of ownership
- Track the number of issued building and grading permits
- Refer General Construction Activities Stormwater Permit (GCASP) violations to the Regional Board
- Train targeted employees in permit requirements for Development Construction

Additional MCMs (Order No. R4-2012-0175):

- Inspect construction sites on an as-needed basis and report number and type of violations incurred, if any
- Implement electronic tracking system
- Implement technical BMP standards

6.1.5 Public Agency Activities Program

The activities under the Public Agency Activities Program include sewage system maintenance and overflow/spill prevention, public yards management, streets and roads maintenance, storm drain operation and management, emergency procedures, and other essential Permittee activities. Examples of existing MCM tasks required until the EWMP is approved and additional MCMs to be implemented post-approval include, but are not limited to, the following:

Existing MCMs (Order No. 01-182):

- Implement a sewer overflow prevention and response program
- Implement Development Planning Program at Permitee-owned construction projects
- Implement Development Construction Program at Permitee-owned construction projects
- Develop, if needed, and implement SWPPPs for field facilities
- Equipment wash areas with a clarifier, pre-treatment device, or be connected to sewer
- Store pesticides/herbicides/fertilizers indoors and apply only in accordance
- Designate catch basins as priority A, B, or C
- Ensure that catch basins are cleaned appropriately
- Place temporary screens on catch basins prior to special events or cleanout immediately afterwards
- Place and maintain trash receptacles at all transit stops with shelters
- Inspect the legibility of catch basins stencils and re-label within 180 days if necessary
- Visually monitor and clean all open channels annually for debris

- Designate curbed streets as priority A, B, or C based on liter accumulation
- Recover saw cutting waste and dispose it offsite
- Train targeted employees in Permit requirements for Public Agency Activities
- Inspect and clean Permittee-owned parking lots a minimum of once per month, or twice per month, if needed
- Conduct a dry weather diversion study and create a priority list of drains for diversion

Additional MCMs (Order No. R4-2012-0175):

- Develop and maintain a public facility inventory
- Develop an inventory of existing development for retrofitting opportunities
- Implement municipal employee and contractor training

6.1.6 Illicit Connections and Illicit Discharges Elimination Program

The final program under the existing MCMs is the Illicit Connections (ICs) and Illicit Discharges (IDs) Elimination Program. The program requires Permittees to document, track, and report all cases of IC/ID and implement a response procedure and methods for public reporting. Examples of existing MCM tasks required until the EWMP is approved and additional MCMs to be implemented post-approval include, but are not limited to, the following:

Existing MCMs (Order No. 01-182):

- Develop an implementation program which specifies how revisions of the IC/ID Stormwater Quality Management Plan (SQMP) are implemented
- Create a database for permitted storm drain connections and map IC/ID
- Perform IC/ID trend analysis
- Train targeted employees in the Permit requirements for IC/ID
- Field screen the storm drain system for ICs in open channels
- Field screen the storm drain system for ICs in underground storm drains in priority areas
- Field screen the storm drain system for ICs in underground storm drains larger than 36-inch diameter
- Review all permitted connections to the storm drain system for compliance
- Investigate ICs within 21 days of discovery
- Terminate ICs within 180 days of confirmation
- Respond to IDs within one business day of discovery
- Investigate IDs as soon as practicable

Additional MCMs (Order No. R4-2012-0175):

- Develop procedures for public reporting of IDs

6.2 Identify Potential for Customization of MCMs

In lieu of the requirements of Parts VI.D.4 through VI.D.10 of the Permit, the SMB EWMP Group may implement customized MCMs within each of the general categories. The motivation for considering customization is made more apparent in a response to comments made by the LA Permit Group that the Permit should establish criteria that will be used to support any customization of MCMs; the Regional Board responded with the following:

The Order specifies that at a minimum, Permittees' programs shall be consistent with 40 CFR section 122.26(d)(2)(iv)(A)-(D). In response to comments that the Order is overly prescriptive, specifying criteria could restrict customization within these categories of minimum control measures. The criterion to allow customization is based on showing equivalent effectiveness, for example, a municipality who has identified a group of facilities within their jurisdiction as the largest source of constituents could be allowed to focus their inspection efforts on controlling the constituents from this subset of facilities.
(http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/StormSewer/CommentLetters/E_MCM%20Matrix%2010-26-12%20Final.pdf)

The opportunity for customization may benefit the SMB EWMP Group by allowing the SMB EWMP Group to assess the effectiveness of their current programs and to modify their programs to better serve local conditions and objectives. If an effectiveness assessment is conducted on a specific MCM activity and it can be reasonably shown that customization of the MCM would result in equal or improved effectiveness on attitudes or knowledge, behavior or implementation, load reduction, or water quality, then a defensible recommendation for modification of that activity can be made, resulting in greater resources freed up for more effective activities. **Figure 6-1** shows the process for identifying and implementing MCM customization.

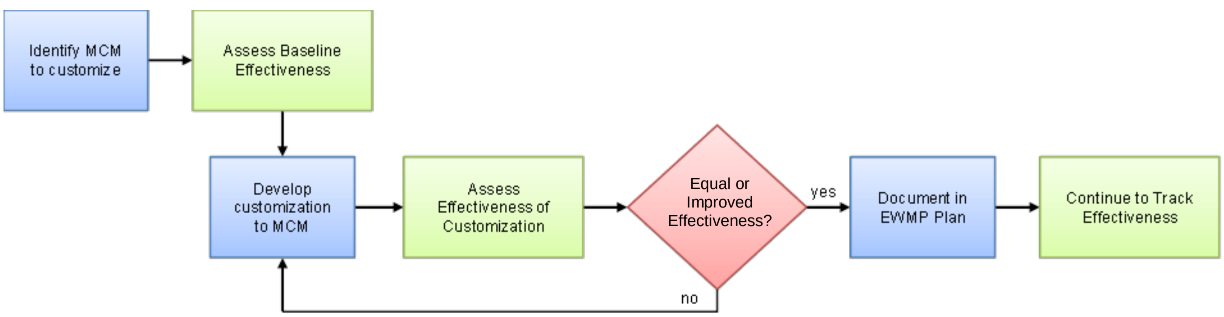
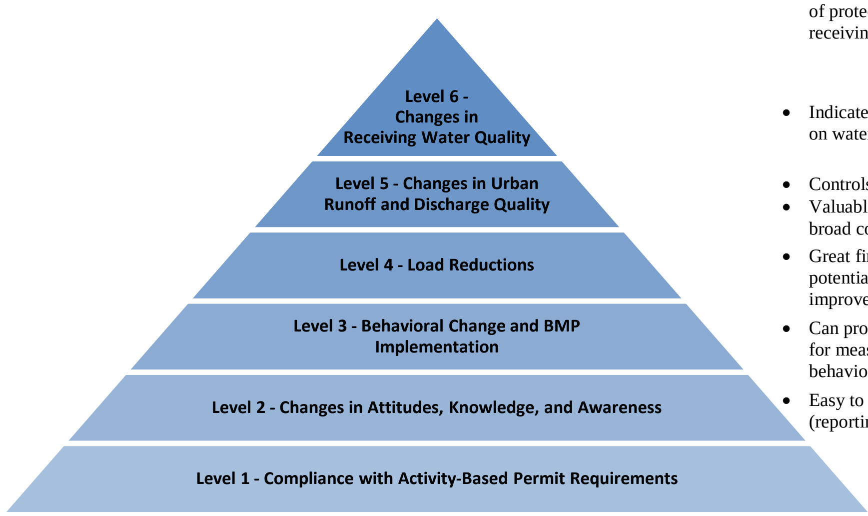


Figure 6-1
Process for MCM customization

The first step in identifying potential customization opportunities for MCMs is the development of a framework to assess the effectiveness of each MCM in its current implementation. For each MCM that can be assessed in this manner, recommendations for customizations can be developed with reasonable assurance of impact to effectiveness.

The California Stormwater Quality Association (CASQA) provides such a framework for the effectiveness assessment of Storm Water Management Programs. The outcome is a hierarchy that categorizes the classification of outcome types (levels) that will allow MCMs to be placed into one or more categories for subsequent outcome assessment. The outcome levels, Level 1 through Level 6, are summarized in **Figure 6-2**.

Benefits **Limitations**



• Achieves ultimate goal of protection of receiving water	• Very difficult to determine for specific MCMs • Sees influence from non-MS4 sources
• Indicates direct impact on water quality	• Requires substantial monitoring
• Controls the source • Valuable for making broad comparisons	• Requires development of a baseline to estimate
• Great first indicator of potential water quality improvement	• Requires observation and inspection
• Can provide the basis for measuring behavioral change	• Many different factors influence levels of public involvement
• Easy to determine (reporting)	• Does not indicate direct impacts

General Classifica

6.2.1 MCMs and Outcome Levels

The outcome types in this effectiveness assessment framework are inherently interrelated. The Permit's storm water management program is, by design, intended to improve the water quality in receiving waters. The means by which this goal is intended to be met is through the implementation of compliance measures by the SMB EWMP Group. Compliance with these activity-based measures results in Level 1 outcomes. Assessments of these activities can provide further deeper understanding of the outcomes they have. Ideally, each activity will contribute to the improvement at the Level 6 receiving water quality level; however, tracking effectiveness at this level is difficult.

A summary of the activities of the SMB EWMP Group's MCMs is included in the 2011-12 Annual Stormwater Report (Los Angeles County Department of Public Works, 2012). In addition to the standard reporting, SMB EWMP Group answered a list of questions in an Assessment of Program Effectiveness. This summary includes largely responses that may be considered as Level 1 outcomes (compliance) with Level 2, Level 3, and Level 4 outcomes for select MCMs. Several obstacles inhibit the ability to achieve a Level 5 or Level 6 assessment, including:

- Available Budget
- Lack of Comprehensive Monitoring
- Timing of MCM Activities And Corresponding Runoff Events
- General Complexity of the Hydrology And Conveyance

All SMB EWMP group members were in compliance with the Permit during the 2011-12 reporting year (Level 1 outcome). **Table 6-2**summarizes effectiveness assessment metrics and potential outcomes associated with select MCMs within each Program Element of the Storm Water Management Program. The following is a brief description of the Program MCMs and outcome levels that can be achieved through the effectiveness assessment framework described.

Table 6-2
Effectiveness Assessment Measures for Various Activities under the Storm Water Management Program

Program MCM	Permittee Activity	Possible Assessment Metric	Outcome Level
Public Information and Participation Program	Advertising / media campaigns (e.g., Used Oil / Used Oil Filter Program)	Year-over-year change in no. of impressions	L2
		Survey results	L2, L3
	Educational programs (e.g., Generation Earth, Environmental Defenders, public workshops)	Year-over-year change in attendance	L2
		Quiz results	L2, L3
	E-Waste collection events	Amount of Household Hazardous Waste/E-Waste	L3, L4
	888-CLEAN-LA hotline	Change in no. of calls	L2
	www.888CleanLA.com	No. of unique visitors / document downloads	L2
Industrial/Commercial Facilities Program	Website on program details	No. of unique visitors / document downloads	L2
	Electronic tracking	Inspections: change in no. of Notices of Violation (NOV) / non-compliance	L3
Planning and Land Development Program	Pre-permitting assessment	No. of developers incorporating BMPs and LID in early-stage	L3
	Annual reporting	% of stormwater capture	L3, L4
	Integrated control measures	Measure performance through planned monitoring	L5
Development Construction Program	Website on program details	Number of hits / document downloads	L2
	Electronic tracking	Inspections: change in no. of NOV / non-compliance	L3
Public Agency Activities Program	Street sweeping	Street sweeper fleet (technology)	L3
		Year-over-year change in debris collected	L3, L4
	Catch basin cleaning	Year-over-year change in trash collected	L3, L4
	Installation of trash receptacles	Observations: cleanliness of public roadways	L3
	Sanitary sewer overflow response	Monitoring results of MS4 water quality	L5
IC/ID Elimination Program	IC/ID reporting hotline	Year-over-year change in no. of calls	L2
	Termination of IC/ID	Outfall monitoring: change in water quality	L5
	Enforcement actions	Change in occurrence	L3
Other	Support for Senate Bill (SB) 346 (Brake Pad Initiative)	% of vehicles with reduced-copper-content brake pads	L4

6.2.2 Public Information and Participation Program

The PIPP is intended primarily to reach out and educate the general public, students, business owners, facility operators, city staff, and others on stormwater. This is accomplished in many ways; examples include "No Dumping" messages on storm drain inlets; public education materials; information websites; community events; reporting hotlines; and specialized awareness programs, such as the used oil program. The program elements are intended to directly impact awareness and the behavior of different target audiences (Level 2 and Level 3 outcomes). Consequently, these behavioral changes may impact constituent loads to the MS4 indirectly, but the actual Level 4 through Level 6 impact of a specific MCM in this category may be difficult to quantify.

6.2.3 Industrial/Commercial Facilities Program

Permittees are required to conduct an Industrial/Commercial Facilities Program designed to prevent IDs, reduce discharges of stormwater, and prevent industrial/commercial discharges to the MS4 from causing or contributing to receiving water quality exceedances. These facilities are tracked and inspected to ensure use of BMPs to control stormwater discharges. In addition, the program aims to contribute to the education of business owners and facility operators regarding SWPPP. The effectiveness of this program can be assessed leading to insight on how awareness (Level 2) and BMP implementation (Level 3) are affected.

6.2.4 Planning and Land Development Program

The Planning and Land Development Program involves developers early in the land development stage, with the integration of BMPs and LID controls to reduce constituent loading to the MS4 and minimize runoff intensity generated from impervious areas. Behavioral change (Level 3) can be assessed through permitting staff observations. Also, it may be possible to assess constituent load reductions (Level 4) through land developer BMP choices and water quality of runoff entering the MS4 (Level 5) if monitoring stations are considered during the planning stage of development and redevelopment.

6.2.5 Development Construction Program

Similar to the Planning and Land Development Program, the Development Construction Program establishes requirements for construction activities to eliminate illicit discharges and prevent water quality violations from stormwater discharges from the construction site. The Program establishes criteria for BMPs and controls through an Erosion and Sediment Control Plan, with elements of a SWPPP. The effectiveness of this program can be assessed through inspections to verify BMP implementation (Level 3). Level 2 awareness outcomes can be assessed through the use of a website that informs contractors on proper BMP selection and prerequisite checklists for permitting.

6.2.6 Public Agency Activities Program

Activities ranging from street sweeping, catch basin cleaning, public facility maintenance, and storm drain operation fall under the Public Agency Activities Program. These activities are essential MCMs that can also be measured for effectiveness. Level 3 through Level 5 outcomes (behavior, load reduction, MS4 water quality) can all be assessed through appropriate evaluation metrics. Impact to receiving water quality (Level 6) may also be possible to determine if appropriate monitoring is in place, with phased implementation of MCM activities to isolate performance evaluation.

6.2.7 Illicit Connections and Illicit Discharges Elimination Program

IC/IDs are controlled through the IC/ID Elimination Program and by implementing a procedure for reporting, tracking, and responding to reports of IC/IDs, as well as establishing protocols for the regular inspection of storm drains. The effectiveness of the reporting procedure can be assessed on a Level 2 (awareness) basis, and response activities can have their effectiveness determined directly through monitoring of the MS4 water quality (Level 5). A quantitative analysis of behavioral change (Level 3) as a result of enforcement actions is also achievable.

6.3 Next Steps to MCM Customization

The effectiveness assessment framework presented previously outlines the process to determine baseline MCM effectiveness, providing the foundation for customization. Specific opportunities to customize MCM activities will be proposed by the SMB EWMP Group and documented by the MWH Team. Customization and justification of MCMs will be summarized in the EWMP Plan.

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ATTACHMENT 1 DETAILED LIST OF EXISTING REGIONAL BMPS IN THE SANTA MONICA BAY EWMP GROUP

Lead Agency[4]	Data Source	BMP Category	Project Name	Purpose	Location	Latitude	Longitude	Active Date
LA	PO	Infiltration	Grand Blvd Tree Wells	7 bioretention filters to treat runoff from 6.8 acres	Intersection of Grand & Riviera	33.9881776	-118.4687948	12/1/2009[1]
LA	PO	Upgrade	Santa Monica Bay Low Flow Diversion Upgrades Pkg 1	Upgrade Marquez, Bay Club, Thorton, Venice Pavilion, and Imperial LFDs to comply with the bacteria TMDL winter dry-weather regulations	PCH, Several Locations	--	--	7/1/2010[1]
LA	PO	Upgrade	Santa Monica Bay Low Flow Diversion Upgrades Pkg 2	Upgrade Temescal Canyon LFD to comply with the bacterial TMDL winter dry -weather regulations	Temescal Canyon Park	--	--	10/1/2010[1]
LA	PO	Low Flow Diversion	Santa Monica Bay Low Flow Diversion Upgrades Pkg 3 (Phase I)	Construct a relief sewer (CIRS) to the Coastal Interceptor Sewer in order to comply with bacterial TMDL winter dry-weather regulations	201 Palisades Beach Road, Santa Monica	34.025803	-118.515767	10/1/2012[1]
LA	PO	Upgrade	Santa Monica Bay Low Flow Diversion Upgrades Pkg 4	Upgrade Santa Monica Canyon and Palisades Park LFD. Electrical upgrades and automatic control from Venice Pump Plant	Will Rogers Beach Parking Lot	--	--	4/1/2011[1]
LA	PO	Constructed Wetland	Westminster Dog Park Stormwater BMP	Modular constructed wetland (bioremediation filter) to capture and treat runoff	1203 South Main Street	33.9962144	-118.4688776	2/1/2010[1]
LA, SM	SM, LFD Info	Treatment Facility	Santa Monica Urban Runoff Recycling Facility (SMURRF)	Treatment and water recycling	1623 APPIAN WAY Santa Monica, CA 90401	34.0103282	-118.4950773	2/1/2001
LA	LFD Info	Low Flow Diversion	Thorton Avenue Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	Thornton Place/Main St./Royal Court, LA, CA 90291	33.9932438	-118.4749841	6/22/99[2]
LA	LFD Info	Low Flow Diversion	Palisades Park Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	15100 PCH, LA 90272	34.029319	-118.521824	11/28/00[2]
LA	LFD Info	Low Flow Diversion	Bay Club Drive Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	Bay Club Drive &PCH 90272	34.0395716	-118.5458028	1/24/2001
LA	LFD Info	Low Flow Diversion	Santa Monica Canyon Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	152 W. Channel, LA 90402 (near intersection of PCH & Santa Monica Canyon Channel outlet	34.0287734	-118.518082	6/10/2003
LA	LFD Info	Low Flow Diversion	Venice Pavilion (Windmar Ave Pump Station)	Diversion of flows away from the MS4 and to the sanitary sewer	Windward Ave Pump Station, LA 90291(at Main St near Venice Pavilion)	33.987949	-118.471415	6/10/2003
LA	LFD Info	Low Flow Diversion	Temescal Canyon Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	15733 PCH, LA 90272 (at Temescal Canyon Rd)	34.0358668	-118.5357291	6/23/2003
LA, LACFCD	LFD Info	Low Flow Diversion	Imperial Highway Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	7600 Imperial Hwy, Los Angeles, CA 90293	33.930846	-118.4292672	4/15/2006
LA	LFD Info	Low Flow Diversion	Marquez Avenue Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	Los Angeles, CA 90293	34.0394427	-118.5501364	6/15/2006
LA, SM, LACFCD	LFD Info	Low Flow Diversion	Pico-Kenter Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	Intersection of Pico Blvd. and Appian Way	34.0067456	-118.4914151	1/1/1993

SM	LFD Info	Low Flow Diversion	Santa Monica Pier Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	110 ft N/O Neilson Way, Santa Monica, CA 90401	34.0024963	-118.4850794	10/1/1997
LACFCD	C, LFD Info	Low Flow Diversion	Playa Del Rey Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	Culver Blvd & Pershing Dr, Playa Del Rey, CA 90045	33.9473913	-118.436635	4/15/2001
LACFCD	C, LFD Info	Low Flow Diversion	Pulga Canyon Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	16510 Pac. Coast Hwy, Los Angeles, CA 90272	34.0389472	-118.5429168	10/5/2004
LACFCD	C, LFD Info	Low Flow Diversion	North Westchester Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	8184 Vista del Mar, Playa del Rey, CA 90293	33.9456557	-118.4427907	10/5/2004
LACFCD	C, LFD Info	Low Flow Diversion	Rose Ave Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	300 Rose Ave., Venice, CA 90291	33.996484	-118.4763986	11/11/2005
LACFCD	C, LFD Info	Low Flow Diversion	Ashland Ave Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	103 Ashland Ave., Santa Monica, CA 90405	33.9993039	-118.4815545	4/15/2006
LACFCD	C, LFD Info	Low Flow Diversion	Santa Ynez Canyon Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	17310 Sunset Blvd., Pacific Palisades, CA 90272	34.0414955	-118.5534517	6/22/2006
LACFCD	C, LFD Info	Low Flow Diversion	Castlerock/Parker Canyon (Parker Mesa) Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	PCH and Coastline Dr., Los Angeles, CA 90272	34.0418807	-118.5676256	4/10/2007
SM	LFD Info	Low Flow Diversion	Montana Avenue Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	Montana Ave, Santa Monica, CA 90403	34.0222113	-118.5075161	7/31/2007
SM	LFD Info	Low Flow Diversion	Wilshire Boulevard Low Flow Diversion	Diversion of flows away from the MS4 and to the sanitary sewer	Wilshire Blvd, Santa Monica, CA 90403	34.0167743	-118.5011941	10/31/2007
LACFCD	C	Low Flow Diversion	Arena Pump Plant	Diversion of flows away from the MS4 and to the sanitary sewer	199 E. El Segundo Blvd, El Segundo, CA 90245	33.9164063	-118.4147238	6/13/2006
LACFCD	C	Low Flow Diversion	El Segundo Pump Plant	Diversion of flows away from the MS4 and to the sanitary sewer	231 Center St., El Segundo, CA 90245	33.9189103	-118.4048539	6/13/2006
LACFCD	C	Low Flow Diversion	Electric Avenue Pump Plant	Diversion of flows away from the MS4 and to the sanitary sewer	314 Brooks Ave., Venice, CA 90291	33.993062	-118.472754	4/15/2001
LACFCD	C	Low Flow Diversion	Pershing Drive, Line C	Diversion of flows away from the MS4 and to the sanitary sewer	Imperial Hwy and Pershing, Playa del Rey, CA 90045	33.9310077	-118.4291008	4/17/2006

Notes: LA = Los Angeles, SM = Santa Monica, LACFCD = Los Angeles County Flood Control District, C = County, PO = PROP O Clean Water Bond Funded Projects

[1] Scheduled completion date

[2] Construction completion date

[3] Address, Latitude, and Longitude have been provided using the available data. Locations should be verified by the SMB EWMP Group and the MWH Team should be updated as necessary

[4] Data sources contain conflicting information in regard to LACFCD and County ownership of LFDs. In this table, all LFDs with this ownership conflict have been listed with LACFCD as the lead agency. Permittees should verify this information and update the MWH Team as necessary.

ATTACHMENT 2 DETAILED LIST OF PLANNED REGIONAL BMPS IN THE SANTA MONICA BAY EWMP GROUP

Lead Agency	Data Source	BMP Category	Project Name	Purpose	Location	Latitude	Longitude	Status	Scheduled Completion
LA	PO	Detention; Treatment Facility	Penmar Water Quality Improvement Project	Capture and treat dry/wet weather runoff (Phase I); Treatment/disinfection system for stormwater to be used for landscape irrigation (Phase II)	1216 E. Rose Ave	34.0076508	-118.4560613	under construction (Phase I); planned - design stage (Phase II)	1/1/2013 (Phase I); 3/1/2015 (Phase II)
LA	PO	Low Flow Diversion	Santa Monica Bay Low Flow Diversion Upgrades Pkg 3 (Phase II)	Construct a relief sewer to comply with the bacteria TMDL winter dry-weather regulations	445 Pacific Coast Highway, Santa Monica	34.0237984	-118.511257	under construction	Winter 2015
LA	PO	Treatment Facility	Temescal Canyon Park Stormwater BMP (Phase II)	Treatment/disinfection system for stormwater to be used for landscape irrigation	15900 PCH	34.0358601	-118.5359567	planned - design stage	3/1/2015
LA	PO	Detention; Treatment Facility	Westchester Stormwater BMP	Capture and treat stormwater runoff from three existing stormdrains	Los Angeles World Airport	33.9425	-118.408056	planned - planning stage	10/1/2014
Los Angeles Conservation Corps	SMB Watershed Regional BMP Projects	Other - Ecological	Coastal Habitat Restoration	Restore three acres of coastal dune habitat along Santa Monica Bay	Santa Monica Bay	34.003053	-118.491059	unknown	--
SMB Restoration Foundation	SMB Watershed Regional BMP Projects	Other - Ecological	Oyster Stock Enhancement in Santa Monica Bay Harbor to reduce total maximum daily loads	Improve water quality, reduce pollutants, and restore ecosystem health	Santa Monica Bay	34.015246	-118.504568	unknown	--
SM	SM	Detention	Marine Park (Penmar) Project	--	--	--	--	--	--
SM	SM	Detention	Los Amigos Park Cistern	--	--	--	--	--	--
SM	SM	Infiltration	Memorial Park, Beach Parking Lot	--	--	--	--	--	--
SM	SM	Treatment Facility	Ozone Park, Los Amigos Park	--	--	--	--	--	--

Lead Agency	Data Source	BMP Category	Project Name	Purpose	Location	Latitude	Longitude	Status	Scheduled Completion
LA	PO	Detention; Treatment Facility	Penmar Water Quality Improvement Project	Capture and treat dry/wet weather runoff (Phase I); Treatment/disinfection system for stormwater to be used for landscape irrigation (Phase II)	1216 E. Rose Ave	34.0076508	-118.4560613	under construction (Phase I); planned - design stage (Phase II)	1/1/2013 (Phase I); 3/1/2015 (Phase II)

LA	PO	Low Flow Diversion	Santa Monica Bay Low Flow Diversion Upgrades Pkg 3 (Phase II)	Construct a relief sewer to comply with the bacteria TMDL winter dry-weather regulations	445 Pacific Coast Highway, Santa Monica	34.0237984	-118.511257	under construction	Winter 2015
LA	PO	Treatment Facility	Temescal Canyon Park Stormwater BMP (Phase II)	Treatment/disinfection system for stormwater to be used for landscape irrigation	15900 PCH	34.0358601	-118.5359567	planned - design stage	3/1/2015
LA	PO	Detention; Treatment Facility	Westchester Stormwater BMP	Capture and treat stormwater runoff from three existing stormdrains	Los Angeles World Airport	33.9425	-118.408056	planned - planning stage	10/1/2014
Los Angeles Conservation Corps	SMB Watershed Regional BMP Projects	Other - Ecological	Coastal Habitat Restoration	Restore three acres of coastal dune habitat along Santa Monica Bay	Santa Monica Bay	34.003053	-118.491059	unknown	--
SMB Restoration Foundation	SMB Watershed Regional BMP Projects	Other - Ecological	Oyster Stock Enhancement in a Santa Monica Bay harbor to reduce total maximum daily loads	Improve water quality, reduce pollutants, and restore ecosystem health	Santa Monica Bay	34.015246	-118.504568	unknown	--
SM	SM	Detention	Marine Park (Penmar) Project						
SM	SM	Detention	Los Amigos Park Cistern						
SM	SM	Infiltration	Memorial Park, Beach Parking Lot						
SM	SM	Treatment Facility	Ozone Park, Los Amigos Park						

Notes: LA = Los Angeles, SM = Santa Monica, PO = PROP O Clean Water Bond Funded Projects

ATTACHMENT 3 DETAILED LIST OF EXISTING DISTRIBUTED BMPS IN THE SANTA MONICA BAY EWMP GROUP

Note: this list summarizes the existing BMPs for which locations are known, 339 of which are within the Jurisdiction Groups 2 and 3 in the City of Los Angeles, and 68 within the City of Santa Monica. The remaining 1683 distributed BMPs appear to be privately owned and were not provided with sufficient information to determine their location (latitude/longitude). The ID number associated with each BMP is not a formal identifier but is intended to be a unique identifier for use by the MWH Team and the Santa Monica Bay EWMP Group.

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0001	LA	SUSMP	Flow Through	Continuous Deflection Separation	6411 W Imperial Hwy	33.931764	-118.401538	3/11/2010
D0002	LA	SUSMP	Site-Scale Detention	Dry Well	8614 Saran DR	33.959257	-118.432606	3/9/2009
D0003	LA	SUSMP	Site-Scale Detention	Detention Basin	8614 Saran DR	33.959257	-118.432606	3/9/2009
D0004	LA	SUSMP	Flow Through	Filterra - Filters	11200 S. Sepulveda	33.933843	-118.396065	10/10/2007
D0005	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	380 World WY	33.944234	-118.408304	6/7/2008
D0006	LA	SUSMP	Flow Through	Vortechnics	380 World WY	33.944234	-118.408304	6/7/2008
D0007	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	300 World WY	33.94502	-118.40568	6/7/2008
D0008	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	451 Paseo Miramar	34.04493	-118.55704	6/7/2008
D0009	LA	SUSMP	Bioretention	Planter Box	451 Paseo Miramar	34.04493	-118.55704	6/7/2008
D0010	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	1331 N Amalfi Dr	34.054287	-118.504829	8/15/2013
D0011	LA	SUSMP	Infiltration	Infiltration Trenches	1331 N Amalfi Dr	34.054287	-118.504829	8/15/2013
D0012	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	8317 S. Delgany AV	33.958519	-118.441986	3/9/2009
D0013	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	1520 N. Monaco DR	34.053051	-118.500389	4/18/2013
D0014	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	380 World WY	33.944234	-118.408304	6/7/2008
D0015	LA	SUSMP	Flow Through	HydroCartridges In-Line Filter	823 Bundy DR	34.0755	-118.4801	3/9/2009
D0016	LA	SUSMP	Bioretention	Planter Box	2421 N Arbutus DR	34.08083	-118.502861	6/7/2008
D0017	LA	SUSMP	Permeable Pavement	Porous Pavement	2421 N Arbutus DR	34.08083	-118.502861	6/7/2008
D0018	LA	SUSMP	Bioretention	Planter Box	1505 N. Umeo RD	34.05939	-118.50531	4/18/2013
D0019	SM	SUSMP	Bioretention	Planter Box	710 Pico BL	34.011686	-118.483922	3/9/2009
D0020	LA	SUSMP	Flow Through	Downspout Filter	710 Pico BL	34.011686	-118.483922	3/9/2009
D0021	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	710 Pico BL	34.011686	-118.483922	3/9/2009
D0022	LA	SUSMP	Bioretention	Slope Vegetation	1128 Hartzell ST	34.050205	-118.520416	2/12/2008
D0023	LA	SUSMP	Bioretention	Slope Vegetation	717 N. Tigertail RD	34.072937	-118.482895	3/9/2009
D0024	LA	SUSMP	Bioretention	Slope Vegetation	673 N. Via Santa Ynez RD	34.04686	-118.54908	3/11/2010
D0025	LA	SUSMP	Bioretention	Slope Vegetation	1515 N. Amalfi DR	34.057929	-118.504291	4/18/2013
D0026	LA	SUSMP	Bioretention	Slope Vegetation	12315 W. 14th Helena DR	34.05586	-118.47934	2/25/2009
D0027	LA	SUSMP	Bioretention	Slope Vegetation	506 N. Arbramar AV	34.042385	-118.535538	3/11/2010
D0028	LA	SUSMP	Bioretention	Slope Vegetation	233 AMALFI	34.031818	-118.513321	6/7/2008

[2] Dates for SUSMP data reflect the date of SUMSP clearance

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0029	LA	SUSMP	Bioretention	Slope Vegetation	482 N. Tuallitan RD	34.067474	-118.483482	6/7/2008
D0030	LA	SUSMP	Bioretention	Slope Vegetation	171 S. 3rd Anita DR	34.054626	-118.483612	8/7/2012
D0031	LA	SUSMP	Bioretention	Slope Vegetation	825 N. Amalfi DR	34.044857	-118.510406	3/9/2009
D0032	LA	SUSMP	Bioretention	Slope Vegetation	14880 W Corona Del Mar	34.029499	-118.520218	4/18/2013
D0033	LA	SUSMP	Bioretention	Slope Vegetation	1149 N Amalfi DR	34.05064	-118.507301	2/12/2008
D0034	LA	SUSMP	Bioretention	Slope Vegetation	1010 N. El Medio AV	34.051529	-118.530807	-
D0035	LA	SUSMP	Source Control	Stormceptor	380 World WY	33.944234	-118.408304	6/7/2008
D0036	LA	SUSMP	Site-Scale Detention	Dry Well	380 World WY	33.944234	-118.408304	6/7/2008
D0037	LA	SUSMP	Rainfall Harvest	Cisterns	14975 W. Corona Del Mar	34.031551	-118.522018	4/18/2013
D0038	LA	SUSMP	Rainfall Harvest	Cisterns	325 S. Saltair AV	34.056889	-118.474289	6/7/2008
D0039	LA	SUSMP	Permeable Pavement	Permeable Pavers	325 S. Saltair AV	34.056889	-118.474289	6/7/2008
D0040	LA	SUSMP	Source Control	CONTECH Catch Basin Insert	6851 W. Imperial HWY	33.931673	-118.410805	3/11/2010
D0041	LA	SUSMP	Source Control	CONTECH Catch Basin Insert	6411 W Imperial HY	33.931764	-118.401538	3/11/2010
D0042	LA	SUSMP	Source Control	Oil Water Separator	6411 W Imperial HY	33.931764	-118.401538	3/11/2010
D0043	LA	SUSMP	Flow Through	Downspout Filter	7401 World West WY	33.941645	-118.424271	3/9/2009
D0044	LA	SUSMP	Infiltration	Infiltration Trenches	7401 World West WY	33.941645	-118.424271	3/9/2009
D0045	LA	SUSMP	Site-Scale Detention	Underground Detention/ Infiltration Chamber System	7401 World West WY	33.941645	-118.424271	3/9/2009
D0046	LA	SUSMP	Flow Through	Downspout Filter	741 N. El Medio AV	34.04667	-118.53363	3/9/2009
D0047	LA	SUSMP	Source Control	Drain Pac Catch Basin Inserts	741 N. El Medio AV	34.04667	-118.53363	3/9/2009
D0048	LA	SUSMP	Bioswale	Vegetated Swale/Strip	741 N. El Medio AV	34.04667	-118.53363	3/9/2009
D0049	LA	SUSMP	Site-Scale Detention	Dry Well	14610 W Hilltree RD	34.036777	-118.515533	4/18/2013
D0050	LA	SUSMP	Site-Scale Detention	Dry Well	128 S. Granville AVE	34.063137	-118.470901	9/4/2013
D0051	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	128 S. Granville AVE	34.063137	-118.470901	9/4/2013
D0052	LA	SUSMP	Site-Scale Detention	Dry Well	240 s. Chadbourne AVE	34.052776	-118.490463	6/7/2008
D0053	LA	SUSMP	Site-Scale Detention	Dry Well	8100 Westchester PK	33.954491	-118.398582	3/9/2009
D0054	LA	SUSMP	Site-Scale Detention	Dry Well	118 S. Cliffwood	34.056595	-118.485153	2/25/2009
D0055	LA	SUSMP	Permeable Pavement	Permeable Pavers	118 S. Cliffwood	34.056595	-118.485153	2/25/2009
D0056	LA	SUSMP	Site-Scale Detention	Dry Well	1925 Mandeville Canyon Rd	34.069771	-118.496071	6/7/2008
D0057	LA	SUSMP	Site-Scale Detention	Dry Well	5950 W. Avion DR	33.955067	-118.402016	3/11/2010
D0058	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	12001 W. Chalon RD	34.085625	-118.482826	2/25/2009
D0059	LA	SUSMP	Rainfall Harvest	Cisterns	12001 W. Chalon RD	34.085625	-118.482826	2/25/2009
D0060	LA	SUSMP	Source Control	Fossil Filter Catch Basin	11751 W. Chenault St	34.05541	-118.46936	7/19/2011

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
				Insert				
D0061	LA	SUSMP	Infiltration	Infiltration Trenches	11751 W. Chenault St	34.05541	-118.46936	7/19/2011
D0062	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	289 World WY	33.94492	-118.40483	6/7/2008
D0063	LA	SUSMP	Rainfall Harvest	Green Roof	1305 Abbot Kinney BL	33.991348	-118.467903	8/15/2013
D0064	LA	SUSMP	Infiltration	Infiltration Trenches	7300 West World WY	33.941748	-118.422457	3/9/2009
D0065	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	7300 West World WY	33.941748	-118.422457	3/9/2009
D0066	LA	SUSMP	Infiltration	Infiltration Trenches	1214 N. Chautauqua BL	34.052116	-118.517914	2/25/2009
D0067	LA	SUSMP	Infiltration	Infiltration Trenches	7000 W. manchester AV	33.959684	-118.414445	3/11/2010
D0068	LA	SUSMP	Infiltration	Infiltration Trenches	10936 W. Chalon RD	34.081841	-118.480766	-
D0069	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	10936 W. Chalon RD	34.081841	-118.480766	-
D0070	LA	SUSMP	Infiltration	Infiltration Trenches	7250 W. World WY	33.941908	-118.420953	3/9/2009
D0071	LA	SUSMP	Flow Through	Stormfilter	7250 W. World WY	33.941908	-118.420953	3/9/2009
D0072	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	7250 W. World WY	33.941908	-118.420953	3/9/2009
D0073	LA	SUSMP	Infiltration	Infiltration Trenches	1600 N. San Remo Dr.	34.060257	-118.499306	2/19/2013
D0074	LA	SUSMP	Bioretention	Landscaped area	1344 Abbot Kinney BL	33.99058	-118.46669	8/15/2013
D0075	LA	SUSMP	Permeable Pavement	Permeable Pavers	1632 Abbot Kinney	33.989437	-118.463478	2/19/2013
D0076	LA	SUSMP	Bioretention	Planter Box	1632 Abbot Kinney	33.989437	-118.463478	2/19/2013
D0077	LA	SUSMP	Permeable Pavement	Permeable Pavers	1060 Vista Grande DR	34.056534	-118.550423	-
D0078	LA	SUSMP	Bioretention	Rain Garden	1060 Vista Grande DR	34.056534	-118.550423	-
D0079	LA	SUSMP	Permeable Pavement	Permeable Pavers	3489 Greenwood AV	34.005871	-118.447388	6/7/2008
D0080	LA	SUSMP	Permeable Pavement	Permeable Pavers	3604 Greenwood AV	34.003998	-118.445297	6/7/2008
D0081	LA	SUSMP	Permeable Pavement	Permeable Pavers	16050 Aiglon ST	34.044708	-118.538033	2/19/2013
D0082	LA	SUSMP	Permeable Pavement	Permeable Pavers	660 E Sunset Av	33.998425	-118.468315	3/11/2010
D0083	LA	SUSMP	Bioretention	Planter Box	660 E Sunset Av	33.998425	-118.468315	3/11/2010
D0084	LA	SUSMP	Permeable Pavement	Permeable Pavers	342 S. Anita AV	34.051632	-118.480919	6/7/2008
D0085	LA	SUSMP	Bioretention	Rain Garden	342 S. Anita AV	34.051632	-118.480919	6/7/2008
D0086	LA	SUSMP	Permeable Pavement	Permeable Pavers	1550 Old Oak RD	34.059757	-118.496071	2/19/2013
D0087	LA	SUSMP	Bioswale	Vegetated Swale/Strip	1550 Old Oak RD	34.059757	-118.496071	2/19/2013
D0088	LA	SUSMP	Permeable Pavement	Permeable Pavers	12657 W Marco PL	34.006702	-118.441132	9/4/2013
D0089	LA	SUSMP	Permeable Pavement	Permeable Pavers	1050 N Norman PL	34.080307	-118.477303	-
D0090	LA	SUSMP	Permeable Pavement	Permeable Pavers	2239 Prospect Ave	33.995552	-118.453726	6/7/2008
D0091	LA	SUSMP	Permeable Pavement	Permeable Pavers	6543 W. 87th ST	33.95879	-118.403358	3/11/2010
D0092	LA	SUSMP	Permeable Pavement	Permeable Pavers	150 S. Gretna Green Way	34.056984	-118.477943	4/18/2013

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0093	LA	SUSMP	Permeable Pavement	Permeable Pavers	1034 N. Fiske St	34.048248	-118.522064	-
D0094	LA	SUSMP	Permeable Pavement	Permeable Pavers	3617 S Ashwood AV	34.00211	-118.448082	6/7/2008
D0095	LA	SUSMP	Permeable Pavement	Permeable Pavers	307 N. Saltair AV	34.06712	-118.47467	6/7/2008
D0096	LA	SUSMP	Permeable Pavement	Permeable Pavers	2473 Walnut AV	33.99342	-118.449036	6/7/2008
D0097	LA	SUSMP	Bioretention	Planter Box	14613 Bestor blvd	34.051689	-118.518745	4/18/2013
D0098	LA	SUSMP	Bioretention	Planter Box	1669 N. San Onofrre Dr	34.062523	-118.502693	8/7/2012
D0099	LA	SUSMP	Bioretention	Planter Box	906 N. Kagawa ST	34.046356	-118.517448	3/9/2009
D0100	LA	SUSMP	Permeable Pavement	Permeable Pavers	906 N. Kagawa ST	34.046356	-118.517448	3/9/2009
D0101	LA	SUSMP	Bioretention	Planter Box	15991 W. Alcima Ave	34.050934	-118.535362	2/19/2013
D0102	LA	SUSMP	Bioretention	Planter Box	12679 Stanwood DR	34.013493	-118.447372	9/4/2013
D0103	LA	SUSMP	Bioretention	Planter Box	213 S 1st Anita DR	34.05416	-118.482947	6/7/2008
D0104	LA	SUSMP	Bioretention	Rain Garden	213 S 1st Anita DR	34.05416	-118.482947	6/7/2008
D0105	LA	SUSMP	Bioretention	Planter Box	214 S Anita AVE	34.054405	-118.482155	6/7/2008
D0106	LA	SUSMP	Bioretention	Rain Garden	214 S Anita AVE	34.054405	-118.482155	6/7/2008
D0107	LA	SUSMP	Permeable Pavement	Permeable Pavers	214 S Anita AVE	34.054405	-118.482155	6/7/2008
D0108	LA	SUSMP	Bioretention	Planter Box	3564 Mandeville RD	34.063961	-118.492462	6/7/2008
D0109	LA	SUSMP	Bioretention	Planter Box	3360 S. Beethoven ST	34.008659	-118.447723	6/7/2008
D0110	LA	SUSMP	Bioretention	Planter Box	7921 Kentwood AV	33.969948	-118.402237	3/9/2009
D0111	LA	SUSMP	Bioretention	Planter Box	246 Anita AVE	34.053253	-118.481613	6/7/2008
D0112	LA	SUSMP	Permeable Pavement	Permeable Pavers	246 Anita AVE	34.053253	-118.481613	6/7/2008
D0113	LA	SUSMP	Bioretention	Planter Box	890 N Toyopa	34.044624	-118.524071	3/9/2009
D0114	LA	SUSMP	Site-Scale Detention	eco rain Detention Module	890 N Toyopa	34.044624	-118.524071	3/9/2009
D0115	LA	SUSMP	Source Control	catch basin filter	890 N Toyopa	34.044624	-118.524071	3/9/2009
D0116	LA	SUSMP	Bioretention	Planter Box	393 N. Kenter AV	34.065742	-118.484497	6/7/2008
D0117	LA	SUSMP	Rainfall Harvest	Rain Barrel	393 N. Kenter AV	34.065742	-118.484497	6/7/2008
D0118	LA	SUSMP	Permeable Pavement	Permeable Pavers	393 N. Kenter AV	34.065742	-118.484497	6/7/2008
D0119	LA	SUSMP	Bioretention	Planter Box	237 E. Windward AV	33.988979	-118.470123	6/7/2008
D0120	LA	SUSMP	Permeable Pavement	Permeable Pavers	237 E. Windward AV	33.988979	-118.470123	6/7/2008
D0121	LA	SUSMP	Bioretention	Planter Box	504 N. East Rustic Rd	34.034161	-118.517639	3/11/2010
D0122	LA	SUSMP	Permeable Pavement	Permeable Pavers	504 N. East Rustic Rd	34.034161	-118.517639	3/11/2010
D0123	LA	SUSMP	Bioretention	Planter Box	12625 W. Westminister AV	34.00767	-118.44117	9/4/2013
D0124	LA	SUSMP	Rainfall Harvest	Rain Barrel	12625 W. Westminister AV	34.00767	-118.44117	9/4/2013
D0125	LA	SUSMP	Bioretention	Planter Box	8500 S. Gilder Ave	33.955067	-118.402016	3/9/2009

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0126	LA	SUSMP	Bioswale	Vegetated Swale/Strip	8500 S. Gilder Ave	33.955067	-118.402016	3/9/2009
D0127	LA	SUSMP	Bioretention	Planter Box	1001 E. Indiana Ave	34.003006	-118.462036	-
D0128	LA	SUSMP	Permeable Pavement	Permeable Pavers	1001 E. Indiana Ave	34.003006	-118.462036	-
D0129	LA	SUSMP	Bioretention	Planter Box	1028 Bundy Dr	34.07872	-118.48196	-
D0130	LA	SUSMP	Bioretention	Planter Box	725 N Napoli Dr	34.041477	-118.510895	3/9/2009
D0131	LA	SUSMP	Bioretention	Planter Box	131 S. Anita AVE	34.056255	-118.483665	8/15/2013
D0132	LA	SUSMP	Bioretention	Planter Box	1134 Lachman Ln	34.056	-118.54657	2/12/2008
D0133	LA	SUSMP	Bioretention	Planter Box	568 N. Almar Ave.	34.043987	-118.536499	3/11/2010
D0134	LA	SUSMP	Bioretention	Rain Garden	568 N. Almar Ave.	34.043987	-118.536499	3/11/2010
D0135	LA	SUSMP	Bioretention	Planter Box	674 N. Enchanted Way	34.04887	-118.54863	3/11/2010
D0136	LA	SUSMP	Bioretention	Planter Box	232 E Grand BL	33.987845 5	-118.4697	6/7/2008
D0137	LA	SUSMP	Permeable Pavement	Porous Pavement	232 E Grand BL	33.987845 5	-118.469785	6/7/2008
D0138	LA	SUSMP	Bioretention	Planter Box	201 N. Bundy	34.061657	-118.476631	6/7/2008
D0139	LA	SUSMP	Permeable Pavement	Permeable Pavers	201 N. Bundy	34.061657	-118.476631	6/7/2008
D0140	LA	SUSMP	Bioretention	Planter Box	1301 N Kenter AV	34.078556	-118.492966	8/15/2013
D0141	LA	SUSMP	Bioretention	Planter Box	246 S. 3rd AV	33.99764	-118.47628	6/7/2008
D0142	LA	SUSMP	Rainfall Harvest	Rain Barrel	246 S. 3rd AV	33.99764	-118.47628	6/7/2008
D0143	LA	SUSMP	Bioretention	Planter Box	1000 N. Tigertail rd	34.077309	-118.484695	-
D0144	LA	SUSMP	Bioretention	Planter Box	957 N. Corsica Dr.	34.045658	-118.508148	3/9/2009
D0145	LA	SUSMP	Permeable Pavement	Permeable Pavers	957 N. Corsica Dr.	34.045658	-118.508148	3/9/2009
D0146	LA	SUSMP	Bioretention	Planter Box	12813 W. Stanwood DR	34.012226	-118.449738	8/15/2013
D0147	LA	SUSMP	Permeable Pavement	Permeable Pavers	12813 W. Stanwood DR	34.012226	-118.449738	8/15/2013
D0148	LA	SUSMP	Rainfall Harvest	Rain Barrel	12813 W. Stanwood DR	34.012226	-118.449738	8/15/2013
D0149	LA	SUSMP	Bioretention	Planter Box	12245 W. Canna Rd	34.081741	-118.485626	2/25/2009
D0150	LA	SUSMP	Bioretention	Planter Box	16749 Marquez TR	34.047434	-118.545704	8/7/2012
D0151	LA	SUSMP	Bioretention	Planter Box	7941 S Steward AV	33.955067	-118.402016	3/9/2009
D0152	LA	SUSMP	Bioretention	Planter Box	15018 W. McKendree	34.052471	-118.523445	4/18/2013
D0153	LA	SUSMP	Permeable Pavement	Permeable Pavers	15018 W. McKendree	34.052471	-118.523445	4/18/2013[1]
D0154	LA	SUSMP	Bioretention	Planter Box	910 Hartzell ST	34.046112	-118.519508	3/9/2009
D0155	LA	SUSMP	Bioretention	Planter Box	12217 W. Tweed Ln	34.052723	-118.476707	2/25/2009
D0156	LA	SUSMP	Bioretention	Planter Box	249 S Rennie AV	33.998627	-118.474167	6/7/2008
D0157	LA	SUSMP	Permeable Pavement	Porous Pavement	249 S Rennie AV	33.998627	-118.474167	6/7/2008
D0158	LA	SUSMP	Bioretention	Planter Box	11 Wavecrest AVE	33.989862	-118.475517	-
D0159	LA	SUSMP	Bioretention	Planter Box	715 N. Napoli DR	34.041309	-118.511108	3/9/2009

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0160	LA	SUSMP	Bioretention	Planter Box	735 N. Napoli DR	34.041679	-118.510712	3/9/2009
D0161	LA	SUSMP	Bioretention	Planter Box	8132 S Holy Cross Pl	33.963596	-118.415352	3/9/2009
D0162	LA	SUSMP	Bioretention	Planter Box	3383 N. Mandeville Canyon RD	34.104992	-118.504082	6/7/2008
D0163	LA	SUSMP	Permeable Pavement	Permeable Pavers	3383 N. Mandeville Canyon RD	34.104992	-118.504082	6/7/2008
D0164	LA	SUSMP	Bioretention	Planter Box	15300 Earlham ST	34.037533	-118.527168	2/19/2013
D0165	LA	SUSMP	Bioswale	Vegetated Swale/Strip	15300 Earlham ST	34.037533	-118.527168	2/19/2013
D0166	LA	SUSMP	Bioretention	Planter Box	8351 Naylor AV	33.96291	-118.395691	3/9/2009
D0167	LA	SUSMP	Bioretention	Planter Box	7836 Westlawn AV	33.96872	-118.40966	3/9/2009
D0168	LA	SUSMP	Bioretention	Planter Box	1333 N. Pavia PL	34.053951	-118.503723	8/15/2013
D0169	LA	SUSMP	Bioretention	Planter Box	1054 Palisair Place	34.05294	-118.53154	-
D0170	LA	SUSMP	Bioretention	Planter Box	1525 S Louella AV	34.005177	-118.455917	4/18/2013
D0171	LA	SUSMP	Permeable Pavement	Porous Pavement	1525 S Louella AV	34.005177	-118.455917	4/18/2013
D0172	LA	SUSMP	Bioretention	Planter Box	15925 Alcima AV	34.051723	-118.532753	2/19/2013
D0173	LA	SUSMP	Bioretention	Planter Box	284 N. Saltair AV	34.06625	-118.47422	6/7/2008
D0174	LA	SUSMP	Bioretention	Planter Box	581 Lorna LN	34.05687	-118.470306	3/11/2010
D0175	LA	SUSMP	Bioretention	Planter Box	11811 W. Darrlington	34.045109	-118.473534	2/25/2009
D0176	LA	SUSMP	Bioretention	Planter Box	523 E Rialto AV	33.989315	-118.466537	3/11/2010
D0177	LA	SUSMP	Permeable Pavement	Permeable Pavers	523 E Rialto AV	33.989315	-118.466537	3/11/2010
D0178	LA	SUSMP	Bioretention	Planter Box	1017 N. Iliff ST	34.048176	-118.519531	-
D0179	LA	SUSMP	Bioretention	Planter Box	1027 N. Illif ST	34.078346	-118.547546	-
D0180	LA	SUSMP	Bioretention	Planter Box	2136 Westridge RD	34.073711	-118.502937	6/7/2008
D0181	LA	SUSMP	Bioretention	Planter Box	17433 W. Tramonto DR	34.078346	-118.547546	7/6/2012
D0182	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	17433 W. Tramonto DR	34.078346	-118.547546	7/6/2012
D0183	LA	SUSMP	Bioretention	Planter Box	15976 W. Alcima AV	34.050789	-118.534615	2/19/2013
D0184	LA	SUSMP	Bioretention	Planter Box	1162 Via De La Paz	34.050552	-118.526222	7/19/2011
D0185	LA	SUSMP	Bioretention	Planter Box	1416 Amalfi	34.05518	-118.503601	4/18/2013
D0186	LA	SUSMP	Bioretention	Planter Box	25 N. Oakmont DR	34.06922	-118.49131	6/7/2008
D0187	LA	SUSMP	Bioretention	Planter Box	1366 Lachman LN	34.059658	-118.549255	8/15/2013
D0188	LA	SUSMP	Bioretention	Planter Box	1678 Alta Mura	34.063287	-118.501526	8/7/2012
D0189	LA	SUSMP	Bioretention	Planter Box	1805 N. Melhill WY	34.067989	-118.501907	6/7/2008
D0190	LA	SUSMP	Bioswale	Vegetated Swale/Strip	1805 N. Melhill WY	34.067989	-118.501907	6/7/2008
D0191	LA	SUSMP	Bioretention	Planter Box	1319 N. Amalfi DR	34.05398	-118.50499	8/15/2013
D0192	LA	SUSMP	Bioretention	Planter Box	16060 Temecula	34.046158	-118.537025	2/19/2013

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0193	LA	SUSMP	Bioretention	Planter Box	1550 N. Sorrento DR	34.059128	-118.501793	2/19/2013
D0194	LA	SUSMP	Bioretention	Planter Box	1812 N. Melhill WY	34.066704	-118.500984	6/7/2008
D0195	LA	SUSMP	Bioretention	Planter Box	1010 N. Iliff ST	34.04813	-118.518921	-
D0196	LA	SUSMP	Bioretention	Planter Box	15986 Alcima	34.050549	-118.534988	2/19/2013
D0197	LA	SUSMP	Bioretention	Planter Box	1677 San Onofre DR	34.062782	-118.502357	8/7/2012
D0198	LA	SUSMP	Rainfall Harvest	Green Roof	1677 San Onofre DR	34.062782	-118.502357	8/7/2012
D0199	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	1677 San Onofre DR	34.062782	-118.502357	8/7/2012
D0200	LA	SUSMP	Bioretention	Planter Box	1000 N. Embury ST	34.047222	-118.522881	-
D0201	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	1000 N. Embury ST	34.047222	-118.522881	-
D0202	LA	SUSMP	Bioretention	Planter Box	1026 N. Iliff ST	34.048534	-118.519005	-
D0203	LA	SUSMP	Bioretention	Planter Box	1021 N. Kagawa ST	34.048466	-118.518555	-
D0204	LA	SUSMP	Bioretention	Planter Box	11771 W. Montana AV	34.053825	-118.469147	2/25/2009
D0205	LA	SUSMP	Bioretention	Planter Box	940 Kagawa	34.047302	-118.517662	3/9/2009
D0206	LA	SUSMP	Bioretention	Planter Box	5109 Ocean Front Walk	33.992569	-118.478722	3/11/2010
D0207	LA	SUSMP	Bioretention	Planter Box	441 S. Barrington AV	34.059826	-118.469543	6/7/2008
D0208	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	441 S. Barrington AV	34.059826	-118.469543	6/7/2008
D0209	LA	SUSMP	Bioretention	Planter Box	13161 W. Boca De Canon LN	34.073582	-118.499359	8/15/2013
D0210	LA	SUSMP	Bioretention	Planter Box	815 N. El Oro LN	34.05111	-118.54805	3/9/2009
D0211	LA	SUSMP	Source Control	Drain Pac Catch Basin Inserts	815 N. El Oro LN	34.05111	-118.54805	3/9/2009
D0212	LA	SUSMP	Bioretention	Planter Box	12780 N. Chalon RD	34.082645	-118.497749	9/4/2013
D0213	LA	SUSMP	Source Control	Drain Pac Catch Basin Inserts	12780 N. Chalon RD	34.082645	-118.497749	9/4/2013
D0214	LA	SUSMP	Bioretention	Planter Box	1134 N. Lachman LN	34.056	-118.54657	2/12/2008
D0215	LA	SUSMP	Bioretention	Planter Box	1364 N. Goucher St	34.054199	-118.522331	8/15/2013
D0216	LA	SUSMP	Bioretention	Planter Box	1110 Embury ST	34.049339	-118.523346	-
D0217	LA	SUSMP	Permeable Pavement	Porous Pavement	707 E. Flower AV	33.999981	-118.468826	3/9/2009
D0218	LA	SUSMP	Permeable Pavement	Porous Pavement	165 N Saltair AV	34.062946	-118.475639	2/19/2013
D0219	LA	SUSMP	Permeable Pavement	Porous Pavement	1129 N Amalfi DR	34.05018	-118.50769	2/12/2008
D0220	LA	SUSMP	Permeable Pavement	Porous Pavement	1129 N Amalfi DR	34.05018	-118.50769	2/12/2008
D0221	LA	SUSMP	Permeable Pavement	Porous Pavement	825 Brooks AV	33.998302	-118.463898	3/9/2009
D0222	LA	SUSMP	Permeable Pavement	Porous Pavement	7800 W. World WY	33.94162	-118.424103	3/9/2009
D0223	LA	SUSMP	Rainfall Harvest	Rain Barrel	304 Grand Bl	33.987865	-118.469582	6/7/2008
D0224	LA	SUSMP	Rainfall Harvest	Rain Barrel	16598 Via Floresta	34.05975	-118.54686	2/19/2013
D0225	LA	SUSMP	Rainfall Harvest	Rain Barrel	701 Almar AVE	34.045891	-118.534927	3/11/2010

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0226	LA	SUSMP	Rainfall Harvest	Rain Barrel	469 El Medio AVE	34.041679	-118.535255	6/7/2008
D0227	LA	SUSMP	Rainfall Harvest	Rain Barrel	817 Galloway ST	34.043766	-118.520584	3/9/2009
D0228	LA	SUSMP	Bioretention	Planter Box	817 Galloway ST	34.043766	-118.520584	3/9/2009
D0229	LA	SUSMP	Rainfall Harvest	Rain Barrel	801 W Venezia AVE	33.992424	-118.457985	3/9/2009
D0230	LA	SUSMP	Rainfall Harvest	Rain Barrel	8490 S. Ramsgate aVe	33.955067	-118.402016	3/9/2009
D0231	LA	SUSMP	Rainfall Harvest	Rain Barrel	248 Bernard AVE	34.000496	-118.470772	6/7/2008
D0232	LA	SUSMP	Rainfall Harvest	Rain Barrel	12618 W. Woodbine St	34.010254	-118.443077	9/4/2013
D0233	LA	SUSMP	Rainfall Harvest	Rain Barrel	349 N. Sycamore RD	34.031548	-118.516167	6/7/2008
D0234	LA	SUSMP	Rainfall Harvest	Rain Barrel	3634 May ST	34.004921	-118.441422	6/7/2008
D0235	LA	SUSMP	Rainfall Harvest	Rain Barrel	429 Via De La Paz	34.037941	-118.529785	6/7/2008
D0236	LA	SUSMP	Rainfall Harvest	Rain Barrel	145 E. Napolean ST	33.94561	-118.441216	4/18/2013
D0237	LA	SUSMP	Rainfall Harvest	Rain Barrel	806 S. 6t St	33.99416	-118.463531	3/9/2009
D0238	LA	SUSMP	Rainfall Harvest	Rain Barrel	721 Brooks Ave	33.997353	-118.465675	3/9/2009
D0239	LA	SUSMP	Rainfall Harvest	Rain Barrel	1147 Embury ST	34.050194	-118.524139	2/12/2008
D0240	LA	SUSMP	Rainfall Harvest	Rain Barrel	1360 Appleton WAY	34.004475	-118.453346	8/15/2013
D0241	LA	SUSMP	Rainfall Harvest	Rain Barrel	845 S Wellesley AV	34.045937	-118.476044	3/9/2009
D0242	LA	SUSMP	Rainfall Harvest	Rain Barrel	3468 S. Rosewood Ave	34.00613	-118.44812	6/7/2008
D0243	LA	SUSMP	Bioretention	Planter Box	3468 S. Rosewood Ave	34.00613	-118.44812	6/7/2008
D0244	LA	SUSMP	Rainfall Harvest	Rain Barrel	628 N San Lorenzo ST	34.035423	-118.509171	3/11/2010
D0245	LA	SUSMP	Rainfall Harvest	Rain Barrel	480 Homewood Rd	34.067154	-118.486656	6/7/2008
D0246	LA	SUSMP	Rainfall Harvest	Rain Barrel	12420 w. Wododbine St.	34.011589	-118.440567	2/25/2009
D0247	LA	SUSMP	Permeable Pavement	Permeable Pavers	12420 w. Wododbine St.	34.011589	-118.440567	2/25/2009
D0248	LA	SUSMP	Rainfall Harvest	Rain Barrel	534 N. Crestline Dr.	34.068237	-118.477554	3/11/2010
D0249	LA	SUSMP	Rainfall Harvest	Rain Barrel	16701 W. Marquez Terrace	34.048416	-118.545319	8/7/2012
D0250	LA	SUSMP	Rainfall Harvest	Rain Barrel	824 W. Venezia Ave	33.992615	-118.457283	3/9/2009
D0251	LA	SUSMP	Rainfall Harvest	Rain Barrel	6955 S. Trolley Way	33.956779	-118.449928	3/11/2010
D0252	LA	SUSMP	Rainfall Harvest	Rain Barrel	305 Homewood Road	34.063122	-118.483383	6/7/2008
D0253	LA	SUSMP	Rainfall Harvest	Rain Barrel	541 Latimer RD	34.036453	-118.516075	3/11/2010
D0254	LA	SUSMP	Rainfall Harvest	Rain Barrel	1750 N Westridge RD	34.065037	-118.495171	7/6/2012
D0255	LA	SUSMP	Rainfall Harvest	Rain Barrel	710 N Napoli DR	34.040771	-118.510841	3/9/2009
D0256	LA	SUSMP	Rainfall Harvest	Rain Barrel	3465 Maplewood AV	34.005512	-118.449493	6/7/2008
D0257	LA	SUSMP	Rainfall Harvest	Rain Barrel	1711 S. Glydon AV	34.003128	-118.455139	8/7/2012
D0258	LA	SUSMP	Rainfall Harvest	Rain Barrel	421 N. Homewood RD	34.065582	-118.485817	6/7/2008

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0259	LA	SUSMP	Rainfall Harvest	Rain Barrel	15237 De Pauw ST	34.037636	-118.524887	4/18/2013
D0260	LA	SUSMP	Rainfall Harvest	Rain Barrel	8041 S. Dunfield AV	33.967388	-118.399467	3/9/2009
D0261	LA	SUSMP	Source Control	Rain Diversion System	12613 Woobine ST	34.010708	-118.443253	7/12/2013
D0262	LA	SUSMP	Bioretention	Rain Garden	12318 W Sunset BL	34.05759	-118.479836	2/25/2009
D0263	LA	SUSMP	Bioretention	Rain Garden	12800 Indianapolis ST	34.01078	-118.448074	8/22/2013
D0264	LA	SUSMP	Bioretention	Rain Garden	111 S. Granville Ave	34.063202	-118.471893	-
D0265	LA	SUSMP	Bioretention	Rain Garden	445 N. Tigertail Rd.	34.066566	-118.479324	6/7/2008
D0266	LA	SUSMP	Bioretention	Rain Garden	781 Amalfi DR	34.04356	-118.510757	3/9/2009
D0267	LA	SUSMP	Bioretention	Rain Garden	13215 W Riveria Ranch Road	34.08634	-118.48864	8/15/2013
D0268	LA	SUSMP	Bioretention	Rain Garden	357 N. Frody RD	34.08634	-118.48864	6/7/2008
D0269	LA	SUSMP	Bioretention	Rain Garden	1378 E Palms BLVD	34.002888	-118.451401	7/2/2013
D0270	LA	SUSMP	Permeable Pavement	Permeable Pavers	1378 E Palms BLVD	34.002888	-118.451401	7/2/2013
D0271	LA	SUSMP	Bioretention	Rain Garden	444 N Homewood RD	34.06638	-118.485703	6/7/2008
D0272	LA	SUSMP	Bioretention	Rain Garden	6407 W. 86th PL	33.959345	-118.399201	3/11/2010
D0273	LA	SUSMP	Bioswale	Vegetated Swale/Strip	6407 W. 86th PL	33.959345	-118.399201	3/11/2010
D0274	LA	SUSMP	Bioretention	Rain Garden	12303 W Gorham AV	34.047466	-118.474739	2/25/2009
D0275	LA	SUSMP	Permeable Pavement	Porous Pavement	12303 W Gorham AV	34.047466	-118.474739	2/25/2009
D0276	LA	SUSMP	Bioretention	Rain Garden	1166 Corrica Dr	34.049595	-118.504105	7/19/2011
D0277	LA	SUSMP	Bioretention	Rain Garden	12616 w. Wood Green	34.008099	-118.441109	9/4/2013
D0278	LA	SUSMP	Bioretention	Planter Box	12616 w. Wood Green	34.008099	-118.441109	9/4/2013
D0279	LA	SUSMP	Bioretention	Rain Garden	1025 E Palms Blvd	33.998119	-118.458931	-
D0280	LA	SUSMP	Bioretention	Rain Garden	404 E. Grand BLVD	33.987922 5	-118.468525	6/7/2008
D0281	LA	SUSMP	Bioretention	Rain Garden	3256 S. Cabrillo Blvd	34.012913	-118.447266	6/7/2008
D0282	LA	SUSMP	Permeable Pavement	Permeable Pavers	3256 S. Cabrillo Blvd	34.012913	-118.447266	6/7/2008
D0283	LA	SUSMP	Bioretention	Rain Garden	1177 N. Embury St	34.051006	-118.524323	7/19/2011
D0284	LA	SUSMP	Permeable Pavement	Permeable Pavers	1177 N. Embury St	34.051006	-118.524323	7/19/2011
D0285	LA	SUSMP	Bioretention	Rain Garden	578 N. Amalfi Dr	34.036812	-118.512306	3/11/2010
D0286	LA	SUSMP	Bioretention	Rain Garden	12318 W. Sunset Blvd	34.05759	-118.479836	2/25/2009
D0287	LA	SUSMP	Bioretention	Rain Garden	1323 N. Pavia Pl	34.053776	-118.504044	8/15/2013
D0288	LA	SUSMP	Permeable Pavement	Permeable Pavers	1323 N. Pavia Pl	34.053776	-118.504044	8/15/2013
D0289	LA	SUSMP	Bioretention	Rain Garden	1341 San Remo Dr	34.054634	-118.499992	8/15/2013
D0290	LA	SUSMP	Permeable Pavement	Permeable Pavers	1341 San Remo Dr	34.054634	-118.499992	8/15/2013
D0291	LA	SUSMP	Bioretention	Rain Garden	115 N. Canyon View DR	34.057632	-118.484543	2/12/2008

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0292	LA	SUSMP	Permeable Pavement	Permeable Pavers	115 N. Canyon View DR	34.057632	-118.484543	2/12/2008
D0293	LA	SUSMP	Bioretention	Rain Garden	825 Brooks Ave	33.998302	-118.463898	3/9/2009
D0294	LA	SUSMP	Bioretention	Rain Garden	12312 W. 13th Helena Dr.	34.05555	-118.479279	2/25/2009
D0295	LA	SUSMP	Bioretention	Rain Garden	12318 Gorham Ave	34.046654	-118.474571	2/25/2009
D0296	LA	SUSMP	Bioretention	Rain Garden	770 Paseo Miramar	34.049366	-118.557106	3/9/2009
D0297	LA	SUSMP	Bioretention	Rain Garden	12738 W. Montana AV	34.045574	-118.480827	9/4/2013
D0298	LA	SUSMP	Bioretention	Rain Garden	245 Bundy DR	34.062721	-118.476768	6/7/2008
D0299	LA	SUSMP	Bioretention	Rain Garden	11912 W. Sunset BL	34.06295	-118.472237	2/25/2009
D0300	LA	SUSMP	Bioretention	Rain Garden	811 Hartzell ST	34.04369	-118.519585	3/9/2009
D0301	LA	SUSMP	Bioretention	Rain Garden	222 N. Carmelina AV	34.061321	-118.483749	6/7/2008
D0302	LA	SUSMP	Bioretention	Slope Vegetation	1160 Ravoli DR	34.050972	-118.507607	2/12/2008
D0303	LA	SUSMP	Bioretention	Slope Vegetation	15253 W De Pauw ST	34.078346	-118.547546	2/19/2013
D0304	LA	SUSMP	Bioretention	Slope Vegetation	16665 W. Mulholland	34.08634	-118.48864	8/7/2012
D0305	LA	SUSMP	Bioretention	Slope Vegetation	17428 Castellammare DR	34.03894	-118.55679	7/6/2012
D0306	LA	SUSMP	Bioretention	Slope Vegetation	17630 Castellammare DR	34.040586	-118.560846	7/6/2012
D0307	LA	SUSMP	Bioretention	Slope Vegetation	17627 Castellammare DR	34.040663	-118.560776	7/6/2012
D0308	LA	SUSMP	Bioretention	Slope Vegetation	17816 W Porto Marina WY	34.04167	-118.56339	6/7/2008
D0309	LA	SUSMP	Bioretention	Slope Vegetation	17810 W Porto Marina WY	34.041652	-118.563323	6/7/2008
D0310	LA	SUSMP	Bioretention	Slope Vegetation	15261 W De Pauw ST	34.078346	-118.547546	2/19/2013
D0311	LA	SUSMP	Bioretention	Slope Vegetation	769 N Marzella AV	34.07497	-118.478111	3/9/2009
D0312	LA	SUSMP	Bioretention	Slope Vegetation	38 Haldeman	34.039772	-118.512566	6/7/2008
D0313	LA	SUSMP	Bioretention	Slope Vegetation	1832 N. Old Orchard RD	34.068455	-118.492477	6/7/2008
D0314	LA	SUSMP	Bioretention	Slope Vegetation	375 N. East Rustic RD	34.031599	-118.517209	6/7/2008
D0315	LA	SUSMP	Bioretention	Slope Vegetation	222 S. Cliffwood	34.054077	-118.484756	6/7/2008
D0316	LA	SUSMP	Bioretention	Slope Vegetation	364 Sycamore RD	34.032082	-118.515945	6/7/2008
D0317	LA	SUSMP	Bioretention	Slope Vegetation	146 Carmelina AV	34.055964	-118.480472	4/18/2013
D0318	LA	SUSMP	Bioretention	Slope Vegetation	257 N. Tranquillo	34.078346	-118.547546	6/7/2008
D0319	LA	SUSMP	Bioretention	Slope Vegetation	1775 Alta Mura RD	34.06272	-118.504506	5/5/2009
D0320	LA	SUSMP	Bioretention	Slope Vegetation	15040 W. Altata DR	34.032486	-118.523094	4/18/2013
D0321	LA	SUSMP	Bioretention	Slope Vegetation	1461 Kenter AV	34.08083	-118.494431	4/18/2013
D0322	LA	SUSMP	Bioretention	Slope Vegetation	14800 W. Corona Del Mar	34.031317	-118.518938	4/18/2013
D0323	LA	SUSMP	Bioretention	Slope Vegetation	10710 W. Chalon RD	34.081841	-118.480766	-
D0324	LA	SUSMP	Bioretention	Slope Vegetation	749 N. Amalfi DR	34.042683	-118.511444	3/9/2009

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0325	LA	SUSMP	Bioretention	Slope Vegetation	500 N Chautauqua BL	34.036179	-118.518632	11/12/2008
D0326	LA	SUSMP	Flow Through	Stormfilter	500 W. World WY	33.94162	-118.424103	3/11/2010
D0327	LA	SUSMP	Flow Through	Stormfilter	7051 W. World	33.94162	-118.424103	4/9/2009
D0328	LA	SUSMP	Flow Through	Continuous Deflection Separation	7051 W. World	33.94162	-118.424103	4/9/2009
D0329	LA	SUSMP	Source Control	StormTech Chamber System	637 Lorma LN	34.055904	-118.469345	3/11/2010
D0330	LA	SUSMP	Site-Scale Detention	Underground Detention/ Infiltration Chamber System	9019 S. Airport BL	33.955067	-118.402016	3/9/2009
D0331	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	9019 S. Airport BL	33.955067	-118.402016	3/9/2009
D0332	LA	SUSMP	Site-Scale Detention	Underground Detention/ Infiltration Chamber System	6022 W. Avion	33.955067	-118.402016	3/11/2010
D0333	LA	SUSMP	Source Control	Fossil Filter Catch Basin Insert	6022 W. Avion	33.955067	-118.402016	3/11/2010
D0334	LA	SUSMP	Bioswale	Vegetated Swale/Strip	6385 W. 80th PL	33.96645	-118.399284	3/11/2010
D0335	LA	SUSMP	Bioswale	Vegetated Swale/Strip	1570 N. San Remo DR	34.059532	-118.499443	2/19/2013
D0336	LA	SUSMP	Bioswale	Vegetated Swale/Strip	1057 N. Chautaqua BL	34.049435	-118.517708	-
D0337	LA	SUSMP	Permeable Pavement	Porous Pavement	1057 N. Chautaqua BL	34.049435	-118.517708	-
D0338	LA	SUSMP	Bioswale	Vegetated Swale/Strip	17643 W. Porto Marina WY	34.0423	-118.56617	7/6/2012
D0339	LA	SUSMP	Bioswale	Vegetated Swale/Strip	1214 N. Turquesa LN	34.05714	-118.547729	2/25/2009
D0340	LA	SUSMP	Bioretention	Planter Box	1214 N. Turquesa LN	34.05714	-118.547729	-
D0341	SM	SMG	Infiltration	French Drain	333 OLYMPIC DRIVE Santa Monica, CA 90401	34.012004	-118.490728	6/4/2003
D0342	SM	SMG	Biofiltration	No Gutters	2725 NEILSON WAY Santa Monica, CA 90405	34.000398	-118.482946	6/21/2000
D0343	SM	SMG	Permeable Pavement	Permeable Paving (general)	222 HOLLISTER AVE Santa Monica, CA 90405	34.004573	-118.485014	2/15/2003
D0344	SM	SMG	Infiltration	Pit (Rock)	2600 OCEAN PARK BLVD Santa Monica, CA 90405	34.017321	-118.456972	6/20/2001
D0345	SM	SMG	Infiltration	Pit (Plastic Box Modules)	1660 7TH ST Santa Monica, CA 90401	34.014438	-118.487769	4/7/2003
D0346	SM	SMG	Infiltration	Pit (Plastic Box Modules)	1704 MONTANA AVE Santa Monica, CA 90405	34.03448	-118.492000	12/12/2001
D0347	SM	SMG	Infiltration	Pit (Plastic Box Modules)	2101 OCEAN PARK BLVD Santa Monica, CA 90405	34.014653	-118.463651	10/25/2002
D0348	SM	SMG	Infiltration	Pit (Plastic Box Modules)	3200 AIRPORT AVE Santa Monica, CA 90405	34.015314	-118.446610	3/21/2011
D0349	SM	SMG	Permeable Pavement	Permeable Paving (general)	2201 20TH CT Santa Monica, CA 90405	34.018589	-118.46834	1/16/2002
D0350	SM	SMG	Permeable Pavement	Permeable Paving (general)	1701 OCEAN PARK BLVD Santa Monica, CA 90405	34.012791	-118.466772	3/19/2002

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0351	SM	SMG	Permeable Pavement	Permeable Paving (general)	2404 ASHLAND ST N Santa Monica, CA 90405	34.014218	-118.458571	3/16/2002
D0352	SM	SMG	Flow Through	Vortex (general)	1601 APPIAN WAY Santa Monica, CA 90401	34.010856	-118.495870	5/15/2000
D0353	SM	SMG	Flow Through	Vortex (general)	2500 MICHIGAN AVE Santa Monica, CA 90404	34.027471	-118.467592	5/15/2001
D0354	SM	SMG	Flow Through	Vortex (general)	1800 OCEAN FRONT WALK Santa Monica, CA 90401	34.006956	-118.492335	5/15/2000
D0355	SM	SMG	Permeable Pavement	Permeable Paving (general)	2200 VIRGINIA AVE Santa Monica, CA 90404	34.022029	-118.468769	3/23/2006
D0356	SM	SMG	Flow Through	Cistern	601 SANTA MONICA BLVD Santa Monica, CA 90401	34.018165	-118.493363	3/31/2004
D0357	SM	SMG	Infiltration	French Drain	1725 MAIN ST Santa Monica, CA 90401	34.010765	-118.490436	6/4/2003
D0358	SM	SMG	Flow Through	Vortex (general)	333 CIVIC CENTER DRIVE Santa Monica, CA 90401	34.011144	-118.489692	10/7/2005
D0359	SM	SMG	Flow Through	Catch Basin/Channel Insert	1751 CLOVERFIELD BLVD Santa Monica, CA 90404	34.025954	-118.470293	5/1/2009
D0360	SM	SMG	Infiltration	Pit (Rock)	1401 OLYMPIC BLVD Santa Monica, CA 90404	34.019911	-118.480596	3/31/2005
D0361	SM	SMG	Infiltration	Pit (Rock)	3201 AIRPORT AVE Santa Monica, CA 90405	34.016171	-118.446103	5/11/2006
D0362	SM	SMG	Infiltration	Depression Basin	1525 EUCLID ST Santa Monica, CA 90404	34.021722	-118.484003	5/22/2007
D0363	SM	SMG	Infiltration	Pit (Rock)	503 OLYMPIC BLVD Santa Monica, CA 90401	34.013541	-118.489062	6/21/2007
D0364	SM	SMG	Infiltration	Pit (Plastic Box Modules)	415 PALISADES BEACH RD Santa Monica, CA 90402	34.024197	-118.513061	12/23/2008
D0365	SM	SMG	Infiltration	Concrete Vault	1620 6TH ST Santa Monica, CA 90401	34.015317	-118.489351	12/15/2009
D0366	SM	SMG	Infiltration	Pit (Plastic Box Modules)	1930 STEWART ST Santa Monica, CA 90404	34.026480	-118.464660	7/7/2009
D0367	SM	SMG	Biofiltration	Gutters	1640 9TH ST Santa Monica, CA 90401	34.016392	-118.486303	-
D0368	SM	SMG	Infiltration	Pit (Plastic Box Modules)	1654 19TH ST Santa Monica, CA 90404	34.023874	-118.476749	2/23/2012
D0369	SM	SMG	Biofiltration	No Gutters	1450 PARK DR Santa Monica, CA 90404	34.031303	-118.475156	1/0/1900
D0370	SM	SMG	Permeable Pavement	Permeable Paving (general)	1501 17TH ST Santa Monica, CA 90404	34.025074	-118.480946	2/1/2011
D0371	SM	SMG	Infiltration	Pit (Rock)	3100 AIRPORT AVE Santa Monica, CA 90405	34.014654	-118.447751	12/7/2011
D0372	SM	SMG	Permeable Pavement	Permeable Paving (general)	1402 14TH ST Los Angeles, CA 90404	34.024036	-118.485661	3/14/2011
D0373	SM	SMG	Permeable Pavement	Permeable Paving (general)	808 WILSHIRE BLVD Santa Monica, CA	34.022055	-118.493846	3/15/2011

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
					90401			
D0374	SM	SMG	Infiltration	Green Street	3111 LONGFELLOW ST Santa Monica, CA 90405	34.002998	-118.471706	3/28/2011
D0375	SM	SMG	Permeable Pavement	Permeable Paving (general)	1217 22ND ST Santa Monica, CA 90404	34.032473	-118.480732	6/7/2011
D0376	SM	SMG	Permeable Pavement	Permeable Paving (general)	608 IDAHO AVE Santa Monica, CA 90403	34.024814	-118.500757	11/11/2011
D0377	SM	SMG	Permeable Pavement	Permeable Paving (general)	1214 IDAHO AVE Santa Monica, CA 90403	34.029413	-118.495083	11/11/2011
D0378	SM	SMG	Permeable Pavement	Permeable Paving (general)	1544 BERKELEY ST Santa Monica, CA 90404	34.034673	-118.467245	12/20/2011
D0379	SM	SMG	Permeable Pavement	Permeable Paving (general)	1660 STANFORD ST Santa Monica, CA 90404	34.032584	-118.465832	12/12/2011
D0380	SM	SMG	Permeable Pavement	Permeable Paving (general)	1617 STANFORD ST Santa Monica, CA 90404	34.033560	-118.466517	8/15/2011
D0381	SM	SMG	Permeable Pavement	Permeable Paving (general)	1257 19TH ST Santa Monica, CA 90404	34.029603	-118.482406	4/16/2012
D0382	SM	SMG	Infiltration	Concrete Vault	1700 MAIN ST Santa Monica, CA 90401	34.011007	-118.491610	5/3/2012
D0383	SM	SMG	Permeable Pavement	Permeable Paving (general)	1105 IDAHO AVE Santa Monica, CA 90403	34.028885	-118.496355	5/24/2012
D0384	SM	SMG	Permeable Pavement	Permeable Paving (general)	1323 17TH ST Santa Monica, CA 90404	34.027368	-118.483626	5/15/2012
D0385	SM	SMG	Permeable Pavement	Permeable Paving (general)	933 7TH ST Santa Monica, CA 90403	34.024989	-118.499121	6/19/2012
D0386	SM	SMG	Permeable Pavement	Permeable Paving (general)	927 5TH ST Santa Monica, CA 90403	34.023554	-118.501128	6/4/2012
D0387	SM	SMG	Infiltration	Rain Barrel-Cistern	2201 PICO BLVD Santa Monica, Ca 90404	34.021102	-118.467354	-
D0388	SM	SMG	Permeable Pavement	Pervious Concrete	1234 10TH ST Santa Monica, CA 90401	34.022754	-118.492038	-
D0389	SM	SMG	Permeable Pavement	Pervious Concrete	1027 12TH ST Santa Monica, CA 90403	34.027583	-118.492942	9/27/2012
D0390	SM	SMG	Permeable Pavement	Pervious Concrete	827 12TH ST Santa Monica, CA 90404	34.03026	-118.496073	9/27/2012
D0391	SM	SMG	Permeable Pavement	Pervious Concrete	1333 19TH ST Santa Monica, CA 90404	34.028756	-118.481416	11/19/2012
D0392	SM	SMG	Infiltration	Perforated Corrugated Metal Pipe	3223 DONALD DOUGLAS LOOP S Santa Monica, CA 90405	34.017873	-118.446288	1/0/1900
D0393	SM	SMG	Permeable Pavement	Permeable Paving (general)	1033 6TH ST Santa Monica, CA 90403	34.022884	-118.498501	-
D0394	SM	SMG	Permeable Pavement	Permeable Paving (general)	1237 7TH ST Santa Monica, CA 90401	34.020776	-118.494289	12/18/2012
D0395	SM	SMG	Infiltration	Green Street	2526 6TH ST Santa Monica, CA 90405	34.005733	-118.480417	11/13/2012
D0397	SM	SMG	Infiltration	Pit (Misc pipe)	1115 HILL ST Santa Monica, CA 90405	34.007402	-118.471931	10/3/2013
D0398	SM	SMG	Infiltration	Pit (Misc pipe)	1760 FRANKLIN ST Santa Monica, CA 90404	34.032485	-118.462727	10/11/2013

ID	Jurisdiction	Data Source	BMP Category	Project Name	Location	Latitude	Longitude	Date Active[2]
D0399	SM	SMG	Flow Through	High Efficiency Biotreatment	2525 MICHIGAN AVE Santa Monica, CA 90404	34.027794	-118.467808	5/15/1998
D0400	SM	SMG	Flow Through	High Efficiency Biotreatment	1543 OCEAN FRONT WALK Santa Monica, CA 90401	34.010431	-118.495853	5/15/1998
D0401	SM	SMG	Flow Through	Vortex (general)	790 OCEAN AVE Santa Monica, CA 90402	34.022296	-118.507643	3/31/2007
D0402	SM	SMG	Flow Through	Vortex (general)	1190 OCEAN AVE Santa Monica, CA 90403	34.016924	-118.501394	1/8/2008
D0403	SM	SMG	Flow Through	Non-Vortex	3402 PICO BLVD Santa Monica, CA 90404	34.027188	-118.453434	11/1/2006
D0404	SM	SMG	Flow Through	Vortex (general)	2900 MAIN ST Santa Monica, CA 90405	33.999370	-118.481183	-
D0405	SM	SMG	Infiltration	Pit (Plastic Box Modules)	201 OCEAN AVE Santa Monica, CA 90402	34.028204	-118.514676	3/21/2006
D0406	SM	SMG	Permeable Pavement	Permeable Paving (general)	2030 BARNARD WAY Santa Monica, CA 90405	33.997549	-118.480135	5/18/2008
D0407	SM	SMG	Infiltration	Green Street	118 BICKNELL AVE Santa Monica, CA 90405	34.005436	-118.48889	7/14/2009

Notes: ES = El Segundo, LA = Los Angeles, SM = Santa Monica, SUSMP = Standard Urban Stormwater Mitigation Plan (SUSMP) LID Data (6/2006-9/2013), SMG = Santa Monica City Owned BMPs

ATTACHMENT 4 LOS ANGELES COUNTY MUNICIPAL STORM WATER PERMIT (ORDER 01-182)
UNIFIED ANNUAL STORMWATER REPORT 2011-2012
APPENDIX B - BEST MANAGEMENT PRACTICES (BMPS) INSTALLED IN 2011-2012

Number of BMPs Installed in 2011-2012 Ballona Creek and Urban Santa Monica Bay Watershed Management Area																
BMP Type	Beverly Hills	City of Los Angeles	Culver City	El Segundo	Hermosa Beach	County of Los Angeles	LACFCD	Manhattan Beach	Palos Verdes Estates	Rancho Palos Verdes	Redondo Beach	Rolling Hills	Rolling Hills Estates	Santa Monica	West Hollywood	Total
Abtech OARS Oil Skimmer																**0**
Abtech Ultra Urban Catch Basin Insert																**0**
CDS Gross Pollutant Separators		2									1					**3**
Clean Screen Catch Basin Inserts	7															**7**
Covered Material Bunkers																**0**
Covered Trash Bins	18															**18**
Dog Parks																**0**
Drain Pac Catch Basin Inserts																**0**
Enhanced Street Sweeping						1										**1**
Extra Trash Cans	16															**16**
Floating Trash Booms						1										**1**
Fossil Filter Catch Basin Inserts		89	5			1									15	**110**
Geo Block Porous Pavement		8														**8**
Grass Block Porous Pavement																**0**
Grass Pavers Porous Pavement																**0**
Gravel Pave Porous Pavement																**0**
HydroCartridge In-Line Filters																**0**
Infiltration Trenches		40				1									3	**44**
Restaurant Vent Traps																**0**
Stormceptor Gross Pollutant Separators	2	1														**3**
Automatic Retractible Screens Catch Basin(ARS)					14											**14**
Biofiltration/Biofilters/Bioswale										2				6	13	**21**
Bioretention Facility		219														**219**
Catch Basin Insert (various)		1638									7			2		**1647**
Cistern/Rain Barrels		7												69		**76**
Clarifier			2													**2**
Concrete Washout Containers						2										**2**
Concrete Waste Management						4										**4**

Number of BMPs Installed in 2011-2012 Ballona Creek and Urban Santa Monica Bay Watershed Management Area																
BMP Type	Beverly Hills	City of Los Angeles	Culver City	El Segundo	Hermosa Beach	County of Los Angeles	LACFCD	Manhattan Beach	Palos Verdes Estates	Rancho Palos Verdes	Redondo Beach	Rolling Hills	Rolling Hills Estates	Santa Monica	West Hollywood	Total
Connector Pipe Screens Catch Basin(CPS)					14				13				26			**53**
Diversion of Surface Water from Slopes												2				**2**
Downspout Inserts														2		**2**
Earth Dikes/Drainage Swales						4										**4**
Efficient Irrigation												2				**2**
Fiber Rolls						1000										**1000**
Filterra		8														**8**
Flow through Planter			1													**1**
Green Roof		3														**3**
Harvest & Reuse															1	**1**
Hydrodynamic Sepatation System															1	**1**
Infiltration Pit														45		**45**
Infiltration System					7						3					**10**
Low Flow Diversion		8														**8**
Minimize Impervious Area											5					**5**
Pet Waste Station															1	**1**
Permeable/Pervious Pavement												12	2	5		**19**
Poured Concrete Catch Basin						1										**1**
Retention Basin			4													**4**
Sand Bags						862										**862**
Signage & Stenciling										15	2				29	**46**
Silt Screens/Fence						2										**2**
Slope Vegetation		15														**15**
Solid Waste Management						2										**2**
Spill Prevention & Control						2										**2**
Stabilized Construction Entrance/Exit						8										**8**
Stockpile Management						1										**1**
Stormdrain Inlet Protection						3										**3**
StormFilter		2												3		**5**
StormTech Chamber System		1														**1**

Number of BMPs Installed in 2011-2012 Ballona Creek and Urban Santa Monica Bay Watershed Management Area																	
BMP Type	Beverly Hills	City of Los Angeles	Culver City	El Segundo	Hermosa Beach	County of Los Angeles	LACFCD	Manhattan Beach	Palos Verdes Estates	Rancho Palos Verdes	Redondo Beach	Rolling Hills	Rolling Hills Estates	Santa Monica	West Hollywood	Total
Trash Enclosures											2					**2**
Vegetated Swale		1														**1**
Water Trucks						1										**1**

ATTACHMENT 5 LOS ANGELES COUNTY MUNICIPAL STORM WATER PERMIT (ORDER 01-182)
UNIFIED ANNUAL STORMWATER REPORT 2011-2012
APPENDIX C - BEST MANAGEMENT PRACTICES (BMPS) MAINTAINED TO DATE

Number of BMPs Maintained to the Date

Ballona Creek and Urban Santa Monica Bay Watershed Management Area

BMP Type	Beverly Hills	City of Los Angeles	Culver City	El Segundo	Hermosa Beach	County of Los Angeles	LACFCD	Manhattan Beach	Palos Verdes Estates	Rancho Palos Verdes	Redondo Beach	Rolling Hills	Rolling Hills Estates	Santa Monica	West Hollywood	Total
Abtech OARS Oil Skimmer			2													2
Abtech Ultra Urban Catch Basin Insert		75	8			264		2		2	4					355
CDS Gross Pollutant Separators		56	2				5	10		1	3					77
Clean Screen Catch Basin Inserts	556			15		5										576
Covered Material Bunkers			22	12		4										38
Covered Trash Bins	278		1	15	46	1400		459	56			1	48			2304
Dog Parks		7	1	2	30	4		2					8	2	1	57
Drain Pac Catch Basin Inserts		143			41									73		257
Enhanced Street Sweeping				2	3	1				1	2		1			10
Extra Trash Cans				62	120	24		126				4	27		200	563
Floating Trash Booms						26										26
Fossil Filter Catch Basin Inserts		998	15	1		78				67	44			19	99	1321
Geo Block Porous Pavement		26								2	1	1	1			31
Grass Block Porous Pavement											1	2		8		11
Grass Pavers Porous Pavement												2		3		5
Gravel Pave Porous Pavement			2										4	3		9
HydroCartridge In-Line Filters		7				7							1	3		18
Infiltration Trenches		157			1	2		15			20		2	31	14	242
Restaurant Vent Traps				44	96			78								218
Stormceptor Gross Pollutant Separators	68	33		6							1				2	110
Abtech Smart Sponge		2														2
Abtech Steemer		1														1
Alternative Surfaces										3						3
Automatic Retractible Screen Catch Basin(ARS)					49	282							2			333
Bioclean Catch Basin Insert														36		36
Biofilters										18				58	16	92
Bioretention Facility (planter box)		1163														1163
Bird Deterrent Spikes						20										20

Number of BMPs Maintained to the Date

Ballona Creek and Urban Santa Monica Bay Watershed Management Area

BMP Type	Beverly Hills	City of Los Angeles	Culver City	El Segundo	Hermosa Beach	County of Los Angeles	LACFCD	Manhattan Beach	Palos Verdes Estates	Rancho Palos Verdes	Redondo Beach	Rolling Hills	Rolling Hills Estates	Santa Monica	West Hollywood	Total
Carson Flow Filter										5						5
Catch Basin Insert (various)					6	37		9			50					102
Catch Basin Opening Screen		28796														28796
Catch Basin Insert Screens, Filters, Excluders														247		247
Cistern/Rain Barrel		16												114		130
Clarifiers			2					5								7
Concrete Porous Pavement													1			1
Concrete Washout Containers						15										15
Concrete Waste Management						5										5
Connector Pipe Screens Catch Basin(CPS)					14	348			13				28			403
Debris Net							1									1
Detention Basin with Biofiltration													1			1
Detention/Infiltration Basin								3		1						4
Diversion of Roof Drains to Vegetated Areas												65				65
Diversion of Surface Water from Slopes												58				58
Downspout Filters/Insert														11		11
Earth Dikes/ Drainage Swales						4										4
Efficient Irrigation												58				58
Enclosed Material Mix Truck						1										1
Energy Dissipator										7		6				13
Fiber Rolls						1000										1000
Filterra		36														36
Filtration Systems/Devices											1					1
Floguard Catch Basin Insert													2			2
Flow-through Planter Box			1												2	3
Grease Interceptors					15											15
Green Roof System		5			2			4								11
Green Street														2		2
Harvest & Reuse															1	1
Horse Rack Diversion													1			1

Number of BMPs Maintained to the Date

Ballona Creek and Urban Santa Monica Bay Watershed Management Area

BMP Type	Beverly Hills	City of Los Angeles	Culver City	El Segundo	Hermosa Beach	County of Los Angeles	LACFCD	Manhattan Beach	Palos Verdes Estates	Rancho Palos Verdes	Redondo Beach	Rolling Hills	Rolling Hills Estates	Santa Monica	West Hollywood	Total
Hydrodynamic Seperation System															1	1
Infiltration Basin													2			2
Infiltration Pit														944		944
Infiltration System					66						16					82
Low Flow Diversion		8					19									27
Minimize Impervious Area											13					13
Perforated CMP														2		2
Permeable/Porous Pavement													2	10		12
Pet Waste Stations								23							81	104
Poured Concrete Catch Basin						1										1
Porous Pavement					2			7				13				22
Recycle Bins						7										7
Retention Basin			4					1								5
Sand Bag						1001										1001
Sanitary Septic Waste Management						2										2
Signage & Stenciling										78	16				82	176
Silt Fence/Screen						44										44
Slope Stabilization						4										4
Slope Vegetation		181														181
Solid Waste Management						2										2
Spill Prevention & Control						2										2
Stabilized Construction Entrance						10										10
Stockpile Management						2										2
Stormdrain Grate						24										24
Stormdrain Inlet Protection						6										6
Storm Filter		33								6				12		51
StormTech Chamber System		3														3
Suntree Baffle Box					1											1
Suntree Grate Inlet Skimmer Box										3						3
Synthetic Turf Playing Field								1								1
Trash Enclosures											14					14
Trash Excluders								62								62
Trench Drain Insert								5								5
Trench Drain with Fossil Filter						6									2	8
Vegetated Swale/Strip		32								10			3		8	53
Vehicle & Equipment Maintenance						1										1
Water Trucks						1										1
Wind Erosion						1										1

APPENDIX G

PLASTIC PELLETS MEMO

CITY OF LOS ANGELES

Santa Monica Bay
Near Shore and Offshore Debris TMDL

Plastic Pellet

Background

- Water Code Section 13367 requires Regional Board to implement a program to control point and nonpoint source discharges of preproduction plastic.

- The program must, at a minimum, require plastic manufacturing, handling, and transportation facilities to implement BMPs, including: appropriate containment systems; sealed containers durable against rupture during transfer and storage; use of capture devices during loading/unloading and transfer; and provide availability of a vacuum system to clean up loose pellets.

- Plastic pellets are harmful to aquatic life, as they are easily transported through waterways into the environment. Birds, fish, and mammals consume these pellets mistakenly as food.

- The Regional Board developed and adopted the Santa Monica Bay Nearshore and Offshore Debris TMDL on November 4, 2010. This TMDL provides the detailed analysis supporting the problem, as well as the numerical target for waste load allocation, monitoring and reporting requirements, and the responsible agencies for compliance with this TMDL. The TMDL consists of two parts for trash and plastic pellets discharge into the Santa Monica Bay. This report focuses on the outline pertaining to plastic pellet discharge control.

- The method of compliance with the plastic pellet waste load allocation assigned to industrial permittees include implementation of BMPs, such as appropriate containment systems, sealed containers, vacuum system, frequent inspection, and cleaning at operation area.

TMDL - REQUIREMENTS

- Numerical target= Zero plastic pellets in Santa Monica Bay.

- Principal source of plastic pellets is point source discharge through storm drains from industries that import, manufacture, process, transport, store, recycle, or handle plastic pellets. Accidental spill during transfer and transportation are also a contributing source.

- Discharge of plastic pellets from storm drains and open channels occurs during or shortly after a main rain event.

- WLA for plastic pellets assigned to permittees of industrial storm water general permit.

- SIC codes associated with industrial operation involving plastic pellets include: 282X, 305X, 308X, 39XX, 25XX, 3261, 3357, 373X, and 2893.

- Zero WLA must be implemented by industries with operation involving plastic pellets.

- Jurisdictional agencies responsible for MS4 discharge must either prepare a Plastic Pellet Monitoring and Reporting Plan (PMRP), or demonstrate that a PMRP is not required under the following conditions:

  - Agencies with plastic pellet (PP) industrial facilities shall prepare a PMRP to i) monitor the amount of PP discharge from the MS4, ii) establish triggers for increased inspection and enforcement of SWPPP requirements, and iii) address potential PP spill.

  - Agencies with no PP industries are not required to monitor at MS4, but are required to include response plan in PMRP.

  - Agencies with only residential areas and limited commercial or industrial transportation corridors (rail and roadway) may submit, in lieu of PMRP, documentation demonstrating lack of PP sources.

  - The PMRP must include protocols for 24-hour notification of Regional Board by the responsible agency in the event of PP spill and a comprehensive containment plan.

Monitoring and Reporting Plan

- Industries responsible for discharge of PP must enroll with the California State Resources Control Board or apply for a general permit or an individual industrial stormwater permit from the Regional Board.

- Industrial Permittees must prepare and keep onsite a SWPPP

- All responsible permittees, as defined under Waste Load Allocation, are required to prepare and submit annual monitoring reports with monitoring designed to ensure compliance with WLA.

- MS4 permittees must either prepare a PMRP or demonstrate that PMRP is not required under certain conditions as follows:

- Responsible agencies have industrial facilities involved in PP manufacturing; transportation agencies within their jurisdiction must prepare PMRP to: i) monitor the amount of PP discharged from MS4 at critical locations and time at a minimum of once during each dry and wet season; ii) establish triggers for increased industrial facilities inspection and enforcement of SWPPP
- Responsible agencies that have no PP industries may not be required to monitor at MS4, but must be required to include a response plan in PMRP.
- A MS4 permittee may, in lieu of PMRP, demonstrate to Regional Board that it has only residential areas within its jurisdiction with limited commercial or industrial transportation corridors (rail and roadway), such that it is not considered a potential source of PP to SMB.

Implementation Schedule

- Submit within 18 months from the effective date of TMDL (September 2013), a PMRP for:

  - Monitoring plastic pellet discharges from the MS4;
  - Increased industrial facility inspections and enforcement;
  - Response to possible plastic pellet spills; OR
  - Demonstrate that PMRP is not required.

- Implement PMRP 4 years from Effective Date of TMDL (March 2016)

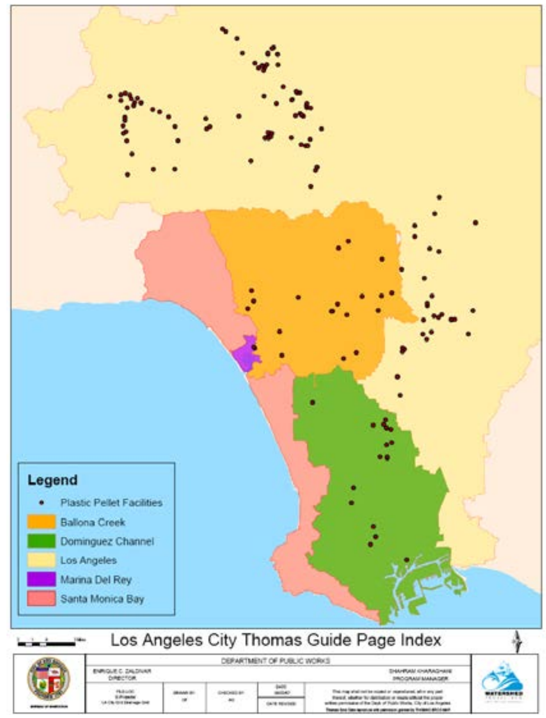
- Submit Results of implementing PMRP Twenty (20) months from receipt of letter of approval from Regional Board

- Within 5 years of effectiveness date of TMDL (March 2017), permittees of industrial storm water NPDES permit (IUs subject to with SIC codes associated with PP), must achieve compliance with Industrial NPDES permit requirements to achieve the plastic pellets WLA

PMRP

a) Santa Monica Bay J2/J3

In a preliminary investigation of industries with SIC codes associated with manufacturing or use of plastic pellets within the City of LA, it was found that none are located in the subwatersheds draining into the Santa Monica Bay, except for Ballona Creek subwatershed as shown here.



Furthermore, with the exception of Ballona Creek, the land use of all other City's sub-watersheds draining into the Santa Monica Bay from Castle Rock to Dockweiler are residential with limited commercial facilities. Additionally, there are no railways within these sub-watersheds, and the only roadway for transportation is the PCH, which falls under the Caltrans jurisdiction. As a result, for these sub-watersheds, submittal of residential documents to illustrate the land use in lieu of PMRP and its' requires components will be sufficient. That is, Santa Monica Bay J2/J3 has exemption from monitoring. Thus, the focus of PMRP will be on the Ballona Creek sub-watershed.

Facilities Involved in Handling PP

To identify facilities potentially involved in operation, transportation, use, generation, or handling plastic pellets The following steps were taken:

1) Request was made from Industrial Waste Management Division of the City for a list of all industrial users/permittees that have been assigned at least one of the SIC codes described in the TMDL as follows; 282X, 305X, 308X, 39XX, 25XX, 3261, 3357, 373X, and 2893.

2) A list of over 2,200 users/permittees was provided that included: permit number, name, address, type of facility, and brief description of their operation

3) Through a process of elimination the list was narrowed down in a few steps by random calling to those industries that did not seem to be candidate PP facilities (such as furniture fixture, drapery hardware, burial casket etc.)

4) The final list included facilities with unit operations, such as Plastic Foam product, Laminating Plastic plates, Plastic manufacturing of Synthetic Resins, Children Toy vehicle, and doll manufacturer, etc.

5) A final list of approximately 172 facilities was then geocoded on a GIS map that included all City watershed shapefiles.

6) 21 facilities were located within the Ballona Creek subwatershed, and 2 in Marina Del Ray.

7) A special survey form was prepared and provided to inspection to be completed during site visits of the 23 facilities. Included in the questionnaire was a question to determine if the facility is involved in manufacturing, use, transport, storage or handling of PP. (See attachment).

8) One facility was found to use PP. Teksun Inc. located at 11368 Olympic Blvd, 90064 within the Ballona Creek Watershed. The remaining questionnaire from this facility showed that they use approximately 500 lb/month of PP. The facility has adequate storage area with no drains leading to the storm drain, and having proper equipment in work area for cleaning up and sweeping any potential spill. Facility does not ship out PP; it only receives PP in plastic bags for their operation.

9) Subsequent to the survey review, a second site visit of Teksun Inc. was conducted by WPD staff to: a) evaluate facility's operation and housekeeping practice; b) to assess the possibility of PP release into the storm drain system in case of accidental spill and to locate the nearest catch basin and point of monitoring. Also visited for potential use of PP was a second facility, Solter Plastic located at 12016 Pico Blvd. However, this facility was found to use plastic sheets and not PP. A GIS map showing these facilities orientation with respect to the nearest catch basin as well as the runoff flow direction is attached.

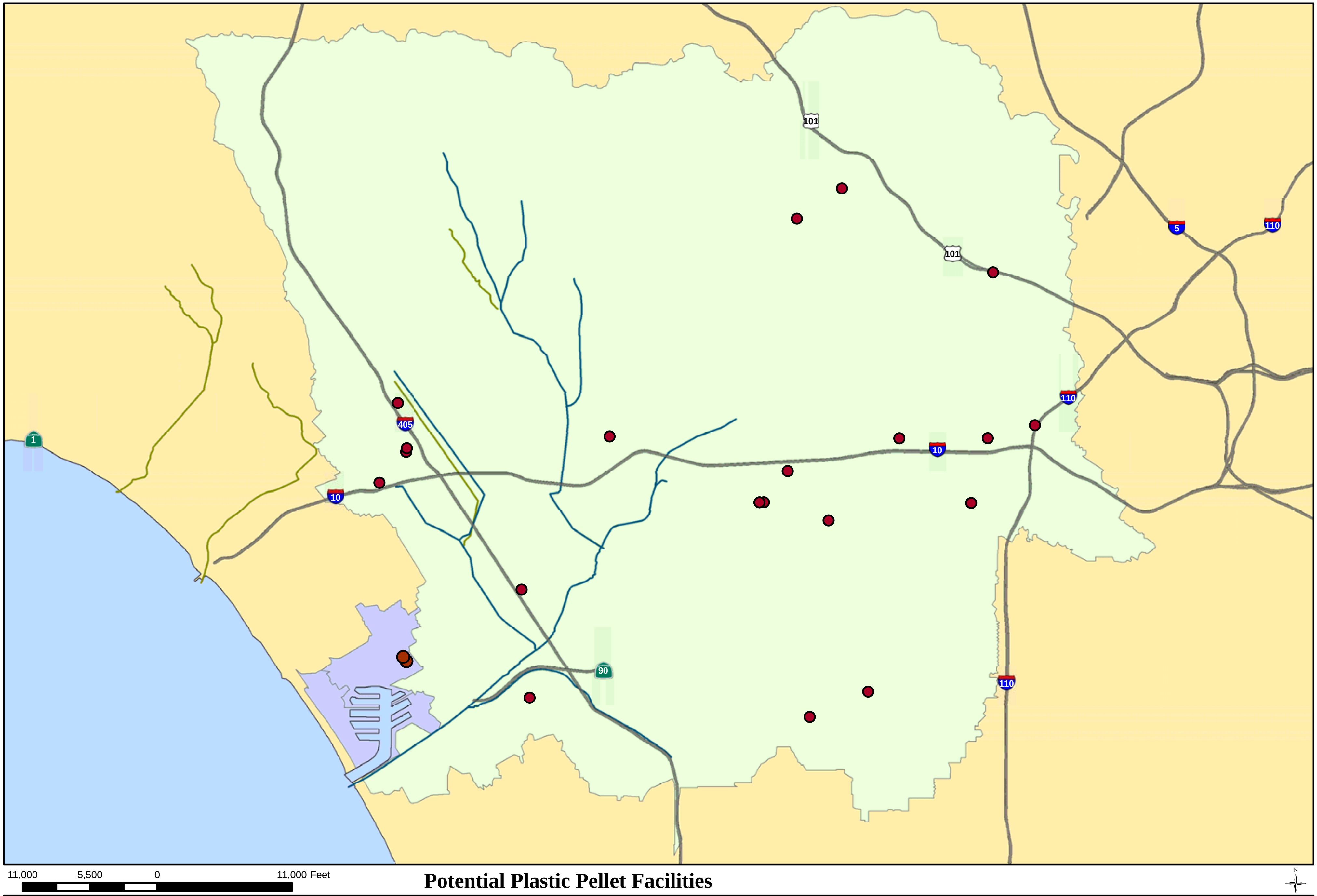
10) Teksun Inc. was observed to have a clean operation. The facility's manager and operators were aware of the PP issues of concern. The operational area seemed to be well contained. No PP was observed in the trash bins. The inspection concluded little chance for PP spill. Photos of the facility location, and nearest catch basin is included in the attachment.

Summary:

- Santa Monica Bay J2/J3 watershed: There are no PP facilities on this water shed and there is little or no chance of transportation of PP through the watershed roadways, and thus is exempt from monitoring (PMRP). The City's emergency/spill response plan for hazardous material, however, should include PP.

- Ballona Creek: The required elements of PMRP can be considered for this watershed, including but not limited to, increased inspection of Teksun Inc., ensuring Teksun is registered with the State , and designating a monitoring location during storm events (the catch basin on Purdue May qualify for observation/and or monitoring).

Attachments



Potential Plastic Pellet Facilities

BUREAU OF SANTATION

ENRIQUE C. ZALDIVAR
DIRECTOR

SHAHRAM KHARAGHANI
PROGRAM MANAGER

FILE-LOC map file Location	DRAWN BY: XX	CHECKED BY: XX	DATE XX/XX/XX

BUREAU OF SANITATION

Appendix G-9

CITY OF LOS ANGELES
SANITATION
DEPARTMENT OF PUBLIC WORKS

Watershed Protection Division

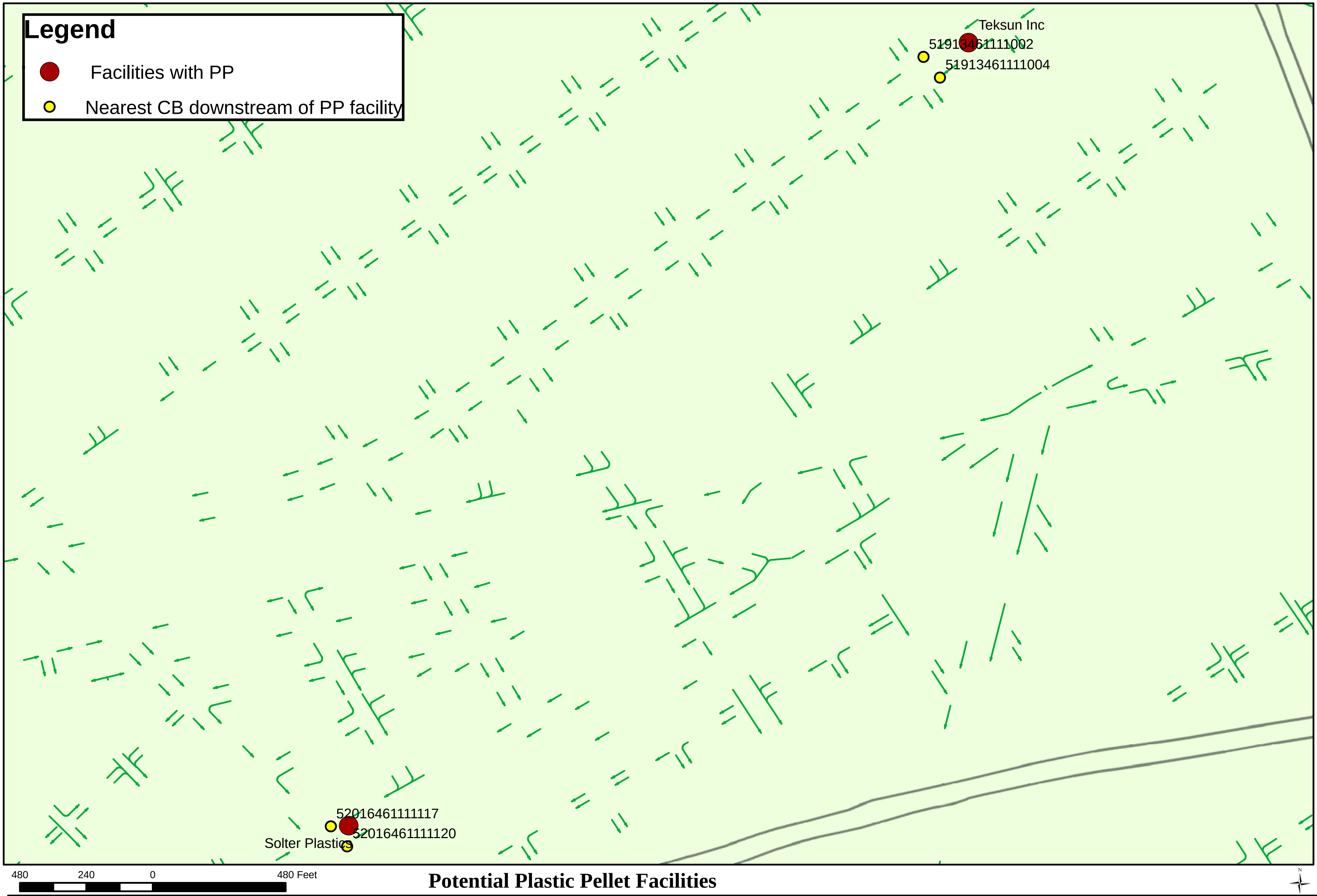
1149 South Broadway
LOS ANGELES, CA 90015
OFFICE: (213) 485-0000
FAX: (213) 485-3939

ON SITE PLASTIC PELLETS USEGE SURVEY

Name (DBA):	**Telephone No.:**
Address / Location: Street ___________________________ City ___________________________ Zip ______________ Contact Name:_____________ Phone: _________________	**Authorized Representative / Title:** ______________________________ ________________________ PRINT NAME PRINT TITLE __________________________________ _________________ Signature Date Inspector: ______________________________

Instructions: Please complete a separate survey form (if necessary, make additional copies) for each location where plastic pellets are used for production of plastic goods. If there is plastic pellets are used, or transferred, check the "NO" box below, sign, date, and return this survey form to the Watershed Protection Division.

Are plastic pellets used, stored, or transported to or from this facility?	YES	NO
Usage/Operation:		
Amount of plastic pellets used per month / year	_________________ Qty.	
Is there any waste stream generated that contains plastic pellets	YES	NO
Storage:		
Is the storage area properly contained	YES	NO
Is the facility have proper equipment in work area to clean up incidental spills of plastic pellets	YES	NO
Transportation:		
Are plastic pellets kept double bagged and sealed during transportation?	YES	NO
	YES	NO
General		
Are there any drains near operation, storage or shipping area that is directly leading to the storm drain system?	YES	NO
Describe the location of nearest catch basin downstream of the facility ____		
Any other Remarks		
____ ____		



Potential Plastic Pellet Facilities

BUREAU OF SANITATION

BUREAU OF SANTATION

ENRIQUE C. ZALDIVAR
DIRECTOR

SHAHRAM KHARAGHANI
PROGRAM MANAGER

FILE-LOC	DRAWN BY:	CHECKED BY:	DATE
map file Location	XX	XX	XX/XX/XX

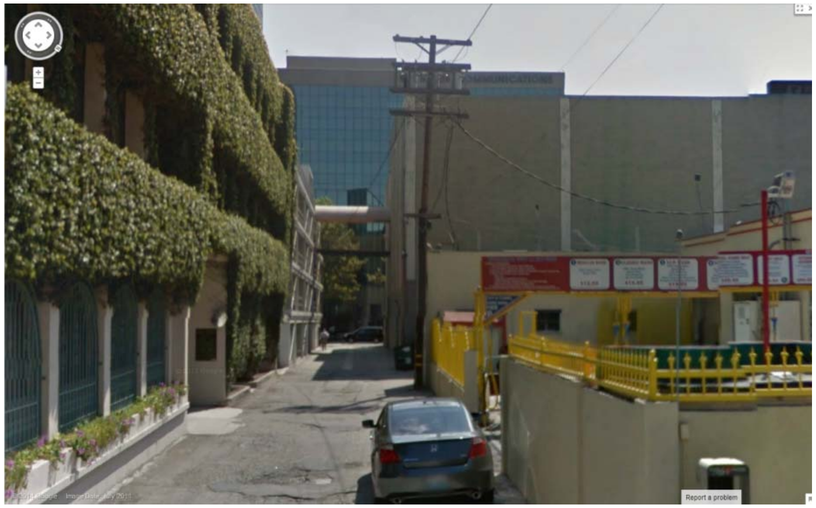
Appendix G-11

WATERSHED PROTECTION

Teksun Facility

Facility's front door on Olympic

- No Possible discharge/release of PP through the front Door
- Operation area towards the back door
- In the event of incidental spill (minute chance), the run off would have to travel down the alley, turn south into Purdue Street travel over a block to enter the nearest catch basin The catch basin configuration would not accommodate for installation of filters.



Facility's back door on the alley behind Olympic

Nearest Catch basin on Purdue St. One and half block away

CITY OF LOS ANGELES
PLASTIC PELLETS FACILITIES

FACILITY NAME	ADDRESS	CITY	ZIP	BUSINESS DESCRIPTION	SIC CODE	SIC DESCRIPTION
Diamond Polyethylene Products	3113 E 11th Street	Los Angeles	90023	WPIMS Facility	2673	Plastics, Foil, and Coated Paper Bags
Penmar Enterprises	11256 Bradley Avenue	Pacoima	91331	WPIMS Facility	2673	Plastics, Foil, and Coated Paper Bags
Aplasticbag-Com	17014 S Vermont Avenue	Gardena	90247	WPIMS Facility	2673	Plastics, Foil, and Coated Paper Bags
Super-Vent Packaging Systems	2020 E 25th Street	Los Angeles	90058	WPIMS Facility	2673	Plastics, Foil, and Coated Paper Bags
Western States Packaging Inc	21341 Lassen Street	Chatsworth	91311	WPIMS Facility	2673	Plastics, Foil, and Coated Paper Bags
Sealer Sales	18327 Sherman Way	Reseda	91335	WPIMS Facility	2673	Plastics, Foil, and Coated Paper Bags
K-C Products Co	1600 E 6th Street	Los Angeles	90023	WPIMS Facility	3081	Unsupported Plastics Film & Sheet
Compotite Corp	355 Glendale Boulevard	Los Angeles	90026	WPIMS Facility	3081	Unsupported Plastics Film & Sheet
Eric 86 Inc	646 N San Fernando Road	Los Angeles	90065	WPIMS Facility	3085	Plastics Bottles
Atlas Foam Products	12836 Arroyo Street	Sylmar	91342	WPIMS Facility	3086	Plastics Foam Products
Foamed Plastics Unlimited	10611 Burbank Boulevard	North Hollywood	91601	WPIMS Facility	3086	Plastics Foam Products
LBM Products	10711 Chandler Boulevard	North Hollywood	91601	WPIMS Facility	3082	Unsupported Plastics Profile Shapes
Plasti-Personalities Inc	1224 252nd Street	Harbor City	90710	WPIMS Facility	3086	Plastics Foam Products
Life Like Products	2340 E 52nd Street	Los Angeles	90058	WPIMS Facility	3086	Plastics Foam Products
Kal Plastics	1321 W 135th Street	Gardena	90247	WPIMS Facility	3081	Unsupported Plastics Film & Sheet
Rxi Holdings Inc	11111 Santa Monica Boulevard # 270	Los Angeles	90025	WPIMS Facility	3085	Plastics Bottles
Cardservice International	21243 Ventura Boulevard # 201	Woodland Hills	91364	WPIMS Facility	3081	Unsupported Plastics Film & Sheet
Mab Plastics	6248 De Longpre Avenue	Los Angeles	90028	WPIMS Facility	3089	Plastics Products, N.E.C.
Engineering & Electronic Inc	1024 N Mccadden Place	Los Angeles	90038	WPIMS Facility	3089	Plastics Products, N.E.C.
Wholesale Plastic Enterprises	1955 Blake Avenue # H	Los Angeles	90039	WPIMS Facility	3089	Plastics Products, N.E.C.
Coast Pharmacy & Medical Supl	2106 Colorado Boulevard	Los Angeles	90041	WPIMS Facility	3089	Plastics Products, N.E.C.
York Engineering	4405 Lincoln Avenue	Los Angeles	90041	WPIMS Facility	3089	Plastics Products, N.E.C.
Mony's International Imports	315 N Hoover Street	Los Angeles	90004	WPIMS Facility	3089	Plastics Products, N.E.C.
Morvis Corvis Corporation	1307 W Pico Boulevard	Los Angeles	90015	WPIMS Facility	3089	Plastics Products, N.E.C.
Karma Kontrol	4606 W Jefferson Boulevard	Los Angeles	90016	WPIMS Facility	3089	Plastics Products, N.E.C.
Quality Plasticraft	4568 W Adams Boulevard	Los Angeles	90016	WPIMS Facility	3089	Plastics Products, N.E.C.
American Molds Engineering Inc	2258 W Washington Boulevard	Los Angeles	90018	WPIMS Facility	3089	Plastics Products, N.E.C.
Sandel Products	3030 Exposition Boulevard	Los Angeles	90018	WPIMS Facility	3089	Plastics Products, N.E.C.
Nathan Kimmel Co	1213 S Santa Fe Avenue	Los Angeles	90021	WPIMS Facility	3089	Plastics Products, N.E.C.
Western Plastics Fabrics Inc	1011 S Santa Fe Avenue	Los Angeles	90021	WPIMS Facility	3089	Plastics Products, N.E.C.
Dial Industries Inc	1538 Esperanza Street	Los Angeles	90023	WPIMS Facility	3089	Plastics Products, N.E.C.
Dial Safety Ladder	3616 Noakes Street	Los Angeles	90023	WPIMS Facility	3089	Plastics Products, N.E.C.
Plastics America	1540 Calzona Street	Los Angeles	90023	WPIMS Facility	3089	Plastics Products, N.E.C.
Electroseal Plastics Inc	2811 N San Fernando Road	Los Angeles	90065	WPIMS Facility	3089	Plastics Products, N.E.C.
Cal Am Mfg Inc	13581 Desmond Street	Pacoima	91331	WPIMS Facility	3089	Plastics Products, N.E.C.
Cal Star Plastic Products	11238 Ilex Avenue	Pacoima	91331	WPIMS Facility	3089	Plastics Products, N.E.C.
G H Engineering Co	12350 Montague Street # A	Pacoima	91331	WPIMS Facility	3089	Plastics Products, N.E.C.
Phillips Plywood Co Inc	13599 Desmond Street	Pacoima	91331	WPIMS Facility	3089	Plastics Products, N.E.C.
Rmia	12801 Wentworth Street	Arleta	91331	WPIMS Facility	3089	Plastics Products, N.E.C.
Topco Sales	11960 Borden Avenue	San Fernando	91340	WPIMS Facility	3089	Plastics Products, N.E.C.
C & G Mercury Plastics	12729 Foothill Boulevard	Sylmar	91342	WPIMS Facility	3089	Plastics Products, N.E.C.
C & S Plastics	12621 Foothill Boulevard	Lake View Ter	91342	WPIMS Facility	3089	Plastics Products, N.E.C.
Kondor Plastics	12865 Foothill Boulevard	Sylmar	91342	WPIMS Facility	3089	Plastics Products, N.E.C.
Pacific Plastics Design Inc	15570 Roxford Street	Sylmar	91342	WPIMS Facility	3089	Plastics Products, N.E.C.
Plexart & Displays	12896 Bradley Avenue # H	Sylmar	91342	WPIMS Facility	3089	Plastics Products, N.E.C.
Atlas Mold	11537 Tuxford Street	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Circle K Plastics	11345 Penrose Street	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Custom Molding Co	11126 Tuxford Street	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Ectemm Molds	7680 San Fernando Road	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Eltec Corp	11871 Sheldon Street	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Exacta Plastics	9105 De Garmo Avenue	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Joe's Tooling	8600 Tujunga Avenue	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Mdi Mfg & Design Inc	11500 Sheldon Street	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Polyplex Plastics of N America	8511 Lankershim Boulevard	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Roplastics	9790 Glenoaks Boulevard	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Rubser	8986 Glenoaks Boulevard	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
William's Foam Co	9847 Glenoaks Boulevard	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Mas Plastics Framing	14248 Oxnard Street	Van Nuys	91401	WPIMS Facility	3089	Plastics Products, N.E.C.
J-Esco Enterprises Inc	8526 Kester Avenue	Panorama City	91402	WPIMS Facility	3089	Plastics Products, N.E.C.
All Valley Plastics	10634 Burbank Boulevard	North Hollywood	91601	WPIMS Facility	3089	Plastics Products, N.E.C.
Asa Plastic Designs	10999 Riverside Drive # 109	North Hollywood	91602	WPIMS Facility	3089	Plastics Products, N.E.C.
Andreas Fibercraft Co	7350 Atoll Avenue # 12	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
Astro Plastics	7300 Fulton Avenue	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
Cadillac Plastic	11245 Vanowen Street	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
California Plastics	7246 Atoll Avenue	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
Clear Systems	13438 Wyandotte Street	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
Collins Products	13112 Saticoy Street	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
Flex Moulding	7361 Ethel Avenue # 34	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
Plastic Form Inc	6868 Farmdale Avenue	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
Promex International Plastics	11125 Vanowen Street	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
Seroplast	13026 Saticoy Street	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
Superplex	7155 Vineland Avenue	North Hollywood	91605	WPIMS Facility	3089	Plastics Products, N.E.C.
Malibu Plastics	1765 Oak Street	Torrance	90501	WPIMS Facility	3089	Plastics Products, N.E.C.
Premiere Specialty Products	2281 W 205th Street	Torrance	90501	WPIMS Facility	3089	Plastics Products, N.E.C.
Plasticorp	24105 Frampton Avenue	Harbor City	90710	WPIMS Facility	3089	Plastics Products, N.E.C.
Star Plastic Designs	25914 President Avenue	Harbor City	90710	WPIMS Facility	3089	Plastics Products, N.E.C.
One World Auto Shippers	229 Broad Avenue	Wilmington	90744	WPIMS Facility	3089	Plastics Products, N.E.C.
Abco Plastic Extruders Inc	739 62nd Street	Los Angeles	90001	WPIMS Facility	3089	Plastics Products, N.E.C.
L W Reinhold Plastics Inc	8763 Crocker Street	Los Angeles	90003	WPIMS Facility	3089	Plastics Products, N.E.C.
Crossman Manufacturing Inc	6820 Brynhurst Avenue	Los Angeles	90043	WPIMS Facility	3089	Plastics Products, N.E.C.
Little Crafts	2225 Southwest Drive	Los Angeles	90043	WPIMS Facility	3089	Plastics Products, N.E.C.
Camden Industries Inc	2050 E 48th Street	Los Angeles	90058	WPIMS Facility	3089	Plastics Products, N.E.C.
Edris Plastic	4560 Pacific Boulevard	Los Angeles	90058	WPIMS Facility	3089	Plastics Products, N.E.C.
D & D Plastics	13920 S Figueroa Street	Los Angeles	90061	WPIMS Facility	3089	Plastics Products, N.E.C.
Galaxy Plastic	545 W 130th Street	Los Angeles	90061	WPIMS Facility	3089	Plastics Products, N.E.C.
Compass Plastics & Tech Inc	15730 S Figueroa Street	Gardena	90248	WPIMS Facility	3089	Plastics Products, N.E.C.
Dae Hyun Usa Inc	17208 S Figueroa Street	Gardena	90248	WPIMS Facility	3089	Plastics Products, N.E.C.
Plastics Processing Corp	13432 Estrella Avenue	Gardena	90248	WPIMS Facility	3089	Plastics Products, N.E.C.
Rotonics Manufacturing Inc	17038 S Figueroa Street	Gardena	90248	WPIMS Facility	3089	Plastics Products, N.E.C.
T & T Plastics	117 W 155th Street	Gardena	90248	WPIMS Facility	3089	Plastics Products, N.E.C.
Pro Plastic Inc	2358 S Robertson Boulevard	Los Angeles	90034	WPIMS Facility	3089	Plastics Products, N.E.C.
Advanced Products	11201 Hindry Avenue	Los Angeles	90045	WPIMS Facility	3089	Plastics Products, N.E.C.
Metro Mold Inc	2234 Purdue Avenue	Los Angeles	90064	WPIMS Facility	3089	Plastics Products, N.E.C.
Solter Plastics	12016 W Pico Boulevard	Los Angeles	90064	WPIMS Facility	3089	Plastics Products, N.E.C.
Teksun Inc	11368 W Olympic Boulevard	Los Angeles	90064	WPIMS Facility	3089	Plastics Products, N.E.C.
Acrylic Specialites	4203 Sepulveda Boulevard	Culver City	90230	WPIMS Facility	3089	Plastics Products, N.E.C.
Joseph Galvan Studio	6740 S Centinela Avenue	Culver City	90230	WPIMS Facility	3089	Plastics Products, N.E.C.
Techmar Corp	4150 Glencoe Avenue A	Marina Del Rey	90292	WPIMS Facility	3089	Plastics Products, N.E.C.
Stratford Molded Plastics Inc	7237 Eton Avenue	Canoga Park	91303	WPIMS Facility	3089	Plastics Products, N.E.C.
Blackburn Engineering	8100 Remmet Avenue # 7	Canoga Park	91304	WPIMS Facility	3089	Plastics Products, N.E.C.
Image Molding	8565 Canoga Avenue	Canoga Park	91304	WPIMS Facility	3089	Plastics Products, N.E.C.
Martec	8447 Canoga Avenue	Canoga Park	91304	WPIMS Facility	3089	Plastics Products, N.E.C.
Plascap Corp Plastic Closures	7721 Deering Avenue	Canoga Park	91304	WPIMS Facility	3089	Plastics Products, N.E.C.
Pope	8551 Canoga Avenue	Canoga Park	91304	WPIMS Facility	3089	Plastics Products, N.E.C.
Robert Davis Mold	7630 Alabama Avenue # 3	Canoga Park	91304	WPIMS Facility	3089	Plastics Products, N.E.C.
Dekker Design Plastics	21701 Plummer Street	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
Econoplast	20371 Prairie Street # 7	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
G M Plastic & Mold	9625 Cozycroft Avenue # E	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
Ken Mc Nabb Co	9801 Independence Avenue	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
Manchester Plastics Co	20401 Prairie Street	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
Micro Plastics Inc	20821 Dearborn Street	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
Orbit Industry	9811 Owensmouth Avenue # 12	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
Plastofilm Industries Inc	22416 Needles Street	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
Precision Molds & Molding Co	21200 Nordhoff Street	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
Rem Industries Inc	20731 Prairie Street	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
Toye Corp	20916 Itasca Street	Chatsworth	91311	WPIMS Facility	3089	Plastics Products, N.E.C.
Home Grown Creation	18836 Malden Street	Northridge	91324	WPIMS Facility	3089	Plastics Products, N.E.C.
Perfect Mold	19356 Business Center Drive	Northridge	91324	WPIMS Facility	3089	Plastics Products, N.E.C.
Unitech-Deco Inc	19731 Bahama Street	Northridge	91324	WPIMS Facility	3089	Plastics Products, N.E.C.
Morris Enterprises Inc	16799 Schoenborn Street	Sepulveda	91343	WPIMS Facility	3089	Plastics Products, N.E.C.
Overflo Drain Systems	18536 Burbank Boulevard	Tarzana	91356	WPIMS Facility	3089	Plastics Products, N.E.C.
Plastic Zone	19841 Ventura Boulevard	Woodland Hills	91364	WPIMS Facility	3089	Plastics Products, N.E.C.

CITY OF LOS ANGELES
PLASTIC PELLETS FACILITIES

FACILITY NAME	ADDRESS	CITY	ZIP	BUSINESS DESCRIPTION	SIC CODE	SIC DESCRIPTION
Valley Plastics	20934 Victory Boulevard	Woodland Hills	91367	WPIMS Facility	3089	Plastics Products, N.E.C.
Aat Fabrication	16760 Stagg Street # 217	Van Nuys	91406	WPIMS Facility	3089	Plastics Products, N.E.C.
Task International	16523 Arminta Street	Van Nuys	91406	WPIMS Facility	3089	Plastics Products, N.E.C.
American Plastic Products, Inc.	9243 Glenoaks Boulevard	Sun Valley	91352	WPIMS Facility	3089	Plastics Products, N.E.C.
Khachik Vartanian	11238 Ilex Avenue	Pacoima	91331	WPIMS Facility	3089	Plastics Products, N.E.C.
PRICE PFISTER	11080 SUTTER Avenue	PACOIMA	91331	PLASTIC PLUMBING FIXTUR	3089	Plastics Products, N.E.C.
ADMIRAL PLASTIC CORP	908 AVILA Street	LOS ANGELES	90012	Air Cond. & Refrig. Equip. & S	3089	Plastics Products, N.E.C.
AMERICAN CASTER CORP	141 W AVENUE 34	LOS ANGELES	90031	MANUFACTURING PLASTIC	3089	Plastics Products, N.E.C.
COAST CONVERTERS INC.	1601 PERRINO Place	LOS ANGELES	90023	Printing: Glass-Matel-Plastic	2673	Plastics, Foil, and Coated Paper Bags
DIAL INDUSTRIES,INC.	1538 ESPERANZA Street	LOS ANGELES	90023	PLASTIC MANUFACTURER	3089	Plastics Products, N.E.C.
HOWARD LEIGHT INDUSTRIES	4061 GLENCOE Avenue	MARINA DEL REY	90292	Latex & Rubber Products	3086	Plastics Foam Products
L.W. REINHOLD PLASTICS INC.	8763 CROCKER Street	LOS ANGELES	90003	MANUFACTURER OF PLAST	3089	Plastics Products, N.E.C.
MICRO PLASTICS, INC.	20821 DEARBORN Street	CHATSWORTH	91311	PLASTIC MOLDING	3089	Plastics Products, N.E.C.
PLASTI PERSONALITIES, INC.	1225 W 252 Street	HARBOR CITY	90710	E.P.S. FOAM MOLDER	3086	Plastics Foam Products
Spears Manufacturing Co.	15853 Olden Street	Sylmar	91392	Plastic Pipe Fittings & Valve M	3089	Plastics Products, N.E.C.
WESTERN GOLD THERMOPLASTICS	840 E 60TH Street	LOS ANGELES	90001	Plastics	3089	Plastics Products, N.E.C.
MICRODOT CONNECTORS	306 PASADENA Avenue	SOUTH PASADENA	91030	MANUFACTURER OF CIRCU	3089	Plastics Products, N.E.C.
ECOPLAST CORPORATION	840 E 60TH Street	LOS ANGELES	90001	PLASTIC RECYCLING	3089	Plastics Products, N.E.C.
UNITED SALES	4713 W JEFFERSON Boulevard	LOS ANGELES	90016	ADULT NOVELTY MANUFAC	3089	Plastics Products, N.E.C.
CAT CONTRACTING INC.	VAN GOGH	GRANADA HILLS	91344	CURED IN PLACE PIPE	3087	Custom Compounding of Purchased Plastics Resins
INSITUFORM SOUTHWEST	8000 RESEDA Boulevard	LOS ANGELES	91335	PIPELINE REHABILITATION	3087	Custom Compounding of Purchased Plastics Resins
CAT CONTRACTING INC./U112	14700 HUBBARD Street	SYLMAR	91342	CARED IN PLACE SEWER PI	3087	Custom Compounding of Purchased Plastics Resins
INSITUFORM SOUTHWEST	MH 112 - 105 KNOB HILL Drive	SHERMAN OAKS	91423	PIPELINE REHABILITATION	3087	Custom Compounding of Purchased Plastics Resins
INSITUFORM SOUTHWEST	MH 099 - 147 FOX Street	MISSION HILLS	91340	PIPELINE REHABILITATION	3087	Custom Compounding of Purchased Plastics Resins
INSITUFORM SOUTHWEST	MH 039 - 035 INDIAN HILLS Street	MISSION HILLS	91340	PIPELINE REHABILITATION	3087	Custom Compounding of Purchased Plastics Resins
INSITUFORM SOUTHWEST	HYDE PARK BL/VAN NESSAV.	LOS ANGELES	90043	PIPELINE REHABILITATION	3087	Custom Compounding of Purchased Plastics Resins
CAT CONTRACTING INC	PROJECTS LISTED IN PERMIT	LOS ANGELES	91324	CURED IN PLACE PIPE/SEW	3087	Custom Compounding of Purchased Plastics Resins
Armorcast Products Company	13246 Saticoy Street	North Hollywood	91605	Manufacture of Underground U	3089	Plastics Products, N.E.C.
ASTRO PAK, FLOW-LINE SERVICES	1150 W JEFFERSON Boulevard	LOS ANGELES	90007	PIPELINE CLEAN. DIV OF A I	3087	Custom Compounding of Purchased Plastics Resins
TRUTH HARDWARE	12685 VAN NUYS Boulevard	PACOIMA	91331	MANUFACTURER OF DOOR	3089	Plastics Products, N.E.C.
CALIFORNIA PLASTICARD, INC.	1380 W WASHINGTON Boulevard	LOS ANGELES	90007	MANUFACTURER OF CREDI	3089	Plastics Products, N.E.C.
INSITUFORM TECHNOLOGIES, INC.	9623 BARTEE Avenue	ARLETA	91331	TRENCHLESS PIPE REHABIL	3087	Custom Compounding of Purchased Plastics Resins
PLASTOPAN	812 E 59TH Street	LOS ANGELES	90001	PLASTIC INJECTION MOLDIN	3089	Plastics Products, N.E.C.
Rehrig Pacific Company	11949 Sherman Road	North Hollywood	91605	Warehousing, Storage, Assem	3089	Plastics Products, N.E.C.
TYCO ELECTRONICS, MICRODOT CO	306 PASADENA Avenue	SOUTH PASADENA	91030	CIRCUIT CONNECTORS	3089	Plastics Products, N.E.C.
Arrsil Auto Repair	10726 S Avalon Boulevard	Los Angeles	90061	Auto Repair	3087	Custom Compounding of Purchased Plastics Resins
Arrsil Auto Repair	10726 S Avalon Boulevard	Los Angeles	90061	Auto Repair	3087	Custom Compounding of Purchased Plastics Resins
Thermo Fisher Scientific/Samco Sci. Cor	1050 Arroyo Avenue	San Fernando	91340	Mfg Disposable Plastic Labwa	3089	Plastics Products, N.E.C.
L. W. REINHOLD PLASTICS, INC	8763 Crocker Street	Los Angeles	90003	Plastics Manufacturer	3089	Plastics Products, N.E.C.
Western States Packaging Inc	13276 Paxton Street	Los Angeles	91331		2673	Plastics, Foil, and Coated Paper Bags
ABCO PLASTIC EXTRUDERS	739 E 62ND Street	LOS ANGELES	90001		3089	Plastics Products, N.E.C.
POLY PAK AMERICA INC	2939 E WASHINGTON Boulevard	LOS ANGELES	90023		3089	Plastics Products, N.E.C.
FORTIFIBER CORP	4489 BANDINI Boulevard	LOS ANGELES	90023		2673	Plastics, Foil, and Coated Paper Bags
PLEX-ART, INC	211 W 140TH Street	LOS ANGELES	90061		3089	Plastics Products, N.E.C.
JET PLASTICS	941 N EASTERN	LOS ANGELES	90063		3089	Plastics Products, N.E.C.
UNITED SALES	4713 W Jefferson Boulevard	Los Angeles	90016	Novelty Wholesale/Manufactur	3089	Plastics Products, N.E.C.
NUPLA CORPORATION	11912 SHELDON	SUN VALLEY	91352		3087	Custom Compounding of Purchased Plastics Resins
CALIFORNIA ART PRODUCTS, CAPCO	11125 VANOWEN	NORTH HOLLYWOOD	91605		3089	Plastics Products, N.E.C.
Max Moulding	13838 S Figueroa Street	Los Angeles	90061		3089	Plastics Products, N.E.C.

SIC	Sub-Total
2673	9
2871	0
3081	4
3082	1
3085	2
3086	6
3087	13
3089	136
Total	171

List of IUs potentially involved in use of plastic pellets.

FACILITY NAME	ADDRESS	CITY	ZIP	SIC CODE	SIC DESCRIPTION	WATERSHED
Rxi Holdings Inc	11111 Santa Monica Boulevard # 270	Los Angeles	90025	3085	Plastics Bottles	Ballona Creek
Mab Plastics	6248 De Longpre Avenue	Los Angeles	90028	3089	Plastics Products, N.E.C.	Ballona Creek
Engineering & Electronic Inc	1024 N MCCADDEN PLACE	LOS ANGELES	90038	3089	Plastics Products, N.E.C.	Ballona Creek
Mony's International Imports	315 N Hoover Street	Los Angeles	90004	3089	Plastics Products, N.E.C.	Ballona Creek
Morvis Corvis Corporation	1307 W Pico Boulevard	Los Angeles	90015	3089	Plastics Products, N.E.C.	Ballona Creek
Karma Kontrol	4606 W Jefferson Boulevard	Los Angeles	90016	3089	Plastics Products, N.E.C.	Ballona Creek
Quality Plasticraft	4568 W Adams Boulevard	Los Angeles	90016	3089	Plastics Products, N.E.C.	Ballona Creek
American Molds Engineering Inc	2258 W Washington Boulevard	Los Angeles	90018	3089	Plastics Products, N.E.C.	Ballona Creek
Sandel Products	3030 Exposition Boulevard	Los Angeles	90018	3089	Plastics Products, N.E.C.	Ballona Creek
Crossman Manufacturing Inc	6820 Brynhurst Avenue	Los Angeles	90043	3089	Plastics Products, N.E.C.	Ballona Creek
Little Crafts	2225 Southwest Drive	Los Angeles	90043	3089	Plastics Products, N.E.C.	Ballona Creek
Pro Plastic Inc	2358 S Robertson Boulevard	Los Angeles	90034	3089	Plastics Products, N.E.C.	Ballona Creek
Metro Mold Inc	2234 Purdue Avenue	Los Angeles	90064	3089	Plastics Products, N.E.C.	Ballona Creek
Solter Plastics	12016 W Pico Boulevard	Los Angeles	90064	3089	Plastics Products, N.E.C.	Ballona Creek
Teksun Inc[1]	11368 W Olympic Boulevard	Los Angeles	90064	3089	Plastics Products, N.E.C.	Ballona Creek
Acrylic Specialites	4203 Sepulveda Boulevard	Culver City	90230	3089	Plastics Products, N.E.C.	Ballona Creek
Joseph Galvan Studio	6740 S Centinela Avenue	Culver City	90230	3089	Plastics Products, N.E.C.	Ballona Creek
Techmar Corp	4150 GLENCOE AV	MARINA DEL REY	90292	3089	Plastics Products, N.E.C.	Marina Del Rey
HOWARD LEIGHT INDUSTRIES	4061 GLENCOE AVENUE	MARINA DEL REY		3086	Plastics Foam Products	Marina Del Rey
UNITED SALES	4713 W JEFFERSON BOULEVARD	LOS ANGELES		3089	Plastics Products, N.E.C.	Ballona Creek
ASTRO PAK, FLOW-LINE SERVICES	1150 W JEFFERSON Boulevard	LOS ANGELES		3087	Custom Compounding of Purchased Plastics Resins	Ballona Creek
CALIFORNIA PLASTICARD, INC.	1380 W WASHINGTON Boulevard	LOS ANGELES		3089	Plastics Products, N.E.C.	Ballona Creek
UNITED SALES	4713 W Jefferson Boulevard	Los Angeles		3089	Plastics Products, N.E.C.	Ballona Creek

[1] The only facility from the list that was found to be involves in handling of Plastic Pellets

CITY OF EL SEGUNDO

City of El Segundo

Public Works Department
Stephanie Katsouleas, Director

April 29, 2015

Hamid Tadayon
City of Los Angeles
Department of Public Works, Bureau of Sanitation
Watershed Protection Division
1149 South Broadway, 10th Floor,
Los Angeles, CA 90015

SUBJECT: Plastic Pellets in City of El Segundo Santa Monica Bay Watershed Area

Mr. Hamid Tadayon:

The City of El Segundo staff has completed its investigation in regards to plastic pellets, and concluded no plastic pellets are currently used, stored, handled or transported in City of El Segundo Santa Monica Bay Watershed Area. Staff looked through the Sic-code sorted database from the City's Business License and Code section, found that only two companies in the Santa Monica Bay Watershed Area with sic codes that could potentially be involved in plastic pellets. One of the companies, Henry Company at 999 N Sepulveda Blvd. Suite 800, El Segundo, CA 90245, is strictly a corporate office. Staff visited and inspected the remaining company, International Plastic Cards, Inc. (IPC) at 1475 E. El Segundo Blvd, El Segundo, CA 90245 and found that there is no manufacturing, storing, handling or transporting of plastic pellets on site. The plastic cards are pre-manufactured and pre-packaged from off-site facility of other companies outside the City, and IPC is only involved in the personalization of the cards such as printing name and card number on the card. See attached inspection form. Therefore, the Plastic Pellet Monitoring and Reporting Plan (PMRP) is not required in City of El Segundo Santa Monica Bay Watershed Area as ascribed under the Santa Monica Bay Nearshore and Offshore Debris TMDL. The only possibility of plastic pellet will come from accidental spills of transportation vehicles passing through the City, and Staff will update the City's Emergency Spill Response Plan to include plastic pellet spill response.

Please include the above finding in the EWMP and let me know if there is any question.

Thank you,

Lifan Xu

Lifan Xu, P.E.
Principal Civil Engineer
City of El Segundo
350 Main St.
El Segundo, CA 90245-3813

350 Main Street, El Segundo, California 90245-3813
Phone (310)524-2300 Fax (310) 640-0489

City of El Segundo

Public Works Department

Stephanie Katsouleas, Director

On Site Plastic Pellets Usage Survey

Name (DBA): INTERNATIONAL PLASTIC CARDS, INC.	**Telephone No.:** 310-322-4472
Address / Location: Street 1475 E. EL SEGUNDO BLVD. City EL SEGUNDO Zip 90245 Contact Name: John Rosso Phone: 310-322-4472	**Authorized Representative / Title:** JOHN ROSSO — PRINT NAME CEO — PRINT TITLE Signature 4/16/2015 — Date Inspector: Lifan Xu

Instructions: Please complete a separate survey form (if necessary, make additional copies) for each location where plastic pellets are used for production of plastic goods. Check if there is plastic pellets are used, or transferred, or check the "NO" box below, sign, date, and return this survey form to Public Works, 350 Main St., El Segundo, CA 90245.

Are plastic pellets used, stored, or transported to or from this facility?	YES ☐	NO ☒

If answer "yes" to the above question, please answer the following questions.

Usage/Operation:		
Amount of plastic pellets used per month / year	______ Qty.	
Is there any waste stream generated that contains plastic pellets	YES ☐	NO ☐
Storage:		
Is the storage area properly contained	YES ☐	NO ☐
Is the facility have proper equipment in work area to clean up incidental spills of plastic pellets	YES ☐	NO ☐
Transportation:		
Are plastic pellets kept double bagged and sealed during transportation?	YES ☐	NO ☐
	YES ☐	NO ☐
General		
Are there any drains near operation, storage or shipping area that is directly leading to the storm drain system?	YES ☐	NO ☐
Describe the location of nearest catch basin downstream of the facility		

Any other Remarks

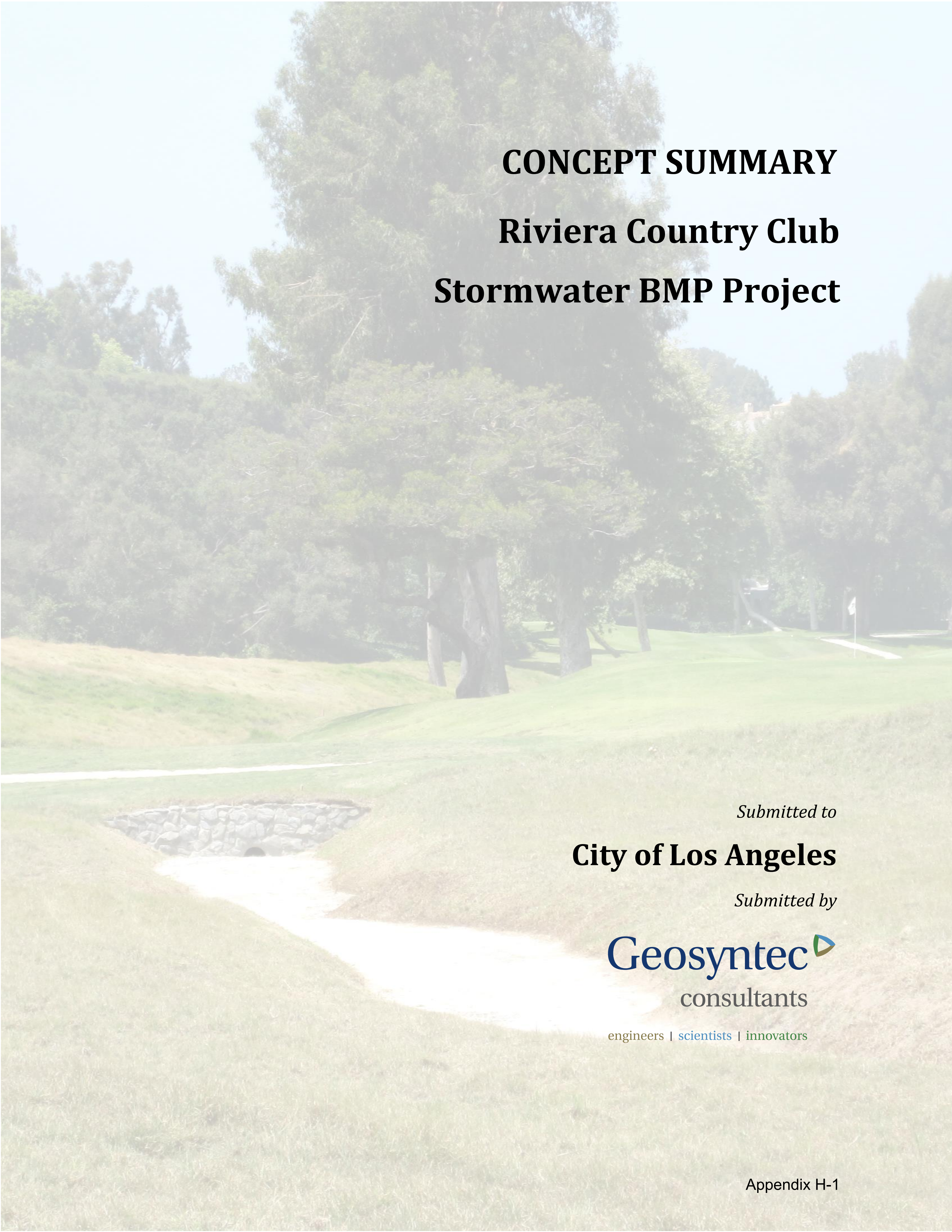
All Plastic cards are manufactured offsite by other companies. No manufacturing takes place on-site.

APPENDIX H

EL SEGUNDO

RIVIERA COUNTRY CLUB

CONCEPT SUMMARY



CONCEPT SUMMARY

Riviera Country Club Stormwater BMP Project

Submitted to

City of Los Angeles

Submitted by

Geosyntec consultants

engineers | scientists | innovators

September 2015

1 INTRODUCTION

The Riviera Country Club (Riviera) is a privately owned golf course within the Santa Monica Canyon watershed. The watershed discharges to the Santa Monica Bay at Santa Monica Bay Beaches Bacteria TMDL Compliance Monitoring Location SMB 2-7, where compliance with bacteria receiving water limitations is assessed during both dry and wet weather. Riviera presents one of few large open spaces within the watershed where significant stormwater management can occur on a regional scale.

Riviera was identified as a potential location to support a regional stormwater management approach. Potential for a stormwater project at Riviera was renewed in 2015 when the Santa Monica Bay Enhanced Watershed Management Program (EWMP) identified Riviera as a centralized BMP opportunity. The project has significant potential to help the City of Los Angeles in achieving its water quality management goals while simultaneously providing a significant potable water augmentation source for Riviera.

1.1 PURPOSE & SCOPE

This Concept Summary Memorandum presents two concept design alternatives for stormwater best management practices (BMPs) to be implemented at the Riviera Country Club. This work is motivated by the need to identify opportunities to retain dry weather and wet weather flows within the Santa Monica Bay Watershed to meet the objectives of the Santa Monica Bay EWMP.

The project scope is to develop concept designs (5% to 10% level of design) for structural stormwater BMPs within Riviera. The project requires the identification and investigation of feasibility of two BMP alternatives through the assessment of desktop screening and available data. The potential performance offered by identified concepts was then assessed by modelling the capture efficiencies relative to the target hydrologic objectives identified in the Santa Monica Bay EWMP.

1.2 REPORT ORGANIZATION

Section 1 of the report introduces the background and project goals. Section 2 provides a background overview of the site conditions and watershed characteristics. Section 3 presents the development of the alternatives, first presenting a hydrologic analysis, followed by a description of alternative 1 and 2. Finally, section 4 presents a preliminary opinion of cost and limitations.

1.3 TERMS OF REFERENCE

This work was conducted by Geosyntec Consultants, Inc. (Geosyntec) for the City of Los Angeles (TOS-SN22). This work was managed and conducted by Chris Wessel, PE, and Vjeko Matic, respectively. Cost opinions were developed by Stacey Schal. Peer and senior reviews were conducted by Vjeko Matic, Jai Panthail, and Ken Susilo, PE, D. WRE, CPSWQ in accordance with Geosyntec's quality assurance policies.

2 BACKGROUND

Available background data is discussed below to characterize relevant parameters required for sizing and estimating performance of the developed concepts. Existing data is also assessed to characterize constraints and opportunities for stormwater management within Riviera property.

2.1 RIVIERA COUNTRY CLUB INFRASTRUCTURE AND CHARACTERISTICS

Riviera is a high profile private golf course in Pacific Palisades. Established in 1926, it annually hosts the Northern Trust Open, a PGA Tour Event, and is widely regarded as one of the best golf courses in the world.

Figure 1. Riviera Country Club barranca, as seen from the 8th hole

The golf course features approximately 137 acres of vegetated space. A prominent landscape feature within the golf course is a dry barranca (Figure 1) that runs the length of the course, coming into play on eight of the course's 18 holes (Figure 2). The barranca is approximately 80 to 100 feet wide and 2 to 6 feet deep at various points along the course.

The barranca was historically the natural channel that drained Santa Monica Canyon. However, due to severe flooding on the golf course, an underground storm drain was constructed in 1975 to redirect water under the course, effectively removing stormwater from flowing onto the course.

Riviera has expressed interest in returning the existing barranca to the condition it resembled when the course was originally designed by George C. Thomas, Jr. This would involve the partial transformation of the barranca from a kikuyu-lined swale into a feature resembling a dry desert wash.

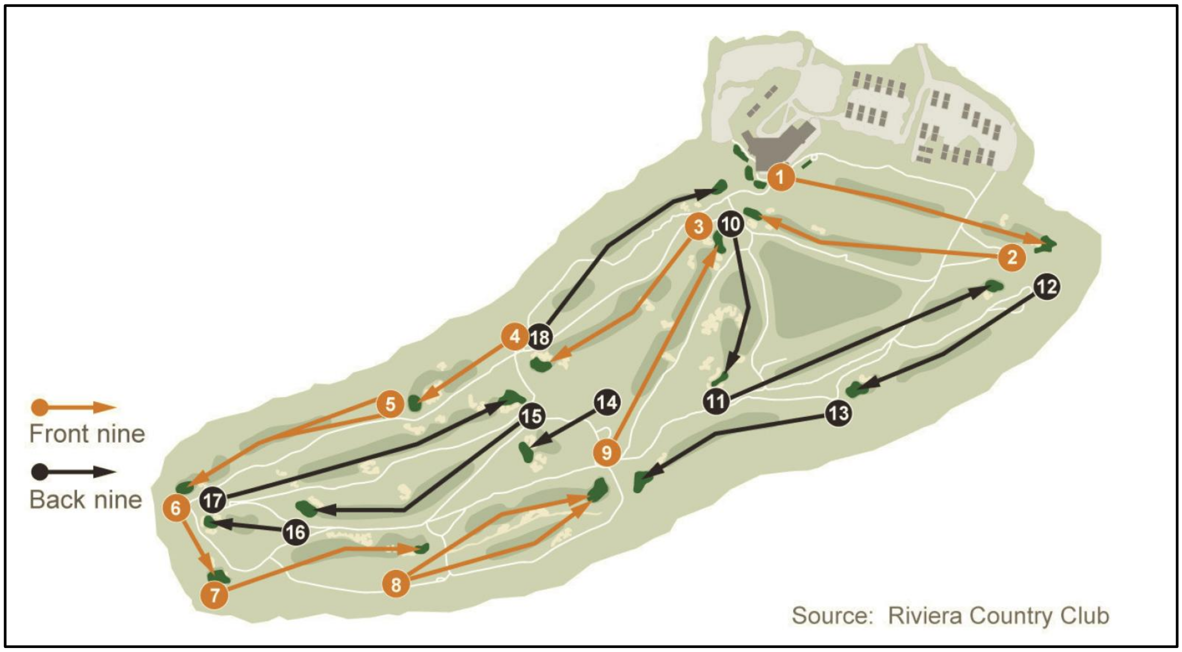


Figure 2. Map showing the 18 holes of the golf course.

Riviera currently uses on average 220,000 gallons of water per day for irrigation of the golf course. In summer months this can be as high as 380,000 gallons per day. Approximately 70% of this volume is sourced from potable water sources and the remainder is pumped from the local groundwater.

2.2 WATERSHED

The Project area lies within the Santa Monica Canyon (SMB 2-07) subwatershed, which comprises approximately 10,040 acres of predominantly open and residential space. The Project drainage area (upstream of Riviera) is approximately 4,500 acres and features 9% impervious area. The Project drainage area therefore accounts for approximately 45 percent of the SMB 2-07 subwatershed. The upper half of the Project drainage area is characterized by the steep landforms in the Santa Monica Mountains which is predominantly open space (Figure 3). The lower portion of the Project drainage area is characterized by single family residential zoning.

The watershed features structural stormwater BMPs upstream of the Riviera Country Club. These are parkside bioswales on Old Oak Rd and Mandeville Canyon Rd, which collect and treat local stormwater runoff

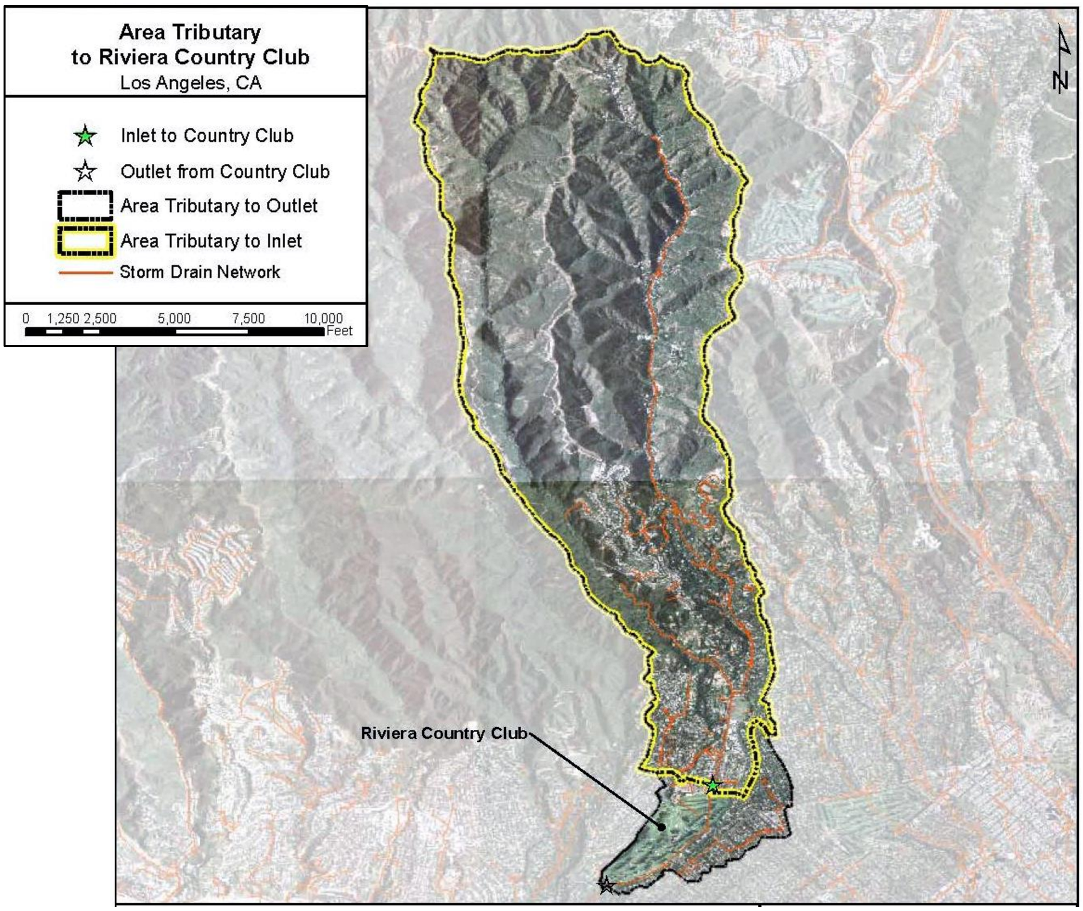


Figure 3. Catchment of the Santa Monica Canyon Channel upstream of Riviera.

2.3 Depth to Groundwater

Available groundwater data include boring logs from the construction of three production bores Riviera use for irrigation (GSi/water 1991). These data indicate that the depth to water table beneath the golf course is typically just deeper than 100 feet below ground surface. This implies that groundwater is sufficiently deep for infiltration to occur in the course vicinity without causing mounding or other groundwater-related hazards.

2.4 Soil Infiltration Data

The LA County 2004 soils dataset categorizes Riviera under the Santa Monica Mountain soil unit, with a presumably conservative surface infiltration rate of 0.36 in/hr. The landform within Riviera is distinct from the majority of the Santa Monica Mountains region, and this categorization is unlikely to be representative of the local conditions.

Riviera conducted a series of test drilling in 1991 to determine groundwater production potential (GSi/water 1991). The drilling logs characterized the first 100 feet from the surface as predominately sands and clay bearing sands with some gravels. Based on USDA (1999) soil classification and USCS soil classification data (ASTM 1985), the usable infiltration rate of gravels and silty gravels can be estimated at 1.63 in/hr. Based on the barranca location, an infiltration rate of 1.63 in/hr was assumed at RCC for this concept report.

For future design purposes, infiltration testing should be conducted in the barranca, to more accurately estimate the infiltration capacity of the Project. Based on this testing, it may be determined that the incorporation of dry wells in the barranca will be necessary to enhance the infiltration capacity and Project performance.

2.5 Stormwater Infrastructure

The 18ft wide x 12ft deep Santa Monica Canyon Channel (SMCC) runs south from Mandeville Canyon, splitting Longworth Drive and Brinkley Avenue before it reaches Riviera's northern boundary near Hole #1. At this point, the channel becomes a box culvert, undergrounded beneath the golf course, running in a southwesterly direction along the approximate line of the barranca until it daylights at the southwest boundary of the course near Hole #6. The channel continues downstream toward Santa Monica Bay.

A low flow diversion owned and operated by the City of Los Angeles is located on SMCC downstream of the golf course. This diversion, identified as 733LFD, is currently operable during dry weather only, diverting flows up to 12 cubic feet per second (cfs) to Hyperion Treatment Plant for treatment. As part of the concept design for the Riviera Country Club Stormwater BMP Project, partial use of this diversion during wet weather conditions was also considered.

A number of smaller diameter stormwater sewers drain adjacent neighborhood streets and provide feasible diversion opportunities since they discharge into the SMCC just upstream of Riviera or beneath Riviera. With the objective of assessing the optimal treatment opportunity, the large runoff volume within the SMCC is the focus of investigation in this report.

Figure 4 shows the storm drain infrastructure in the vicinity of Riviera, along with the approximate footprint of the barranca.

Figure 4. Stormwater infrastructure adjacent to the Riviera Country Club.

3 CONCEPT DEVELOPMENT

Based on previously developed concepts, the analysis of available data, as well as conversations with the City of Los Angeles and Riviera Country Club, two concept alternatives were developed to capture and treat both dry and wet weather flows in SMCC. The following was assumed in the development of these concepts:

- Riviera and the City of Los Angeles are interested in implementing a system which captures both dry weather flows to use for course irrigation, and wet weather flow to infiltrate into, and flow through, the barranca. The use of dry weather flow for irrigation will offset the quantity of imported water required, while the wet weather flow infiltration will help the City achieve its water quality management objectives.

- Riviera is interested in only limited use of the barranca for stormwater infiltration. The redesign of the barranca to its previous condition as a wash may enhance the infiltration ability of the barranca.
- Riviera is willing to allow use of their existing 350,000 gallon storage tank adjacent to SMCC in the design of the project.
- The City of Los Angeles will allow the Santa Monica Canyon low flow diversion downstream of Riviera (733LFD) to be partially used during wet weather in conjunction with this project for an efficient management of storm events.

Based on these assumptions, a general concept was developed for a BMP that:

- Captures diverted flows from SMCC;
- Stores water for irrigation use on the golf course; and
- Allows water to be infiltrated in the barranca without flooding or overwhelming the barranca.

A hydrologic analysis was conducted to evaluate the details of this general concept.

3.1 Hydrologic Analysis

A preliminary hydrologic model was constructed to analyze the potential effectiveness of various BMP configurations, based on the assumptions described above. The model was designed to:

- Analyze various diversion flow rates within SMCC upstream of Riviera;
- Store diverted flows in the existing 350,000 gallon storage tank at Riviera, plus an additional storage tank of varying volume;
- Use stored water during dry weather for irrigation, at a rate equivalent to 220,000 gallons/day;
- Pump water from the storage tank to the barranca at a rate equivalent to the estimated infiltration capacity of the barranca. The barranca was estimated to have an infiltration capacity of 1.63 in/hr from existing bore logs provided by Riviera

(GSi/Water 1991). In the model it was assumed that 2/3 of the barranca's 410,000 SF footprint is available to facilitate infiltration, to account for sloped banks.; and

- Assume that flows of up to 6 cfs that bypass Riviera project could be diverted via the LFD (note that 6 cfs was assumed since additional flows will inevitably be present downstream of the course due to other tributary areas).

The model runs analyzed various sizes of the additional storage tank and the upstream diversion rate. The objective of the hydrologic analysis was to determine what diversion and storage quantities are required to effectively use the retention capacity of the barranca and tanks during a wet weather event, while not overwhelming the barranca with excess water to cause pooling.

Two concept alternatives are proposed based on the hydrologic analysis above:

- **Alternative 1**: Storage in the existing 350,000 gallon tank for dry and wet weather flows. The storage tank will also be used as a sump from which water is pumped into the barranca at a rate equivalent to the barranca infiltration rate. A diversion rate of 12 cfs from SMCC was assumed for this alternative.

- **Alternative 2**: Storage in the existing 350,000 gallon tank and an additional 1 million gallon (MG) tank, for dry and wet weather flows. The additional 1.0 MG tank was assumed to have a soft bottom for infiltration purposes. Pumping from the storage tank to the barranca at a rate equivalent to the barranca infiltration rate was also assumed. A diversion rate of 20 cfs from SMCC was assumed for this alternative.

It is important to note that although Alternative 1 and Alternative 2 are presented as separate concepts, the concept design presented herein allows for both alternatives to be integrated together at separate phases. For example, Alternative 1 can first be implemented as "Phase I" of the Project. Then, based on adaptive management, Alternative 2 can be implemented at a later date as "Phase II" of the Project, as necessary.

Both alternatives require a diversion via a rubber dam, similar to the one used at the bottom of the SMC channel (Figure 5) from the Santa Monica Canyon Channel at an elevation of approximately 325 feet above mean sea elevation to maintain the head to gravity feed the existing tank. Pretreatment of the diverted flows via a continuous deflection separator (CDS) (Figure 6) or equivalent unit was also assumed. It is estimated that 620 feet of additional piping will be required to facilitate the connection between the diversion and the existing storage tank.

Figure 5. Rubber Dam Diversion in Santa Monica Canyon downstream from Riviera (photo credit: Josh Svensson)

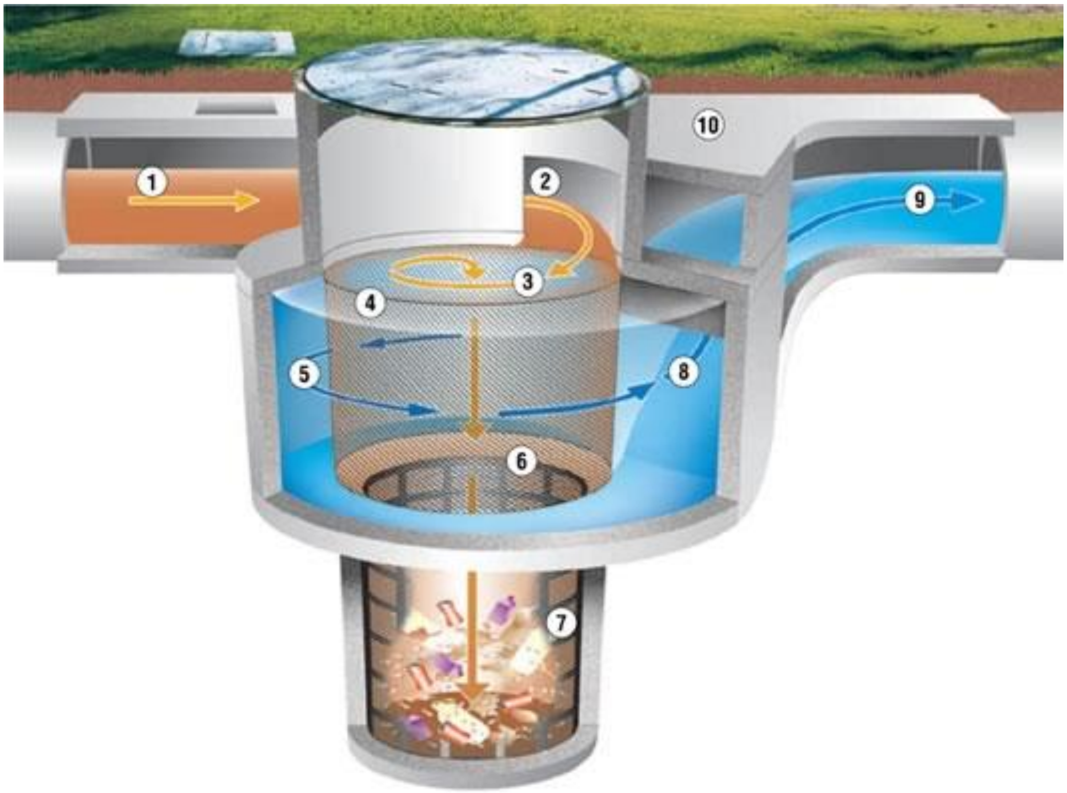


Figure 6. Example Continuous Deflection Separator (CDS) (image:www.conteches.com)

Both alternatives also assume optimal pumping of available water from the storage tank(s) to both the barranca and the golf course for irrigation. For this purpose, it is recommended that a real-time control system (e.g., OptiRTC or similar) be considered to control the pumps in real time. Such a control system could rely on data such as weather forecasts, soil moisture conditions, and stored volume to operate the entire system in an efficient manner. In addition, the real-time control system could be used to operate the rubber dam diversion. By doing so, the rubber dam could be deflated during large storm events, to allow bypass to occur in strategic quantities. Such operation could lead to less discharge days into the ocean at SMB 2-07 surf zone.

Alternative 1 and Alternative 2 result in an estimated long-term runoff capture efficiency of 51 and 59 percent, respectively, based on model results covering ten years of historical precipitation data from January 1, 1990 through December 31, 1999. The Santa Monica Bay Watershed J2/3 EWMP requires a 19 percent total load reduction in bacteria to achieve reasonable assurance of compliance with the SMBBB TMDL for wet weather. Although the hydrologic analysis described above did not include water quality modeling, and also was not performed specifically for the 90th percentile year (as was the case in the EWMP), the long –term capture efficiency of 51 – 59 percent may be sufficient to achieve the EWMP target load reduction. Additional water quality modeling could be used to examine this claim.

Future geotechnical investigation at the Project site and/or monitored performance of the completed Project may result in the determination that enhanced infiltration is necessary to meet the City's water quality goals. A possible mechanism to achieve this could be the implementation of dry wells within the barranca. Appropriately placed dry wells could increase the infiltration capacity of the barranca, thereby allowing higher quantities of water to be pumped to the barranca for infiltration. Such enhancements were not included in the proposed Project alternatives and are outside the scope of this concept report; however, their implementation could be evaluated and included as part of the Project design.

Details for Alternative 1 and Alternative 2 are provided below, including schematics of each alternative for both dry and wet weather flows.

3.2 Alternative 1.

Under Alternative 1, dry weather flow will fill the existing 350,000 gallon tank in 12 to 25 hours and be available for irrigation (Figure 7). Captured water that is pumped from the storage tank for irrigation will be disinfected by an ultraviolet (UV) treatment system. The UV system will require additional pre-treatment through an activated carbon system to remove colloidal solids. Excess volumes not used for irrigation can be pumped into the barranca (Figure 9), which will replenish the local groundwater, or can be bypassed and diverted for treatment via the downstream low flow diversion.

Under the wet weather flow situation, Alternative 1 (Figure 8) uses the existing 350,000 gallon tank to capture up to 12 cfs of diverted stormwater, before is pumped into the barranca for infiltration to the local groundwater table. A pumping rate of 10.5 cfs is recommended to match the infiltration capacity of the barranca. Treatment of the water pumped to the barranca for infiltration is not necessary.

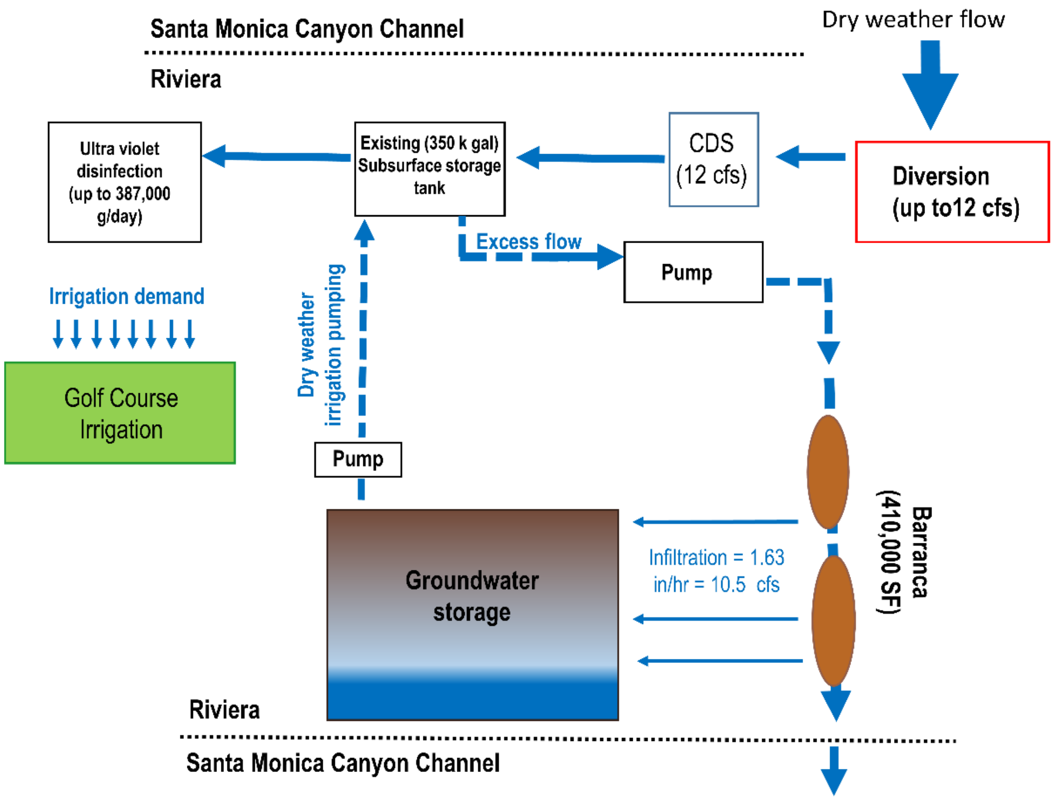


Figure 7. Alternative 1 (existing tank only) dry weather process flow diagram.

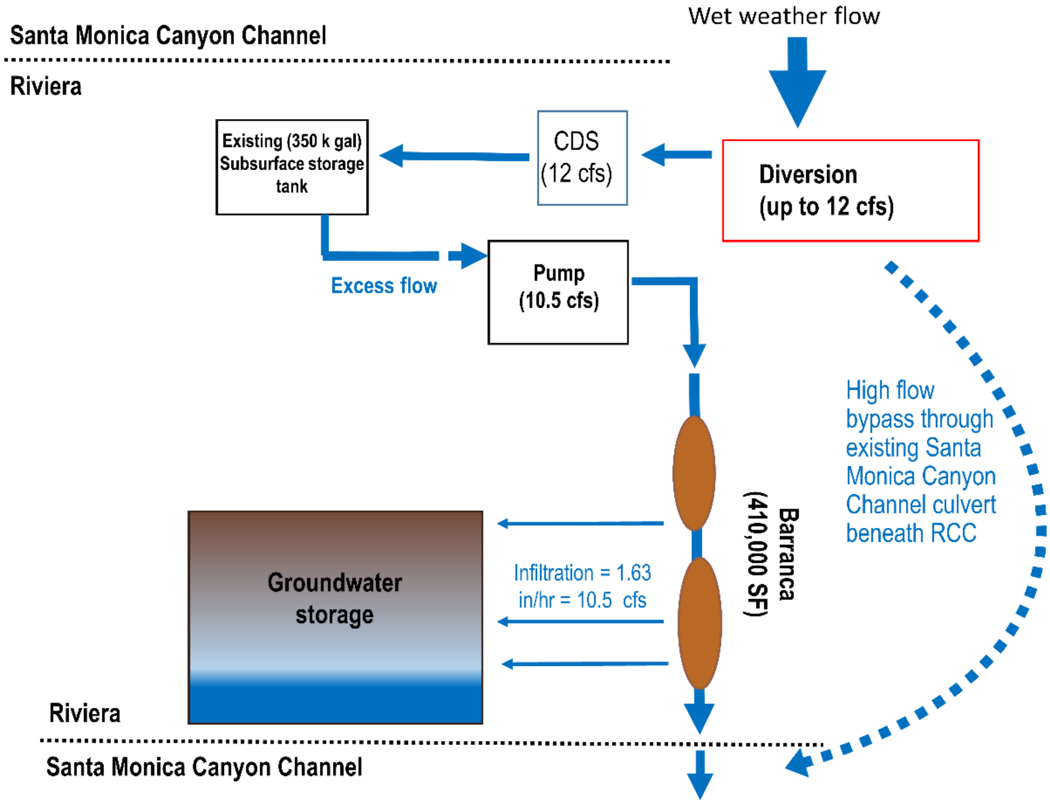


Figure 8. Alternative 1 (existing tank only) wet weather process flow diagram.

Figure 9. Plan view of Alternative 1.

3.3 ALTERNATIVE 2

Alternative 2 features an additional 1.0 MG tank that provides significant additional infiltration capacity over its approximately 13,000 SF pervious base.

Under Alternative 2, dry weather flows will first fill the existing 350,000 gallon tank, which will be available for irrigation demand (Figure 10). Captured water that is pumped from the storage tank for irrigation will be disinfected by a UV treatment system. The UV system will require additional pre-treatment through an activated carbon system to remove colloidal solids. Excess flows in this alternative will gravity drain to the 1.0 MG tank to infiltrate into the groundwater. Any additional excess water will then be pumped to the barranca as per the Alternative 1 dry flow configuration, or can be bypassed and diverted for treatment via the downstream low flow diversion.

During wet weather (Figure 11), the additional storage and infiltration capacity provided by the tank allow for a diversion rate of up to 20 cfs from Santa Monica Canyon Channel.

Similarly to Alternative 1, stormwater will be pumped, from either tank, at a rate of up to 10.5 cfs to match the barranca's infiltration capacity.

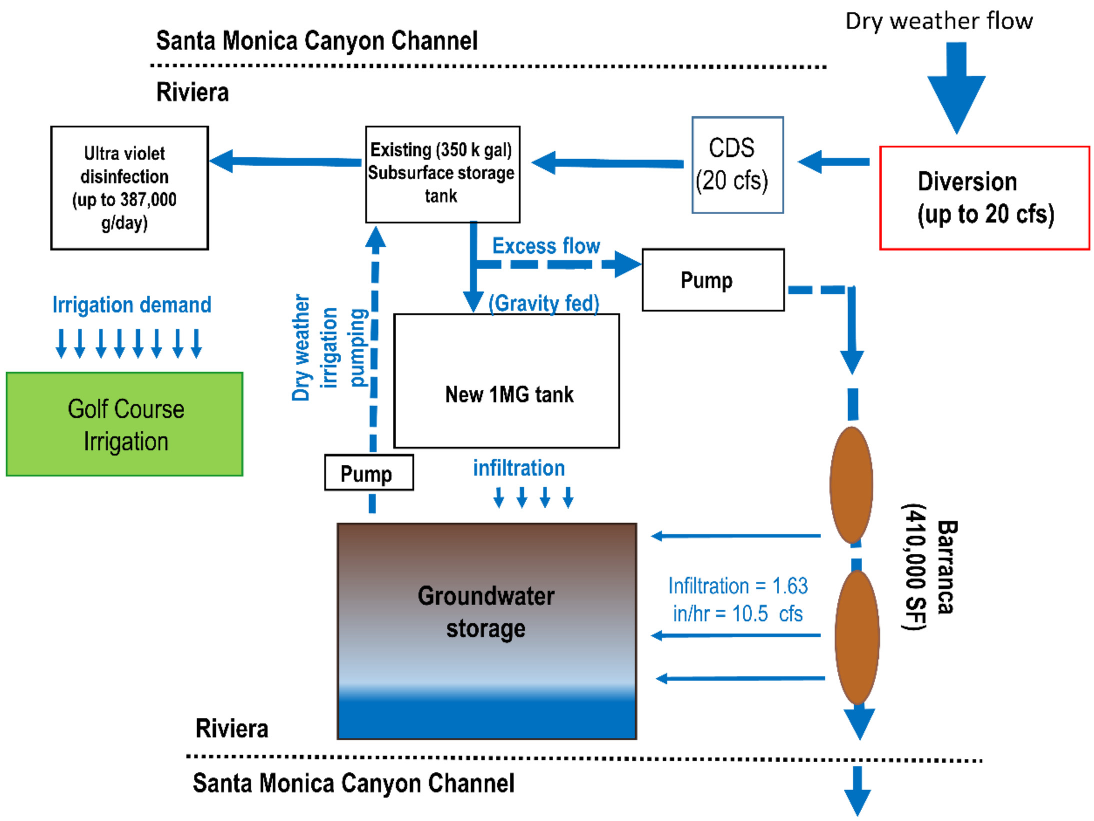


Figure 10. Alternative 2 (1.0 MG Tank + Existing Tank) dry weather process flow diagram.

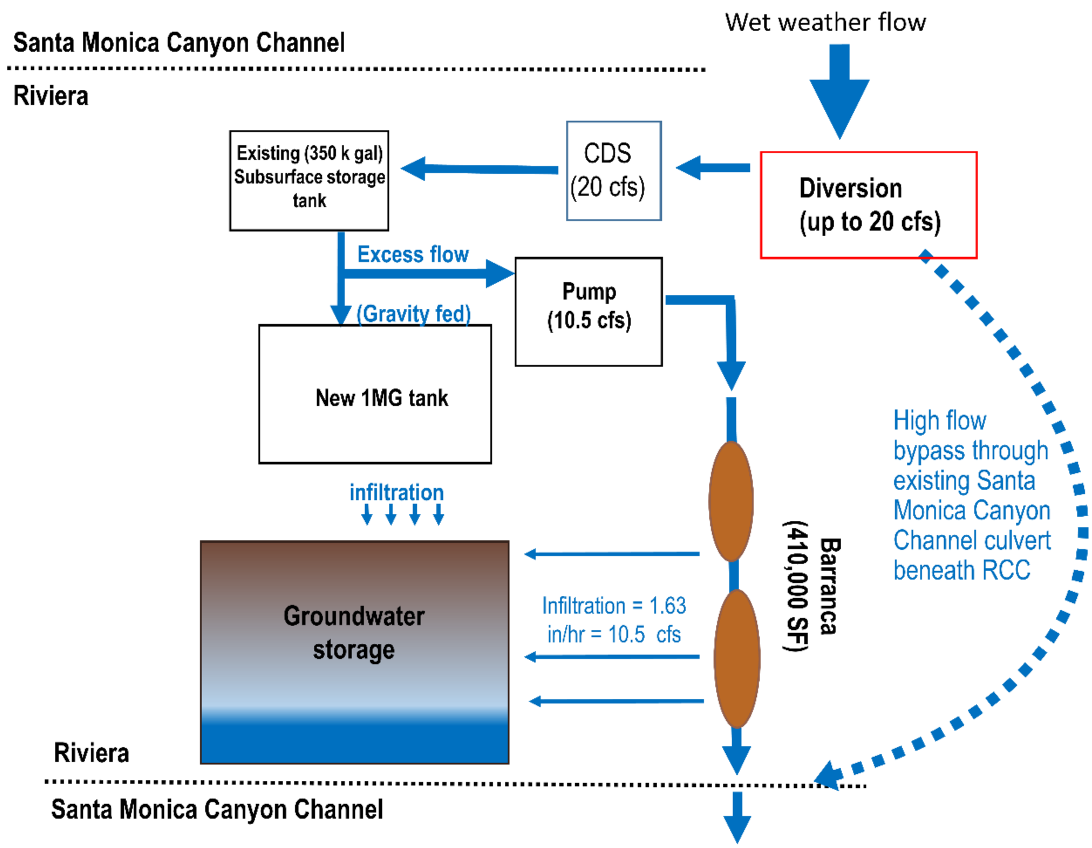


Figure 11 Alternative 2 (1.0 MG Tank + Existing Tank) wet weather process flow diagram.

Figure 12. Alternative 2 plan view

3.4 DRY WEATHER FLOW BALANCE AND IRRIGATION OFFSETS

Dry weather flows through the Santa Monica Canyon Channel provide a reliable source of water to offset or possibly eliminate potable water used in irrigation of the golf course. Table 1 shows the monthly irrigation demand at Riviera Country Club for 2012-2013 compared to the estimated dry weather flows in SMCC.

Table 1. Estimate of Irrigation Demand Compared to Dry Weather Flow

Month	RCC Irrigation Demand (gal)[1]	Average Monthly Dry Weather Flow in SMCC at 733LFD (gal)[2]	Average Monthly Dry Weather Flow in SMCC at RCC (gal)[3]
Jan	2,971,000	32,241,000	16,120,600
Feb	2,995,100	17,041,600	8,520,800
Mar	5,761,900	29,841,600	14,920,800
Apr	9,985,300	31,515,000	15,757,500
May	11,193,900	35,848,200	17,924,100
Jun	9,548,800	29,048,100	14,524,100
Jul	8,785,300	32,770,800	16,385,400
Aug	12,012,000	25,749,100	12,874,500
Sep	8,099,400	26,047,100	13,023,600
Oct	8,099,400[4]	22,644,300	11,322,200
Nov	1,930,300	23,955,600	11,977,800
Dec	17,600	20,308,600	10,154,300

[1] Monthly irrigation data was provided by RCC, covering November 2012 through September 2013 (Riviera Country Club, 2013).

[2] This estimate is based on flow data from the downstream low flow diversion in SMCC (733LFD), provided through personal communication with the City of Los Angeles (LADWP, 2015). Data covered July 2010 through June 2015.

[3] Because 733LFD is downstream of RCC, it was assumed that half of the measured flows are present in SMCC upstream of RCC.

[4] No data was provided for the month of October. Therefore, it was assumed that the adjacent month with the highest irrigation demand (September) was representative of the irrigation demand for the month of October.

As shown in Table 1, the average monthly dry weather flow in SMCC at Riviera Country Club exceeds the monthly irrigation demand at the golf course for every month. The golf club estimated they use approximately 17,600 to 12,000,000 gallons per month of water for irrigation during 2012 to 2013 (depending on seasonal climate variations), approximately 70% of which was imported water (Riviera Country Club, 2013). Dry weather flows through the Santa Monica Canyon Channel have been estimated to be 8,500,000 to 17,900,000 gallons per month, providing potentially enough water to completely offset the golf courses irrigation demands (LADWP 2015).

4 Preliminary Opinion of Cost

Cost opinions developed below include "hard costs" for tangible assets and "soft costs" to reflect considerations such as design and permitting.

Hard costs are determined using a line item unit cost approach, which separately accounts for each material cost element required for the instillation. The majority of the hard cost estimates were based on RS Means[1] construction cost database.[2] A number of additional line items costs opinions were referenced using contractor quotes or published municipal data. Additional details are provided in the attachment.

The soft costs are assumed to be a percentage of the hard cost subtotal and are based on literature, best professional judgment, and data from past projects (Brown and Schueler, 1997; International Cost Engineering Council, 2014). The soft costs considered for each proposed BMP include:

- **Utility Realignment (2% of subtotal)** — Costs associated with the relocation of utilities that are located within the proposed BMP footprint or inhibit construction activities.
- **Mobilization and Demobilization (8% of subtotal)** – The costs associated with activation/deactivation of equipment and manpower resources for transfer to/from a construction site until completion of the contract.
- **Planning, Permitting, Bond, and Insurance Costs (8% of subtotal)** – Cost, including planning and permit fees and personnel hours, of obtaining required permits for BMP installation. Examples of permits needed may include erosion and sediment control, stormwater, construction, and public space permits. Potential bond and insurance costs are also included.
- **Engineering and Planning (30% of subtotal)** – Costs associated with BMP and site design, as well as access for maintenance, environmental mitigation, buried objects, safety/security, traffic control, limited space, and site restoration.

[1] RS Means is a unit cost database that is updated annually (http://www.rsmeansonline.com/). When costs from literature are not available project's design criteria and unit costs from the database were used to estimate the project's cost.

[2] Costs were assumed for 2015. A location factor was included in locally sourced construction cost estimates, however the majority of RS means are based on national averages which may result in additional costs due to above average construction costs in Los Angeles.

- **Construction Management (15% of subtotal)** – The costs associated with management and oversight of the construction of the BMP, from project initiation until completion of the contract.
- **Contingency (25%)**

Uncertainties associated with the presented cost opinion include the soft cost contingencies discussed above, material selection, inflation, and other unknown factors. The costs provided here should be used as an approximation only, subject to change. There is likely to be considerable uncertainty in costs which were determined as single units, such as the channel diversion and CDS unit, which can vary by vendor.

The estimate for UV disinfection includes UV modules, power source and distribution, lamps, safety cleaning and monitoring equipment, piping, walkway and miscellaneous equipment. This estimate is based on a disinfection treatment cost estimate equation provided by the United Nations in 2003. The approach is based on data starting from 1993 and has been adjusted for inflation using the Bureau of Labor Statistic's infiltration calculator. The UV disinfection system assumes a 30 minute hydraulic retention time. This is a conservative estimate which could potentially be reduced to 10 minutes pending favorable water quality conditions. In this case, the cost would be reduced by a factor of three.

Costs associated with the barranca redesign are limited to excavation only. No costs have been included for additional features for the barranca, including golf course architecture fees, landscape features, cart path alterations, etc. Such costs will be dependent on Riviera Country Club's desired design for the barranca.

Table 2 and Table 3 present the cost opinions associated with Alternative 1 and Alternative 2, respectively.

Table 2. Alternative 1 Opinion of Cost

CATEGORY	DESCRIPTION	QT (UNIT)	UNIT COST	LINE ITEM
Diversion Weir & CDS	Santa Monica Canyon Channel rubber dam.	1 (EA)	$500,000	$500,000
	OPTI-RTC discharge controllers including planning level support, instillation, hardware and 5 years of servicing.	1 (EA)	$123,000	$123,000
	Public storm utility drainage piping, reinforced 24" diameter RCP, includes excavation, backfill, bedding (HIGH COST)	600 (LF)	$156	$96,700
	CDS. Treats up to 30 cfs (CDS10060)	1 (EA)	$115,000	$115,000
Disinfection	UV disinfection with activated carbonate filter pre-treatment to handle 387,000 g/day.	1 (EA)	$250,000	$250,000
Pump & Barranca	12 CFS pump. Pump, pedestal sump, single stage, 2000 GPM, 60 HP, 8'' discharge	1 (EA)	$34,500	$34,500
	Excavating, sand & gravel with no sheeting or dewatering included, 1' to 4' deep, ¾ CY excavator ($6.10/CY). Assumes 3' depth excavation.	411,000 (SF)	$1.10	$450,800
ALTERNATIVE 1 SUBTOTAL				$1,570,000
Utility Realignment				$47,000
Mobilization/demobilization				$126,000
Planning, Permitting, Bond, and Insurance Costs				$126,000
Engineering and Planning				$471,000
Construction Management				$235,000
Contingency				$392,000
ALTERNATIVE 1 TOTAL				**$ 2,967,000**

Table 3. Alternative 2 Opinion of Cost

CATEGORY	DESCRIPTION	QT (UNIT)	UNIT COST	LINE ITEM
DIVERSION WIER & CDS	Santa Monica Canyon Channel rubber dam.	1 (EA)	$500,000	$500,000
	OPTI-RTC discharge controllers including planning level support, instillation, hardware and 5 years of servicing.	1 (EA)	$123,000	$123,000
	Public storm utility drainage piping, reinforced concrete pipe (RCP), 24" diameter RCP, includes excavation, backfill, bedding	620 (LF)	$156	$96,700
	CDS. Treats up to 30 cfs (CDS10060)	1 (EA)	$115,000	$115,000
Disinfection	UV disinfection with activated carbonate filter pre-treatment to handle 387,000 g/day.	1 (EA)	$250,000	$250,000
TANK	Excavating, bulk, dozer, 80 H.P., 300' haul, common earth.	6000 (CY)	$1.81	$81,800
	8 CY truck, 15 MPH ave, 6 mile cycle, 20 minute wait.	4,951 (CY)	$10.65	$52,700
	Shoring excavated area	4,508 (SF)	$37.00	$166,500
	Concrete cistern (1 million gallons)	133,681 (CF)	$8.95	$1,196,400
	Manholes, 5' ID manhole, 8' deep with cover	1 (EA)	$4,000	$8,000
	Geosynthetic Fabric - 120 lb tensile strength	1,485 (SY)	$2.76	$4,100
	Fine grading, loam, or topsoil for large area	1,634 (SY)	$1.17	$1,900
	Gravel delivery. (Includes delivery)	545 (Tons)	$28.00	$15,200
	Gravel spreading and grading. (Includes spreading and grading only).	272 (CY)	$10.00	$2,700
PUMP & BARRANCA	12 CFS pump. Pump, pedestal sump, single stage, 2000 GPM, 60 HP, 8'' discharge	1 (EA)	$34500	$34,500

CATEGORY	DESCRIPTION	QT (UNIT)	UNIT COST	LINE ITEM
	Excavating, sand & gravel with no sheeting or dewatering included, 1' to 4' deep, 3/4 CY excavator ($6.10/CY). Assumes 3' depth excavation.	411,000 (SF)	$1.10	$450,800
ALTERNATIVE 2 SUBTOTAL				$3,000,000
Utility Realignment				$92,000
Mobilization/demobilization				$248,000
Planning, Permitting, Bond, and Insurance Costs				$248,000
Engineering and Planning				$929,000
Construction Management				$464,500
Contingency				$774,800
ALTERNATIVE 2 TOTAL				**$5,857,000**

5 IMPLEMENTATION SCHEDULE

A proposed schedule is presented in Table 4 below for the implementation of both Alternative 1 and Alternative 2 as a single, phased project. This schedule is subject to change, but highlights the possibility of Phase I (Alternative 1) and Phase II (Alternative 2) being implemented in accordance with the interim and final deadlines of the SMBBB wet weather TMDL, respectively.

Table 4. Implementation Schedule.

Project Phase	Description	Completion Date
Phase 1 – Design & capital cost fund raising.	Progress Alternative 1 to 100% construction design. Raise funding for construction of Phase I	January 2017
Phase 1 – Construction	Construction of Phase I	July 2018
Phase 1 – Monitoring & Analysis	Monitor the performance of Alternative 1 to quantify system performance and determine need for Phase II	July 2020
Phase 2 – Design & capital costs fund raising.	Progress Alternative 2 to 100% design. Raise funds for construction of Phase II	December 2020
Phase 2 - Construction	Construction of Phase II	July 2021

6 LIMITATIONS

This work product is conceptual and subject to change. The professional opinions and recommendations expressed in this memorandum are made in accordance with generally accepted standards of practice and were based largely on source information provided by others.

7 REFERENCES

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