City of Malibu

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June 29, 2015

Samuel Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013

RE: LA County MS4 Permit - North Santa Monica Bay Coastal Watersheds Enhanced Watershed Management Program Submittal

Dear Mr. Unger:

On behalf of the City Malibu, the County of Los Angeles, and the Los Angeles County Flood Control District, collectively the North Santa Monica Bay Coastal Watersheds (NSMBCW) Enhanced Watershed Management Program (EWMP) Group, enclosed is the NSMBCW EWMP. The NSMBCW EWMP Group is submitting these documents to fulfill the requirements of Order No.R4-2012-0175 Municipal Separate Storm Sewer System (MS4) Permit. Submittal of the enclosed EWMP complies with the timeline identified in Section VI.C.4.c.iv of the MS4 Permit. All agencies have reviewed and approved the EWMP for submittal to the Regional Water Quality Control Board (RWQCB).

This document represents a proactive and comprehensive approach to assessing and protecting the water quality in our region. Our agencies look forward to working with the RWQCB on these issues, and would be glad to meet with you and your staff to discuss and clarify any of the information included in these documents. If you have any questions, please contact Assistant Public Works Director Rob DuBoux at rduboux@malibucity.org or (310) 456-2489, extension 339.

Sincerely,

Jim Thorsen
City Manager

Enclosure

cc:
Christi Hogin, City Attorney
Robert L. Brager, Public Works Director
Vic Peterson, Environmental Sustainability Director
Rob DuBoux, Assistant Public Works Director
Jennifer Voccola Brown, Senior Environmental Programs Coordinator
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ENHANCED WATERSHED MANAGEMENT PROGRAM (EWMP)

FOR

NORTH SANTA MONICA BAY COASTAL WATERSHEDS

Submitted to:
Los Angeles Regional Water Quality Control Board

Submitted by:
North Santa Monica Bay Coastal Watersheds EWMP Group

June 2015

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LIST OF APPENDICES

LIST OF ACRONYMS

AED	Allowable Exceedance Days
ASBS	Area of Special Biological Significance
ASCE	American Society of Civil Engineers
BMP	Best Management Practice
CEDEN	California Environmental Data Exchange Network
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CIMP	Coordinated Integrated Monitoring Program
CML	Compliance Monitoring Location
CSMP	Coordinated Shoreline Monitoring Plan
CTR	California Toxic Rules
CWA	Clean Water Act
DDT	Dichloro-diphenyl-trichloroethane
ED	Exceedance Day
EMC	Event Mean Concentration
EWMP	Enhanced Watershed Management Program
FIB	Fecal Indicator Bacteria
GIS	Geographic Information System
GM	Geometric Mean
HSPF	Hydrological Simulation Program - Fortran
IBD	International BMP Database
IC/ID	Illicit Connection/Illicit Discharge
LACDBH	Los Angeles County Department of Beaches and Harbors
LACFCD	Los Angeles County Flood Control District
LID	Low Impact Development
LVMWD	Las Virgenes Municipal Water District
MCM	Minimum Control Measure
MPN	Most Probable Number
MST	Microbial Source Tracking
MS4	Municipal Separate Storm Sewer System
NOI	Notice of Intent

LIST OF ACRONYMS (Continued)

NPDES	National Pollutant Discharge Elimination System
NSMBCW	North Santa Monica Bay Coastal Watersheds
OWTS	Onsite Wastewater Treatment Systems
PCB	Polychlorinated Biphenyl
QA/QC	Quality Assurance/Quality Control
RAA	Reasonable Assurance Analysis
RWL	Receiving Water Limitation
SBPAT	Structural BMP Prioritization and Analysis Tool
SCCWRP	Southern California Coastal Watershed Research Project
SMB	Santa Monica Bay
SMBB	Santa Monica Bay Beaches
SWMM	Storm Water Management Model, originally developed by USEPA
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TLR	Target Load Reduction
TMDL	Total Maximum Daily Load
TMRP	Trash Monitoring and Reporting Plan
TOC	Total Organic Carbon
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WBPC	Water Body-Pollutant Combination
WCM	Watershed Control Measure (analogous to BMP)
WERF	Water Environment Research Foundation
WLA	Waste Load Allocation
WMA	Watershed Management Area
WMMS	Watershed Management Modeling System
WQBEL	Water Quality-Based Effluent Limitation
WRF	Water Reclamation Facility

EXECUTIVE SUMMARY

PURPOSE AND OBJECTIVES

Following adoption of the 2012 Los Angeles Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) Permit[1] (Permit), the City of Malibu (Malibu), County of Los Angeles (County), and Los Angeles County Flood Control District (LACFCD) agreed to collaborate on the development of an Enhanced Watershed Management Plan (EWMP) for the North Santa Monica Bay Coastal Watersheds (NSMBCW).

This NSMBCW EWMP is intended to facilitate effective, watershed-specific Permit implementation strategies in accordance with Permit Part VI.C. This EWMP:

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

In compliance with Section VI.C.4.b and Section VI.C.4.c.iv of the Permit, the NSMBCW EWMP Group submitted a Notice of Intent (NOI) to develop an EWMP on June 27, 2013, and a Work Plan for development of the EWMP on June 28, 2014, respectively, to the Los Angeles Regional Water Quality Control Board (Regional Board). The NOI is provided as **Appendix A** and the EWMP Work Plan is provided as **Appendix B**. As of the time of drafting of this EWMP, comments have not been received from the Regional Board on the submitted EWMP Work Plan. As the next step in EWMP development, the NSMBCW EWMP Group is required by Section

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

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

VI.C.4.c.iv of the Permit to submit this Draft EWMP no later than June 28, 2015. This Draft NSMBCW EWMP is consistent with the Work Plan previously submitted to the Regional Board.

Watershed Management Programs (WMPs) are a voluntary opportunity afforded by Section VI.C.1 of the Permit for Permittees to collaboratively or individually develop comprehensive watershed-specific control plans and are intended to facilitate Permit compliance and water quality target achievement. An EWMP is a WMP which comprehensively evaluates opportunities for collaboration on multi-benefit regional projects that retain all non-stormwater runoff and runoff from the 85th percentile, 24-hour storm event while also achieving benefits associated with issues such as flood protection and water supply. Where it is not feasible for regional projects to retain the 85th percentile, 24-hour storm, the EWMP must demonstrate through a Reasonable Assurance Analysis (RAA) that applicable water quality targets should be achieved. The EWMP allows Permittees to collaboratively or individually develop comprehensive watershed-specific control plans which:

a. Prioritize water quality issues;

b. Identify and implement focused strategies, control measures, and BMPs;

c. Execute an integrated monitoring and assessment program; and

d. Allow for modification over time.

In general, WMPs and EWMPs are intended to facilitate Permit compliance and water quality target achievement and must ensure: 1) that discharges from covered MS4s achieve applicable WQBELs and RWLs and do not include prohibited non-stormwater discharges; and 2) that control measures are implemented to reduce the discharge of pollutants to the maximum extent practicable (MEP). Per Permit Section VI.C.1.e, WMPs and EWMPs are to be developed based on the Regional Board's Watershed Management Areas (WMAs) or subwatersheds thereof.

Consistent with Permit requirements, this EWMP is written to:

1. Be consistent with Permit provisions in Part VI.C.1.a.-f and Part VI.C.5-C.8;
2. Incorporate applicable State agency input on priorities and key implementation factors;
3. Provide for meeting water quality standards and other CWA obligations;

4. Include multi-benefit regional projects which retain stormwater from the 85th percentile, 24-hour storm;
5. Include watershed control measures to achieve compliance with all interim and final WQBELs in drainage areas where retention of the 85th percentile, 24-hour storm is infeasible;
6. Maximize the effectiveness of funding;
7. Incorporate effective innovative technologies;
8. Ensure existing requirements to comply with technology based effluent limitations and core requirements are not delayed; and
9. Ensure a financial strategy is in place.

This EWMP is applicable to the NSMBCW EWMP Area, which consists of the coastal watersheds within Santa Monica Bay Beaches Bacteria (SMBBB) TMDL Jurisdictional Groups 1 (J1) and 4 (J4) and the portion of Malibu Creek Watershed (SMBBB TMDL Jurisdictional Group 9 [J9]) within the City of Malibu's jurisdiction, as shown in **Figure ES-1**. It was developed through collaboration amongst the NSMBCW EWMP Group, all of whom maintain jurisdiction over a portion of the NSMBCW EWMP Area. The NSMBCW EWMP Area excludes lands owned by jurisdictions other than the NSMBCW EWMP Group, including the State of California and Federal lands.

The NSMBCW EWMP Area encompasses 55,121 acres, including 20 subwatersheds and 28 freshwater coastal streams as defined by the Basin Plan (Regional Board, 1995. Updated 2011). The watersheds within J1 from east to west include: Topanga Canyon, Tuna Canyon, Pena Canyon, Piedra Gorda Canyon, Las Flores Canyon, Carbon Canyon, Corral Canyon, Solstice Canyon, Latigo Canyon, Escondido Canyon, Ramirez Canyon, Zuma Canyon, Trancas Canyon, Encinal Canyon, Los Alisos Canyon, and Arroyo Sequit. Nicholas Canyon, located between Los Alisos Canyon and Arroyo Sequit, is the only watershed within J4, and Malibu Creek is the only watershed within J9. The NSMBCW EWMP Area is shown in **Figure ES-1**.

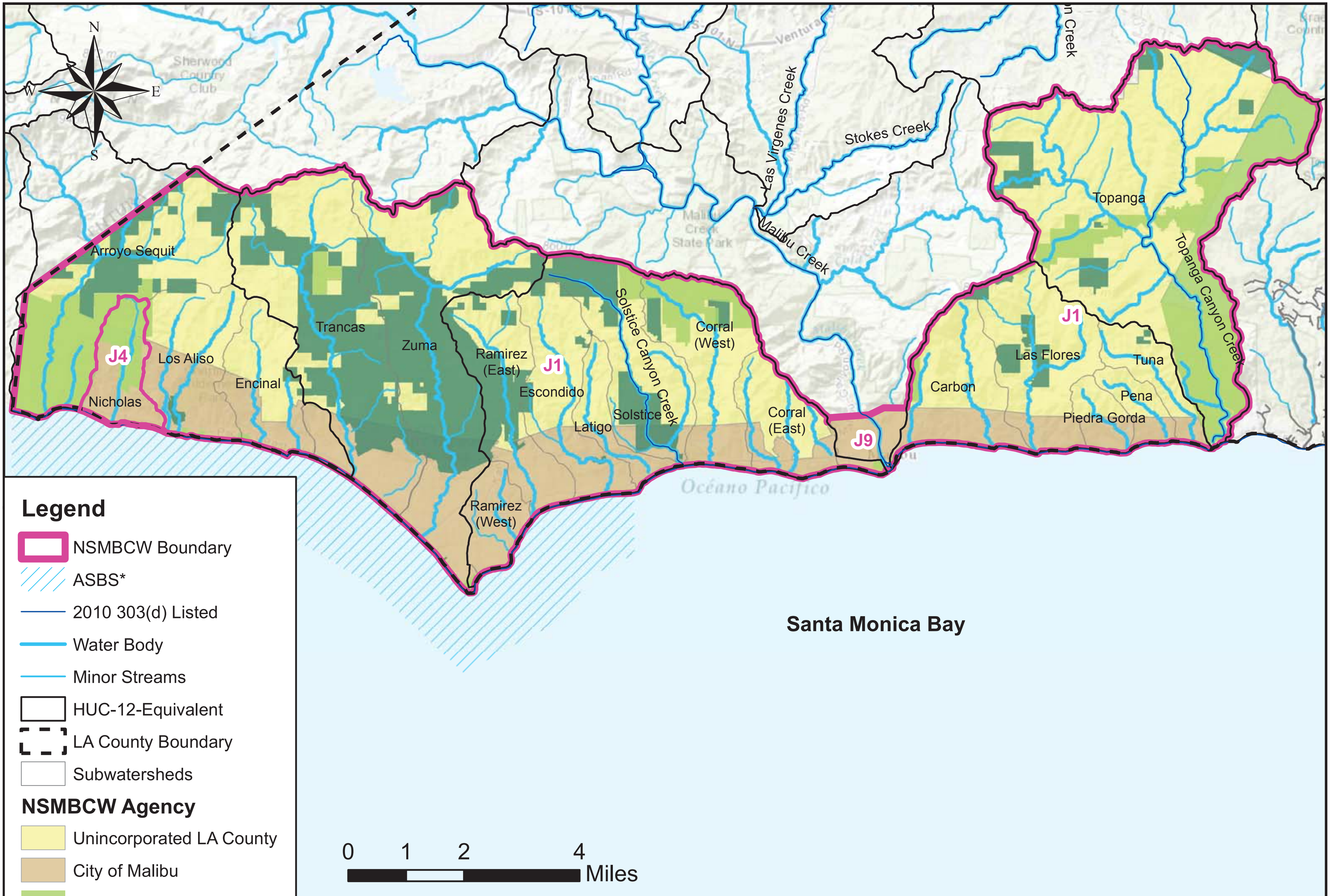

Figure ES-1. NSMBCW EWMP Area.
NSMBCW EWMP

June 2015

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

REASONABLE ASSURANCE ANALYSIS

Because the EWMP is a planning document intended to lay out a framework of activities that will achieve Water Quality objectives, it is necessary to demonstrate that selected BMPs are reasonably expected to meet defined goals. This evaluation of performance is described through a technically robust and rigorous Reasonable Assurance Analysis (RAA). The RAA evaluates the simulated existing load of prioritized pollutants for each modeled watershed, then compares this value to the allowable load for those same pollutants and watersheds. The difference between the simulated existing load and the calculated allowable load is the target load reduction (TLR), or the amount of load that needs to be reduced within the modeled watershed to reach compliance. The RAA then seeks to identify and evaluate BMP implementation scenarios within the NSMBCW EWMP Area for each priority pollutant identified below in order to meet the allowable load. The following is an overview of the types of BMPs contemplated in the NSMBCW EWMP Area.

<u>Programmatic BMPs</u>: These source controls include a combination of BMPs such as new or enhanced pet waste controls (ordinance, signage, education/outreach, mutt mitts, etc.), Clean Bay Restaurant Program, enhanced street sweeping (e.g., 100% vacuum sweepers, increased frequency, posting of 'No Parking' signs for street sweeping, etc.), increased catch basin and storm drain cleaning, and other new or enhanced nonstructural BMPs that target the pollutants addressed in this EWMP.

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

<u>Redevelopment</u>: Beginning in 2001, redevelopment projects were required by the Permit (via the Standard Urban Stormwater Management Program [SUSMP]) to incorporate stormwater treatment BMPs into their projects if their project size

exceeded specified thresholds. The 2001 MS4 Permit SUSMP redevelopment requirements were applied between 2003 (the point at which the Bacteria TMDL was implemented) and 2015 for the NSMBCW EWMP Area. Additionally, the 2012 MS4 Permit established new criteria for redevelopment projects, requiring certain sized projects to capture, retain, or infiltrate the 85th percentile design storm or the 0.75-inch design storm, whichever is greater, via the implementation of LID BMPs. These were taken into account as well.

Structural BMPs: Both existing and proposed regional and distributed structural BMPs are included in this EWMP to address water quality targets in the Santa Monica Bay Watershed.

The RAA process shows that implementation of EWMP-defined activities within the NSMBCW EWMP Area are expected to result in discharges that achieve applicable Permit-specified WQBELs and that do not cause or contribute to exceedances of applicable RWLs.

WATER QUALITY PRIORITIES

Receiving waters for stormwater runoff from the NSMBCW EWMP Area were screened for water quality priorities by reviewing Total Maximum Daily Loads (TMDLs), the State's 303(d) list, and additional water quality data. Each identified water quality priority for a given receiving water body was categorized as a water body-pollutant combination (WBPC). WBPCs were classified into one of three categories, in accordance with Section VI.C.5(a).ii of the Permit. **Table ES-1** presents the resulting classifications for the WBPCs within the NSMBCW EWMP Area. WBPCs categorized below are subject to change through the EWMP's adaptive management process (as described in Section 8) based on future data collected as part of the CIMP or other monitoring programs.

Table ES-1. Water Body Pollutant Prioritization for the NSMBCW EWMP Area

Category	Water Body	Pollutant	Basis
1	Malibu Creek and Lagoon	Nutrients	USEPA-established Nutrients TMDL and Benthic TMDL for the Malibu Creek Watershed
	SMB Beaches	Dry Weather Bacteria	SMB Beaches Bacteria TMDLs for both dry and wet weather
	SMB Beaches	Wet Weather Bacteria	
	Malibu Creek and Lagoon	Indicator Bacteria	Malibu Creek and Lagoon Indicator Bacteria TMDL
	Malibu Creek	Trash	Malibu Creek Trash TMDL
	SMB	Trash/Debris	TMDL for debris for Santa Monica Bay Offshore/Nearshore
	SMB	DDTs	USEPA TMDL for DDT and PCBs for Santa Monica Bay Offshore/Nearshore
	SMB	PCBs	
2	Topanga Canyon Creek	Lead	Topanga Canyons Creek 303(d) listing for lead.
	Malibu Creek	Sulfates & Selenium	Malibu Creek 303(d) listing for sulfates and selenium
	Malibu Lagoon	pH	Malibu Lagoon 303(d) listing for pH
3	None		There are currently no known available data demonstrating exceedances of receiving water limits within the NSMBCW Area, aside from those WBPCs already defined as Category 1 and 2.

The RAA was performed for bacteria in both the Santa Monica Bay Watershed and the Malibu Creek Watershed. In addition, the RAA was performed for nutrients (nitrates, total nitrogen, and total phosphorus) in the Malibu Creek Watershed and total lead in the Topanga Canyon Creek Subwatershed.

The MS4 compliance targets for dichloro-diphenyl-trichloroethanes (DDTs) and polychlorinated biphenyls (PCBs) established in the Santa Monica Bay DDT & PCB TMDL were based on the assumption that the existing stormwater pollutant loads for DDT and PCBs were lower than what was needed to protect the Santa Monica Bay from these legacy pollutants (i.e., based on data used in the TMDL, no MS4 pollutant load reduction is expected to be required). Therefore, no reductions in DDT and PCB loading from the NSMBCW EWMP Group MS4s are required to meet the TMDL and therefore, no RAA is required.

Trash was not modeled as part of the RAA, instead the RAA describes how the NSMBCW EWMP Agencies will comply with the TMDL through their Trash Monitoring and Reporting Programs which are aimed at meeting the zero trash discharge definition in the TMDL.

SANTA MONICA BAY WATERSHED

In the NSMBCW EWMP Area, the wet weather RAA was performed for bacteria in all subwatersheds and total lead in the Topanga Creek Subwatershed. After evaluating the TLR for each WBPC in the Santa Monica Bay Watershed, BMPs were identified where necessary to meet the allowable loads. The wet weather TLRs for bacteria in the tributary subwatersheds to Santa Monica Bay were calculated to range from 0 to 43.9 percent (as a percent of calculated baseline load), and the cumulative wet weather TLR for the entire NSMBCW EWMP Area in the Santa Monica Bay Watershed was calculated to be 7.3 percent of the baseline load. The wet weather TLR for total lead in the Topanga Creek Subwatershed was estimated to be zero. Section 5.1 details the calculated TLRs for bacteria in Santa Monica Bay and total lead in Topanga Creek.

Where wet weather TLRs were calculated to be greater than zero, BMPs were identified in order to reduce the existing load to compliance levels. A summary of specific BMPs for Santa Monica Bay can be found in Section 5.2 and results from the RAA can be found in Section 5.3 for Santa Monica Bay.

For dry weather, the NSMBCW EWMP Group's compliance approach is consistent with the Permit requirement to eliminate 100 percent of non-exempt dry weather MS4 discharges. The Group's implementation approach for achieving this is to use 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 prevent non-exempt sources of non-stormwater flow) and source investigations. By eliminating flows, this is equivalent to 100 percent load reduction for all pollutants, thereby demonstrating reasonable assurance of meeting all applicable TMDL limits and water quality objectives in the Permit 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.

MALIBU CREEK WATERSHED

The NSMBCW EWMP Group is responsible for the portion of the Malibu Creek Watershed within the City of Malibu. This area is approximately 618 acres in size, or 0.87 percent of the entire 70,651 acre Malibu Creek Watershed. Approximately 306 acres of the 618-acre watershed are tributary to Malibu Legacy Park. Legacy Park was designed to retain the 0.75-inch design storm for most of the 306-acre Civic Center drainage areas, as well as dry weather flows from the other two drains which are tributary to the project. Because the 85th percentile, 24-hour design storm over the entire Legacy Park tributary area is approximately 0.65 inch, the park currently qualifies as a regional EWMP project. The RAA was therefore not performed for the tributary area to Malibu Legacy Park, since it is considered a regional EWMP project capable of capturing and retaining the 85th percentile, 24-hour storm.

The remaining area, which is almost entirely on the eastern side of Malibu Creek, is a uniquely developed area requiring special consideration when modeling as part of the RAA. This area (identified as the "MCW" analysis region, as shown in **Figure ES-2**) contains approximately 312 acres of sparsely developed space, with a total impervious coverage of approximately 12 percent. The development in this analysis region contains mostly low density (rural) single family residential. There are no NSMBCW Agency-owned storm drains in this analysis region and streets do not have curbs or gutters. Besides the 85 acres of state- and federally-owned land, the developed neighborhood is privately owned property, including private roads. None of the developed area is directly connected to Malibu Creek. Instead, all impervious areas are disconnected via densely vegetated fields and flow paths. To represent this disconnected imperviousness, baseline conditions for the developed areas in this analysis region were modeled as being tributary to vegetated swales.

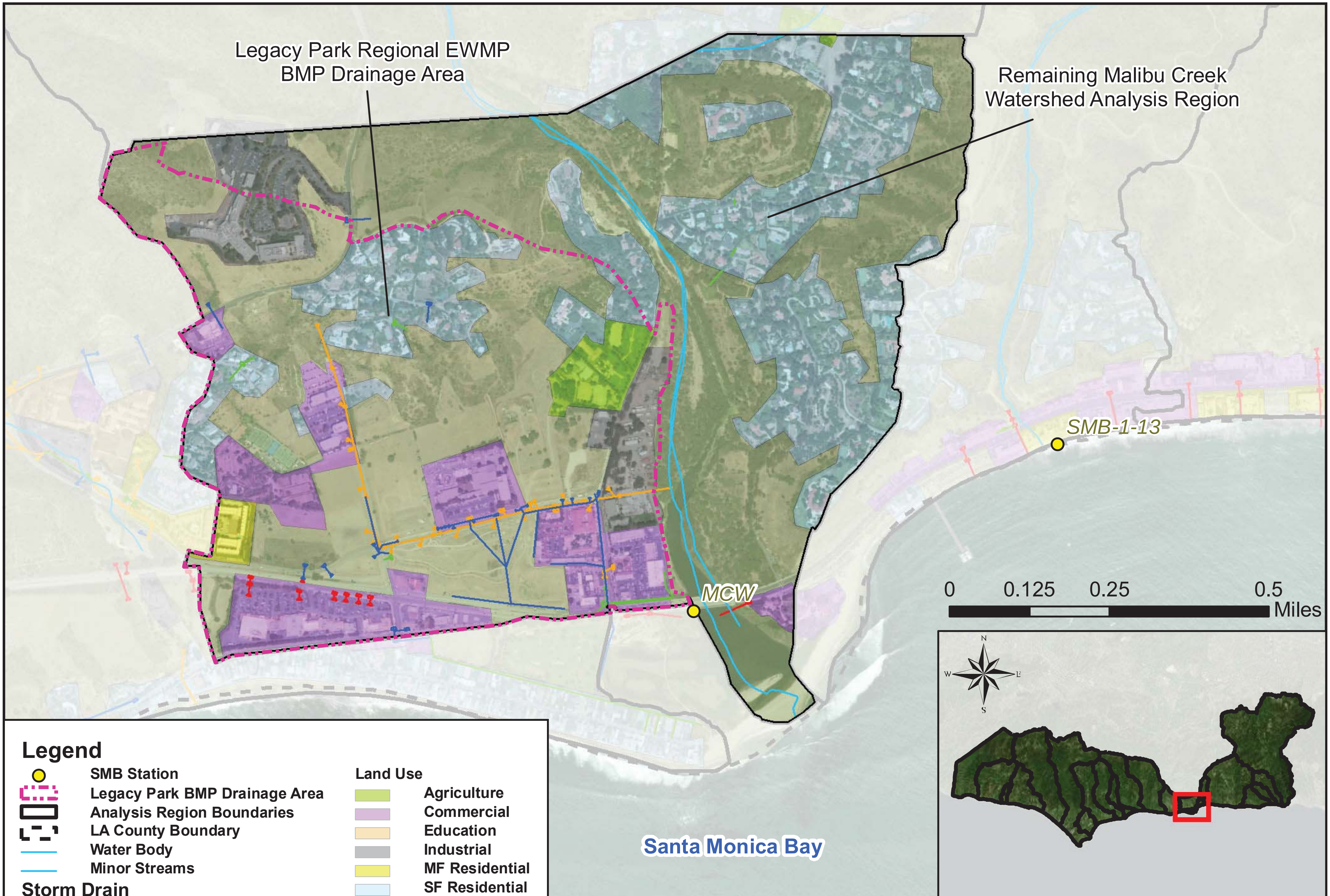

Figure ES-2. Malibu Creek Watershed NSMBCW EWMP

June 2015

Geosyntec consultants

For bacteria within the modeled area of the Malibu Creek Watershed, the absolute allowed load for fecal coliform was calculated to be 23.5 x 10^{12} MPN for Model Year 1995. However, the baseline load reaching Malibu Creek was calculated to be 19.9 x 10^{12} MPN fecal coliform due to the limited discharges occurring from the EWMP Area. Therefore, even during the critical year, since the existing load is less than the allowed load, no load reduction is required to meet the allowed load (TLR = 0), and reasonable assurance of compliance with the TMDL limit has been demonstrated.

For nitrate plus nitrite in the Malibu Creek Watershed per the Malibu Creek Nutrients TMDL, the allowed load, calculated based on total runoff in the 90th percentile critical year (1995) multiplied by the concentration-based waste load allocation (8 mg/L), was calculated to be 8,680 lbs. The baseline load, calculated based on total runoff in 1995 multiplied by the 90th percentile daily concentration in 1995 (1.6 mg/L), is 1,733 lbs. Therefore, even in a critical condition, no load reduction is required to meet the allowed load (TLR = 0), and reasonable assurance of compliance with the TMDL limit has been demonstrated.

For total nitrogen within the Malibu Creek Watershed per the USEPA Benthic TMDL, the TMDL establishes a final concentration-based waste load allocation for total nitrogen of 4.0 mg/L (average winter season load). Within the NSMBCW EWMP-portion of the Malibu Creek Watershed, the total nitrogen baseline load reaching the receiving water for Model Year 1995 (2,170 lbs) was calculated to be less than the allowed load (4,340 lbs); therefore, load reductions are not anticipated to be necessary to meet the TMDL winter total nitrogen WLA (i.e., the TLR is zero), and reasonable assurance of compliance has been demonstrated. Similarly for total phosphorus, the TMDL establishes a final concentration-based waste load allocation for total phosphorus of 0.2 mg/L (average winter season load). Within the NSMBCW EWMP-portion of the Malibu Creek Watershed, the total phosphorus baseline load reaching the receiving water for Model Year 1995 (211 lbs) was calculated to be less than the allowed load (217 lbs); therefore, load reductions are not anticipated to be necessary to meet the TMDL WLAs (i.e., the TLR is zero), and reasonable assurance of compliance has been demonstrated.

Therefore, within the Malibu Creek Watershed analysis region, reasonable assurance of compliance with all WBPC allowed loads was demonstrated since there is no required load reduction. As such, no new structural BMPs have been proposed for this watershed (Analysis Region MCW). Load reductions associated with the implementation of non-structural BMPs were quantified and range from 7 to 24 percent of baseline loads for the critical year for each modeled pollutant. These are summarized in Section 6.3.

For dry weather within the Malibu Creek Watershed, all flows tributary to Legacy Park are captured, treated, and retained by Legacy Park. Therefore, dry weather discharges from this area do not exist. In the remaining portion of the Malibu Creek Watershed, the only storm drain infrastructure is a small rectangular channel on the eastern side of Malibu Creek. This drain is privately owned, and is not directly connected to the Creek. Therefore, no dry weather discharges are known to occur from the NSMBCW EWMP Area within the Malibu Creek Watershed, and reasonable assurance of compliance with applicable dry weather bacteria TMDL WQBELs and nutrient TMDL WLAs is demonstrated on this basis. Future screening results will be considered through the EWMP adaptive management process, and this dry weather RAA conclusion may be reevaluated at that time.

ESTIMATED COSTS

Costs were estimated for the proposed structural BMPs identified in the EWMP. Total capital costs estimated for structural BMPs include “hard” costs, such as construction and materials, as well as “soft” costs, such as design, construction management, and permitting. Operation and maintenance costs were also estimated for structural BMPs, as discussed in Section 9.

1 INTRODUCTION

Following adoption of the 2012 Los Angeles Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) Permit[3] (Permit), the City of Malibu (Malibu), County of Los Angeles (County), and Los Angeles County Flood Control District (LACFCD) agreed to collaborate on the development of an Enhanced Watershed Management Plan (EWMP) for the North Santa Monica Bay Coastal Watersheds (NSMBCW). This NSMBCW EWMP is intended to facilitate effective, watershed-specific Permit implementation strategies in accordance with Permit Part VI.C. This document summarizes the NSMBCW-specific water quality priorities identified jointly by Malibu, the County, and LACFCD (collectively referred to as the NSMBCW EWMP Group), outlines the program plan, including specific strategies, control measures and best management practices (BMPs) necessary to achieve water quality targets (Water Quality-Based Effluent Limitations [WQBELs] and Receiving Water Limitations [RWLs]), and describes the quantitative analysis performed to support target achievement and Permit compliance.

In compliance with Section VI.C.4.b and Section VI.C.4.c.iv of the Permit, the NSMBCW EWMP Group submitted a Notice of Intent (NOI) to develop an EWMP on June 27, 2013, and a Work Plan for development of the EWMP on June 28, 2014 to the Los Angeles Regional Water Quality Control Board (Regional Board). The EWMP Notice of Intent and Work Plan are provided as **Appendix A** and **Appendix B**, respectively. As of the time of drafting of this EWMP, comments have not been received from the Regional Board on the submitted EWMP Work Plan. As the next step in EWMP development, the NSMBCW EWMP Group is required by Section VI.C.4.c.iv of the Permit to submit this Draft EWMP no later than June 28, 2015. This Draft NSMBCW EWMP is consistent with the Work Plan previously submitted to the Regional Board.

In compliance with Section VI.B and Attachment E of the Permit, the NSMBCW EWMP Group submitted a Coordinated Integrated Monitoring Plan (CIMP) to the Regional Board on June 28, 2014. The CIMP is currently being finalized in accordance with comments received from the Regional Board.

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

1.1 PURPOSE AND REGULATORY FRAMEWORK

Watershed Management Programs (WMPs) are a voluntary opportunity afforded by Section VI.C.1 of the Permit for Permittees to collaboratively or individually develop comprehensive watershed-specific control plans and are intended to facilitate Permit compliance and water quality target achievement. An EWMP is defined in the Permit as a WMP which comprehensively evaluates opportunities for collaboration amongst Permittees and other partners on multi-benefit regional projects that, wherever feasible, retain, 1) all non-stormwater runoff, and 2) all stormwater runoff from the 85th percentile, 24-hour storm event while also achieving benefits associated with issues such as flood control and water supply. Where regional projects cannot achieve these standards, the EWMP must demonstrate that applicable water quality targets are achieved through a Reasonable Assurance Analysis (RAA). Additional details on the regulatory background (NPDES Permit, Water Quality Standards, and California Ocean Plan) and the Permit specifics of EWMPs are provided below.

1.1.1 NPDES PERMIT

The 1972 Clean Water Act (CWA) established the NPDES Program to regulate the discharge of pollutants from point sources to waters of the United States. In 1990, the USEPA developed Phase I of the NPDES Storm Water Permitting Program, which established a framework for regulating municipal and industrial discharges of stormwater and non-stormwater that had the greatest potential to negatively impact water quality within waters of the United States. In particular, under Phase I, USEPA required NPDES Permit coverage for discharges from medium and large MS4 servicing populations greater than 100,000 persons. Operators of MS4s regulated under the Phase I NPDES Storm Water Program were required to obtain permit coverage for municipal discharges of stormwater and non-stormwater to waters of the United States.

The Regional Board designated the MS4s owned and/or operated by the incorporated cities and Los Angeles County unincorporated areas within the Coastal Watersheds of Los Angeles County as a large MS4 due to the total population of Los Angeles County. All MS4s within the Coastal Watersheds of Los Angeles County except for the City of Long Beach MS4 are subject to the waste discharge requirements set forth in Order No. R4 2012-0175 Permit No. CAS004001. General permit requirements, which are relevant to and must be met through EWMPs, include: (i) a requirement to effectively prohibit non-stormwater discharges through the MS4, (ii) requirements to implement controls to reduce the discharge of pollutants to the maximum extent practicable, and (iii) other provisions the Regional Board has determined appropriate for the control of such pollutants.

1.1.2 WATER QUALITY STANDARDS AND TMDLS

The CWA also required that Regional Water Quality Control Boards establish water quality standards for each water body in their region. Water quality standards include beneficial uses, water quality objectives and criteria that are established at levels sufficient to protect those beneficial uses, and an anti-degradation policy to prevent degrading waters. The Regional Board adopted a Water Quality Control Plan - Los Angeles Region (hereinafter Basin Plan) on June 13, 1994 addressing this portion of the CWA, which designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters in the Los Angeles Region. Pursuant to California Water Code section 13263(a), the requirements of the Permit implement the Basin Plan. Beneficial use designations for water bodies within the NSMBCW EWMP Area are summarized in **Table 1**.

Table 1. NSMBCW Water Bodies and Beneficial Uses Designated in the Basin Plan

Water Body	MUN	GWR	NAV	REC1	REC2	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	WET[a]
Malibu Lagoon			E	E	E			E	E	E	E	E	E	E
Malibu Creek	P*			E	E	E	E			E	E	E	E	E
Arroyo Sequit	P*	I		E	E	E	E			E	E	E	E	E
Nicholas Canyon	P*			I	I	I				E				
Los Alisos Canyon	P*			I	I	I				E	E			
Lechuza Canyon	P*			I	I	I				E				
Encinal Canyon	P*			I	I	I				E	E			
Trancas Canyon Creek	E*			E	E	E				E	E			
Zuma Canyon Creek	E*			E	E	E	E			E	E	P	P	
Ramirez Canyon Creek	I*			I	I	I				E			P	
Escondido Canyon Creek	I*			I	I	I				E	E			
Latigo Canyon	I*			I	I	I				E	E			
Puerco Canyon	I*			I	I	I				E				
Solstice Canyon Creek	E*			E	E	E				E		P	P	
Corral Canyon Creek	I*			I	I	I				E				
Carbon Canyon	P*			I	I	I				E				
Las Flores Canyon Creek	P*			I	I	I				E				
Piedra Gorda Canyon	P*			I	I	I				E				
Pena Canyon	P*			I	I	I	E			E				
Tuna Canyon	P*			I	I	I				E				
Topanga Canyon Creek	P*			I	I	E	E			E		P	I	

E = Existing beneficial use
I = Intermittent beneficial use
P = Potential beneficial use
[*]Asterisked MUN designations are designated under SB 88-63 and RB 89-03. Some designations may be considered for exemption at a later date.
[a] Water bodies designated as WET may have wetlands habitat associated with only a portion of the water body. Any regulatory action would require a detailed analysis of the area.

CWA Section 303(d)(1) requires each state to identify the waters within its boundaries that do not meet water quality standards. Water bodies that do not meet water quality standards are considered impaired and are placed on the state's CWA Section 303(d) List. For each listed water body-pollutant combination, the state is required to establish a Total Maximum Daily Load (TMDL) to establish the allowable pollutant loadings for a water body and provide the basis upon which to establish water quality-based controls (required by NPDES Permits). Provisions regarding TMDLs are then incorporated into NPDES Permits once they have been developed and adopted. The 2010 CWA Integrated Report and updated 303(d) list were approved by the State Water Resources Control Board (SWRCB) on August 4, 2010 and by the United States Environmental Protection Agency (USEPA) on October 11, 2011. Specific TMDLs developed for the NSMBCW EWMP Area are discussed in more detail in Section 2.

1.1.3 OCEAN PLAN AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE

In 1972, the State of California adopted the Ocean Plan (SWRCB, 2012a), which regulates waste discharges to protect the quality of ocean waters for use and enjoyment by the general public. All receiving water bodies are ultimately tributary to the SMB, thus making the regulations set forth in the Ocean Plan applicable to the NSMBCW. In particular, the Ocean Plan designates Areas of Special Biological Significance (ASBS), which are areas requiring special protection of species or biological communities to the extent that maintenance of natural water quality is assured. One of these ASBS designations is within the NSMBCW EWMP Area and includes the minimally-developed area from Laguna Point to Latigo Point, known as ASBS 24 (see **Figure 1**). The Permit defines this area as:

"Ocean water within a line originating from Laguna Point at 34° 5' 40" north, 119° 6'30" west, thence southeasterly following the mean high tideline to a point at Latigo Point defined by the intersection of the mean high tide line and a line extending due south of Benchmark 24; thence due south to a distance of 1000 feet offshore or to the 100 foot isobath, whichever distance is greater; thence northwesterly following the 100 foot isobath or maintaining a 1,000-foot distance from shore, whichever maintains the greater distance from shore, to a point lying due south of Laguna Point, thence due north to Laguna Point."

As a result of this ASBS designation, the NSMBCW agencies were required by the SWRCB to either cease the discharge of stormwater and nonpoint sources of waste into ASBS 24 or request an exception to the California Ocean Plan. The NSMBCW agencies each submitted a request for an exception. In March of 2012, the SWRCB granted these exceptions, finding that such discharge exceptions will not compromise protection of ocean waters for beneficial uses. As a stipulation of the exceptions, discharges by the NSMBCW agencies are required to meet the following criteria:

- The discharges must be covered under an appropriate authorization to discharge waste to the ASBS, such as an NPDES permit and/or waste discharge requirements;
- The authorization must incorporate all of the Special Protections required by the SWRCB in Resolution No. 2012-0012 (SWRCB, 2012b); and
- The exception applies to stormwater and nonpoint source waste discharges only.

The details of the California Ocean Plan exceptions are provided in SWRCB Resolution No. 2012-0012 (SWRCB, 2012b).

In September 2014, the NSMBCW EWMP Group submitted a Draft Compliance Plan and Draft Pollution Prevention Plan to the SWRCB in order to provide a comprehensive approach to dealing with potential pollutant sources to ASBS 24 (NSMBCW EWMP Group, 2014b and NSMBCW EWMP Group, 2014c). After conducting an assessment of the potential pollutant load reductions required in order to enhance the water quality of the ASBS, it was determined that structural BMPs would not be required to meet targets. Instead, non-structural source controls would be relied upon to ensure ongoing protection of ASBS 24 and to meet the requirements of the ASBS Special Protections.

As described in more detail herein, the NSMBCW EWMP includes similar findings; namely, that additional structural BMPs are not required within the NSMBCW EWMP Area tributary to ASBS 24. The non-structural BMPs described in the ASBS Compliance Plan are included in Section 5.2.2 of this NSMBCW EWMP.

1.1.4 WMPs and Enhanced WMPs

The voluntary WMPs and EWMPs allow Permittees to collaboratively or individually develop comprehensive watershed-specific control plans which a) prioritize water quality issues, b) identify and implement focused strategies, control measures and BMPs, c) execute an integrated monitoring and assessment program, and d) allow for modification over time. In general, WMPs and EWMPs are intended to facilitate Permit compliance and water quality target achievement and must ensure: 1) that discharges from covered MS4s achieve applicable WQBELs and RWLs and do not include prohibited non-stormwater discharges; and 2) that control measures are implemented to reduce the discharge of pollutants to the maximum extent practicable (MEP). Per Permit Section VI.C.1.e, WMPs and EWMPs are to be developed based on the Regional Board's Watershed Management Areas (WMAs) or subwatersheds thereof.

The Permit specifies that an EWMP shall:

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

The EWMP must also include an adaptive management process that allows the EWMP to be modified based on consideration of items such as, but not limited to, water quality data, implementation progress, and Regional Board recommendations.

1.2 EWMP JURISDICTIONAL CHARACTERISTICS

This EWMP is applicable to the NSMBCW EWMP Area, which consists of the coastal watersheds within Santa Monica Bay Beaches Bacteria (SMBBB) TMDL Jurisdictional Groups 1 (J1) and 4 (J4) and the portion of Malibu Creek Watershed (SMBBB TMDL Jurisdictional Group 9 [J9]) within the City of Malibu's jurisdiction. It represents collaboration amongst the NSMBCW EWMP Group, all of whom maintain jurisdiction over a portion of the NSMBCW EWMP Area. The NSMBCW EWMP Area excludes lands owned by jurisdictions other than the NSMBCW EWMP Group, including the State of California and Federal lands. The NSMBCW EWMP Area is shown in **Figure 1**.

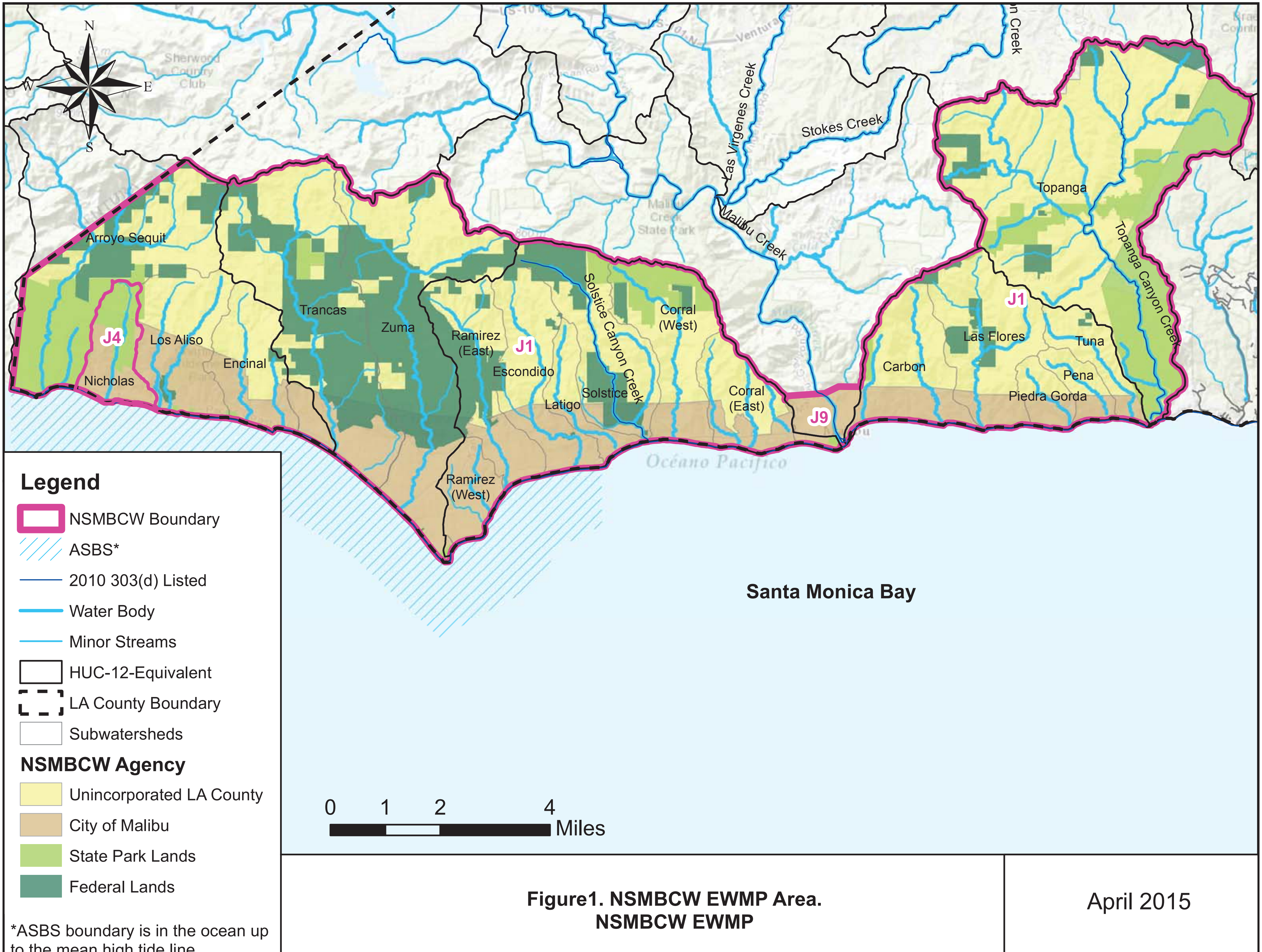

Figure1. NSMBCW EWMP Area.
NSMBCW EWMP

April 2015

1.3 GEOGRAPHICAL CONTEXT

The NSMBCW EWMP Area encompasses 55,121 acres, including 20 subwatersheds and 28 freshwater coastal streams as defined by the Basin Plan (Regional Board, 1995. Updated 2011). The watersheds within J1 from east to west include: Topanga Canyon, Tuna Canyon, Pena Canyon, Piedra Gorda Canyon, Las Flores Canyon, Carbon Canyon, Corral Canyon, Solstice Canyon, Latigo Canyon, Escondido Canyon, Ramirez Canyon, Zuma Canyon, Trancas Canyon, Encinal Canyon, Los Alisos Canyon, and Arroyo Sequit. Nicholas Canyon, located between Los Alisos Canyon and Arroyo Sequit, is the only watershed within J4 and Malibu Creek is the only watershed within J9.

1.3.1 TOPOGRAPHY

The topography of the NSMBCW EWMP Area is dominated by the Santa Monica Mountains, an east-west trending mountain range (also referred to as a transverse range) that rises steeply from the Pacific Ocean. Elevations range from sea level to 3,111 feet at Sandstone Peak in the northern portion of Arroyo Sequit sub-watershed (United States Geological Survey Topographic-Bathymetric Map Los Angeles, CA 1975), which is approximately 5.5 miles inland from the Pacific Ocean. Drainage is thus is characterized by steep, narrow canyons which run out of the Santa Monica Mountains across a very narrow coastal plain.

1.3.2 CLIMATE

Annual rainfall within the Malibu coastal plain averages 12-13 inches, though annual rainfall can vary significantly from year-to-year as well as geographically throughout the EWMP Area, primarily due to the Santa Monica Mountains.

Although rainfall in the area is generally low and infrequent, passing storms (coinciding with the southern California rainy season from November to April) are generally intense, capable of releasing large rain amounts in relatively short periods of time (Malibu Bay Company, 2002).

1.3.3 GEOLOGY

The Santa Monica Mountains are relatively young, having formed approximately 20 million years ago as a result of repeated episodes of uplift and submergence. Considered part of the east-west trending Transverse Range, they are believed to be an extension of the Channel Islands. The Santa Monica Mountains can be characterized as an anticline ruptured by faulting and intrusions, the most dominant of which being the Malibu Fault. The Malibu Coast fault runs from offshore just west of Point Dume to offshore just east of Malibu and separates Catalina Schist basement rocks, offshore south of the coast, from granitic and meta-sedimentary rocks north of the fault. Due to the folding and faulting that has affected the Santa Monica Mountains, bedrock formations have fractures, joints, and tilted bedding planes at both steep and shallow angles.

The bedrock formations exposed in the Santa Monica Mountains north of the Malibu Coast fault consist of two main sequences (Yerkes and Campbell, 1980). The lower sequence consists of basement rocks of middle Mesozoic age, including slates, schists, and granitic rocks which are overlain by marine sedimentary series of late Cretaceous and early Tertiary age sandstone and siltstone formations. The upper sequence is a varied group of sedimentary and volcanic formations of middle Tertiary (Oligocene and Miocene) age that make up part of the south-central and western Santa Monica Mountains. These are the Sespe, Vaqueros, and Topanga Formations, Conejo Volcanics (intrusive volcanics into the Sespe and Vaqueros Formations), Monterey Formation, and Trancas Formation. A comprehensive water quality report by the Las Virgenes Municipal Water District (LVMWD) in 2011 (LVMWD, 2011) found that the Monterey Formation in particular is known to contain high levels of sulfur, selenium, and phosphate.

South of the Malibu Coast fault, the upper sequence bedrock formations found consist of Trancas Formation siltstone, sandstone and claystone (found at Trancas) and Monterey Formation shales (found at Point Dume). Trancas and Point Dume also have associated Pleistocene terrace deposits or Quaternary alluvium, beach, or estuarine deposits.

The shallowest surface geologic units consist of colluvium/soil, alluvium, estuarine deposits, landslide deposits, and terrace deposits. These range in age from very recent (historic) to early Quaternary (Pleistocene), and may be locally covered by artificial fill. All of the natural units was deposited by either water (streams, debris flows, long shore currents, and high tidal surges), gravity (slow creep or rapid slippage), or by in-place weathering (soil).

1.3.4 SOILS

The USDA Soil Conservation Service (now the Natural Resources Conservation Services) prepared a study in 1967 entitled "Soils of the Malibu Area, California with Farm and Non-farm Interpretations" that characterized soils in the Malibu area. Based on this study, the majority of soils in the NSMBCW EWMP Area are classified as clay loams or silty clay loams. Specific examples of soil types found in the area include

Castaic silty clay loams, Gazos silty clay loams, Gilroy clay loams, and Linne silty clay loams. Due to their clay nature, soils within the NSMBCW EWMP Area tend to have low infiltration capacity and high runoff potential.

1.3.5 LAND USE

As summarized in **Table 2** and illustrated in **Figure 2**, the land within the NSMBCW EWMP Area is largely undeveloped (93% vacant land use), the majority of which is designated as natural open space presently owned or proposed for acquisition by the Santa Monica Mountain Conservancy (SMMC). The majority of developed land is located along or adjacent to the narrow stretch of coastal plain, except in Arroyo Sequit and Topanga watersheds, where development is dispersed in the mid- to upper areas. Low density and rural residential development are the most prevalent developed land uses. Commercial and industrial lands are sparse, with the shoreline area of the Carbon subwatershed and the western side of Malibu Creek Watershed within the City of Malibu having the most concentrated areas of commercial development within the NSMBCW EWMP Area. The largest non-residential development within the NSMBCW EWMP Area is Pepperdine University, which is found within the Corral subwatershed. Developments within the unincorporated areas, as well as the incorporated areas of Malibu, are predominantly serviced by on onsite wastewater treatment systems (OWTS) however some unincorporated areas are sewered.[4]

[4] Within the City of Malibu there are 5 sewered neighborhoods served by small wastewater treatment facilities: Malibu West, Point Dume Club (mobile homes), Paradise Cove Mobile Home Park, Tivoli Cove Condominiums, Malibu County Estates, and the three condominiums in the Civic Center area.

Table 2. Land Use Distributions within the NSMBCW EWMP Area

JG	HUC-12 Watershed[a]	Vacant (%)	Agriculture (%)	Commercial (%)	SFR[b] (%)	MFR[b] (%)	Industrial[c] (%)	Education (%)
1/4	Arroyo Sequit	96.5%	0.9%	0.2%	2.2%	0.1%	0.0%	0.0%
1	Zuma Canyon	89.0%	1.9%	0.5%	7.7%	0.5%	0.1%	0.3%
1	Solstice Canyon	87.7%	0.7%	0.6%	8.8%	0.7%	0.1%	1.4%
9	Cold Creek-Malibu Creek[d]	56.0%	1.6%	11.2%	24.9%	0.7%	5.7%	0.0%
1	Santa Monica Beach	91.7%	0.0%	0.8%	7.0%	0.4%	0.0%	0.0%
1	Garapito Creek	94.9%	0.6%	0.2%	4.1%	0.2%	0.0%	0.1%
	Total	93.1%	0.8%	0.4%	5.0%	0.3%	0.1%	0.3%

[a] A HUC-12 watershed is defined by a 12-digit hydrologic unit code (HUC) delineation by the United States Geological Survey (USGS), which identifies the watershed area based on six levels of classification: regional, sub-region, hydrologic basin, hydrologic sub-basin, watershed, and subwatershed. See **Figure 2**.

[b] SFR = Single Family Residential; MFR = Multi-Family Residential

[c] Minor areas within the NSMBCW EWMP Area are zoned for industrial use, although the actual land use is not associated with manufacturing or similar industrial activities.

[d] The land use distribution for this watershed only includes the 619 acres tributary to Malibu Creek within the NSMBCW EWMP Area.

Land use data for the NSMBCW EWMP Area was taken from Los Angeles County Department of Public Works (LACDPW) Modified Rational Method Hydrology Support Files, which contains 2005 land use data for the entire County of Los Angeles (County of Los Angeles, 2005). After reviewing the data, including aerial photo analyses of various parcels, it was determined that a select number of parcels in the City of Malibu that were designated as agricultural areas were in fact single family residential developments. Therefore, based on discussion with the City of Malibu and review of the City's Local Coastal Plan (LCP), some agricultural land uses were updated to reflect the land use designated in the LCP (City of Malibu, 2001). Parcels that were determined to contain equestrian facilities maintained a designation of agricultural to best reflect the pollutant loads expected from such facilities. In total, approximately 15 parcels were updated to reflect existing LCP land uses compared to the 2005 LACDPW data.

Descriptions of each subwatershed in the NSMBCW EWMP Area, including land use characteristics, are provided below.

Arroyo Sequit. Arroyo Sequit is the reference subwatershed for the Santa Monica Bay Beaches Bacterial TMDL, used by the Regional Board for setting allowable exceedance days/Water Quality Objectives for fecal indicator bacteria in the rest of Santa Monica Bay. The subwatershed is virtually undeveloped (less than 2.5 percent is developed); therefore, anthropogenic sources of bacteria are believed to be sparse. Much of the open space within the subwatershed is within parcels belonging to the Santa Monica Mountains Conservancy (SMMC). There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed. Arroyo Sequit Canyon outlets at Leo Carrilo State Beach, where sample site SMB 1-1 is located.

Nicholas (J4). Nicholas Canyon is the sole Jurisdiction 4 area. It is a 1220-acre subwatershed, with more than half of the subwatershed located within lands proposed for acquisition by the SMMC. Except for a small area of medium to high density and low density residential development along the shoreline, the subwatershed can generally be characterized as predominately natural open space. There is a 2-acre parcel in the subwatershed that is designated as a wildlife preserve or sanctuary. Just east of Pacific Coast Highway is a horse ranch. Nicholas County Canyon Beach is a moderately popular, fairly open beach that provides parking for approximately 150 vehicles. The beach also provides fishing, picnicking, restrooms, showers, surfing, and swimming. A small, low-flow creek outlets to the east of a rocky point down coast of the main open beach area. Sample site SMB 4-1 is collected on the open beach part of the shore, upcoast of the outlet of the creek. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed.

Los Alisos. Los Alisos Canyon is a 2380-acre subwatershed with approximately 267 acres of residential development. In the upper region of the subwatershed around Decker Canyon there is a scattering of rural residential development and a small area designated as open space and recreation. Along the shoreline, the area is mostly low density residential with a small area of medium to high density residential development. There are two inland parks west of Pacific Coast Highway. Only 5 acres of non-pastoral or livestock agricultural land (nursery, vineyards) are found within the subwatershed. Most of the upper half of the subwatershed is the jurisdiction of the SMMC. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed. Sample site SMB 1-2 is located within this watershed at El Pescador State Beach. This is an open beach site, with no direct drainage to the sample site. Due to safety concerns, sampling has not occurred at this site since early 2014.

Encinal. Encinal Canyon is an 1830-acre subwatershed that has 179 acres of residential development. Scattered rural residential development is found beyond the incorporated boundaries of the City of Malibu and is located primarily along streams. Medium to high density development dominates the shoreline with some intermingling of low density development. Two small agricultural (non-pastoral or livestock) parcels comprising a total of about 14 acres are located relatively close to the shoreline. Approximately one-third of the land area within this subwatershed is proposed for acquisition by the SMMC. Sample site SMB 1-3 is located within this watershed at El Matador State Beach. This is an open beach site, with no direct drainage to the sample site.

Trancas. Trancas Canyon is a 6580-acre subwatershed that has 635 acres of residential development. Slightly more than 85 percent of the subwatershed is undeveloped land uses. A variety of developed land uses make up the remaining 15 percent of the watershed. A mixture of land uses, including medium to high and low density residential, educational, commercial, and rural residential, is found in the western portion of the subwatershed. The middle and upper regions of the subwatershed are mostly undeveloped, with a scattering of, rural residential, golf course, governmental, and agricultural land uses in the upper watershed. Approximately 26 acres of land within the northeastern section of the subwatershed is classified as cropland and pasture. There are 3 mapped horse ranches within the subwatershed, with one of the ranches located relatively close to the shoreline. Nearly half of the shoreline is comprised of a beach park (Zuma Beach). Relatively small-sized parcels proposed for ownership by the SMMC are scattered throughout the subwatershed. Trancas Canyon Creek outlets (when the sand berm is breached) at the up coast end of Zuma Beach below Broad Beach at sample site SMB 1-4.

Zuma. Zuma Canyon is a 6290-acre subwatershed that has 796 acres of residential development (13 percent of the total subwatershed). Developed land (including commercial and residential) comprises about 18 percent of the Zuma subwatershed. Low density residential development scattered with commercial, agricultural, horse ranch, and medium to high density residential development comprises the western portion of the subwatershed. Development is also found in the far upper portion of the subwatershed and is mostly characterized by rural residential and agricultural land uses. There are seven mapped horse ranches in this subwatershed. A few, small parcels proposed for ownership by the SMMC are found in the mid- to upper-regions of the subwatershed. A large proportion of the shoreline is comprised of a beach park (Zuma Beach). Zuma Canyon Creek outlets (when the sand berm is breached) down coast toward the Westward Beach Road end of Zuma Beach at sample site SMB 1-5. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed.

Ramirez. Ramirez Canyon is a 3350-acre subwatershed. It has 318 acres of residential development, with about 27 percent of its land area characterized by non-open space uses. Nearly all of the development is within the lower portion of the subwatershed. Numerous land uses are represented in the developed portion of the subwatershed. Low density residential development comprises the greatest proportion of the developed land uses. Commercial land is located away from the shoreline. There is a 6-acre horse ranch located in the lower portion of the subwatershed. The eastern portion of the subwatershed is planned for ownership by the SMMC. The outlet of Ramirez Canyon Creek is at Paradise Cove Beach where a stormwater treatment facility was constructed by the City of Malibu to address unknown sources of indicator bacteria in the creek prior to discharge at the beach near sample site SMB 1-7. Walnut Creek outlets at the uppermost boundary of Paradise Cove at sample site SMB O-1. SMB 1-6 on Point Dume at Zumirez Drive is also located in this subwatershed.

Escondido. Escondido Canyon is a 2300-acre subwatershed that has 318 acres of residential development. Rural residential development is found scattered throughout the subwatershed. Medium to high density residential development is found along the shoreline and low density residential development is found just east of the shoreline. About a third of the land area is within SMMC lands. About 43 acres of mapped horse ranches (representing about 2 percent of the subwatershed) are present. Escondido Canyon Creek outlets (when the sand berm is breached) at a small pocket beach between homes at sample site SMB 1-8.

Latigo. Latigo Canyon, with 824 acres of land, is one of the smallest subwatersheds in the NSMBCW EWMP Area. The subwatershed has 80 acres of residential development. Developed land within the Latigo subwatershed is characterized mostly by rural residential development in the central area of the subwatershed along the rim of Latigo Canyon and low and medium to high density residential development near the shoreline. Managed lands of the SMMC are found along the eastern border of the subwatershed. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed. Latigo Canyon Creek outlets at the east end of Latigo Beach under the Tivoli Cove community at sample site SMB 1-9.

Solstice. Solstice Canyon is a 2840-acre subwatershed that has minimal development limited to rural residential and horse ranch uses and a small commercial area near the coastline, and Solstice Canyon Park with very limited vehicle parking available. Much of this subwatershed is proposed for ownership by SMMC. SMMC first opened Solstice Canyon as a public park in 1988. It is now managed by the National Park Service. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed. Sample site SMB 1-10 is located near the mouth of Solstice Creek at Dan Blocker County Beach.

Corral. Corral Canyon is a 4,300-acre subwatershed that is bounded by the Malibu Creek Watershed to the east. It includes 244 acres of residential development. Corral subwatershed hosts the approximate 180-acre campus of Pepperdine University which is located in the southwestern area of the subwatershed fairly close to the shoreline. Except for a concentrated area of rural residential development in the east, most of the developed area in the subwatershed is near the shoreline and surrounding the university. Most of the residential development near the shoreline is medium to high density. The County of Los Angeles constructed the Marie Canyon Water Quality Improvement Project prior to the outlet of Marie Canyon on a section of Puerco Beach to address unknown sources of indicator bacteria in Marie Canyon Creek prior to discharge at the beach near sample site SMB 1-12. Additionally, samples sites SMB 1-11 (Corral Canyon Creek at Corral Beach) and SMB O-2 (Puerco Beach) are located within this subwatershed.

Malibu Creek (J9). The NSMBCW EWMP Group is responsible for the portion of the Malibu Creek Watershed within the City of Malibu. This area is approximately 618 acres in size, or 0.87 percent of the entire 70,651 acre Malibu Creek Watershed. Approximately 306 acres of the 618-acre watershed are tributary to Malibu Legacy Park, a regional EWMP project capable of retaining the 85th percentile, 24-hour storm over the entire tributary area. The remaining area, which is almost entirely on the eastern side of Malibu Creek, contains approximately 312 acres of sparsely developed space, with a total impervious coverage of approximately 12 percent. The development in this are contains mostly low density (rural) single family residential. There are no NSMBCW-owned storm drains in this analysis region and streets do not have curbs or gutters. Besides the 85 acres of state- and federally-owned land, the developed neighborhood is privately owned property, including private roads. When the sand berm is breached, Malibu Creek outlets at Surfrider Beach between the Malibu Lagoon State Beach and the State-operated Malibu Pier.

Carbon. Carbon Canyon is a 2310-acre subwatershed that is bounded by the Malibu Creek Watershed to the west. It has 315 acres of residential development (14 percent of the total area). Rural residential development is found scattered within the eastern and western portions of the subwatershed. Medium to high density residential development is located adjacent to Pacific Coast Highway. A small beach park is found along the western shoreline and the State-operated Malibu Pier is located within this subwatershed. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed. Sample site SMB 1-13 is located within this subwatershed, near the bottom of Sweetwater Canyon.

Las Flores. Las Flores Canyon is a 2921-acre subwatershed that has 282 acres of residential development. Within this subwatershed, medium to high density development flanks the shoreline along with commercial development. Scattered low density development is found within the lower subwatershed and rural residential development is found scattered within the central and eastern areas of the subwatershed. A large proportion of the land is comprised of SMMC lands. In 2008, the City of Malibu constructed a small neighborhood park just above Pacific Coast Highway with a small playground, 1/3 mile of walking trails, and picnic area. As part of the park construction, measures were taken to preserve and naturalize the creek through the planting of over 45 varieties of native plant species and the installation of a vegetated swale to mitigate runoff from the roadway. Sample site SMB 1-14 is located at the bottom of Las Flores Creek at Las Flores Lagoon and Beach.

Piedra Gorda. Piedra Gorda is a 629-acre subwatershed with approximately 80 percent of the land within this subwatershed designated as open space, with the majority of that area proposed for ownership by SMMC. Sample site SMB 1-15 is located within this subwatershed. This sample location is an open beach site at Big Rock Beach.

Pena. Pena Canyon is the smallest subwatershed within the Santa Monica Bay portion of the NSMBCW EWMP Area, with 625 acres of area. About 96 percent of this subwatershed is represented by open space lands, and much of this area is proposed for acquisition by SMMC. Medium to high density residential development and a beach park are the only other uses within the subwatershed and both of these uses are along the shoreline. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed. Sample site SMB 1-16 is located at the mouth of Pena Canyon on Las Tunas County Beach.

Tuna. Tuna Canyon is a 1007-acre subwatershed that has 39 acres of residential development. This subwatershed is virtually undeveloped with the exception of a few scattered areas of rural residential development in the east and medium to high density and commercial development along the shoreline. Nearly the entire subwatershed is proposed for acquisition by SMMC. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed. Sample site SMB 1-17 is located at the wave wash of Tuna Canyon.

Topanga. Topanga Canyon is the largest subwatershed within the NSMBCW EWMP Area. It is a 12,611-acre subwatershed that has nearly every category of land use represented within its borders. There is little development near the shoreline other than a beach park, a small commercial area, and a small (2-acre) maintenance facility zoned as industrial land use. The central and eastern areas of the subwatershed are marked by rural residential, commercial, public, horse ranch, educational, and mixed urban/construction land uses. This subwatershed has a relatively high concentration of horse ranches, the majority of which are in the upper subwatershed. There is only one NSMBCW-owned MS4 outfall known to exist in this subwatershed. Sample site SMB 1-18 is located near the mouth of Topanga Canyon Creek at Topanga Lagoon and State Beach.

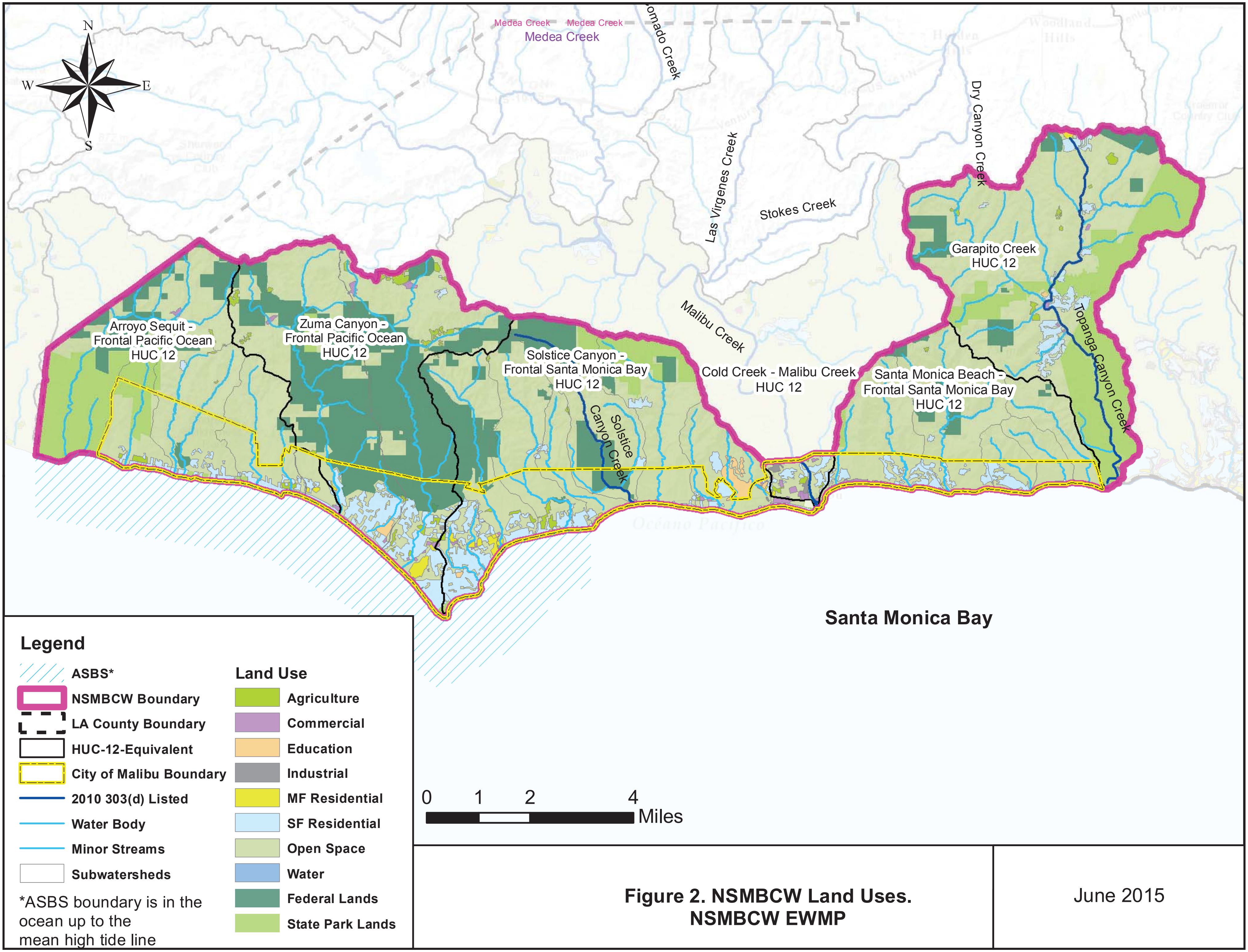

Figure 2. NSMBCW Land Uses.
NSMBCW EWMP

June 2015

1.4 OUTREACH AND STAKEHOLDER PROCESS

Section VI.C.1.f.v of the Permit requires a stakeholder process for collaboration on EWMP development. The development process must:

- Provide appropriate opportunity for stakeholder input;
- Include participation in the Permit-wide Technical Advisory Committee (TAC); and
- Incorporate applicable State agency input on priority setting and other key implementation issues.

The NSMBCW EWMP Group has conducted public outreach to engage the public and other interested parties to support EWMP development. Received input has been incorporated as appropriate. These efforts are described in more detail below.

Public Workshops. Public workshops were held jointly with the Malibu Creek Watershed Group in May 2014, November 2014, and May 2015 at King Gillette Ranch in Calabasas, California. For each workshop, an informational presentation was provided followed by a question and answer period. Comments were collected and concerns were noted and considered during EWMP development by the NSMBCW EWMP Group. The presentations were made available following each respective meeting, and can be found at the City of Malibu's EWMP webpage (www.malibucity.org/EWMP).

Website. As the lead agency in the EWMP development, the City of Malibu has maintained an EWMP webpage (www.malibucity.org/EWMP) where information regarding EWMP development, public workshops, and links to the Regional Board where relevant document submittals are posted. Additionally, contact information for NSMBCW EWMP Group leads from each agency is provided in case further information is desired.

Technical Advisory Committee: The NSMBCW EWMP Group has, and will continue to, actively participate in the Los Angeles Region EWMP TAC throughout the EWMP process.

Outreach to City and County Departments: Throughout the EWMP development process, the City and County have attended various division meetings, providing internal informational seminars and presenting relevant information for feedback from senior staff. Additionally, the City presented the

EWMP to the City of Malibu Public Works Commission on May 27th to receive and incorporate feedback.

1.5 REPORT ORGANIZATION

Following the executive summary, background and introductory information on the NSMBCW EWMP is provided in Section 1 of this report. Section 2 describes the water body pollutant priorities that are addressed by the EWMP. Section 3 provides information on the BMPs implemented by the NSMBCW EWMP Group and how these BMPs were identified and analyzed through the Reasonable Assurance Analysis (RAA). The next two sections present the results of the RAA within the NSMBCW EWMP Area – Section 4 provides results for the Santa Monica Bay Watershed and Section 5 provides results for the Malibu Creek Watershed. A compliance schedule and interim compliance demonstration is provided in Section 6, followed by the adaptive management process for revising the EWMP in Section 7. Section 8 provides a cost estimate for EWMP implementation; Section 9 confirms that the NSMBCW EWMP Group possesses sufficient legal authority to implement the EWMP; Section 10 provides the references cited in the EWMP.

2 WATER QUALITY PRIORITIES

As part of the EWMP, the Permit requires the NSMBCW EWMP Group to identify water quality priorities within their WMA. To accomplish this per Permit Section VI.C.5.a, the NSMBCW EWMP Group conducted the following for the NSMBCW EWMP Area:

1. Characterized the water quality of stormwater and non-stormwater discharges from the MS4 as well as receiving water bodies based on available data;
2. Classified water body-pollutant combinations into one of three Permit-specified categories;
3. Prioritized water body-pollutant combinations; and
4. Assessed sources for high priority water body-pollutant combinations.

A summary of results is provided below.

2.1 WATER QUALITY CHARACTERIZATION

Stormwater and non-stormwater discharges from the MS4 and receiving water quality were characterized based on 303(d) listings as well as available monitoring data, including data derived from the following monitoring programs or agencies/organizations: Santa Monica Bay Beaches Bacteria TMDL Coordinated Shoreline Monitoring Plan (CSMP), Southern California Bight 2008 Regional Monitoring (Bight '08), Heal the Bay, the Las Virgenes Municipal Water District (LVMWD, 2011), and the Joint Powers Authority of the LVMWD/Triunfo Sanitation District. Applicable water quality objectives and criteria are presented below followed by a discussion of the water quality conditions within the NSMBCW EWMP Area.

2.1.1 303(D) LISTINGS AND TMDL WLAS

The 2010 Clean Water Act (CWA) Integrated Report and updated 303(d) list were approved by the State Water Resources Control Board on August 4, 2010 and by the United States Environmental Protection Agency (USEPA) on October 11, 2011. The 2010 303(d)-listed water bodies and associated pollutants within the NSMBCW EWMP Area are summarized in **Table 3** below.

Table 3. 2010 303(d)-Listed Water Bodies in NSMBCW

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
Solstice Canyon Creek	Miscellaneous	Invasive species	Not a Stormwater Issue
Topanga Canyon Creek	Metals/Metalloids	Lead	TMDL Does Not Currently Exist
Malibu Creek	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
	Nutrients	Nutrients (Algae)	Addressed by USEPA Nutrient TMDL and USEPA

Water Body	Pollutant Class	Pollutant	Notes
			Benthic TMDL
	Hydromodification	Fish Barriers (Fish Passage)	Not a Stormwater Issue
	Sediment	Sedimentation/Siltation	Addressed by USEPA Benthic TMDL
	Nuisance	Scum/Foam- Unnatural	Addressed by Nutrient TMDL
	Metals	Selenium	TMDL Does Not Currently Exist
	Trash	Trash	Addressed by Trash TMDL
	Other Inorganics	Sulfates	TMDL Does Not Currently Exist
	Miscellaneous	Invasive Species	Not a Stormwater Issue
		Benthic-Macroinvertebrate Bioassessments	Addressed by USEPA Benthic TMDL
Malibu Lagoon	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
		Swimming Restrictions	Addressed by Bacteria TMDL
		Viruses (enteric)	Addressed by Bacteria TMDL
	Nutrients	Eutrophic Conditions	Addressed by Nutrient TMDL and USEPA Benthic TMDL
	Miscellaneous	Benthic Community Effects	Addressed by USEPA Benthic TMDL
		pH	TMDL Does Not Currently Exist

The water bodies listed in **Table 3** are subject to water quality objectives in the Ocean Plan, Basin Plan and Basin Plan Amendments, including Waste Load Allocations (WLAs) developed through TMDLs. The beneficial use designations for NSMBCW water bodies can be found in **Table 1**, and additional information on associated water quality objectives can be found in the Ocean Plan and Basin Plan. TMDLs developed for water bodies within the NSMBCW EWMP Area are discussed in more detail below.

There are currently ten TMDLs in effect for the water bodies within the NSMBCW EWMP Area; nine of which are incorporated into Attachment M of the MS4 Permit. These TMDLs are summarized in **Table 4** and delineated in more detail, including specific Water Quality Based Effluent Limitations (WQBELs) and/or Receiving Water Limitations (RWLs), in **Table 5** and **Table 6**.

Table 4. NSMBCW TMDLs

TMDL Name	Agency	Effective Date
SMB Beaches (SMBB) Bacteria TMDL, Reconsideration of Certain Technical Matters of the SMBB Bacteria TMDL, Resolution R12-007	Regional Board	July 2, 2014
Malibu Creek and Lagoon Bacteria TMDL, Resolution R12-009	Regional Board	July 2, 2014
Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments (Benthic TMDL)	USEPA	July 2, 2013
SMB TMDL for DDT and PCBs	USEPA	March 26, 2012
SMB Nearshore Debris TMDL, Resolution R10-010	Regional Board	March 20, 2012
Malibu Creek Watershed Trash TMDL, Resolution R4-2008-007	Regional Board	July 7, 2009
TMDL for Bacteria in the Malibu Creek Watershed, Resolution 2004-019R[a]	Regional Board	January 24, 2006
SMB Beaches (SMBB) Bacteria TMDL, Dry Weather, Resolution 2002-004[b]	Regional Board	July 15, 2003
SMB Beaches (SMBB) Bacteria TMDL, Wet Weather, Resolution 2002-022[b]	Regional Board	July 15, 2003
Malibu Creek Watershed Nutrients TMDL (Nutrient TMDL)	USEPA	March 21, 2003

[a] This TMDL was revised pursuant to Resolution R12-009.
[b] This TMDL was revised pursuant to Resolution R12-007.

Table 5. Final RWLs and WQBELs for NSMBCW TMDLs

TMDL	Parameter	Effluent Limitation/ Receiving Water Limitation
SMB Nearshore Debris TMDL	Trash	Zero[a]
	Plastic Pellets	Zero[a]
SMB PCBs/DDT TMDL	DDT[b]	27.08 g/yr (based on 3-year avg)
	PCBs[b]	140.25 g/yr (based on 3-year avg)
SMBB Bacteria TMDL	Total coliform (daily maximum)	10,000/100 mL
	Total coliform (daily maximum), if the ratio of fecal-to-total coliform exceeds 0.1	1,000/100 mL
	Fecal coliform (daily maximum)	400/100 mL
	Enterococcus (daily maximum)	104/100 mL
	Total coliform (geometric mean[c])	1,000/100 mL
	Fecal coliform (geometric mean[c])	200/100 mL
	Enterococcus (geometric mean[c])	35/100 mL
Malibu Creek and Lagoon Bacteria TMDL	Total coliform (daily maximum) –Malibu Lagoon	10,000/100 mL
	Total coliform (daily maximum), if the ratio of fecal-to-total coliform exceeds 0.1-Malibu Lagoon	1,000/100 mL
	Fecal coliform (daily maximum) –Malibu Lagoon	400/100 mL
	Enterococcus (daily maximum)-Malibu Lagoon	104/100 mL
	E. coli (daily maximum) – Malibu Creek	235/100 mL
	Total coliform (geometric mean[c]) –Malibu Lagoon	1,000/100 mL
	Fecal coliform (geometric mean[c]) –Malibu Lagoon	200/100 mL
	Enterococcus (geometric mean[c]) –Malibu Lagoon	35/100 mL
	E. coli (geometric mean[c]) – Malibu Creek	126/100 mL
Malibu Creek Watershed Trash TMDL	Trash	Zero[a]
Malibu Creek Watershed Nutrients TMDL	Nitrate + Nitrite as N (summer daily maximum) [b]	8 lbs/day (based on 1.0 mg/L numeric target)
	Total Phosphorus (summer daily maximum) [b]	0.8 lbs/day (based on 0.1 mg/L numeric target)
	Nitrate + Nitrite as N (winter daily maximum) [b]	8 mg/L
Malibu Creek and Lagoon Benthic TMDL	Total Nitrogen (summer)[d]	0.65 mg/L
	Total Phosphorus (summer)[d]	0.1 mg/L
	Total Nitrogen (winter)[d]	4.0 mg/L
	Total Phosphorus (winter)[d]	0.2 mg/L

[a] A WQBEL of zero for trash and debris means that no trash or debris can be discharged from the MS4 into water bodies within the Santa Monica Bay watershed management area and then into Santa Monica Bay or along the shoreline of Santa Monica Bay. Within the NSMBCW EWMP Area, there are no facilities that work with or produce plastic pellets, such that the WQBEL for plastic pellets is already being achieved.

[b] The Permit identifies these thresholds as grouped WLAs without identifying them as RWLs or WQBELs, which imply where the point of compliance is located (i.e., receiving water or MS4 outfall). Group load-based WLAs are for the applicable MS4 discharger group; the individual load-based WLAs for each NSMBCW MS4 agency would be area-weighted fractions of these.

[c] The geometric mean is calculated based on the weekly calculation of a rolling six week geometric mean using five or more samples, starting all calculation weeks on Sunday.

[d] Values shown are TMDL WLAs, and are not yet incorporated into the Permit (e.g., as RWLs or WQBELs).

Grouped RWLs for the SMBB Bacteria TMDL and Malibu Creek and Lagoon Bacteria TMDL are also expressed in the Permit as allowable exceedance days (AEDs), which vary by season and by monitoring location. Compliance monitoring locations within the NSMBCW EWMP Area include 21 Santa Monica Bay Beaches Bacteria TMDL compliance monitoring locations (SMB 1-1 through SMB 1-18; SMB O-1 and SMB O-2; and SMB 4-1) and a single Malibu Creek Watershed compliance monitoring location (MCW-1).These AEDs are summarized in **Table 6** below. The final grouped RWLs for dry weather are currently effective, and the final wet weather RWLs will be effective on July 15, 2021. The monitoring locations are shown on **Figure 3**. Compliance monitoring locations identified as MC-1, MC-2, and MC-3 in the Santa Monica Bay Beaches Bacteria TMDL CSMP are not included in Permit Attachment M and have therefore been excluded from the EWMP.

Table 6. Single Sample Allowable Exceedance Days for NSMBCW Bacteria Monitoring Stations, from Permit Attachment M

Station	Station Name	Summer Dry Weather (Apr 1 – Oct 31)		Winter Dry Weather (Nov 1 – Mar 31)		Wet Weather (Year-Round)	
		Daily Sample[a]	Weekly Sample	Daily Sample[a]	Weekly Sample	Daily Sample[a]	Weekly Sample
SMB 1-1	Arroyo Sequit at Leo Carillo Beach	0	0	9	2	17	3
SMB 1-2	El Pescador State Beach	0	0	1	1	5	1
SMB 1-3	El Matador State Beach[b]	0	0	1	1	3	1
SMB 1-4	Trancas Creek	0	0	9	2	17	3
SMB 1-5	Zuma Creek	0	0	9	2	17	3
SMB 1-6	Point Dume Unnamed Drainage	0	0	9	2	17	3
SMB O-1	Walnut Creek	0	0	9	2	15	3
SMB 1-7	Ramirez Creek at Paradise Cove	0	0	9	2	17	3
SMB 1-8	Escondido Creek	0	0	9	2	17	3
SMB 1-9	Latigo Canyon	0	0	9	2	17	3
SMB 1-10	Solstice Creek at Dan Blocker Beach	0	0	5	1	17	3
SMB 1-11	Corral Canyon Creek at Corral Beach	0	0	9	2	17	3
SMB O-2	Puerco Canyon Storm Drain	0	0	0	0	6	1
SMB 1-12	Marie Canyon at Puerco Beach	0	0	9	2	17	3
SMB 1-13	Sweetwater Creek at Carbon Beach	0	0	9	2	17	3
SMB 1-14	Las Flores Creek	0	0	6	1	17	3
SMB 1-15	Piedra Gorda at Big Rock Beach[b]	0	0	9	2	17	3
SMB 1-16	Pena Canyon	0	0	3	1	14	2
SMB 1-17	Tuna Canyon at Las Tunas Beach	0	0	7	1	12	2
SMB 1-18	Topanga Creek	0	0	9	2	17	3
SMB 4-1	Nicholas Beach	0	0	4	1	14	2
MCW-1[c]	Malibu Lagoon at last breach point	5	1	-	-	15	2

[a] SMB 1-18 is the only monitoring site that is sampled daily; all others are sampled weekly (on average).

[b] SMB 1-3 and 1-15 are both open beach monitoring locations which are not associated with creeks or storm drain outfalls.

[c] MCW-1 is also titled LVMWD (R-4). The Malibu Creek and Bacteria TMDL does not distinguish between summer and winter seasons for dry weather AEDs. Instead, the AEDs represent the total AEDs for all dry weather for the entire monitoring year.

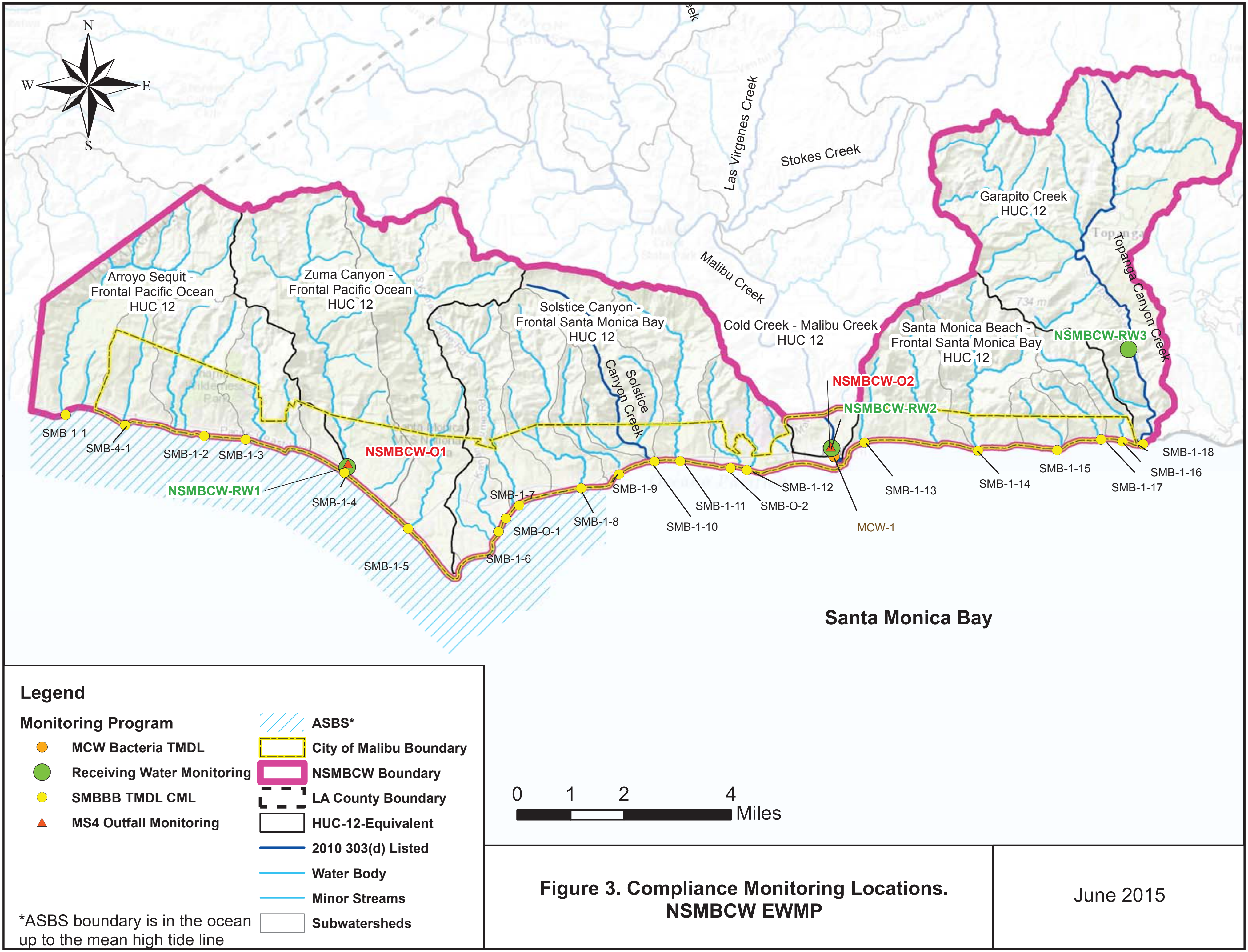

Figure 3. Compliance Monitoring Locations. NSMBCW EWMP

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2.1.2 RECEIVING WATER QUALITY

Available monitoring data from previous studies and data collection efforts were reviewed with respect to applicable water quality objectives and criteria to characterize receiving water quality within the NSMBCW EWMP Area. Raw monitoring data analyzed were limited to data available at the time this report was drafted, including bacteria data analyzed as part of the CSMP, data available from Bight '08, and data available from Heal the Bay. Previous reports and data were reviewed for the following pollutants: bacteria, DDT and PCBs, Trash, Nutrients, Lead, pH, and Selenium and Sulfates. The analysis conducted is summarized below but is described in detail in the NSMBCW EWMP Work Plan (**Appendix B**).

Indicator Bacteria: Shoreline monitoring data collected as part of the CSMP and as well as stream monitoring data collected by Heal the Bay were evaluated to characterize indicator bacteria conditions within the NSMBCW EWMP Area. Shoreline monitoring bacteria data were analyzed for the years 2005 - 2013 in terms of the number of exceedance days (EDs) at each location, as defined in the SMBB Bacteria TMDL. Although long-term trends have not been comprehensively evaluated for the CSMP bacteria data, the data indicate that: 1) attainment of wet weather AEDs is highly variable on an annual basis and is driven by hydrology as well as other natural/non-anthropogenic conditions (e.g., Imamura *et al* 2011, Izbicki *et al* 2012b); and 2) although the number of dry and wet weather EDs is highly variable from season-to-season, year-to-year, and site-to-site, there are some sites which appear to have consistently better or worse water quality than others. For example, if each site is ranked by exceedance percentage per season, with a higher ranking corresponding to a lower exceedance percentage, SMB 1-2, 1-3, 1-16, and 4-1 are all ranked in the top 5 sites for each season, while SMB 1-12, 1-18, and MC-2 are all ranked in the bottom 5 for each season.

Heal the Bay has been conducting sampling for *E. coli* at four different stream locations within the NSMBCW Area, including three reference streams (HtB-14 at Solstice Creek, HtB-18 at Lechuza Creek, and HtB-19 at Arroyo Sequit Creek) and one non-reference locations in Malibu Creek (HtB-1). Compared to the REC1 single sample Basin Plan Objective, the *E. coli* data collected by Heal the Bay between 2001 and August 2013 shows a comprehensive dry weather exceedance rate of 0 to 7.7 percent and a comprehensive wet weather exceedance rate of 0 to 7.1% for the reference streams. In comparison, *E. coli* data collected over the same period of time from lower Malibu Creek at HtB-1 shows a comprehensive dry weather exceedance rate of 2.9 percent and a comprehensive wet weather exceedance rate of 17.6 percent. For reference, the Malibu Creek Bacteria TMDL sets an allowable exceedance rate for *E. coli* of 1.6 percent for dry weather and 19 percent for wet weather.

Because the Malibu Creek monitoring location at HtB-1 has a dry weather exceedance rate within the range of exceedance rates for the three reference creeks, anthropogenic effects with respect to indicator bacteria during dry weather are not easily distinguishable by this limited dataset. During wet weather, although the long-term average exceedance rate at HtB-1 exceeds those of the Heal the Bay reference streams, the average exceedance rate is still lower than the allowable exceedance rate established in the TMDL.

DDT and PCBs: USEPA's Santa Monica Bay DDT and PCBs TMDL 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 NSMBCW watershed area) to establish MS4 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. Therefore, to help characterize DDT and PCB conditions within the NSMBCW EWMP Area, data collected by the Southern California Coastal Watershed Research Project (SCCWRP) as part of the Bight Regional Monitoring Program were analyzed.

SCCWRP conducted PCB and DDT monitoring in SMB in 2008 at two sampling locations immediately off the coast of the NSMBCW EWMP area. These locations included B08-7522, located off the coast near the creek mouth of Arroyo Sequit Canyon; and B08-7517, located off the coast near the creek mouth of Topanga Canyon. Results from B08-7522 show a total PCB sediment concentration range of 14 – 20 ug/kg dry weight (11.7 – 16.7 ug/g OC) and a DDT concentration range of 0.002 – 1.000 ug/kg dry weight (0.002 – 0.8 ug/g OC). These results are higher than the final PCB target for sediment (0.7 ug/g OC), but below the final DDT target for sediment (2.3 ug/g OC). Results from B08-7517 show a total PCB sediment concentration range of 0 – 13 ug/kg dry weight (0 – 1.6 ug/g OC) and a DDT concentration range of 6.651 – 23.2 ug/kg dry weight (0.8 – 2.8 ug/g OC). Both of these concentration ranges span the TMDL-established targets for PCBs and DDT.

These ranges include estimated values that assume one half of the method detection limit for all non-detect results. There is no evidence supporting any linkage between MS4 discharges and the observed sediment concentrations. No other data or source information are available at this time.

Trash: Data for trash discharge from the MS4 are unavailable for the NSMBCW Area at this time and were not analyzed as part of this data analysis. A Trash Monitoring and Reporting Plan (TMRP) was submitted to the Regional Board by the County before the TMDL-specified deadline of September 20, 2012. Following finalization and approval of the TMRP, monitoring for trash and debris will begin in the SMB Watershed in accordance with the County's TMRP.

The City submitted a TMRP for the Malibu Creek Watershed Trash TMDL. Since Permit Attachment M specifies that a Permittee in compliance with the WQBELs for the Malibu Creek Watershed Trash TMDL will be deemed in compliance with the WQBEL for trash in Santa Monica Bay, the City will rely on their Malibu Creek Watershed TMRP to achieve compliance with the SMB Debris TMDL.

Nutrients: Malibu Creek Watershed currently has two USEPA TMDLs in place which set numeric targets for nutrients: the 2003 Malibu Creek Watershed Nutrients TMDL (Nutrients TMDL) and the 2013 Malibu Creek & Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments (Benthic TMDL). The Benthic TMDL, which was released after the Permit became effective, developed stricter WLAs than the Nutrients TMDL, although these WLAs are not incorporated into the Permit. As a result, nutrient concentration data in this section are compared with WLAs (or numeric targets, where WLAs were load-based) from both TMDLs, as shown in **Table 5**.

Historical nutrient data within the Malibu Creek Watershed were summarized in a report by the Las Virgenes Municipal Water District (LVMWD) in 2011 (LVMWD, 2011). Reviewing a wide variety of water quality data from numerous monitoring programs, the study summarized phosphate (as phosphorus)[5] and nitrate (as nitrogen) data at approximately 50 monitoring locations throughout the watershed. USEPA's 2013 Benthic TMDL also summarizes nutrient data within the Malibu Creek Watershed, relying heavily on the data summarized in the 2011 report by LVMWD.

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[5] The majority of agencies which have monitored nutrients in the Malibu Creek Watershed have analyzed phosphate instead of total phosphorus. The USEPA's 2003 Nutrients TMDL and the USEPA's 2013 Benthic TMDL set numeric targets for total phosphorus. The LVMWD report states, "The use of phosphate – a subset of total phosphorus – for our analysis of exceedances is conservative for sites identified as exceeding the [Nutrient] TMDL target, especially since these sites constitute the bulk of the watershed by area" (LVWMD, 2011).

Two of the monitoring locations summarized in the 2011 LVMWD report, both monitored by the Joint Powers Authority of the LVMWD/Triunfo Sanitation District, were located within the lower portion of Malibu Creek Watershed within the geographical scope of the NSMBCW EWMP: RSW_MC004D, in Malibu Creek near Cross Creek Road, and RSW_MC011D, in Malibu Lagoon. Although the 2011 study did not distinguish between summer and winter as defined by the USEPA Nutrients TMDL, it did distinguish between "wet season" and "dry season," which are approximately equivalent to the TMDL-defined seasons. Median nutrient concentrations in lower Malibu Creek and Malibu Lagoon meet the numeric targets for nitrogen established in the 2003 Nutrients TMDL, but do not meet the summer numeric target for phosphorus established therein. If these medians are compared to the lower numeric targets from the 2013 Benthic TMDL (shown in **Table 5**), median nitrate concentrations at each monitoring location would still meet the nitrogen numeric target, but the phosphorus numeric target would be exceeded at both monitoring locations during both the summer and winter periods. It is important to note that monitoring station RSW_MC004D is upstream of MS4 inputs from the NSMBCW EWMP Group, and therefore data at this station reflect the quality of water entering the NSMBCW EWMP area.

In addition to the nutrient data collected by LVMWD/Triunfo Sanitation District, Heal the Bay has been conducting water quality sampling within Malibu Creek Watershed since 1998. Data from their sampling efforts are summarized in the LVMWD report, but up-to-date data through December 2013 are available via Heal the Bay's website (http://streamteam.healthebay.org/). In particular, Heal the Bay has collected nitrate and phosphate data in Malibu Creek at a monitoring location nearly identical to RSW_MC004D, also located near Cross Creek Road. This location is identified as "HtB-1." Like monitoring station RSW_MC004D, HtB-1 is upstream of MS4 inputs from the NSMBCW EWMP Group, and therefore data at this station reflect the quality of water entering the NSMBCW EWMP Area. The data have been collected approximately monthly since November 1998. The data were compared with the nitrogen and phosphorus numeric targets established by both the 2003 Nutrients TMDL and the 2013 Benthic TMDL. As expected, the percentages of exceedances for both nitrate and phosphate increase when compared against the Benthic TMDL numeric targets. Also, the percentages of exceedances in the winter are significantly higher for both nitrate and phosphate than in the summer.

Lead: The basis for the 303(d) listing of total lead in Topanga Canyon relies on data that are not available through the SWRCB's 303(d) website. No other lead data are known to be available for the Topanga Canyon Creek watershed at this time.

pH: Raw data are not available on the SWRCB's 303(d) website. The listing of Malibu Lagoon for pH includes a statement that out of 138 water samples, 33 samples exceeded the Basin Plan's water quality objective. The data were collected at various monitoring stations within the lagoon during winter 1997, summer-winter 1998, and winter-fall 1999, prior to the recent lagoon restoration project.

The Joint Powers Authority of the LVMWD/Triunfo Sanitation District monitored pH within Malibu Lagoon between 1971 and 2010, prior to the 2012-2013 lagoon restoration project. The data were summarized in LVMWD's 2011 study, showing that a median pH value of 8.2 was found in the Lagoon based on 160 samples (LVMWD, 2011). This is within the Basin Plan Objective range of 6.5 to 8.5. However, the LVMWD study did not report the percent of these samples that were outside of the Basin Plan Objective range.

Following the extensive restoration of Malibu Lagoon in May 2013, which included physical changes in the Lagoon's ecosystem, rearranging the western channels to create an artificial peninsula, and removal of all vegetation canopy and bank vegetation, pH data were collected by the Santa Monica Bay Restoration Foundation (SMBRF) at two locations in the northwest portion of the Lagoon- ML1 and ML2 (SMBRF, 2013). Data were collected every 30 minutes at each location from May 3 (ML 2) and June 25 (ML 1) through November 15, 2013. At ML 1, 58% of the 6,847 samples were above the 8.5 threshold. The average pH at this location over the period of record was measured to be 8.65. At ML 2, 34% of the 9,323 samples were above the 8.5 threshold. The average pH at ML2 over the period of record was measured to be 8.35. The data show that pH levels in the lagoon remain outside of the Basin Plan Objective range despite the restoration effort.

Since the completion of Legacy Park in 2010, all NSMBCW Group-owned MS4 dry weather flows within the Malibu Creek Watershed have been diverted, and stormwater flows have been significantly reduced. Therefore, there is no known evidence supporting a linkage between MS4 discharges and the observed pH exceedances.

Selenium and Sulfates: Malibu Creek is 303(d)-listed for both selenium and sulfates; however, raw data are not available on the SWRCB's website. The samples that served as the basis for the 303(d)-listing for each of these constituents were collected upstream of the City of Malibu and outside the jurisdiction of the NSMBCW EWMP Group. There is currently no evidence supporting a linkage between MS4 discharges and exceedances of selenium and/or sulfates. Because both pollutants are reported to be a result of natural sources within the upper watershed (LVMWD, 2011), they are addressed collectively here.

The SWRCB's 303(d) website states that 5 of 20 samples (25%) taken between October 2000 and April 2003 exceeded the California Toxic Rules (CTR) criterion for total selenium (5.0 ug/L). As noted previously, this sampling was conducted upstream of the City of Malibu and outside the jurisdiction of the NSMBCW EWMP Group. No other information regarding this listing is available on the SWRCB's website.

The Joint Powers Authority of the LVMWD/Triunfo Sanitation District monitored selenium within Malibu Creek between 1971 and 2010. Analysis of data from monitoring location RSW_MC004D, located within Malibu, shows a median concentration of 3 ug/L for 28 water quality samples. This median concentration meets the CTR criterion. Additionally, the data show that the highest concentrations of selenium are in the upper portion of the watershed, and are reportedly due to the presence of the Monterey Geologic Formation, which is known to contain high levels of sulfur and selenium (LVMWD, 2011).

For sulfates, the SWRCB's 303(d) website states that 9 of 22 samples (40.9%) taken between October 2000 and March 2004 exceeded the Basin Plan Objective (500 mg/L). Similar to selenium, it is important to note that sampling was conducted upstream of the City of Malibu and outside the jurisdiction of the NSMBCW EWMP Group. No other information regarding this listing is available on the SWRCB's website.

The Joint Powers Authority of the LVMWD/Triunfo Sanitation District also monitored sulfate within Malibu Creek between 1971 and 2010. Data for monitoring location RSW_MC004D shows a median concentration of 530 mg/L for 29 water quality samples, which is above the Basin Plan Objective. However, like selenium, the data show that the highest concentrations of sulfate are in the upper portion of the watershed, and are reportedly due to the presence of the Monterey Geologic Formation, which is known to contain high levels of sulfur and selenium (LVMWD, 2011).

2.1.3 MS4 Discharge Quality

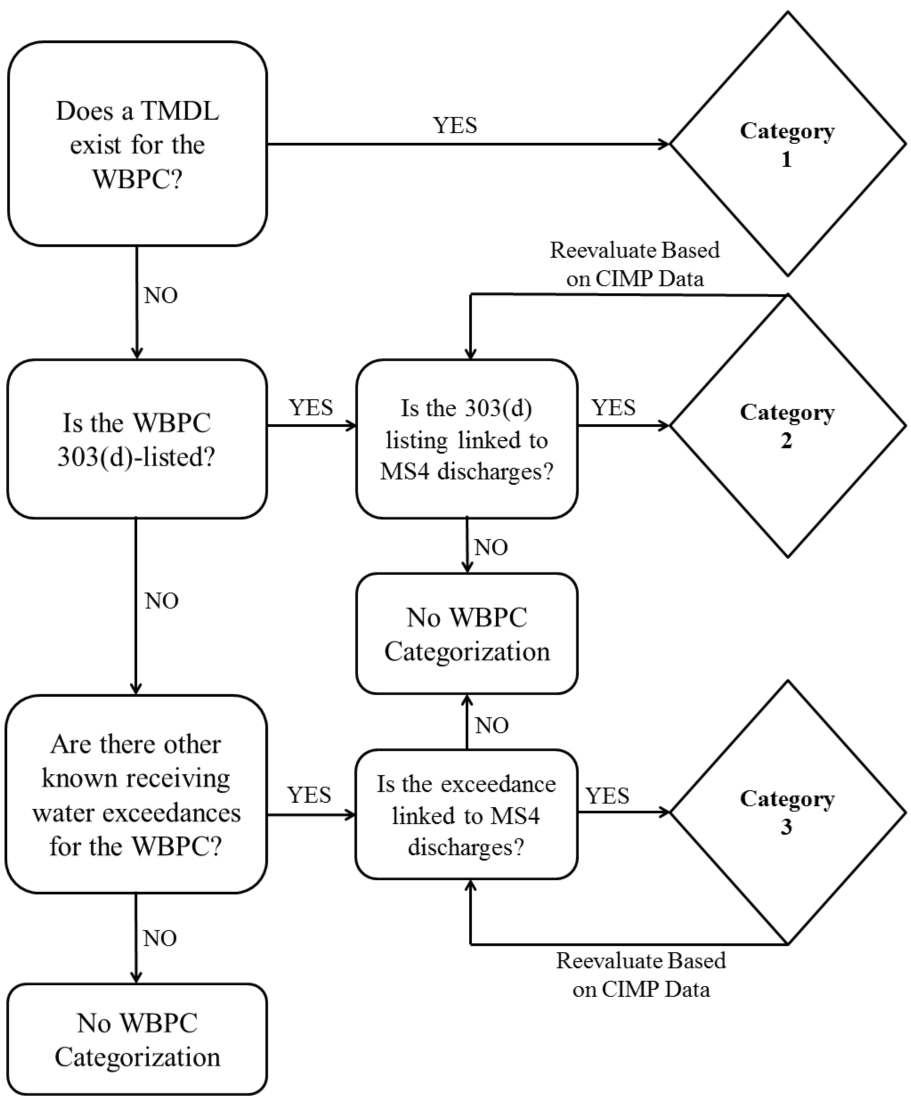
Stormwater and non-stormwater discharges have not yet been characterized within the NSMBCW EWMP Area. No MS4 discharge monitoring data were available at the time of this assessment, but discharge characterization will occur as part of the implementation of the CIMP (NSMBCW EWMP Group, 2014d). Since outfall monitoring data from the CIMP were not available at the time of EWMP development, information from regional MS4 land use studies (e.g., Los Angeles County, 2000) and/or TMDL technical reports were used in Section 2.2 for the water body-pollutant prioritization.

2.2 WATER BODY-POLLUTANT PRIORITIZATION

Water body-pollutant combinations (WBPCs) were established and categorized based on Permit Section VI.C.5.b.

Figure 4 provides a brief conceptual overview of the process used to identify and categorize the WBPCs within the NSMBCW EWMP Area.

Figure 4. Process for Categorizing Water Body-Pollutant Combinations



As shown above, identified WBPCs were prioritized as Category 1, 2 or 3, in accordance with Section IV.C.5(a).ii of the Permit, to guide the implementation of structural and institutional BMPs. The three priority categories are defined as follows:

- Category 1 (Highest Priority): WBPCs for which WQBELs and/or RWLs have been established in an approved TMDL;
- Category 2 (High Priority): Pollutants for which data indicate water quality impairment in the receiving water according to the State's 303(d) list and for which MS4 discharges may be causing or contributing to the impairment; and
- Category 3 (Medium Priority): Pollutants which exceed applicable RWLs contained in the Permit and for which MS4 discharges may be causing or contributing to the exceedances, but which do not have an approved TMDL or are not listed on the 303(d) list.

Table 7 presents the resulting classifications for the WBPCs within the NSMBCW EWMP Area. WBPCs categorized below are subject to change through the EWMP's adaptive management process (as described in Section 8) based on future data collected as part of the CIMP or other monitoring programs. Additional details on the process of identifying these WBPCs can be found in the NSMBCW EWMP Work Plan (**Appendix B**).

Table 7. Water Body Pollutant Prioritization for the NSMBCW EWMP Area

Category	Water Body	Pollutant	Basis
1	Malibu Creek and Lagoon	Nutrients	USEPA-established Nutrients TMDL and Benthic TMDL for the Malibu Creek Watershed
	SMB Beaches	Dry Weather Bacteria	SMB Beaches Bacteria TMDLs for both dry and wet weather
	SMB Beaches	Wet Weather Bacteria	
	Malibu Creek and Lagoon	Indicator Bacteria	Malibu Creek and Lagoon Indicator Bacteria TMDL
	Malibu Creek	Trash	Malibu Creek Trash TMDL
	SMB	Trash/Debris	TMDL for debris for Santa Monica Bay Offshore/Nearshore
	SMB	DDTs	USEPA TMDL for DDT and PCBs for Santa Monica Bay Offshore/Nearshore
	SMB	PCBs	
2	Topanga Canyon Creek	Lead	Topanga Canyons Creek 303(d) listing for lead.
	Malibu Creek	Sulfates & Selenium	Malibu Creek 303(d) listing for sulfates and selenium
	Malibu Lagoon	pH	Malibu Lagoon 303(d) listing for pH
3	None		There are currently no known available data demonstrating exceedances of receiving water limits within the NSMBCW Area, aside from those WBPCs already defined as Category 1 and 2.

A few WBPCs within the NSMBCW EWMP Area are included on the SWRCB's 2010 303(d) list, but are not included in **Table 7** and are not directly addressed as part of this EWMP. These WBPCs, and the reasoning for excluding each, are as follows:

- Invasive species in Solstice Canyon and fish barrier in Malibu Creek: These WBPCs are not related to MS4 discharges.
- The fish consumption advisory in SMB, which is being addressed by the PCB and DDT TMDL; sediment and benthic-macroinvertebrate bioassessments in Malibu Creek, which are being addressed by the Benthic TMDL; scum and foam in Malibu Creek, which is being addressed by the Nutrients TMDL; swimming restrictions and viruses in Malibu Lagoon, which are being addressed by the Malibu Lagoon Indicator Bacteria TMDL; eutrophic conditions in Malibu Lagoon, which is being addressed by the Nutrients TMDL; and benthic community effects in Malibu Lagoon, which is being addressed by the Benthic

TMDL. These WBPCs are already being addressed (directly or indirectly) by one of the TMDLs contained in this EWMP.

- Sediment toxicity in SMB Offshore/Nearshore: there is sufficient evidence in support of the WBPC being delisted from the 303(d) list, as determined by the USEPA. The USEPA PCB and DDT TMDL states the following regarding sediment toxicity: "There is little evidence of sediment toxicity in Santa Monica Bay…Our evaluation of the data showed only 3 out of 116 samples exhibited toxicity. Following the California listing policy, Santa Monica Bay is meeting the toxicity objective and there is sufficient evidence to delist sediment toxicity. We therefore make a finding that there is no significant toxicity in Santa Monica Bay and recommend that Santa Monica Bay not be identified as impaired by toxicity in California's next 303(d) list."

2.3 SOURCE ASSESSMENT

To complement the water quality prioritization process, the Permit requires that Permittees identify known and suspected stormwater and non-stormwater sources for WBPCs. The intent of the Source Assessment is to identify potential sources within the watershed for the WBPCs and to support prioritization and sequencing of management actions.

The preliminary source assessment and literature review conducted for the NSMBCW EWMP Area is summarized in **Table 8** below and is described in more detail in the NSMBCW EWMP Work Plan (**Appendix B**). Since sources of pollutants for the various water bodies within the NSMBCW are essentially identical (e.g., sources of trash within SMB and Malibu Creek are believed to be the same), the source assessment is organized by pollutant.

Table 8. Water Body Pollutant Source Assessment

Pollutant	Potential Sources
Indicator Bacteria	• Human sources[a] - sanitary sewer overflows and leaks, OWTS, illicit discharges and connections, homeless encampments, swimmers • Non-human anthropogenic sources – waste from dogs, horses and other domestic animals or livestock • Non-anthropogenic sources[b] - plants, algae, decaying organic matter, beach wrack, beach sands, creek and lagoon sediment, birds and other wildlife • Dry weather runoff and stormwater from all developed and undeveloped land uses, which include and convey pollutants from origin sources listed above; this category includes MS4 permitted discharges as well as discharges from other sites and areas not covered under the Phase I MS4 Permit (e.g., Construction General Permit sites, Phase II MS4 General Permit sites, Caltrans' MS4s, State and Federal owned lands, other recreational areas, and private storm drains)

Pollutant	Potential Sources
DDT and PCBs	• Palos Verdes Shelf[c] • Stormwater and dry weather runoff from developed and agricultural land uses
Trash	• Litter from adjacent land areas • Roadways • Direct dumping and deposition • Storm drains (Regional Board, 2008)
Nutrients	• Natural and legacy sources – decaying vegetation and organic litter, birds, tidal inflow, and release from lagoon sediments[d] • Human sources - sanitary sewer overflows and leaks, OWTS, illicit discharges and connections, homeless encampments, swimmers • Non-human anthropogenic sources – waste from dogs, horses and other domestic animals or livestock, and fertilizers and compost • Dry weather runoff and stormwater from undeveloped and developed land (including agriculture, livestock, equestrian, and golf course areas), which include and convey pollutants from origin sources listed above • Discharges from Tapia Water Reclamation Facility
Lead	• Natural background soils • Dry weather runoff and stormwater from all developed and undeveloped land uses, including MS4 permitted discharges as well as discharges from other sites and areas not covered under the Phase I MS4 Permit (e.g., Construction General Permit sites, Phase II MS4 General Permit sites, Caltrans' MS4s, State and Federal owned lands, other recreational areas, and private storm drains
pH	• Unknown
Selenium/ Sulfates	• Groundwater exfiltration and dissolution of minerals from northern tributaries of Malibu Creek, particularly areas with Monterey Formation type geology (LVMWD, 2011)[e]

[a] Monitoring results from multiple microbial source tracking studies conducted in surface waters in the NSMBCW EWMP Area indicate that human fecal contributions are minor or non-existent (findings summarized in City of Malibu, 2012).

[b] 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, Weston Solutions 2010.

[c] The largest concentration of DDT and PCBs within Santa Monica Bay is contained within the Palos Verdes shelf, which is being addressed by the USEPA as a CERCLA site. Loadings from the shelf to the bay are large and have been well characterized (USEPA, 2012).

[d] Sutula et al (2004) found that sediment enriched in particulate nitrogen and phosphorus was deposited in Malibu Lagoon during the wet season. These particulate nutrients were remobilized as dissolved inorganic nutrients to the surface waters during dry season. The study reported that sediment release approximately equals 18% of the total nitrogen source and 5% of the total phosphorus source from other nonpoint source inputs to the Lagoon during the dry season (Sutula et al, 2004).

[e] Undeveloped areas with Monterey Formation geology are a significant nonpoint source of phosphate within a number of subwatersheds in the upper Malibu Creek Watershed (LVMWD, 2011).

Where source information specific to the watershed was unavailable, pertinent literature was utilized to provide direction for further assessment. Additional water quality data will be needed to quantify the contribution of MS4 discharges – particularly relative to the many other identified sources that have been documented within the NSMBCW.

MS4 outfall monitoring (through the CIMP) and source identification (through the non-stormwater screening and monitoring program) will be essential to support future BMP planning and EWMP updates.

3 SELECTION OF APPROPRIATE BEST MANAGEMENT PRACTICES (BMPS)

This section summarizes the objectives set by the NSMBCW EWMP Group in identifying appropriate BMPs as well as the reasoning behind the general types of control measures (MCMs, structural controls, etc.) that were incorporated herein. Since the modeling conducted as part of the RAA serves as the basis not only for BMP evaluation but also BMP identification, details on how specific BMP projects were identified can be found in Section 4. Furthermore, Sections 5 and 6 contain specifics (concept, water quality performance) on the combination of BMP projects that were chosen for this program.

3.1 OBJECTIVES

The Permit requires the NSMBCW EWMP Group to identify strategies, control measures, and BMPs[6] to implement within their WMA. Specifically, the Permit specifies that BMPs be implemented to achieve effluent limits in the Permit applicable to MS4 discharges and to reduce impacts to receiving waters from stormwater and non-stormwater runoff. This expectation assumes the implementation of both types of BMPs – non-structural and structural – by the NSMBCW EWMP Group.

The objectives of selecting and incorporating BMPs into the NSMBCW EWMP include:

1. Preventing and/or eliminating non-stormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters;
2. Achieving all applicable interim and final WQBELs and/or RWLs pursuant to corresponding compliance schedules; and
3. Ensuring that discharges from the MS4 do not cause or contribute to exceedances of RWLs.

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

3.2 DEFINITION OF BEST MANAGEMENT PRACTICES

The Permit defines BMPs as "practices or physical devices or systems designed to prevent or reduce pollutant loading from stormwater or non-stormwater discharges to receiving waters, or designed to reduce the volume of stormwater or non-stormwater discharged to the receiving water." These BMPs may include:

1. Structural and/or non-structural BMPs and operation and maintenance procedures that are designed to achieve applicable WQBELs and/or RWLs;
2. Retrofitting areas of existing development known or suspected to contribute to the highest water quality priorities with regional or sub-regional BMPs; and
3. Stream and/or habitat rehabilitation or restoration projects where stream and/or habitat rehabilitation or restoration are necessary for, or will contribute to demonstrable improvements in the physical, chemical, or biological receiving water conditions and restoration and/or protection of water quality standards in receiving waters.

Non-structural BMPs are BMPs that prevent or reduce the release of pollutants or transport of pollutants within the MS4 area but do not involve construction of physical facilities. Non-structural BMPs are often implemented as programs or strategies which seek to reduce runoff and/or pollution close to the source. Examples include but are not limited to: street sweeping, downspout disconnect programs, pet waste cleanup stations, irrigation ordinances, or illicit discharge elimination. Minimum control measures (MCMs) as set forth in the Permit are a subset of non-structural BMPs even though some MCMs include measures that require the implementation of structural BMPs.

Structural BMPs are BMPs that involve the construction of a physical control measure to alter the hydrology or water quality of incoming stormwater or non-stormwater. There are two categories of structural BMPs, defined by the runoff area treated by the BMP: regional BMPs[7] and distributed BMPs. Regional BMPs are designed to treat runoff from a large drainage area and are expected to include multiple parcels and various land uses. These may include infiltration basins, treatment plants, and subsurface flow wetlands, among others. Distributed BMPs are designed to treat runoff from smaller drainage areas and are normally installed to collect runoff close to the source from a limited number of parcels. Distributed BMPs typically include swales,

[7] The term "regional BMP" does not necessarily indicate that the project can capture and retain the 85th percentile storm, as described in the Permit. The term "regional EWMP project" is therefore used for those regional BMPs that are expected to be able to capture and retain the 85th percentile storm.

bioretention facilities, biofiltration facilities, and cisterns, among others. Relevant regional and distributed structural BMPs are described below.

Infiltration Basins

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 all influent up to the design storm is infiltrated at the BMP.

Subsurface Flow Wetlands

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 International BMP database 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.

Constructed Surface Flow Wetlands

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 treatment 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.

Treatment Facilities

This BMP type includes the complete or partial diversion of the water quality design storm to a treatment plant for disinfection. Conventional treatment practices, while more common for the treatment of dry weather 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.

Cisterns

Cisterns are a harvest-and-use BMP, typically designed to capture a water quality design storm. Captured water is infiltrated or reused for irrigation, thereby reducing runoff and associated pollutants. Because cisterns are typically a full-capture BMP, the pollutant removal effectiveness of cisterns is considered comparable to infiltration basins. Capture-and-use regulations currently in place in the NSMBCW EWMP Area effectively require captured water to be used for landscape irrigation only.

Bioretention/Biofiltration

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil- and plant-based filtration device that removes pollutants through a variety of 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, where infiltration can occur in addition to filtration. 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 (or "bioinfiltration") can also be designed with a raised underdrain to enhance the amount of retention, nitrate removal, and incidental infiltration achieved by the BMP.

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 via 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.

Green Roofs

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.

Porous / Permeable Pavements

Permeable pavements are infiltration-type BMPs that contain significant voids to allow water to pass through to a 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 (porous concrete or permeable asphalt). All permeable pavements with a stone reservoir base treat stormwater and remove sediments and metals to some degree. While conventional non-permeable pavement results in increased rates and volumes of surface runoff, porous 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 roadways, parking lots, and sidewalks. The paving surface, subgrade, and installation requirements of permeable pavements are more complex than those for conventional asphalt or concrete surfaces. For porous 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.

Media Filters

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 drain system or to an infiltration facility. As stormwater or dry weather runoff passes through the sand, pollutants are trapped in the small pore spaces between sand grains or are adsorbed to the sand surface. Media filters can be used as stand-alone or pre-treatment measures to extend the life and effectiveness of downstream BMPs.

Hydrodynamic Separators

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. Like media filters, hydrodynamic separators can be used as stand-alone or pre-treatment measures to extend the life and effectiveness of downstream BMPs.

3.3 DEMONSTRATION OF BMP PERFORMANCE – INTRODUCTION TO THE REASONABLE ASSURANCE ANALYSIS

Because the EWMP is a planning document intended to lay out a framework of activities that will achieve Water Quality Objectives, it is necessary to demonstrate that selected BMPs are reasonably expected to meet defined goals. This evaluation of performance is described through a technically robust and rigorous Reasonable Assurance Analysis (RAA). Through this analysis, the NSMBCW EWMP Group identified and evaluated BMP implementation scenarios within the NSMBCW EWMP Area for each WBPC identified in Section 2. The RAA process shows that implementation of EWMP-defined activities within the NSMBCW EWMP Area are expected to result in discharges that achieve applicable Permit-specified WQBELs and that do not cause or contribute to exceedances of applicable RWLs. Since the modeling conducted as part of the RAA serves as the basis not only for BMP evaluation but also BMP identification, Section 4 is devoted to providing details on the RAA process. Results from the RAA are presented in Section 5 (Santa Monica Bay Watershed) and Section 6 (Malibu Creek Watershed).

4 RAA MODELING TOOLS AND APPROACH

In 2014, the Regional Board released a guidance document intended to establish baseline expectations and promote consistency and objectivity in the development of the RAAs throughout the Los Angeles Region. RAA details described herein, including model selection, data inputs, critical condition selection (90th percentile wet year), calibration performance criteria, and output types are consistent with the resulting Regional Board RAA Guidance.

4.1 RAA APPROACH - DRY WEATHER

Demonstrating reasonable assurance of compliance with applicable dry weather Permit limits **(Table 9**) requires a methodology that accounts for many factors which cannot be accurately modeled based on dry weather runoff processes alone (Thoe et al, 2015), despite the existence of somewhat extensive dry weather beach-specific monitoring datasets that are available. Therefore, to perform the RAA for dry weather for the NSMBCW EWMP Area, a semi-quantitative conceptual model (methodology) has been developed following the Permit compliance structure. This approach applies independent lines of evidence for demonstrating that MS4 discharges are not causing or contributing to receiving water exceedances. The following series of criteria form the 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.

1. If a dry weather diversion, infiltration, or disinfection system is located at the downstream end of the analysis region, 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). Diversion 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.

2. If there are no MS4 outfalls (major or minor) owned by the NSMBCW Agencies within the analysis region, MS4 discharges are considered to not be contributing to pollutant concentrations in the receiving water. Therefore, reasonable assurance is demonstrated.

3. For the Santa Monica Bay Beaches Bacteria TMDL compliance monitoring locations, if the allowed summer-dry and winter-dry single sample exceedance days have been achieved for four out of the past five years and the last two

years, then the existing water quality conditions at this compliance monitoring location are acceptable, and reasonable assurance is demonstrated.

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

Table 9 summarizes the dry weather TMDL limits for each applicable WBPC in the NSMBCW EWMP Area.

Table 9. Dry Weather Permit Limits (Final Compliance Limits)

Waterbody	TMDL	Pollutant	RWL/WQBEL
SMB	SMB Beaches Bacteria TMDL for Dry Weather	Coliform	Exceedance Days (per season, per year)
Malibu Creek	Malibu Creek Watershed Nutrients TMDL	Coliform	
		Nitrate + Nitrite	8 lbs/day (summer daily maximum)
		Total Phosphorus	0.8 lbs/day (summer daily maximum)
	Malibu Creek and Lagoon Benthic TMDL	Total Nitrogen	1.0 mg/L (summer)[a]
		Total Phosphorus	0.1 mg/L (summer)[a]

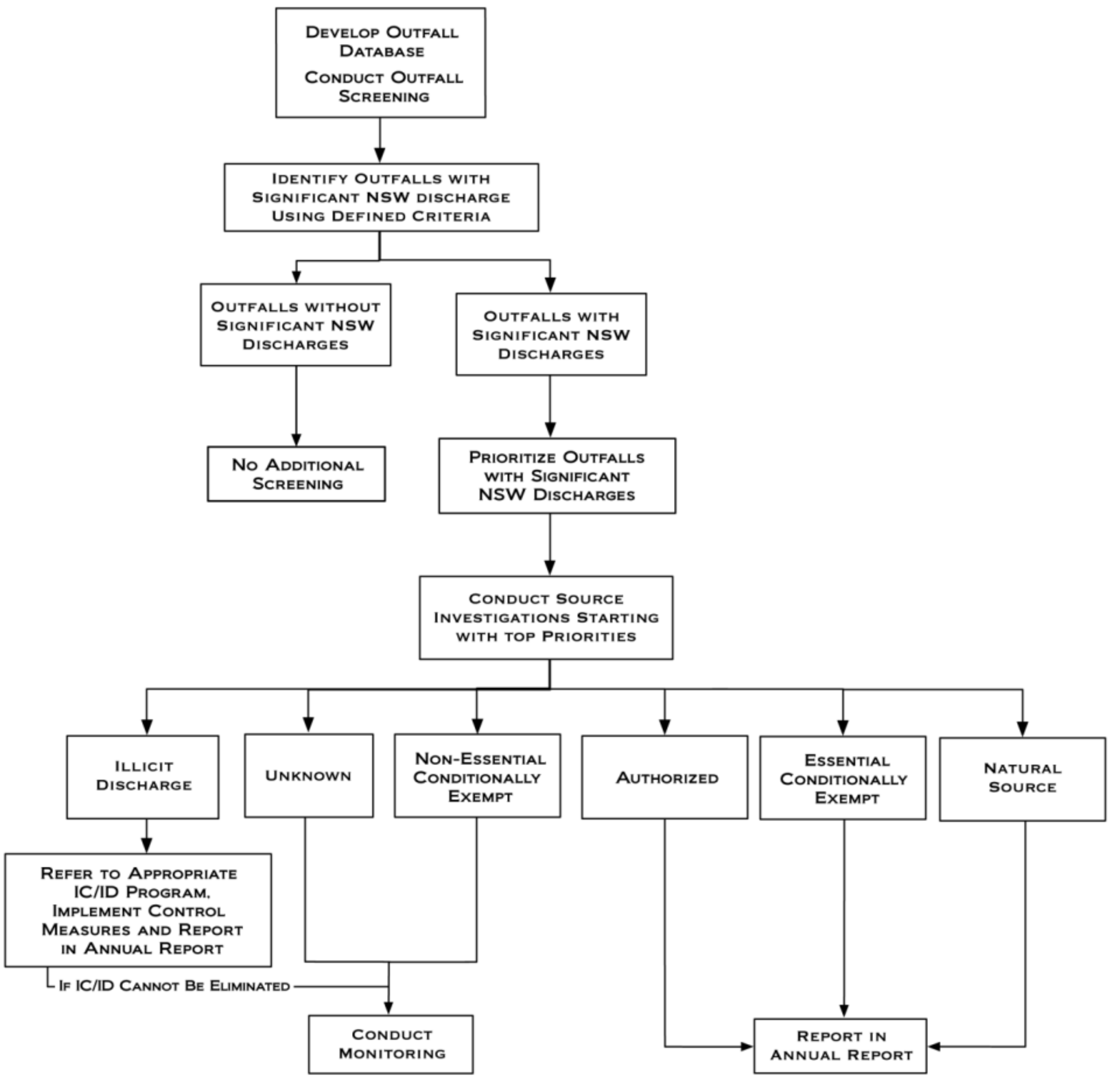
[a] Values shown are TMDL WLAs, and are not yet formally incorporated into the Permit (e.g., as RWLs or WQBELs). These values are expressed in the TMDL as seasonal averages.

4.1.1 *NON-STORMWATER DISCHARGE SCREENING*

Since the NSMBCW EWMP Group's dry weather compliance approach is consistent with the Permit requirement to eliminate 100 percent of non-exempt dry weather MS4 discharges, the Group's non-stormwater screening process plays an important role in demonstrating reasonable assurance of compliance for dry weather.

The non-stormwater screening process consists of the steps shown in **Figure 5**. Further details on the NSMBCW EWMP Group's approach to meet this requirement are provided in Section 4 of the NSMBCW Draft CIMP (NSMBCW EWMP Group, 2014d).

Figure 5. Non-Stormwater Outfall Screening Program



4.2 RAA APPROACH – WET WEATHER

The Permit specifies the TMDL RWLs and WQBELs applicable to each Permittee. The NSMBCW RAA was conducted to demonstrate reasonable assurance of compliance with these limits. In instances where critical conditions were not clearly defined (e.g., a critical condition of "wet weather") or the limit's expression could not be directly modeled based on pollutant loads in stormwater (e.g., exceedance days as the expression for bacteria RWLs), steps were taken to establish a link between the expressed Permit limit and relevant modelable data (i.e., rainfall, runoff, and pollutant concentrations in the runoff). **Table 10** summarizes these steps for each modeled WBPC with a Permit-established limit.

Table 10. Wet Weather Permit Limits
(Final Compliance Limits for Quantitatively Modeled Pollutants)

<table>
<tr><th>Waterbody</th><th>Pollutant</th><th>RWL/WQBEL</th><th>How Limits Were Used to Establish Target Load Reductions for the RAA</th></tr>
<tr><td>SMB</td><td>Coliform</td><td rowspan="2">Exceedance Days (per season, per year)</td><td rowspan="2">TLRs were set for each compliance monitoring location based on site-specific exceedance percentages based on historic exceedance rates and the number of modeled discharge days for the 90th percentile wet year, as detailed in Section 5.1.1 and Section 6.1.1.</td></tr>
<tr><td rowspan="4">Malibu Creek</td><td>Coliform</td></tr>
<tr><td>Nitrate + Nitrite</td><td>8 mg/L (winter daily maximum)[a,b]</td><td>TLRs were set based on the difference between the 90th percentile daily concentration for nitrate and the WQBEL. Nitrite was assumed to be negligible in stormwater, as evidenced by monitoring data.</td></tr>
<tr><td>Total Nitrogen</td><td>4.0 mg/L (winter)[b,c]</td><td rowspan="2">For each pollutant, TLRs were set based on the difference between the modeled average annual wet weather runoff load for the 90th percentile wet year and the allowed load, calculated as the WQBEL multiplied by the annual runoff volume for the 90th percentile wet year.</td></tr>
<tr><td>Total Phosphorus</td><td>0.2 mg/L (winter)[b,c]</td></tr>
</table>

[a] The Permit identifies this concentration as a grouped WLA without explicitly identifying it as a RWL or WQBEL.

[b] Both the Malibu Creek Watershed Nutrients TMDL and the Malibu Creek and Lagoon Benthic TMDL define separate RWLs/WQBELs for summer (April 15 – November 15) and winter (November 16 – April 14). For purposes of wet weather modeling, only winter targets are considered here.

[c] Values shown are TMDL WLAs, and are not yet formally incorporated into the Permit (e.g., as RWLs or WQBELs).

The critical condition for the Malibu Creek and Lagoon Benthic TMDL was defined simply as the “winter period,” and compliance with this TMDL can be achieved by meeting the concentration-based discharge limits (calculated as a flow-weighted average seasonal concentration). To be consistent with the controlling pollutant, bacteria, the 90th percentile year was modeled as the critical condition for this TMDL.

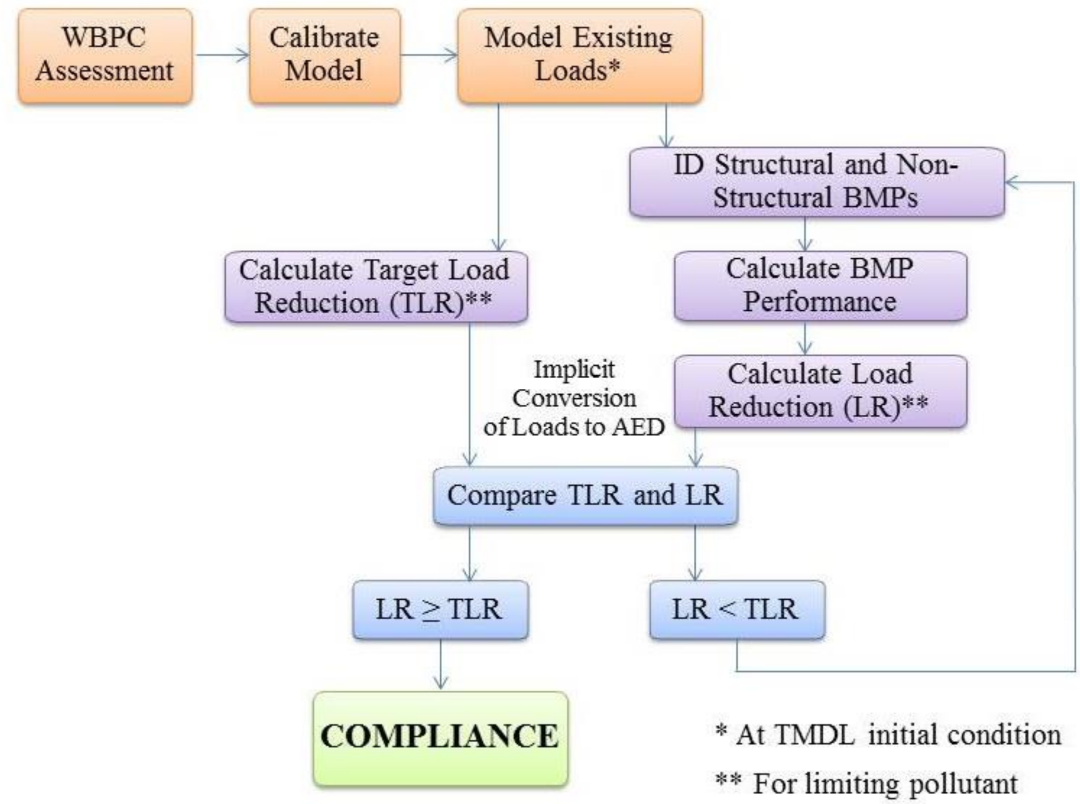
The wet-weather RAA process consists generally of the following steps:

- Identify WBPCs for which the RAA was performed;

- Identify the MS4 service area (exclude lands of agencies not party to this EWMP such as Federal land and State land, as shown in **Figure 1**Figure);
- Using a permit-approved model, for each analysis region, calculate target load reductions (TLRs) for 90th percentile year based on Permit limits and Regional Board RAA Guidance (Regional Board, 2014);
- Identify structural and non-structural BMPs that were either implemented after applicable TMDL effective dates or are planned for implementation in the future;
- Using a permit-approved model, quantify the performance of these BMPs in terms of annual pollutant load reductions;
- Compare these calculations with the TLRs; and
- Revise the BMP implementation scenario until TLRs are met.

This process is outlined in **Figure 6**.

Figure 6. RAA Process Overview



TLRs (discussed in Sections 5.1 and 6.1) represent a numerical expression of the Permit compliance metrics (e.g., bacteria allowable exceedance days (AEDs) for wet weather) that can be modeled and can serve as a basis for confirming that the EWMP is anticipated to achieve compliance with the Permit's TMDL-based limits and the water quality objectives. Thus, if the structural and non-structural BMPS by which the TLRs are achieved in the EWMP are appropriately implemented, compliance with the MS4 Permit's TMDL limits and water quality objectives will be reasonably demonstrated and assured.

4.3 SBPAT MODEL

The selected RAA approach leverages the strengths of a publicly available, Permit-approved, Geographical Information System (GIS)-based model that has already been developed for the region: SBPAT (Regional Board, 2014 and Regional Board, 2012).[8] The NSMBCW EWMP Work Plan (**Appendix B**) provides the rationale for the selection of SBPAT as the primary water quality modeling program used to perform the NSMBCW RAA.

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 spans in the rainfall record, and tracks inter-event antecedent conditions;
- Tracks stormwater 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 reduction metrics by storm event, and consolidates these outputs on an annual basis.

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 used in physical and mathematical problems when it is difficult to obtain a closed-form expression, when a deterministic algorithm is not desired, and/or when expected output ranges (or quantified uncertainty) are desired. A schematic of SBPAT's Monte Carlo process is provided in **Figure 7**. Model documentation, as well as links to related technical articles and presentations, is provided at www.sbpat.net.

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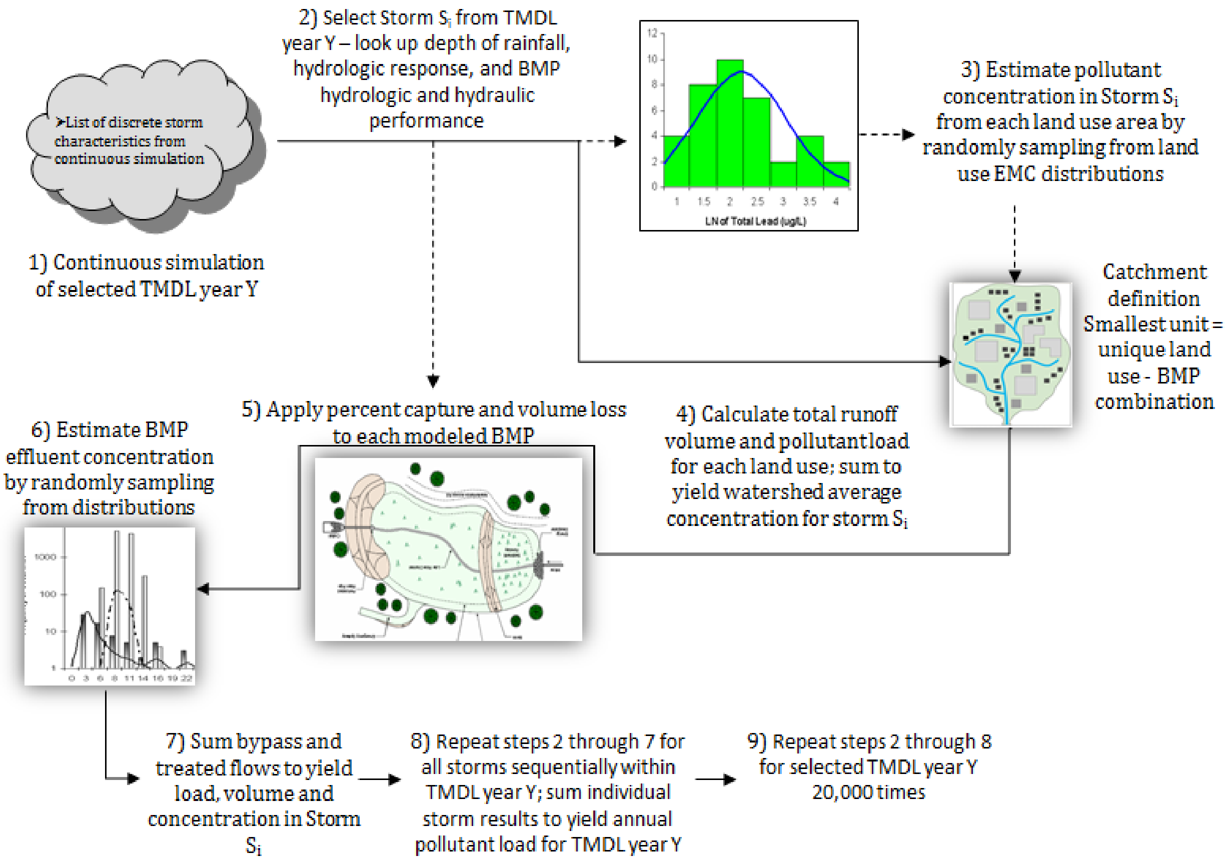
[8] SBPAT is specifically referenced in the MS4 Permit Part VI.C.5.b.iv and was presented at the first two Permit Group TAC RAA Subcommittee meetings. Furthermore, SBPAT has been used for reasonable assurance analysis purposes in the Los Angeles region for four TMDL Implementation Plans, two WMPs, four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

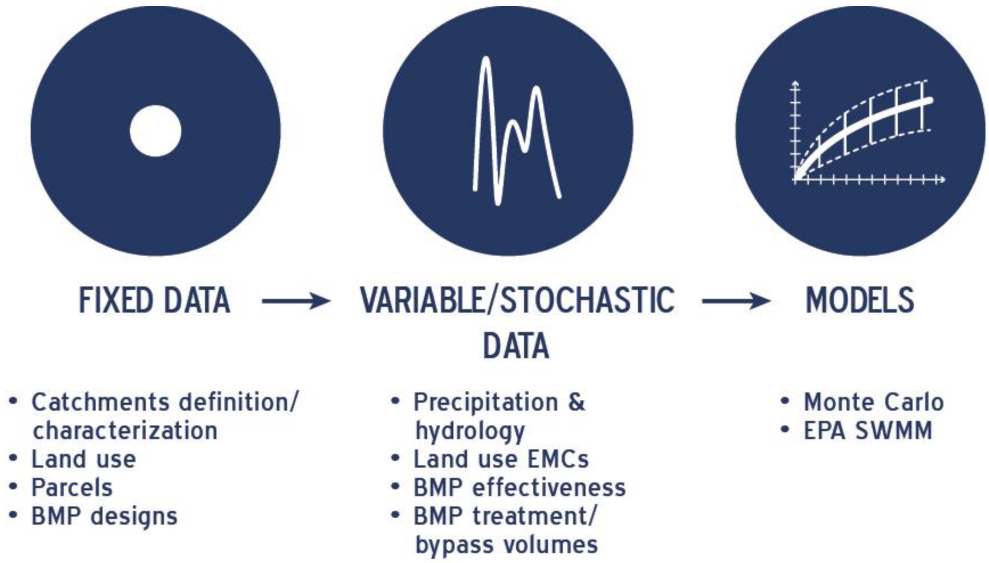
Figure 7. SBPAT Monte Carlo Method Components



4.4 MODELING DATA

Data used for the quantification/analysis module include both fixed and stochastic parameters. The model utilizes land use-based event mean concentrations (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 to quantify water quality benefits and uncertainties. Model data flow is provided below in **Figure 8**.

Figure 8. SBPAT Model Data Flow



4.4.1 SPATIAL DOMAIN

The RAA was performed for the NSMBCW EWMP Area, as shown in **Figure 1**. The area consists of Santa Monica Bay Jurisdictional Groups 1 and 4 and the portion of the Malibu Creek Watershed within the City of Malibu's jurisdiction. In order to perform the RAA, analysis regions (areas for which compliance was evaluated individually) were defined based on areas tributary to compliance monitoring locations. These compliance monitoring locations include 19 Santa Monica Bay Beaches Bacteria TMDL compliance monitoring locations (SMB 1-1 through SMB 1-18 and SMB 4-1) and a single Malibu Creek Watershed compliance monitoring location (MCW-1). Additional analysis regions (i.e., that do not drain to a compliance monitoring location) were defined to account for the remaining drainage areas for each WBPC so that all areas within the NSMBCW EWMP Area were covered by an analysis region. In total, 30 analysis regions were defined and analyzed. Analysis regions are shown on **Figure 9** and summarized in **Table 11**. RAA results are reported for each analysis region, with the exception of the area tributary to Malibu Legacy Park, a regional EWMP project capable of fully capturing and retaining the 85th percentile, 24-hour design storm. More information on Malibu Legacy Park can be found in Section 6.2.4.1.

To account for contributions from agencies not party to this EWMP (i.e., State/Federal lands), existing loads from these agencies were calculated and subtracted out of the modeled watershed loads for the NSMBCW EWMP Area. Additional details on these adjustments can be found in the NSMBCW EWMP Work Plan (**Appendix B**). School properties, which the NSMBCW EWMP Group does not have control over with respect to stormwater activities, were included in the RAA for consistency with other EWMPs.

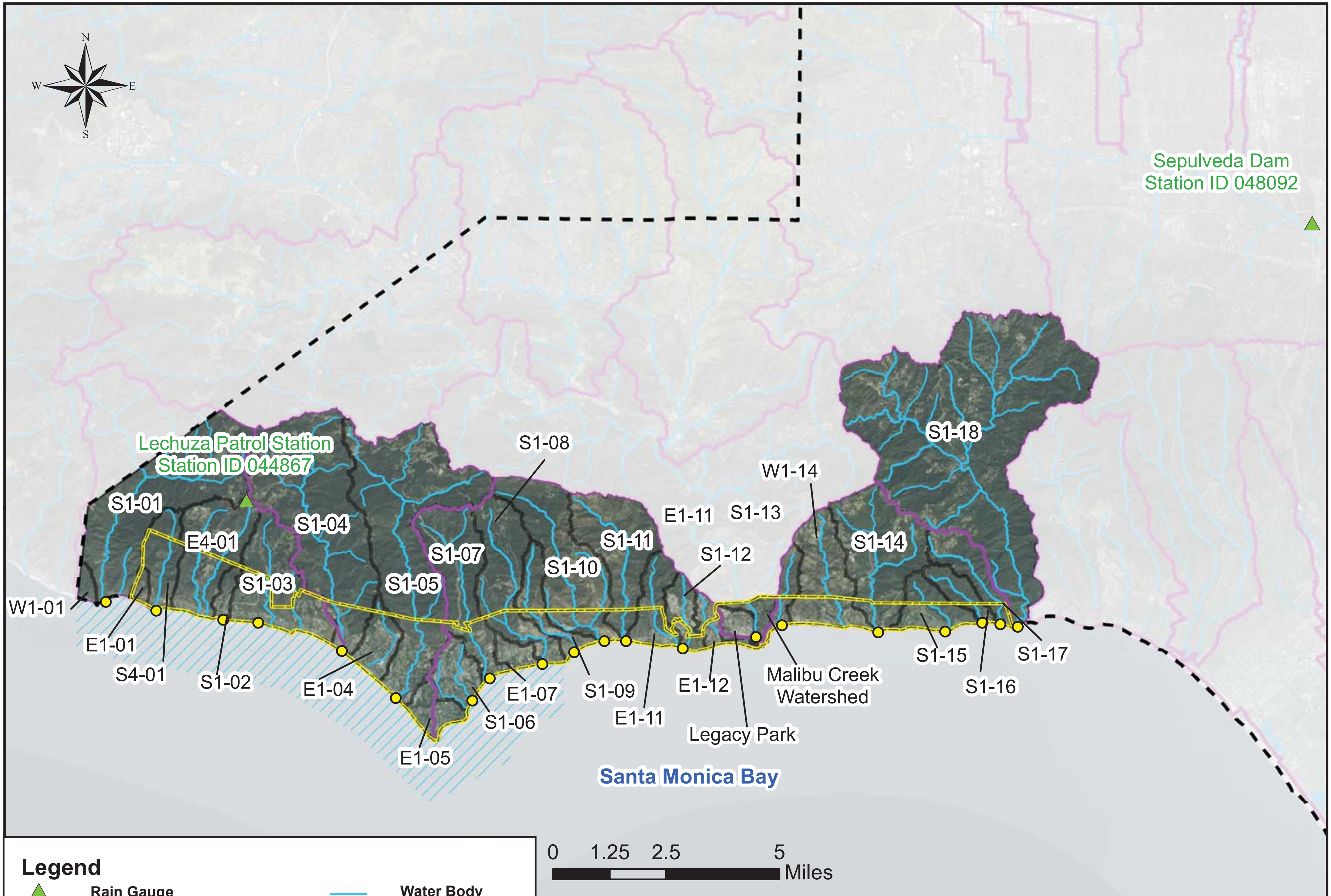


Figure 9. NSMBCW Analysis Regions for RAA NSMBCW EWMP

April 2015

Geosyntec consultants

Table 11. Analysis Regions and Compliance Monitoring Locations

Analysis Region	Compliance Station ID	Compliance Station Name
W1-01	N/A[1]	Not directly tributary to a CML
S1-01	SMB 1-1	Arroyo Sequit at Leo Carillo Beach
E1-01	N/A[1]	Not directly tributary to a CML
S4-01	SMB 4-1	Nicholas Beach
E4-01	N/A[1]	Not directly tributary to a CML
S1-02	SMB 1-2	El Pescador State Beach
S1-03	SMB 1-3	El Matador State Beach
S1-04	SMB 1-4	Trancas Creek
E1-04	N/A[1]	Not directly tributary to a CML
S1-05	SMB 1-5	Zuma Creek
E1-05	N/A[1]	Not directly tributary to a CML
S1-06	SMB 1-6	Point Dume Unnamed Drainage
S1-07	SMB 1-7	Ramirez Creek at Paradise Cove
E1-07	N/A[1]	Not directly tributary to a CML
S1-08	SMB 1-8	Escondido Creek
S1-09	SMB 1-9	Latigo Canyon
S1-10	SMB 1-10	Solstice Creek at Dan Blocker Beach
S1-11	SMB 1-11	Corral Canyon Creek at Corral Beach
E1-11	N/A[1]	Not directly tributary to a CML
S1-12	SMB 1-12	Marie Canyon at Puerco Beach
E1-12	N/A[1]	Not directly tributary to a CML
MCW	MCW-1	Malibu Lagoon at last breach point
S1-13	SMB 1-13	Sweetwater Creek at Carbon Beach
W1-14	N/A[1]	Not directly tributary to a CML
S1-14	SMB 1-14	Las Flores Creek
S1-15	SMB 1-15	Piedra Gorda at Big Rock Beach
S1-16	SMB 1-16	Pena Canyon
S1-17	SMB 1-17	Tuna Canyon at Las Tunas Beach
S1-18	SMB 1-18	Topanga Creek

[1] These analysis regions were created to represent subwatersheds not directly tributary to a CML.

GIS layers used in SBPAT included, but were not limited to, the following:

- Storm drains
- Receiving water bodies
- Soils
- Rain gage polygons
- Parcels
- Land use
- Catchments

4.4.2 HYDROLOGY

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 calculate runoff volumes. Revised and recalibrated SBPAT database values and EWMP-defined BMP information are used to calculate 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 calculated for every storm event.

4.4.2.1 90TH PERCENTILE YEAR DEFINITION

Consistent with the Permit-specified limits and the Regional Board RAA Guidance (Regional Board, 2014), the RAA was performed for all WBPCs for the 90th percentile critical year.[9] The critical year was determined by evaluating the total annual rainfall and the total number of wet weather days[10] at the various gauges in the NSMBCW EWMP Area. Rainfall analyses were performed for "Model Years" (i.e., November 1 – October 31) in order to provide consistency with the bacteria TMDLs and the CIMP. **Table 12** presents these results. The 90th percentile year was determined to be 1995 after analyzing the available rainfall data.[11] In all cases shown in **Table 12**, 1995 was found to be greater than or equal to the 90th percentile year, justifying its selection as the critical condition. The selection of 1995 as the critical condition is also consistent with other SMB EWMPs.

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[9] For the purposes of this RAA, 90th percentile daily average concentrations of nitrate as nitrogen (in Malibu Creek Watershed) and total lead (in Topanga Canyon Creek) were also used to represent critical conditions, and these critical concentrations were applied to annual volumes for the 90th percentile critical year (1995) to calculate baseline loads for the critical condition. Further details on this approach can be found in Section 4.

[10] Consistent with the SMB Beaches Bacteria TMDL, "wet weather" days are defined as days with at least 0.1-inch of rainfall and the three days immediately following.

[11] For Lechuza Patrol Station, data were analyzed from Model Years 1955 through 1997 (last full year on record). For Sepulveda Dam, data were analyzed from Model Years 1955 through 2012 (with 1980 and 1981 excluded due to a lack of data).

Table 12. Rainfall Summary at NSMBCW Precipitation Gauges (Model Year 1995)

	Model Year 1995 Percentile Ranking (Total Rainfall)		Model Year 1995 Percentile Ranking (Wet Days)	
	Percentile	Total Rainfall (in)	Percentile	Wet Days
Lechuza Patrol Station (Station ID 044867)	93.1%	39.5	90.9%	89
Sepulveda Dam (Station ID 048092)	91.2%	33.15	91.2%	72

A summary of annual rainfall data for each gauge above is provided in **Appendix C**.

4.4.3 WATER QUALITY

The priority WBPCs for the NSMBCW EWMP Area, combined with data availability, were used to determine the 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 were randomly sampled from the long-term storm event runoff volume record produced by SWMM. Land use-based wet weather pollutant EMC values (see **Table 13** for summary statistics) and BMP effluent concentrations (presented in Section 4.4.4) for each storm were then randomly sampled from their log-normal statistical distributions. The runoff volumes (including volumes treated and bypassed by BMPs), land use EMCs, and BMP effluent concentrations were combined to determine the total pollutant loads and load reductions (i.e., difference between existing and post-BMP load calculations) for each randomly sampled storm event. This procedure was 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 were then used to characterize the average (mean) values for the annual volume, pollutant loads, and pollutant concentrations in stormwater runoff from the modeled area, with and without BMPs implemented.

Table 13. SBPAT EMCs for NSMBCW Watersheds – Arithmetic Estimates of the Log-normal 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 ug/L	Tot Cu ug/L	Tot Pb ug/L	Diss Zn ug/L	Tot Zn ug/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 (1,490,000)[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	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."

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

4.4.4 SUMMARY OF BMP PERFORMANCE DATA

The performances of existing and planned BMPs in the NSMBCW were evaluated both in terms of volume capture (based on BMP design criteria) and predicted effluent quality. Due to a lack of project-specific monitoring data quantifying the performance of an installed BMP, modeling of expected BMP performance was based on existing, peer-reviewed pollutant reduction data for similar types of pollutants and BMPs. Coupled with information on the capacity/volume of each BMP in question, modeling was used to predict the impact of each BMP on water quality.

Expected BMP performance was modeled using data from the International Stormwater BMP Database (IBD; www.bmpdatabase.org), which is 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 is more reliable in modeling stormwater treatment rather than percent removal, which assumes a linear influent-to-effluent relationship (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):

1. 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);
2. The variability in percent removal is often more broad than the variability in effluent pollutant concentration;
3. A high percent removal may still result in a high pollutant concentration, thereby leading to a false determination that BMPs are performing well; and
4. Different percent removals can be calculated within the same dataset (i.e., when looking at individual pairs of influent/effluent samples).

For the reasons stated above, percent removal is not used to quantify BMP performance. Instead raw effluent data has been used to estimate the "irreducible pollutant concentration" attributable to each BMP 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.

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 EMCs, 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.[12] 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 14**.

[12] The bootstrap approach randomly samples the dataset several thousand times and computes the desired statistic from the subset of data.

Table 14. BMPs and Constituents Modeled[a]

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)[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	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)	

[a] All constituents are addressed for all BMPs that provide treatment (i.e., excluding those identified as "volume reduction only").

[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.

Table 15 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% non-detect ratio). **Table 16** summarizes arithmetic averages and **Table 17** summarizes the arithmetic standard deviations of the BMP effluent concentrations that were 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 18** 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.

Table 15. Summary of Number of Data Points and Percent Non-Detects for BMP Effluent Concentration Data from the IBD

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 16. IBD 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 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 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 17. IBD 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 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 reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

Table 18. IBD 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 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 reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

In some cases, performance data were not available for all types of BMPs requiring a performance assessment as part of the RAA. If the unit treatment processes (e.g., filtration, sedimentation, etc.) for a BMP with data ("BMP 1") can be expected to be similar for a BMP without data ("BMP 2"), then equivalent performance for "BMP 2" is assumed based on the performance of "BMP 1". However if no data exist and unit treatment processes cannot be associated with a BMP with data, then no treatment is assumed except for load reductions associated with simulated volume loss. **Table 19** summarizes the performance assumptions for each of the BMPs that were modeled in the RAA. Additionally, bioretention with underdrains ("biofiltration") were assessed in the RAA using a vegetated swale BMP from the IBD, which represents some incidental volume reduction as well as a certain percent treated discharge and a certain percent bypass discharge. Effluent quality assigned to treated underdrain discharge was based on the characteristics of the "bioretention" BMP.

Table 19. Assumptions and Source Data for BMP Performance

BMP	Source Data and Assumptions
Vegetated Swale (Bioswale)	Strictly from vegetated swale category from the IBD
Cistern	No treated effluent; volume reductions only
Bioretention w/o underdrain	No treated effluent; volume reductions only
Porous Pavement	No treated effluent; volume reductions only
Green Roof	No treated effluent; volume reductions only
Low Flow Diversion	No treated effluent; volume reductions only
Media Filter	Strictly from media filter category from the IBD; includes non-bio media filters (e.g., sand filters)
Subsurface Flow Wetland	Lowest of all IBD categories; except for Fecal Coliform where 90% removal is used [a]
Constructed Wetland / Retention Pond (w/o Extended Detention)	Based on combined wetland basin and retention pond IBD categories (basis per Geosyntec 2008)
Treatment Plant	Secondary Drinking Water Standards or Minimum of all BMP types, whichever is less
Dry Extended Detention Basin	Strictly detention basin category from the IBD
Hydrodynamic Separator	From Geosyntec, 2008
Infiltration Basin	No treated effluent; volume reductions only
Constructed Wetland / Retention Pond (w/ Extended Detention)	Based on retention pond IBD category (basis per Geosyntec 2008)

[a] SSF (subsurface flow) wetlands provide multiple unit treatment processes provided by other BMPs (e.g., sedimentation, filtration, biochemical, etc.). 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.

4.5 MODEL CALIBRATION

4.5.1 HYDROLOGIC CALIBRATIONS

The hydrology component of SBPAT was calibrated for the only location in the SMB watershed where *all* data requirements (daily flow, hourly precipitation, and daily beach bacteria concentrations) were met - the Topanga Creek subwatershed. No other SMB subwatersheds met the calibration data requirements. The Topanga subwatershed is located on the eastern edge of the NSMBCW EWMP 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 Creek subwatershed outlet, with estimated baseflow removed. Hourly rainfall data were used for the nearby Lechuza Patrol Station #72 gauge (gauge reference ID 352b) 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 Flood Control District's Topanga Creek streamflow gauge (gauge reference ID F54C-R) was used to determine 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.

The hydrologic calibration reported in the NSMBCW EWMP Work Plan (**Appendix B**) was refined to include additional precipitation and streamflow data. The refined calibration used a vacant undifferentiated land use effective imperviousness value of 1% and required the evaluation of various saturated hydraulic conductivity multipliers that resulted 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 adjustment 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 10** presents the refined hydrologic calibration results, including the 0.20 saturated hydraulic conductivity multiplier. As described in the Work Plan and in the April 2014 presentation to Regional Board staff, the emphasis of the calibration effort focused on accurate, unbiased prediction of "non-extreme" annual conditions (annual volumes exceeding a 25-year frequency, 4% 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[13]. These calibrated input parameter values were used throughout all SMB watersheds in the wet weather RAAs.

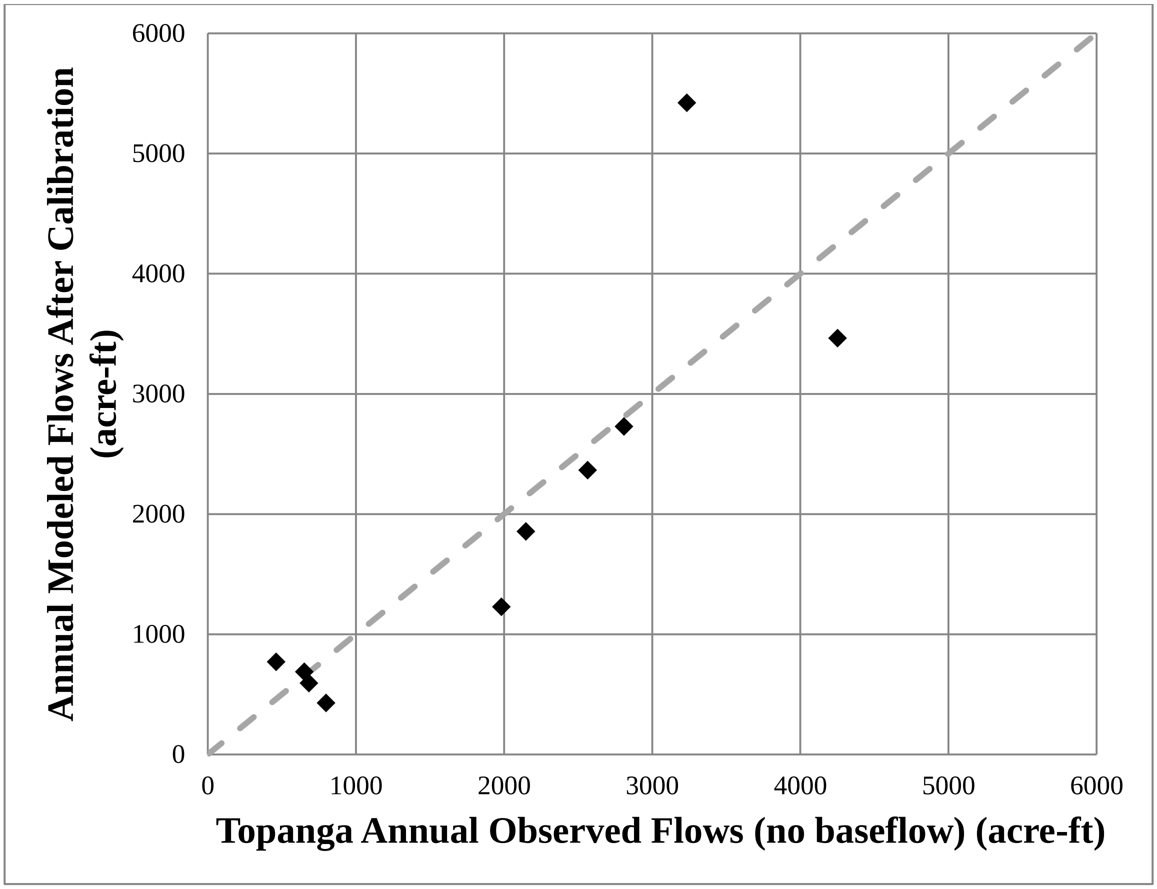

Figure 10. Annual Runoff Volumes for Topanga Subwatershed: Modeled vs. Observed, 2001-2012

Following calibration, average relative prediction error (or the percent differences between the averages annual observed and modeled annual runoff volume) was calculated to be -0.24%. According to the Regional Board's RAA Guidance (Regional Board, 2014, which is based on Donigian, 2000), SBPAT model performance with respect to hydrology as a result of this calibration is categorized as "very good."

[13] The stream gauge annual volume measurement in 2008 was unexplainably high (corresponding to a runoff coefficient greater than one), and the 2005 year included a 15-day period of near-record rainfall levels that were anomalously high (where the mean annual rainfall depth fell between December 27 and January 10, and major landslides were reported in nearby coastal Ventura County).

4.5.2 WATER QUALITY CALIBRATION

SBPAT's land use EMC statistics were compared with the most current MS4 land use water quality monitoring data available. The land use EMCs used in SBPAT (**Table 16** and **Table 17**) were calculated from Los Angeles County land use-specific data collected between 1996 and 2000 and SCCWRP land use-specific data collected between 2001 and 2004 (SCCWRP data were used for fecal coliform only). An example comparison between the SBPAT-modeled pollutant concentrations (shown by non-parametric summary statistics drawn from SBPAT's lognormal distributions) for the single family residential land use, compared with the original SCCWRP sample results, is shown in **Figure 11** for fecal coliform bacteria. As shown, the comparison between these data sets is very good. The example is provided for single family residential land use since this is the dominant developed land use in the NSMBCW EWMP Area. Similar plots can be found for each modeled pollutant in **Appendix C**. Modeled EMC values are consistent with the recommended values for land use-specific loading in Table 3.3 of the RAA Guidelines.[14] In the future, as new local monitoring data become available, EMCs may be reevaluated as part of the EWMP adaptive management process.

[14] An exception to this was made for the open space/vacant fecal coliform EMC data. These values were instead 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 were used by the Regional Board for every creek or river bacteria TMDL in the region and taken from (SCCWRP, 2005) and (SCCWRP 2007a).

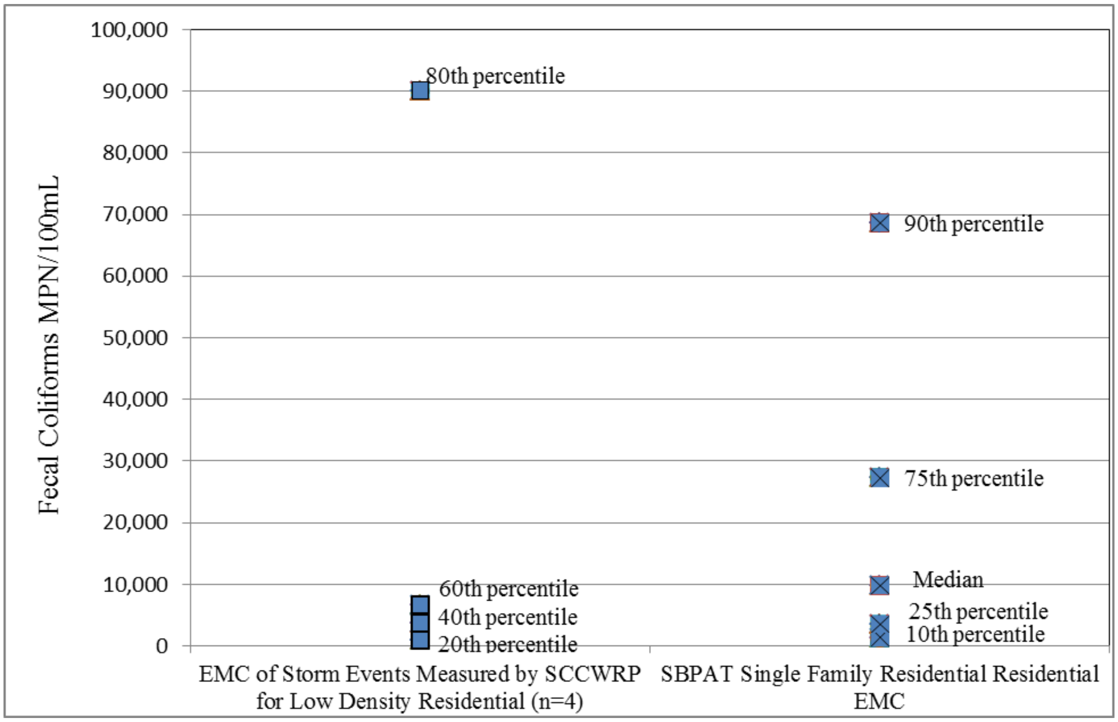

Figure 11. Comparison of Fecal Coliform Low Density Residential EMC Values Between SCCWRP Measurements (n=4) and SBPAT Modeled Values (a full log distribution is used by the model, but non-parametric summary statistics are shown for comparison)

4.6 MODEL VALIDATION

In addition to the above land use EMC verification, SBPAT's bacteria exceedance day calculation methodology was validated using the Santa Monica Bay reference watershed at Leo Carrillo Beach – Arroyo Sequit. Recent beach bacteria monitoring results were used. This validation is described in Section 4.6.1 below. Another validation of SBPAT's annual bacteria loads is included in Section 4.6.2, demonstrating their correlation with measured annual wet weather beach exceedance days.

4.6.1 VALIDATION OF EXCEEDANCE DAY CALCULATION APPROACH

To be consistent with the SMB Beaches Bacteria TMDL for wet weather, which established allowed exceedance day WLAs based on monitoring results from the Leo Carrillo reference beach, the exceedance day calculation approach was tested on Leo Carrillo and its Arroyo Sequit subwatershed for the same critical year as the TMDL

(Model Year 1993).[15] 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 Model Year 1993. This analysis occurred in three steps:

1. The calibrated SBPAT model, using the nearby Lechuza Patrol Station gauge for Model 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 samples collected on days with >=0.10-inch of rainfall exceeded the single sample recreational Water Quality Objectives.[16] In other words, on 27 percent of days when runoff discharges due to a rain event might be expected, one or more fecal indicator bacteria concentrations at the beach exceeded the objectives.
3. Multiplying 59 discharge days by the 27 percent exceedance percentage resulted in 16 predicted wet weather exceedance days for Leo Carrillo for Model 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 calculation methodology.

4.6.2 Validation of Using Annual Fecal Coliform Loads to Predict Exceedance Day Reductions

A second methodology validation step was performed to demonstrate that modeled annual fecal coliform loads are indeed predictive of the compliance metric, or annual exceedance days for all fecal indicator bacteria. For bacteria modeling, verifying the linkage between modeled *fecal coliform loads* (i.e., discharged from the hypothetical watershed outlets) and total observed wet weather *exceedance days* (in the receiving water, based on REC1 daily maximum water quality objectives) is critical to establish reasonable assurance that compliance monitoring locations will be in compliance with the Permit limits. To establish this linkage, an analysis was conducted using shoreline

[15] Note that in the SMB Beaches Bacteria TMDL, Model Year 1993 was defined as the critical year. However, based on more recent rainfall records, 1995 has been determined to be the 90th percentile year, and so is used for the RAA. See Section 4.4.2.1 and **Appendix C**.

[16] Single sample recreational Water Quality Objectives for bacteria include: 10,000 MPN/100 mL for total coliform; 400 MPN/100 mL for fecal coliform; 104 MPN/100 mL for Enterococcus (salt water); 235 MPN/100 mL for E. coli (freshwater); and the total coliform density shall not exceed a daily maximum of 1,000 MPN/100 mL if the ratio of fecal-to-total coliform exceeds 0.1.

monitoring data at Topanga Canyon[17] (SMB 1-18) between 2005 and 2013. **Figure 12** illustrates a reasonable correlation between total modeled annual fecal coliform loads and total annual observed wet weather exceedance days. Each point shown represents one single Model Year.

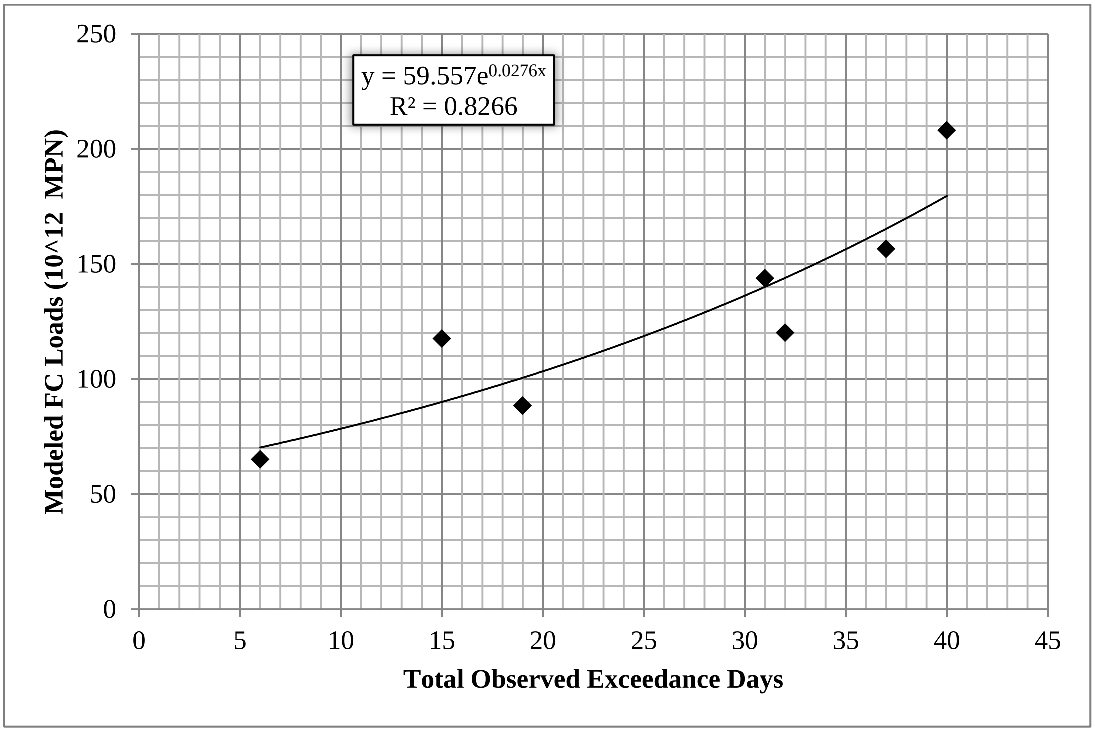

Figure 12. Correlation between Modeled Fecal Coliform Loads and Observed Exceedance Days, 2005-2013

5 SANTA MONICA BAY WATERSHED DEMONSTRATION OF COMPLIANCE

This section describes the proposed BMPs for the Santa Monica Bay areas (Jurisdictional Groups 1 and 4) and the demonstration that if implemented, there is reasonable assurance that the BMPs will meet the stated objectives. The results of the

[17] This subwatershed is 88 percent open space and was selected for water quality validation due to it being the hydrologic calibration subwatershed and because it had *daily* shoreline monitoring data, which was necessary in order to have a sufficiently robust dataset of annual wet weather exceedance days. See additional explanation in Section 4.5.1.

RAA for the Santa Monica Bay Watershed are presented below, including a summary of the target load reductions (TLRs), the BMPs selected for implementation in the NSMBCW EWMP Area, and a summary of load reductions achieved by the selected BMPs.

5.1 WET WEATHER TARGET LOAD REDUCTIONS

5.1.1 BACTERIA (SANTA MONICA BAY BEACHES)

In the NSMBCW EWMP Area, five SMB Beaches Bacteria TMDL CMLs have been assigned exceedance day allowances in the Permit based on an anti-degradation approach. As such, no load reductions are required (TLR = 0) for each subwatershed tributary to these compliance monitoring locations (SMB 1-2, SMB 1-3, SMB 1-16, SMB 1-17, and SMB 4-1), consistent with the TMDL's approach that acknowledges that historic average wet weather bacteria exceedance rates for each of these subwatersheds are lower than that of the reference beach. Historic wet weather monitoring data (2005 – 2014) at these five sampling locations confirm this understanding, as the long-term exceedance rate at all five sites varies between 5 and 15%, well below the long-term wet weather exceedance rate at the reference beach (26%).

Although the SMB Beaches Bacteria TMDL requires only that beach water quality at anti-degradation compliance locations be maintained, the NSMBCW EWMP Group will seek to implement non-structural and LID-based BMPs within these portions of the EWMP Area that will protect and potentially further improve water quality at these beaches. These measures, though not required for Permit compliance, are quantified in Section 5.3.1 below.

The methodology used to calculate TLRs for all other SMB analysis regions within the NSMBCW EWMP Area is described below.

5.1.1.1 TARGET LOAD REDUCTION CALCULATION METHODOLOGY (CONCEPTUAL MODEL) FOR BACTERIA

In order to establish the bacteria target load reduction (TLR) for each analysis region, a conceptual model methodology was developed 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 WQBEL expression for the SMB Beaches Bacteria TMDL and Malibu Creek Watershed Bacteria TMDL.

After validation of the modeling methodology using the reference watershed (see Section 4.6.1), the conceptual model approach was applied to all analysis regions within the NSMBCW EWMP Area in order to predict baseline exceedance days for the 90th percentile year, or Model Year 1995. Once baseline discharge days were calculated for each analysis region, the number of allowed discharge days was established using the exceedance percentage of samples collected during days with precipitation greater than 0.1 inches at each compliance monitoring location. The number of Permit-specified wet weather allowable exceedance days (17 for all non-anti-degradation sites) was divided by this site-specific exceedance percentage to calculate the number of discharge days that would result in the allowed number of exceedance days. **Table 20** summarizes the allowable discharge days calculated for each analysis region.

Table 20. Allowable Discharge Days for each Modeled Analysis Region (Model Year 1995)

Watershed	CML	Analysis Region	Historical Exceedance Rate (2002 – 20013)		Allowable Exceedance Days	Allowable Discharge Days	Required Diversion Flow Rate (cfs)
			Wet Weather	Daily Rainfall > 0.1 inch			
Santa Monica Bay	-	W1-01	-	-	-	68	0.0
	S1-01[1]	S1-01	26%	25%	17	68	0.0
	-	E1-01	-	-	-	69	0.0
	S4-01[2]	S4-01	13%	20%	14	70	0.0
	-	E4-01	-	-	-	53	0.0
	S1-02[2]	S1-02	8%	14%	5	35	0.0
	S1-03[2]	S1-03	5%	9%	3	35	0.0
	S1-04	S1-04	36%	34%	17	49	0.0
	-	E1-04	-	-	-	51	0.0
	S1-05	S1-05	26%	32%	17	53	0.0
	-	E1-05	-	-	-	56	0.0
	S1-06	S1-06	25%	29%	17	58	0.0
	S1-07	S1-07	54%	66%	17	26	12.0
	-	E1-07	-	-	-	26	12.7
	S1-08	S1-08	43%	63%	17	27	6.9
	S1-09	S1-09	37%	61%	17	28	2.8
	S1-10	S1-10	35%	52%	17	33	4.5
	S1-11	S1-11	29%	42%	17	40	0.0
	-	E1-11	-	-	-	34	4.4
	S1-12	S1-12	49%	60%	17	28	17.8
	-	E1-12	-	-	-	28	6.8
	S1-13	S1-13	42%	46%	17	15	3.2
	-	W1-14	-		-	15	12.3
	S1-14	S1-14	31%	54%	17	37	8.4
	S1-15	S1-15	25%	33%	17	34	0.0
	S1-16[2]	S1-16	15%	31%	14	32	0.0
	S1-17[2]	S1-17	11%	14%	12	51	0.0
	S1-18	S1-18	58%	63%	17	46	38.6

[1] Compliance monitoring location at the reference watershed.
[2] Compliance monitoring locations with anti-degradation-based allowed exceedance days for wet weather.

To determine the TLR necessary for each analysis region to meet the allowed discharge days, a technical approach utilizing a virtual BMP was modeled at each outlet and/or CML.

For each analysis region's outlet retention BMP, an in-stream diversion system was iteratively sized (based on a diversion flow rate) to produce a bypass frequency (or number of discharge days) during Model Year 1995 that matched the allowed discharge days. Each virtual diversion system diverted runoff to an infinitely large retention BMP where the diverted water was fully captured. The load reduction resulting from this BMP scenario (i.e., baseline analysis region load minus analysis region load with the diversion system and retention BMP in place) became the TLR for each analysis region. "Reasonable assurance" of compliance with the allowed discharge days was then considered to have been met when actual and proposed BMPs combined to achieve the TLR for each analysis region. This approach was presented to Regional Board staff on June 6, 2014 and verbal feedback received during the meeting was supportive.

In summary, the following approach was implemented to calculate a bacteria TLR for each modeled analysis region (see **Appendix C** for an example calculation):

1. Each analysis region is modeled in SBPAT for the 90th percentile wet year (Model Year 1995).
2. The existing, baseline condition (i.e., without any outlet retention BMP) is modeled for each analysis region, resulting in a mean baseline fecal coliform (FC) load for the 90th percentile wet year (baseline load).
3. The exceedance percentage of samples collected during days with precipitation greater than 0.1 inches is determined for each CML.
4. The allowable number of discharge days for each analysis region is calculated.
   a. For analysis regions within the SMB Watershed tributary to a CML, allowable discharge days are calculated by dividing 17 TMDL allowable exceedance days by the exceedance percentage calculated in Step 3.
   b. For analysis regions within the SMB Watershed that lie between CMLs, allowable discharge days are calculated by averaging the allowable discharge days from the nearest adjacent analysis regions (e.g., the number of allowable discharge days for analysis region E1-07 is the average of the allowable discharge days calculated for S1-07 and S1-08).
5. An in-stream diversion to a large, theoretical retention BMP at the outlet of each analysis region is iteratively sized so that it only bypasses during the number of allowable discharge days determined in Step 4.
6. Each diversion and retention BMP is then modeled in SBPAT to produce a mean FC load for the 90th percentile wet year (allowed load).
7. For each analysis region, the difference between the baseline load (step 2) and the allowed load (step 6) results in a TLR for the 90th percentile wet year, which is the load reduction required to meet the allowable exceedance days for wet weather.

Within the NSMBCW EWMP Area, the TLR for bacteria for each analysis region was found to range between 0 and 44 percent. The cumulative TLR for the entire Santa Monica Bay Watershed, calculated as the total baseline bacteria load minus the total allowed bacteria load for the entire Santa Monica Bay Watershed, was calculated to be 7.3%. These TLRs are summarized in **Table 21** below.

5.1.2 TOTAL LEAD (TOPANGA CANYON CREEK)

Total lead is listed as a Category 2 WBPC in Topanga Canyon Creek (analysis region S1-18) 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. This concentration was converted from the dissolved lead criteria concentration of 65 µg/L to a total lead criteria concentration by following CTR conversion procedures and assuming a hardness of 100 mg/L, a conversion factor of 0.791, and a Water Effects Ratio (WER) of 1.0. A TLR methodology was applied consistent with the conceptual model for nitrates plus nitrites, including the use of 90^{th} percentile daily concentrations of total lead during Model Year 1995 to establish baseline loads during the critical period.

The baseline load, calculated based on total runoff volume from 1995 multiplied by the 90^{th} percentile daily concentration in 1995 (14.3 µg/L), is 180 lbs. The allowed load, calculated based on total volume for the 90^{th} percentile critical year (1995) multiplied by the water quality objective (82 µg/L), is 1,031 lbs. Therefore, even in a critical condition, no reduction of the baseline load is required by the NSMBCW EWMP Group to meet the allowed load (TLR = 0), and therefore it is determined that reasonable assurance of compliance with the water quality objective has been demonstrated.

5.1.3 PCBS AND DDT (SANTA MONICA BAY)

The Santa Monica Bay TMDL for DDTs and PCBs developed WLAs for stormwater throughout the Santa Monica Bay watershed. Because the NSMBCW EWMP Area contribution is not distinctly defined in the TMDL, the WLAs assigned to the entire Santa Monica Bay watershed management area 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 TMDL WLAs for the entire NSMBCW EWMP Area 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. These WBPCs are not analyzed further in this RAA, and based on this evaluation it is determined that reasonable assurance of compliance with the WLA has been demonstrated.

5.1.4 SUMMARY OF SANTA MONICA BAY TLRS

Table 21 provides a summary of calculated TLRs for bacteria in Santa Monica Bay and total lead in Topanga Canyon Creek. In addition, the cumulative bacteria TLR for the entire NSMBCW EWMP Area in the Santa Monica Bay Watershed is summarized at the bottom of **Table 21**.

Table 21. Target Load Reductions for the Santa Monica Bay Watershed (Model Year 1995)

Watershed	Compliance Monitoring Location	Analysis Region	Pollutant[a]	Baseline Load per Year	Target Load Reduction: Absolute Load per Year	Target Load Reduction: % of Baseline Load
Santa Monica Bay	-	W1-01	**Fecal Coliform**	**0.8**	**0.0**	**0%**
	S1-01	S1-01	**Fecal Coliform**	**38.8**	**0.0**	**0%**
	-	E1-01	**Fecal Coliform**	**0.7**	**0.0**	**0%**
	S4-01	S4-01[b]	**Fecal Coliform**	**30.1**	**0.0**	**0%**
	-	E4-01	**Fecal Coliform**	**45.7**	**0.0**	**0%**
	S1-02	S1-02[b]	**Fecal Coliform**	**18.9**	**0.0**	**0%**
	S1-03	S1-03[b]	**Fecal Coliform**	**130.6**	**0.0**	**0%**
	S1-04	S1-04	**Fecal Coliform**	**100.7**	**0.0**	**0%**
	-	E1-04	**Fecal Coliform**	**267.3**	**0.0**	**0%**
	S1-05	S1-05	**Fecal Coliform**	**398.6**	**0.0**	**0%**
	-	E1-05	**Fecal Coliform**	**344.9**	**0.0**	**0%**
	S1-06	S1-06	**Fecal Coliform**	**386.0**	**0.0**	**0%**
	S1-07	S1-07	**Fecal Coliform**	**78.9**	**7.5**	**9.5%**
	-	E1-07	**Fecal Coliform**	**121.5**	**36.4**	**29.9%**
	S1-08	S1-08	**Fecal Coliform**	**86.5**	**7.8**	**9.0%**
	S1-09	S1-09	**Fecal Coliform**	**28.9**	**3.6**	**12.5%**
	S1-10	S1-10	**Fecal Coliform**	**23.9**	**1.5**	**6.1%**
	S1-11	S1-11	**Fecal Coliform**	**19.5**	**0.0**	**0%**
	-	E1-11	**Fecal Coliform**	**54.6**	**11.2**	**20.5%**
	S1-12	S1-12	**Fecal Coliform**	**86.4**	**37.9**	**43.9%**
	-	E1-12	**Fecal Coliform**	**58.2**	**16.3**	**28.0%**
	S1-13	S1-13	**Fecal Coliform**	**57.5**	**6.5**	**11.3%**
	-	W1-14	**Fecal Coliform**	**142.3**	**29.5**	**20.8%**
	S1-14	S1-14	**Fecal Coliform**	**53.7**	**8.2**	**15.3%**
	S1-15	S1-15	**Fecal Coliform**	**72.1**	**0.0**	**0%**
	S1-16	S1-16[b]	**Fecal Coliform**	**4.6**	**0.0**	**0%**
	S1-17	S1-17[b]	**Fecal Coliform**	**14.5**	**0.0**	**0%**
	S1-18	S1-18	**Fecal Coliform**	**311.4**	**51.8**	**16.6%**
			Total Lead	180.0	0.0	0%
	Cumulative SMB		**Fecal Coliform**	**2978**	**218.2**	**7.3%**

[a] Pollutants in bold are the controlling pollutants in each analysis region.
[b] These compliance monitoring locations have Permit limits based on an anti-degradation approach, and therefore have a TLR of zero.

5.2 BEST MANAGEMENT PRACTICES

5.2.1 METHODS TO SELECT AND PRIORITIZE

In order to demonstrate reasonable assurance, BMPs identified for incorporation were prioritized 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 greatest load reduction per dollar. This was accomplished by targeting land uses with the greatest percent imperviousness and highest pollutant loads and by using BMPs with the greatest performance, particularly for the controlling pollutant.

The RAA was performed according to the following steps:

1. Calculate load reductions associated with existing BMPs;
2. Assume non-modeled non-structural programmatic load reduction (5 percent of baseline pollutant load);
3. Calculate Low Impact Development (LID) incentives and redevelopment load reduction;
4. Calculate planned and proposed regional BMP load reductions after evaluating existing plans and parcel screening analyses;
5. Meet the TLR by backfilling the remaining load reduction with regional BMPs or distributed BMPs to treat a percentage of developed land uses.

BMP load reductions were evaluated for the period between the effective date and final compliance deadline for the SMB Beaches Bacteria Wet Weather TMDL. These dates are summarized in **Table 22**.

Table 22. TMDL Effective Dates and Final Compliance Dates

TMDL	TMDL Effective Date	Final Compliance Deadline
SMB Beach Bacteria TMDL	May 20, 2003	July 15, 2021

5.2.2 *RECOMMENDED MINIMUM CONTROL MEASURES*

The Permit allows the opportunity in an EWMP to customize specified MCMs to focus resources on high priority issues within their watersheds. Customization may include replacement of a MCM with a more effective measure, reduced implementation of an MCM, augmented implementation of the MCM, focusing the MCM on the water quality priority, or elimination of an MCM. Modifications to the MCMs must be appropriately justified and still be consistent with 40 CFR § 122.26(d)(2)(iv)(A)-(D). A control measure may only be eliminated based on the justification that it is not applicable to a particular permittee (per Section IV.C.5.b.iv.1(c) of the Permit). Customized measures, once approved as part of the EWMP, will replace in part or in whole the prescribed MCMs in the Permit. The Planning & Land Development Program is not eligible for customization in that it may be no less stringent than the baseline requirements in the Permit. However, it can be enhanced over the baseline permit requirements such as LA County has done in its LID ordinance, thereby yielding additional pollutant and stormwater volume control for the watershed. The Permit-specified MCMs (baseline MCMs) build upon the MCMs in the previous MS4 Permit (Order 01-182). Although similar in many ways to the previously-required MCMs, in most cases the baseline MCMs contain more prescriptive record-keeping and/or implementation requirements.

Summary assessments of each MCM contained in the Permit are provided below, as well as a determination as to whether the NSMBCW EWMP Group will implement the MCM provisions as defined in the Permit, or whether modifications will be made. Additional (future) modifications may also be made through the Adaptive Management Process, outlined in Section 8.

5.2.2.1 GENERAL FRAMEWORK FOR MCM CUSTOMIZATION

An approach for evaluating existing institutional MCMs was developed as part of the NSMBCW EWMP Work Plan (**Appendix B)** and was used to evaluate existing MCMs and develop the customized MCMs. The following steps provide a general framework for MCM customization:

- Identify MCMs for potential customization. This may include identifying:
    - MCM requirements prescribed by the Permit which are not already being implemented by the permittee;
    - Currently implemented MCMs which have been enhanced over the previous Permit as part of TMDL implementation, e.g., Clean Bay Restaurant Certification Program;
    - Programmatic solutions/non-structural controls identified in TMDL implementation plans which may not yet have been implemented; and
    - MCMs which are currently being implemented but which may be excessive in scope. For example, commercial inspections being conducted of retail gasoline facilities which are already heavily regulated through other environmental programs in areas that have no receiving water impairments for the pollutants of concern may be carried out less frequently, or discontinued indefinitely.

- Identify MCMs which are not applicable. A control measure may be eliminated based on the justification that it is not applicable to a particular permittee. For example if it is the policy of a permittee not to use pesticides in public agency activities, then there is no need for tracking of pesticide use and this MCM may be proposed for elimination.
- Assess the effectiveness of the incremental baseline MCM requirements with respect to water quality priorities. The data necessary to quantify this will vary greatly by MCM, but may include information such as: receiving water quality, inspection and reporting records, number of qualifying projects (e.g., number of construction projects greater than 1 acre), number of pet station bags used, amount of material picked up by street sweeping activities, number of employees trained, and maintenance records. Additionally, the California Stormwater Quality Association (CASQA) provides a tool to estimate the effectiveness of stormwater management programs. The tool recommends possible assessment metrics that can be used for various stormwater programs.
- Quantify the additional resources required to implement the incremental baseline MCMs. This may include estimating additional staff resources in terms of full-time employees, consulting resources, and contracted services.
- Assess the effectiveness and resources required to implement the customized MCM. The process to quantify these will be the same as the process used to quantify the baseline effectiveness of the existing MCM.
- Compare the assessed effectiveness and resources required to implement the incremental baseline MCMs and the customized MCMs. Customization can be justified in several ways:
    - If the customized MCM effectiveness is equal to or greater than the baseline MCM, customization can be justified.
    - If an MCM requirement is not applicable, then elimination is justified.
    - If the incremental MCM requires additional resources that are disproportionate to the increased effectiveness achieved, then retention of the existing MCM may be justified.
- Document the customized MCM justification.

MCMs were evaluated based on their effectiveness in addressing the WBPCs specific to the NSMBCW EWMP Area and based on the NSMBCW EWMP Group's knowledge and experience with existing MCMs. In many ways, the Group's practical experience with MCM implementation over time provides the best insight as to what MCM modifications/enhancements will be most helpful to target the WBPCs of concern in the NSMBCW EWMP Area. **Table 23** summarizes the proposed MCM modifications and enhancements for the NSMBCW EWMP Agencies. The NSMBCW EWMP Group will implement the remaining MCMs identified in Part VI.D of the Permit with no additional modifications. An overview of all MCMs and the WBPCs which they target is provided in **Appendix D**.

Table 23. Common MCM Modifications/Enhancements for City and County

2012 Permit Requirement	Modification/Enhancements	Justification for Modification
D.5 Public Information and Participation Program (PIPP)		
Develop and distribute public education materials on: vehicle fluids; household waste; construction waste; pesticides, fertilizers, and integrated pest management (IPM); green wastes; and animal wastes. Distribute public education materials at points of purchase including automotive parts stores, home improvement centers, landscaping/garden centers, and pet shops/feed stores.	PIPP enhancements including: - "Living Lightly in Our Watersheds – A Guide for Residents of the SMB Watershed." Copies of this guide are regularly distributed at public counters and events. A partnership project with the Resource Conservation District of the Santa Monica Mountains and other local agencies, this guide is currently being updated for print production, and a new website for presenting the information is being developed. - Malibu is founding member and facilitator of the Malibu Area Conservation Coalition (MACC). MACC is a partnership of local government agencies, utilities, resource districts, and community stakeholders working within Malibu and the North Santa Monica Mountains that share the common goal of empowering local communities to conserve and protect natural and economic resources and habitat. Recognizing that watersheds, oceans, water and power generation and delivery systems do not stop at jurisdictional boundaries, the coalition is dedicated to providing effective programs, environmental education and outreach. The MACC does this by providing resources to the community to improve resource conservation, and eliminate non-point source pollution. Programs have included promoting the Surfrider Foundation' s Ocean Friendly Gardens program, providing rebates and incentives for conservation devices and landscape retrofits, hosting workshops and training, and installing demonstration gardens. - Malibu actively participates in the Malibu Chamber of Commerce environmental Committee which provides education/outreach and recognition to local businesses and the community through events, awards, workshops, and outreach campaigns. - Special focused outreach directly to the equestrian community in neighborhoods known to have increased equestrian uses or facilities. Including direct contact with properties, offers to conduct site evaluations, education and outreach to property owner associations, and educational materials. A new equestrian facilities	This is an enhancement.

2012 Permit Requirement	Modification/Enhancements	Justification for Modification
	best management practices guidelines is currently in development. - The City of Malibu has conducted landscaper/gardener training and certification programs multiple times in both Spanish and English.	
D.6. Industrial/Commercial		
Educate - notify each facility in inventory of BMP requirements once per permit cycle	Outreach material content and distribution will be focused on industrial/commercial facilities with the potential to contribute to pollutants identified as water quality priorities.	Outreach to industrial/commercial facilities will focus on water quality priorities to most effectively utilize resources.
Inspect facilities twice during the 5 year permit term (w/first inspection within 2 years of the effective date and 6 months in between inspections); industrial facilities that have been inspected within 24 months do not have to be inspected (evaluate year 2/year 4)	The NSMBCW EWMP Group conducts inspections of commercial facilities within the NSMBCW EWMP Area on an annual basis rather than twice per five years as required in the Permit. This includes annual inspections of food service establishments including restaurants, grocery stores, and coffee shops to reduce this type of business' impact on water quality due to stormwater and dry weather runoff. Malibu is a partner in the Santa Monica Bay Restoration Foundation's Clean Bay Restaurant Certification program that far exceeds the minimum requirements of the previous MS4 Permit. Inspections include a comprehensive 30+ point stormwater inspection checklist requiring 100% compliance in order for the facility to be awarded a Clean Bay Restaurant Certification.	This is an enhancement.
D.7. Planning and Land Development		
Update ordinance/design standards to conform with new requirements (LID and Hydromodification)	The City of Malibu exceeds the Permit's LID requirements by requiring LID implementation on more projects than otherwise required by the Permit. In addition, the City of Malibu implements a Local Coastal Program, which is certified by the California Coastal Commission, including a Land Use Plan (LUP) and Local Implementation Plan (LIP) that detail many environmental quality and protection standards, objectives, and implementation measures for new development and redevelopment projects. These include requirements for water conservation, protection of native vegetation, and landscaping with native vegetation. All landscape plans are reviewed by Malibu's contract biologist. A water quality mitigation plan is required for all planning priority projects along with additional projects, including beachfront development that creates, adds, or replaces 2,500 sf or more of impervious area; projects that result in the creation, addition, or replacement of 2,500 sf that discharge directly to or adjacent to an ASBS or are tributary to an ASBS; and single family residential projects that create, add, or replace 5,000 sf of impervious surface area.	This is an enhancement.

2012 Permit Requirement	Modification/Enhancements	Justification for Modification
D.8. Construction		
Develop/implement SOPs/inspection checklist	Develop/Modify checklist to explicitly address watershed priorities and associated sources	Modify to focus on water quality priorities
D.9 Public Agency Activities		
Develop retrofit opportunity inventory (within public ROW or in coordination with TMDL implementation plan; evaluate and rank	EWMP regional and distributed project selection process will be utilized to meet these requirements rather than implementing separate evaluations for retrofit opportunities.	Separate procedures are not needed as these considerations are incorporated into the EWMP control measure selection process
Develop procedures to assess impact of flood management projects on water quality of receiving waters; evaluate to determine if retrofitting is feasible		
Evaluate existing structural flood control facilities to determine if retrofitting facility to provide additional pollutant removal is feasible		
Implement controls to limit infiltration of seepage from sanitary sewers to the storm drains	Implement controls to limit sewage discharges from OWTS to the MS4 by maintaining a Septic System Management Plan and Comprehensive Onsite Wastewater Treatment System Inspection and Operating Permit Program.	Due to lack of municipal sanitary sewer in the majority of the NSMBCW EWMP Area, the MCM will be implemented where applicable, otherwise, the modified MCM will apply where OWTS exists.
Street sweeping - Priority A: 2x/mo; B: 1x/mo; C: as needed, not less than 1x/yr	Continue implementation of current program, which includes sweeping of all City streets monthly (even Priority C streets) and Pacific Coast Highway weekly; enhance with vacuum trucks, as feasible.	This is an enhanced program
D.10 Illicit Connections and Illicit Discharges Elimination		
Signage adjacent to open channels provide info regarding public reporting	Implement signage in prioritized areas only, only in areas where the NSMBCW EWMP Group has local jurisdiction or land control.	Modify to focus on water quality priorities, and to limit signage requirements to enforceable locations.

5.2.2.2 ADDITIONAL PROGRAMMATIC CONTROLS

In addition to these MCMs, Malibu originally enacted its water conservation ordinance in December 1991 (the City had recently incorporated in March 1991) to prevent waste or unreasonable use of water—a consequence of which is the reduction of incidental residential runoff. In December 2009, Malibu enacted Ordinance No. 343 – Landscape Water Conservation Ordinance, to comply with the requirements of the Water Conservation in Landscaping Bill (AB1881) of the State of California. The 2009 ordinance adopted by Malibu was deemed to be “at least as effective” as the “Model Water Efficient Landscape Ordinance” set forth by the California Department of Water Resources (DWR). The City went above the minimum requirements established by the DWR in this ordinance to capture more redevelopment projects and limit the amount of turf that could be installed, among other restrictions. On June 8, 2015, the City of Malibu adopted Ordinance No. 390, which enhances water conservation efforts by further restricting water of landscape and lawns; prohibiting residential car washing unless all wash water is retained on site; and requiring all mobile car washes within City limits to use recycled water. Similarly, the County adopted Ordinance No. 2008-00052U on October 7, 2008, establishing water conservation requirements for all unincorporated areas of the County. Among other requirements, the ordinance set forth a hose watering prohibition, established landscape watering requirements, and placed limits on vehicle washing procedures.

Consistent with Permit requirements, the NSMBCW EWMP Group has adopted laws to protect and improve water quality throughout the NSMBCW EWMP Area. The NSMBCW EWMP Group has banned smoking on public beaches, the use of expanded polystyrene food packaging, and the distribution of plastic shopping bags. The bans on smoking in public places, expanded polystyrene food packaging, and plastic shopping bags are TMDL implementation measures identified in the Santa Monica Bay Debris TMDL.

Malibu plants native and drought resistant vegetation and utilizes water efficient irrigation systems at City owned or operated facilities to reduce water consumption and the need for applying chemicals on landscaping, with the exception of limited fertilizer application to turf on ball fields. All municipal parks, except Legacy Park, are managed with an evapotransporation (ET) based irrigation system that tracks rainfall, evaporation, and transpiration to determine irrigation requirements. The system also applies programmed “Crop Coefficients” (plant growth habits) that automatically adjust irrigation to specific seasonal needs, and other programming options to minimize runoff and water puddles. Malibu has also undertaken outreach programs and installed pet waste disposal bag dispensers at public parks within the NSMBCW and the Malibu Equestrian Center.

The NSMBCW EWMP Group recognizes that opportunities may arise for the implementation of additional programmatic controls. These opportunities may include:

- True source control, such as removal of metals from brake pads and pesticide bans;
- Landscaper/gardener training and certification program;
- Enhanced street sweeping;
- Enhanced illicit connection program;
- Enhanced inspection and enforcement programs;
- Enhanced enforcement of litter ordinances; and
- Installation of additional trash cans or increased trash collection services in high trash generating areas.

During implementation of the EWMP, the NSMBCW EWMP Group members will look for opportunities to maximize the use of institutional control measures.

5.2.3 Quantified Non-structural BMPs

Specific non-structural BMP model inputs are summarized in **Table 25**. Non-structural BMPs have been categorized as follows.

5.2.3.1 Programmatic BMPs

These source controls include a combination of BMPs such as new or enhanced pet waste controls (ordinance, signage, education/outreach, mutt mitts, etc.), human waste source tracking and remediation (e.g., sanitary surveys and other investigations, etc.), new or enhanced equestrian facility outreach, 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 5 percent load reduction was applied for all pollutants to represent the cumulative benefit from all programmatic BMPs in addition to MCM enhancements the NSMBCW EWMP Group implement.

5.2.3.2 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 85th 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 24**). These assumed rates were based on redevelopment data collected in the Los Angeles region.

Table 24. 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:

- **TMDL Effective Date - 2015:** The 2001 MS4 Permit SUSMP requirements were assumed to be implemented over this period, which varied by watershed, as flow-through media filters at a 0.2 in/hr design event.
- **2015 – 2021:** The 2012 MS4 Permit post-construction requirements were assumed to be (on average) implemented as 50 percent biofiltration and 50 percent bioretention. Biofiltration (bioretention with underdrains) were modeled using bioswale BMP types with effluent EMCs set to bioretention and sized to treat the 1-year, 1-hour design storm (approximately 0.36 – 0.50 in/hr, depending on location), while bioretention units were sized to retain 100 percent of the 85th percentile, 24-hour design storm depth, calculated as the mean for each analysis region (approximately 0.75 – 1.0 in, depending on location).

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 calculate load reductions associated with these redevelopment BMPs, the land use percentages shown in **Table 24** 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, 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.

5.2.3.3 PUBLIC RETROFIT INCENTIVES

These BMPs include programs directed at incentivizing the public to decrease the amount of stormwater runoff from their property, specifically via downspout disconnection. Public incentives for retrofitting existing development were modeled in SBPAT between 2015, when the EWMP will begin to be implemented, and 2021. Public retrofit incentives were assumed to be a downspout disconnection program, modeled as bioswales sized to a design storm intensity of 0.2 in/hr. Assumptions included:

- 10 percent of all single family residential areas will be converted to disconnected downspout systems; and
- 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.

Table 25. BMP Assumptions for Public Retrofit Incentives and Redevelopment

Non-Structural Program (assumed implementation period)	Modeled 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 (TMDL effective Date - 2015)	Media Filter	0.2 (in/hr)	-	-	-	-	-	-
Redevelopment (2015-Final)	Bioretention	0.75 – 1.0 (in)	-	-	-	-	12	0.30
	Biofiltration[1]	0.36-0.50 (in/hr)	0.03	0.25	10	4	2	0.15
Public Retrofit (2015-Final)	Bioswale	0.2 (in/hr)	0.03	0.25	10	4	2	0.30

[1] Modeled as a bioswale using bioretention EMCs.

5.2.4 *STRUCTURAL BMPS*

Existing (constructed between 2003 and 2014) and proposed structural BMPs were modeled in SBPAT based on the most current design information. The following sections outline the structural BMPs that were modeled as well as their drainage areas, design details in SBPAT, and any relevant assumptions.

5.2.4.1 EXISTING REGIONAL EWMP PROJECTS

Within the Santa Monica Bay Watershed in the NSMBCW EWMP Area, there are no regional EMWP projects capable of capturing and retaining the 85th percentile, 24-hour storm.

5.2.4.2 EXISTING REGIONAL BMPS

The following existing regional BMPs were modeled to quantify associated load reductions.

5.2.4.2.1 Paradise Cove Stormwater Treatment Facility (Analysis Region S1-07)

Completed in 2010 by the City of Malibu, the Paradise Cove SWTF treats flows from Ramirez Canyon Creek where it discharges at Paradise Cove. The system is designed as a 3-stage system which removes sediment prior to filtration and UV treatment of the creek water: Stage 1- sediment removal (Bay Saver Technologies type device); Stage 2- filtration; and Stage 3- ultraviolet disinfection. The treatment flow rate for sediment removal is 3600 gpm and the treatment flow rate for UV/filtration is 900 gpm. The SWTF treats flows from approximately 2230 acres. The BMP was modeled in SBPAT as a regional treatment facility with 100 ft^3 of storage and a treatment flow rate of 900 gpm (2.0 cfs).

5.2.4.2.2 Marie Canyon Water Quality Improvement Project (Analysis Region S1-12)

Opened in 2007 by the LACFCD with the support of the City of Malibu, the Marie Canyon Water Quality Improvement Project was designed to filter and treat up to 100 gpm of dry and wet weather runoff at the Marie Canyon drain. The Marie Canyon facility uses ultraviolet radiation to destroy bacteria and pathogens in stormwater and dry weather flows (including natural stream flows/seeps and runoff from residential neighborhoods) from Marie Canyon Creek and then returns the treated water to the creek, which then flows to the beach. The project treats flows from approximately 602 acres. The BMP was modeled in SBPAT as a regional treatment facility with 100 ft^3 of storage and a treatment flow rate of 100 gpm (0.22 cfs).

5.2.4.2.3 Broad Beach Biofiltration Project (Analysis Region S1-03)

The Broad Beach Biofiltration Project, completed in 2015 by the City of Malibu, consists of nine stormwater quality catch basins on Broad Beach Road in the City of Malibu. Stormwater runoff from 14 acres of single family residential property is treated via flow-through biofiltration BMPs. Since the project was modeled based on the SUSMP design requirements, the project was modeled in SBPAT as a media filter BMP with a treatment flow rate of 0.2 in/hr (Geosyntec, 2011).

5.2.4.2.4 Wildlife Road Storm Drain Improvements (Analysis Region S1-06)

In 2015, the City of Malibu completed installation of four Filterra (biofiltration) units and two bioswales along Wildlife Road and Whitesands Place in the residential neighborhood northeast of Point Dume State Beach. Stormwater runoff from 14 acres of single family residential property is treated via flow-through biofiltration BMPs. Since the project was modeled based on the SUSMP design requirements, the project was modeled in SBPAT as a media filter BMP with a treatment flow rate of 0.2 in/hr.

5.2.4.2.5 Trancas Canyon Park (Analysis Region S1-04)

The construction of Trancas Canyon Park in 2010 included bioretention BMPs to capture and treat runoff from approximately 13.5 acres of land. This project was modeled as a bioretention BMP designed to capture and treat runoff from the SUSMP design storm (0.75-inch storm).

5.2.4.2.6 Las Flores Creek Restoration and Park (Analysis Region S1-14)

During the restoration of Las Flores Creek in 2008, bioretention BMPs were incorporated to treat runoff from 4 acres of single family residential land. These BMPs were modeled as a bioretention BMP designed to capture and treat runoff from the SUSMP design storm (0.75-inch storm).

5.2.4.3 PROPOSED REGIONAL BMPS

Following the NSMB J1/4 Bacteria TMDL Implementation Plan, the SMBBB TMDL J1/4 Site Evaluations Technical Report presented concept reports for potential BMP retrofits within the NSMBCW EWMP Area. These concepts, along with other potential sites, were reviewed to identify potential regional BMPs, with particular attention given to Topanga Canyon watershed based on County input as described below.

5.2.4.3.1 Analysis Region S1-18 (Topanga Canyon)

The BMPs originally identified in the SMBBB TMDL J1/4 Site Evaluations Technical Report as “Topanga-1/3” were collectively found to provide the best opportunity for a regional BMP to achieve Permit compliance, with some modifications.

The proposed regional BMP is a large-scale green street project along Viewridge Road in the upper portion of the Topanga Canyon watershed. In total, approximately 80.7 acres of single family residential property are tributary to this project. By rerouting two of the existing storm drains in this neighborhood, runoff that would otherwise discharge directly to the canyon will be treated via the green street project.

Although still in the conceptual design stages of project planning, the project will consist of a combination of bioretention BMPs and flow-through biofiltration BMPs, dependent on soil conditions and other constraints. The BMPs will be designed to capture and treat the 85th percentile, 24-hour storm (1.11 inches) and/or the 1-year, 1-hour design storm intensity (0.44 in/hr), to the maximum extent practicable. As feasible, the project will be constructed in the center median and/or along the curbside of Viewridge Road. The project will also provide recreational and educational enhancements, as feasible.

For modeling purposes, the project was modeled as half bioretention (design storm of 1 inch) and half biofiltration (design storm intensity of 0.4 in/hr). As previously described, biofiltration BMPs were modeled using bioswale BMP types with effluent EMCs set to bioretention. **Figure 13** shows the tributary area to the proposed green street regional BMP on Viewridge Road. Expected load reductions from the project are shown in Section 5.3.1.

Figure 13. Topanga Canyon Subwatershed (Analysis Region S1-18)
Proposed Regional BMP
NSMBCW EWMP

June 2015

Geosyntec consultants

5.2.4.4 PROPOSED DISTRIBUTED BMPS

Distributed Green Street BMPs include infrastructure such as bioswales, biofiltration, and bioretention, typically constructed in the public right-of-way, designed to treat stormwater before it enters the storm drain system. Based on iterative model results in the NSMBCW EWMP Area, it was determined that in nearly every analysis region where additional load reductions were required, distributed BMPs were the preferred option for meeting the target load reduction.

Green Street distributed BMPs were modeled as biofiltration BMPs in all cases (modeled using bioswale BMP types with effluent EMCs set to bioretention), since infiltration is generally not feasible in the NSMBCW EWMP Area because of site-specific constraints which include (but are not limited to) soil conditions, steep slopes, and geologic instability. In all cases, biofiltration BMPs were modeled with a design storm intensity of 0.30 in/hr; all other design parameters were consistent with those shown in **Table 25**.

In each analysis region where additional structural BMPs were required, distributed BMPs were modeled as treating a percentage of developed land uses (including commercial, education, single family residential, multi-family residential, and industrial, where applicable) in selected subcatchments. **Table 26** summarizes the area required to be treated by proposed green street BMPs in the NSMBCW EWMP Area.

Table 26. Proposed Distributed BMPs in the NSMBCW EWMP Area

Analysis Region	Subwatershed	Developed Area in Analyzed Region (acres)	Percentage of Area Required to be Treated	Area Required to be Treated (acres)	Percent Within City of Malibu	Percent Within County
E1-07	Ramirez Canyon	93.7	35%	32.8	100%	0%
S1-09	Latigo Canyon	24.3	10%	2.4	100%	0%
E1-11	Corral Canyon	74.2	20%	14.8	100%	0%
S1-12	Marie Canyon	202.7	55%	111.5	23.3%	76.7%
E1-12	Winter Canyon	54.8	40%	21.9	54.7%	45.3%
S1-13	Sweetwater Canyon	51.8	5%	2.6	100%	0%
W1-14	Las Flores Canyon	211.4	15%	31.7	100%	0%
S1-14		28.0	5%	1.4	0%	100%

Figures 14 – 21 show the various analysis regions with proposed distributed BMPs, as well as the developed areas analyzed in each region.

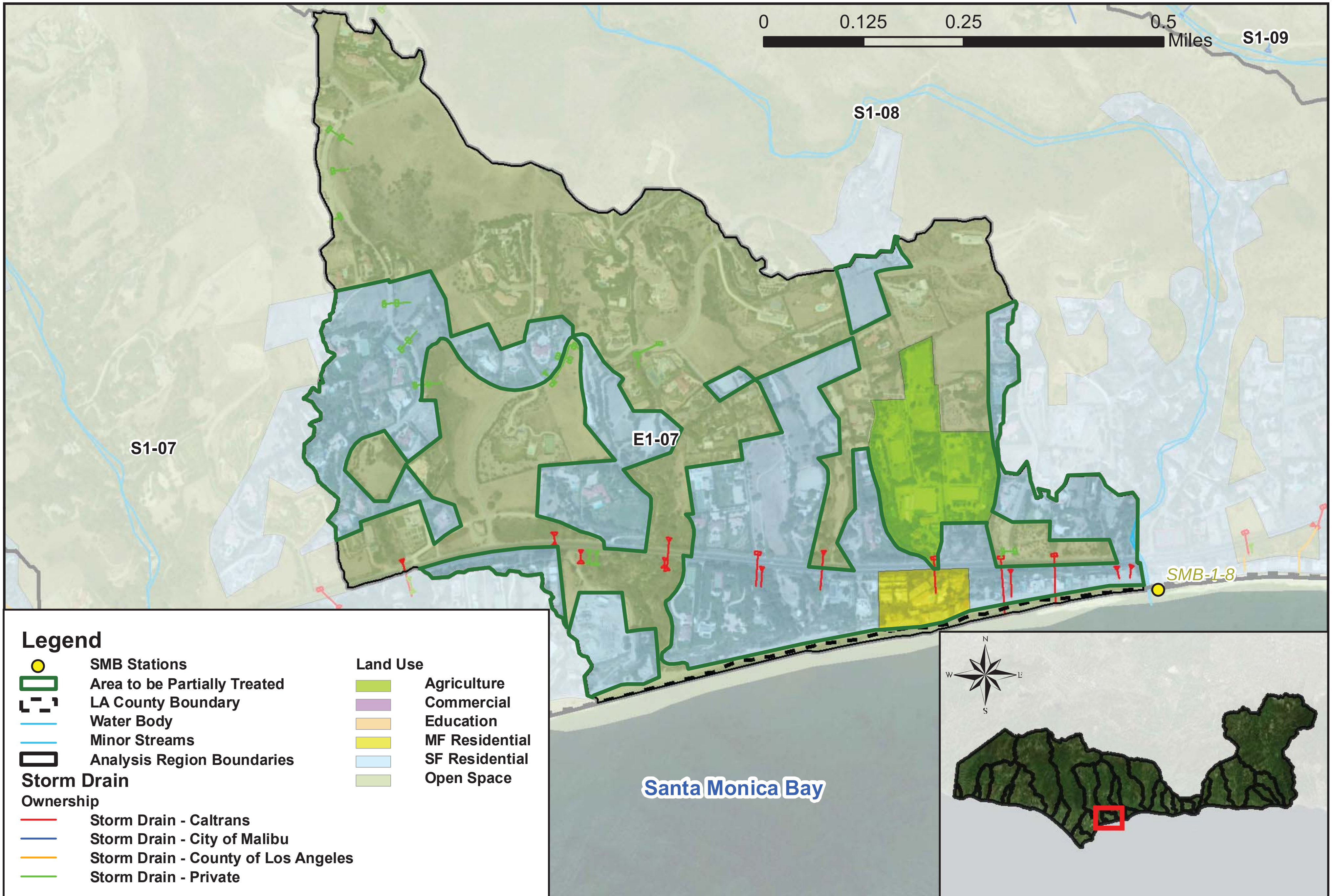

Figure 14. East of Ramirez Creek at Paradise Cove (Analysis Region E1-07)
Area to be Treated by Distributed BMPs (35% of Area Outlined in Green)
NSMBCW EWMP

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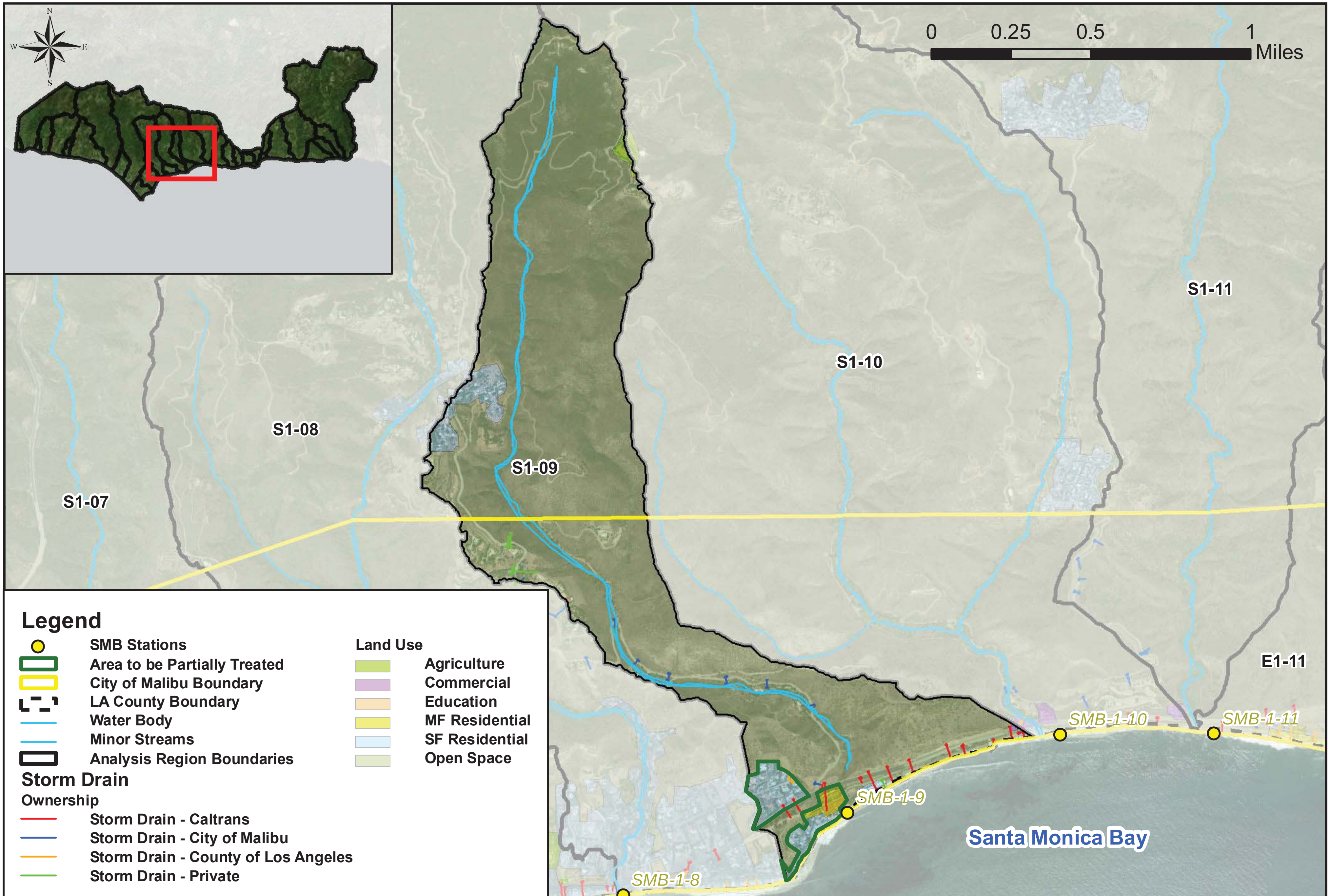

Figure 15. Latigo Canyon (Analysis Region S1-09)
Area to be Treated by Distributed BMPs (15% of Area Outlined in Green)
NSMBCW EWMP

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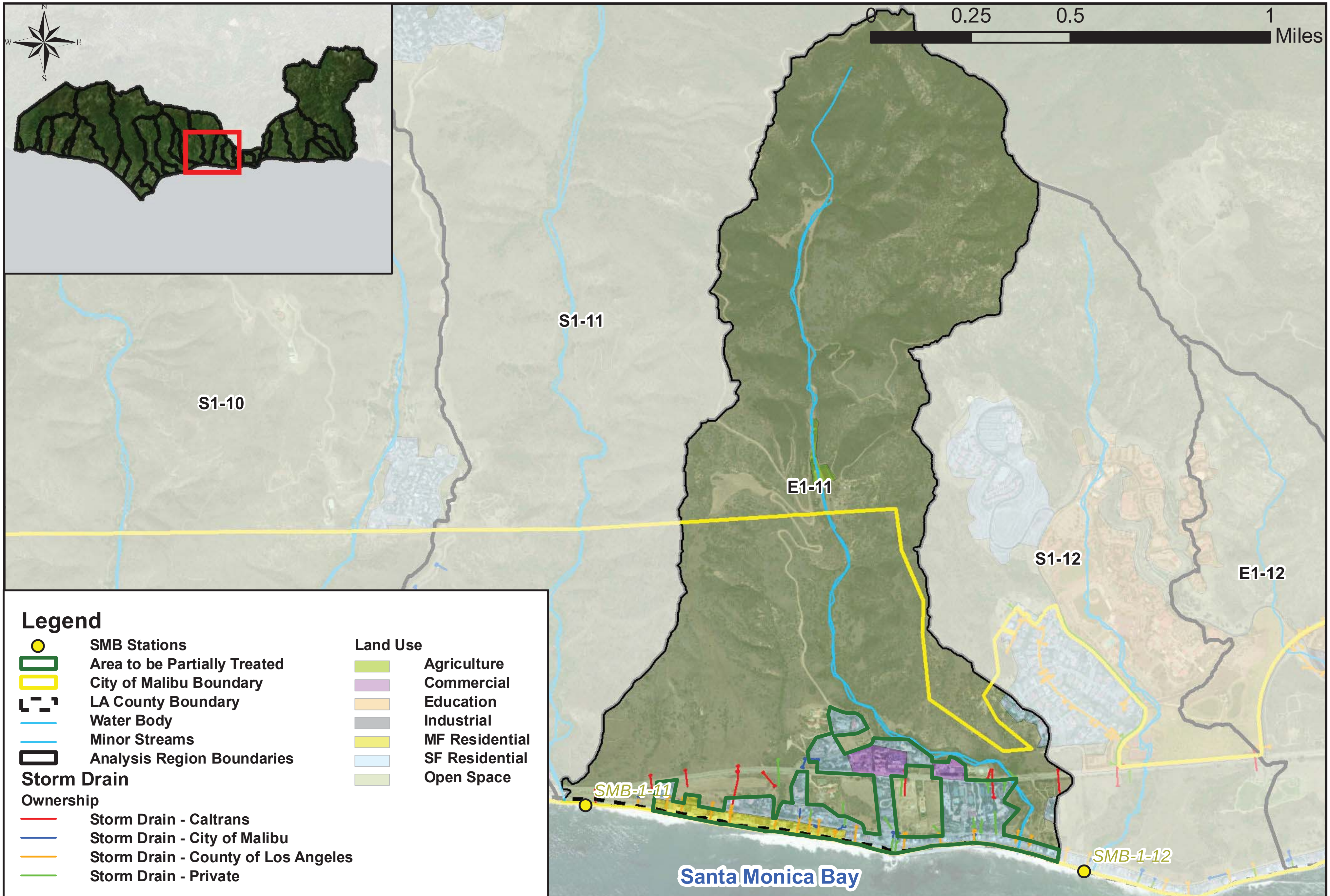

Figure 16. East of Corral Canyon Creek (Analysis Region E1-11)
Area to be Treated by Distributed BMPs (20% of Area Outlined in Green)
NSMBCW EWMP

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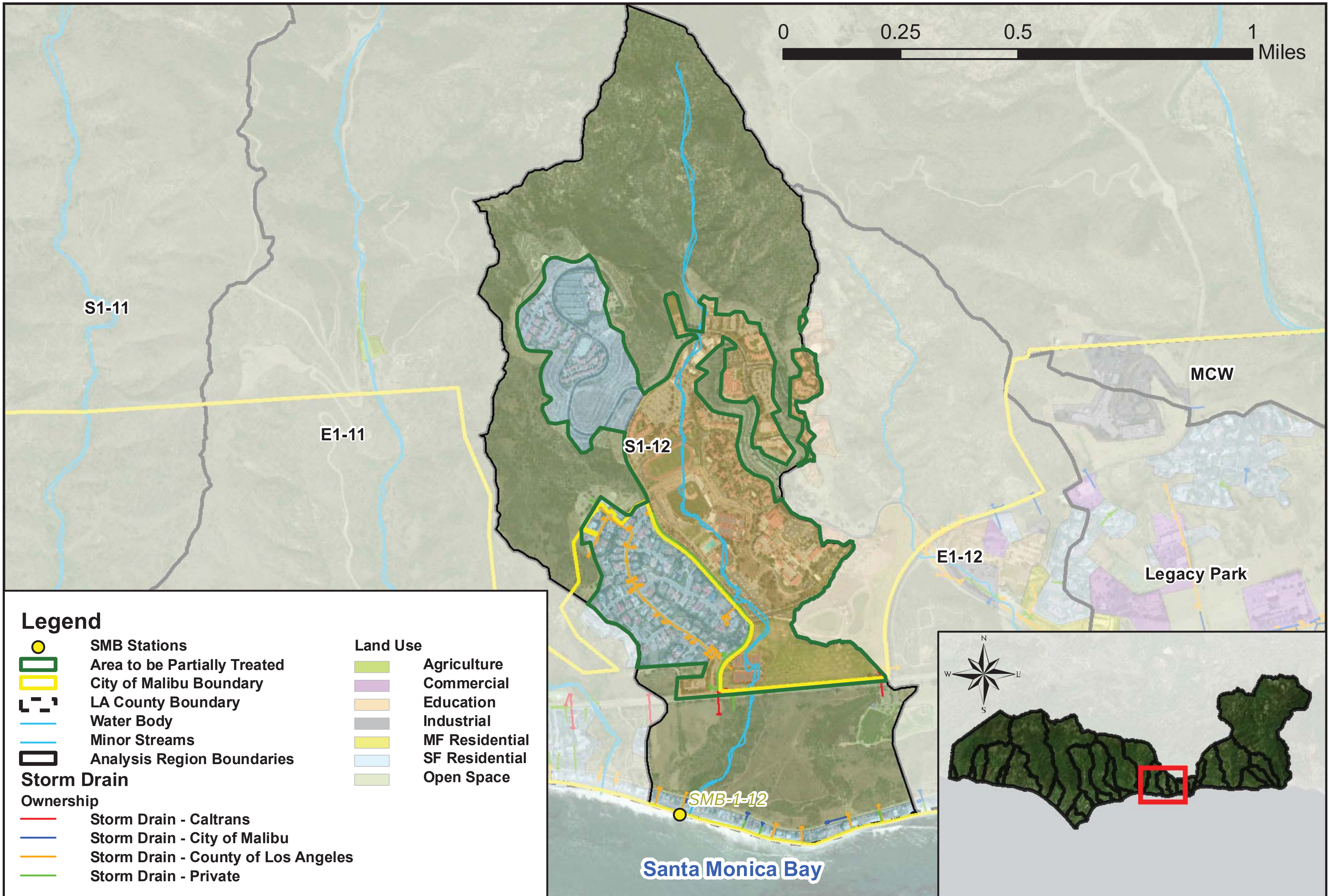

Figure 17. Marie Canyon at Puerco Beach (Analysis Region S1-12)
Area to be Treated by Distributed BMPs (55% of Area Outlined in Green)
NSMBCW EWMP

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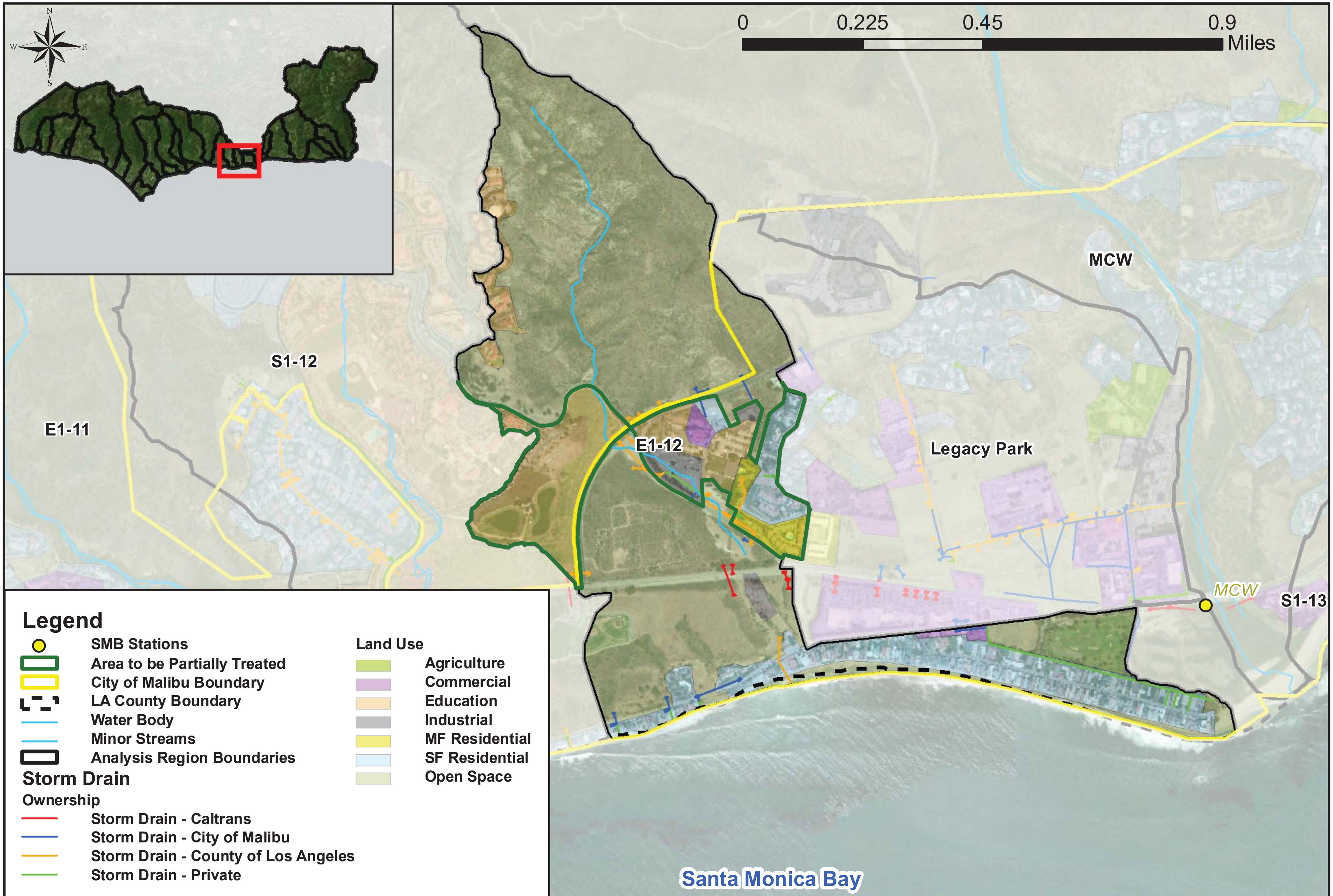

Figure 18. East of Marie Canyon (Analysis Region E1-12)
Area to be Treated by Distributed BMPs (40% of Area Outlined in Green)
NSMBCW EWMP

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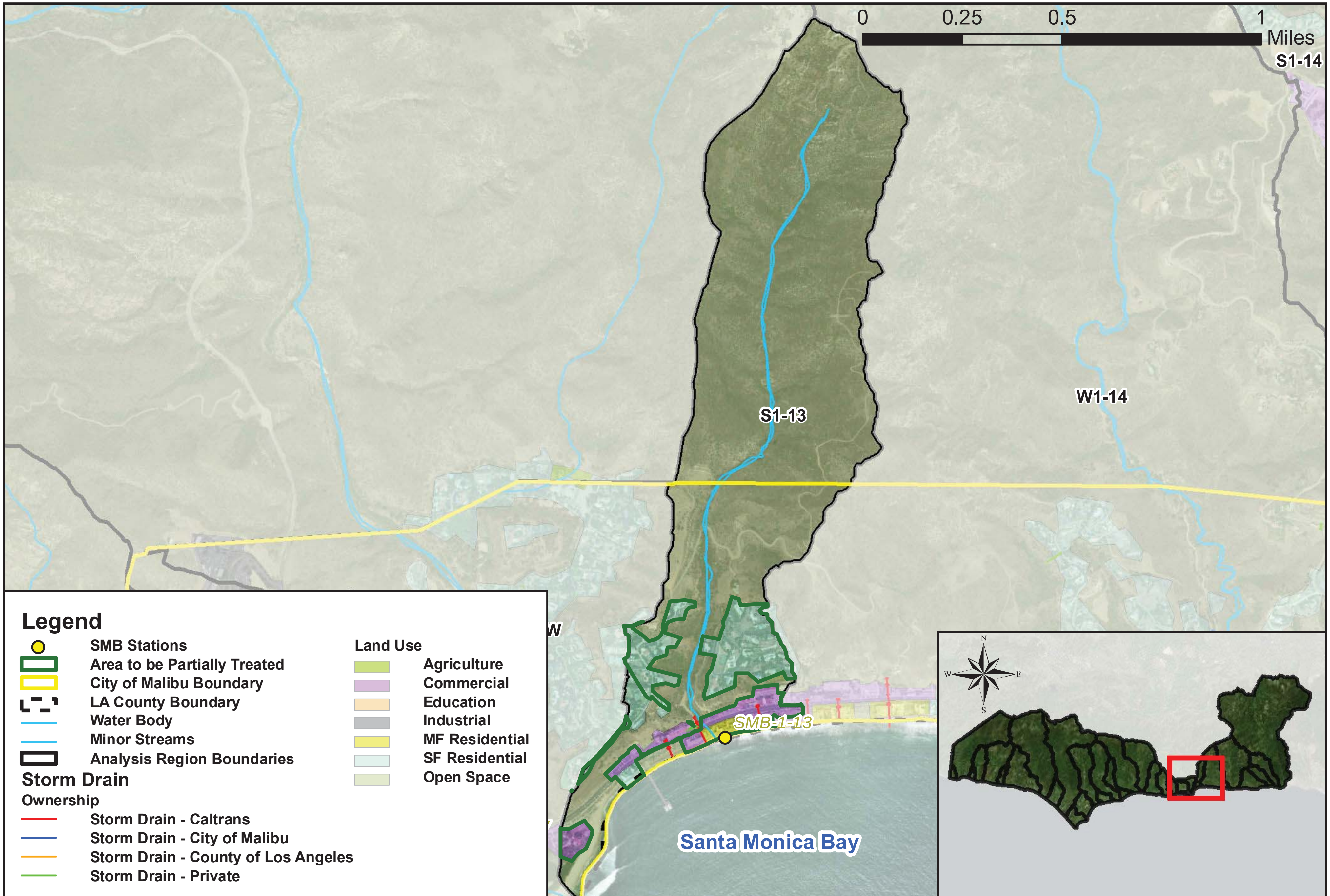

Figure 19. Sweetwater Creek at Carbon Beach (Analysis Region S1-13)
Area to be Treated by Distributed BMPs (10% of Area Outlined in Green)
NSMBCW EWMP

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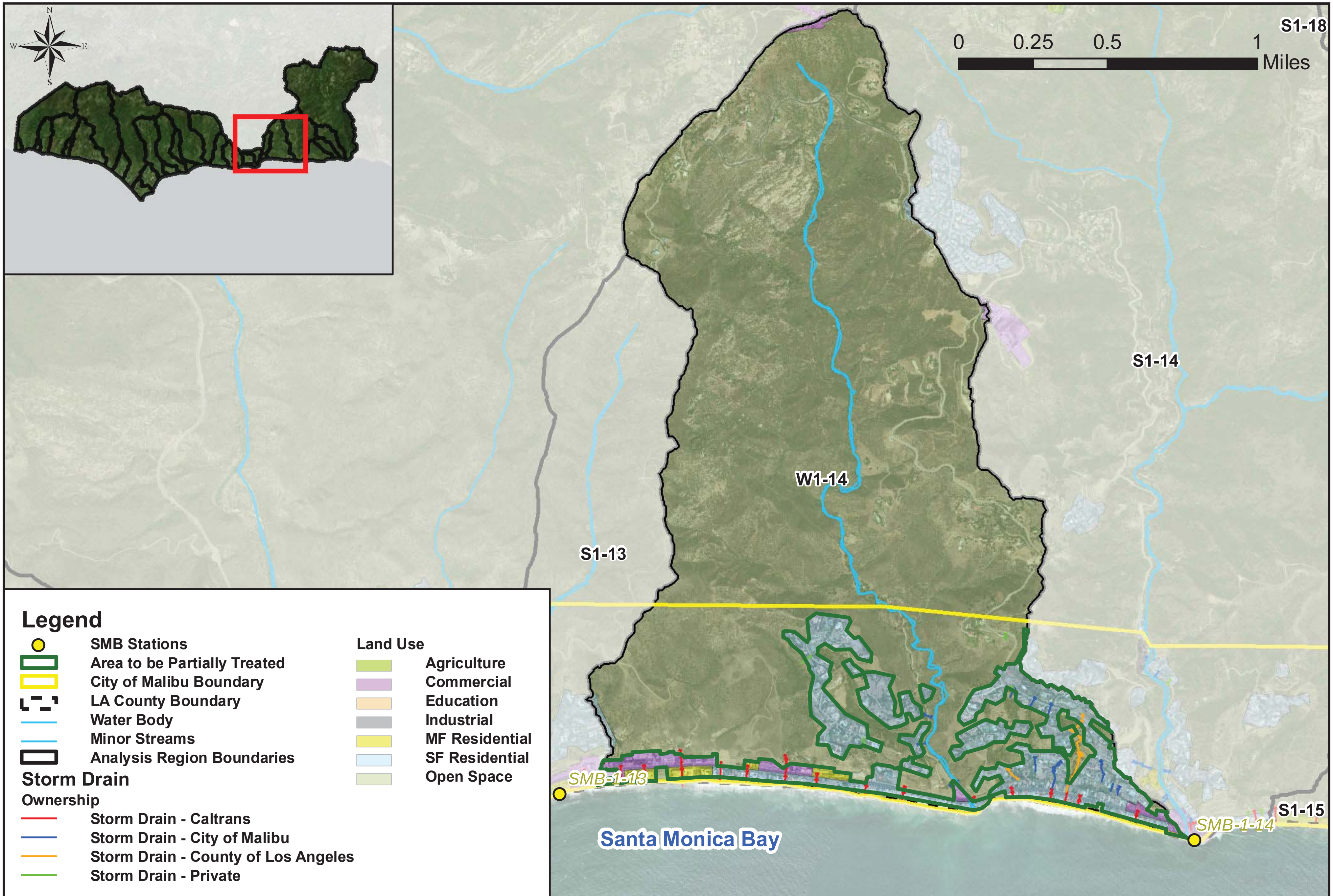

Figure 20. West of Las Flores Creek (Analysis Region W1-14)
Area to be Treated by Distributed BMPs (15% of Area Outlined in Green)
NSMBCW EWMP

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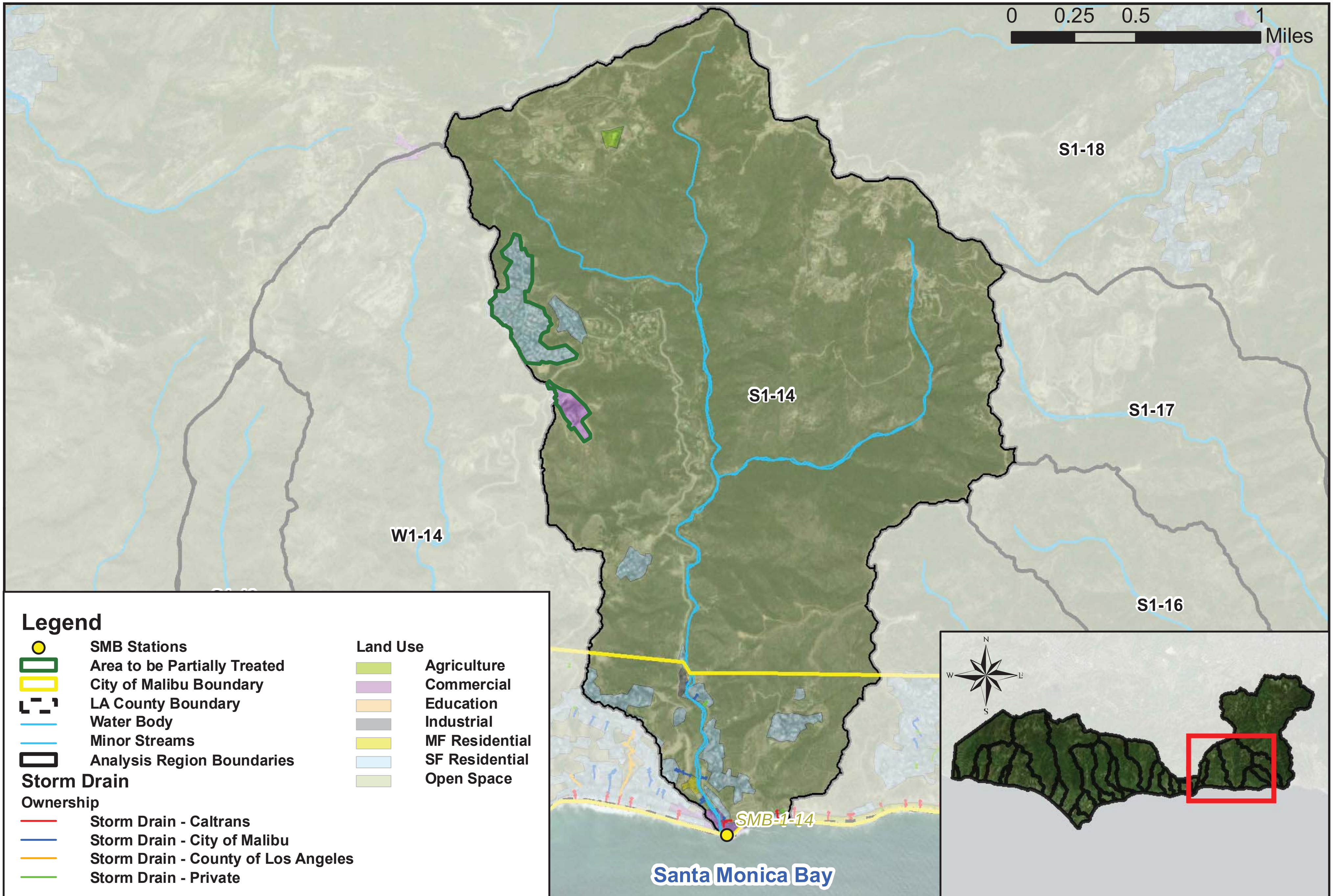

Figure 21. Las Flores Creek (Analysis Region S1-14)
Area to be Treated by Distributed BMPs (10% of Are Outlined in Green)
NSMBCW EWMP

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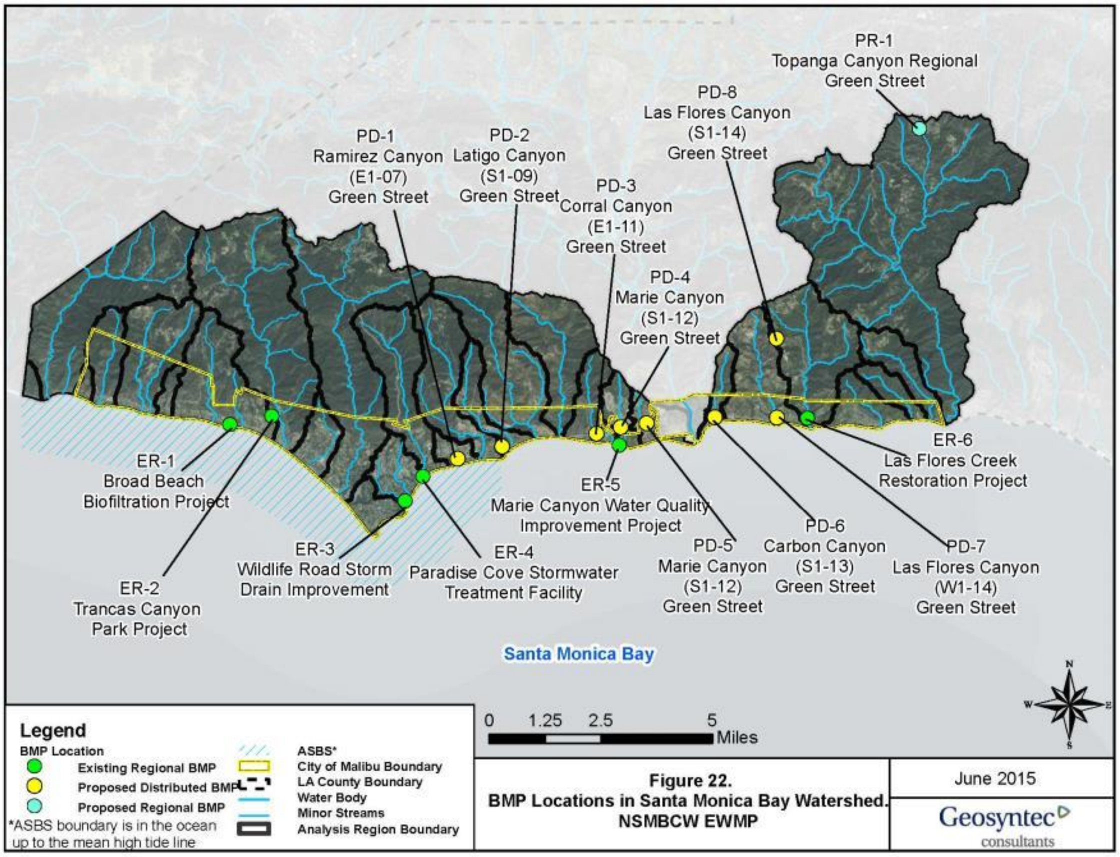
5.2.4.5 SUMMARY OF BMPS

Figure 22 shows an overview of all existing and proposed structural BMPs within the SMB portion of the NSMBCW EWMP Area.

Figure 22. BMP Locations in Santa Monica Bay



5.3 REASONABLE ASSURANCE ANALYSIS

5.3.1 REASONABLE ASSURANCE ANALYSIS – WET WEATHER

Although quantitative analyses were conducted for each analysis region separately, cumulative load reductions for the entire SMB watershed are also summarized below (**Table 28**). In all cases, expected cumulative load reductions exceed the cumulative target load reductions for each watershed WBPC.

In Santa Monica Bay, total bacteria load reductions for the various analysis regions were calculated to be between 5.0 and 45.9 percent (by 2021), based on expected load reductions from existing BMPs; implementation of various structural and non-structural

BMPs; establishment of LID ordinances to incorporate LID BMPs into qualifying redevelopment projects; and implementation of a downspout disconnect program for single family residential homeowners. In each analysis region, the calculated load reduction is greater than the calculated TLR for bacteria, thereby demonstrating reasonable assurance of compliance with the TMDL limits.

Across the entire SMB watershed, a required bacteria TLR of 7.3 percent was established by summing the absolute TLR for each analysis region and dividing this value by the baseline load from all analysis regions. The modeled bacteria load reduction for the entire SMB watershed was 14.4 percent, based on the implementation of all previously described BMPs, and every calculated subwatershed analysis region BMP load reduction exceeded the subwatershed-specific TLR. Therefore, the expected bacteria load reduction for all of SMB is significantly higher than the required bacteria TLR. See **Table 28**.

As previously discussed, consistent with the Permit, it has been assumed that there is a zero required load reduction for PCBs and DDTs in MS4 discharges to Santa Monica Bay. Therefore, reasonable assurance is demonstrated for these pollutants. 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.

Results of the RAA for each analysis region are presented in **Table 27** below. The values provided correspond to the load reductions, by BMP type, following the applicable final compliance deadline. As shown, the TLR is met in all analysis regions, with varying levels of non-structural and regional BMPs. More detailed results of the RAA can be found in **Appendix C**.

Table 27. Modeling Results – RAA Demonstration of Compliance with Final Limits (SMB Watershed)

Watershed	Analysis Region	Pollutant	Quantified Load Reductions as a Percentage of Baseline Loads for the 1995 Critical Year					Target Load Reduction
			Non-Modeled Programmatic BMPs	Public Incentives + Redevelopment	Existing/ Planned BMPs	Proposed BMPs	Cumulative Load Reduction	
Santa Monica Bay	W1-01	**Fecal Coliform**	**5.0%**	**0.0%**	**0.0%**	**0%**	**5.0%**	**0%**
	S1-01	**Fecal Coliform**	**5.0%**	**3.5%**	**0.0%**	**0%**	**8.5%**	**0%**
	E1-01	**Fecal Coliform**	**5.0%**	**0.1%**	**0.0%**	**0%**	**5.1%**	**0%**
	S4-01	**Fecal Coliform**	**5.0%**	**2.0%**	**0.0%**	**0%**	**7.0%**	**0%**
	E4-01	**Fecal Coliform**	**5.0%**	**3.5%**	**0.0%**	**0%**	**8.5%**	**0%**
	S1-02	**Fecal Coliform**	**5.0%**	**6.0%**	**0.0%**	**0%**	**11.0%**	**0%**
	S1-03	**Fecal Coliform**	**5.0%**	**4.5%**	**4.1%**	**0%**	**13.6%**	**0%**
	S1-04	**Fecal Coliform**	**5.0%**	**3.5%**	**0.9%**	**0%**	**9.4%**	**0%**
	E1-04	**Fecal Coliform**	**5.0%**	**4.3%**	**0.0%**	**0%**	**9.3%**	**0%**
	S1-05	**Fecal Coliform**	**5.0%**	**2.3%**	**0.0%**	**0%**	**7.3%**	**0%**
	E1-05	**Fecal Coliform**	**5.0%**	**5.3%**	**0.0%**	**0%**	**10.3%**	**0%**
	S1-06	**Fecal Coliform**	**5.0%**	**4.3%**	**2.7%**	**0%**	**11.9%**	**0%**
	S1-07	**Fecal Coliform**	**5.0%**	**3.3%**	**2.6%**	**0%**	**10.9%**	**9.5%**
	E1-07	**Fecal Coliform**	**5.0%**	**3.6%**	**0.0%**	**22.0%**	**30.6%**	**29.9%**
	S1-08	**Fecal Coliform**	**5.0%**	**4.4%**	**0.0%**	**0%**	**9.4%**	**9.0%**
	S1-09	**Fecal Coliform**	**5.0%**	**3.9%**	**0.0%**	**5.6%**	**14.5%**	**12.5%**
	S1-10	**Fecal Coliform**	**5.0%**	**4.0%**	**0.0%**	**0.0%**	**9.0%**	**6.1%**
	S1-11	**Fecal Coliform**	**5.0%**	**3.5%**	**0.0%**	**0.0%**	**8.5%**	**0%**
	E1-11	**Fecal Coliform**	**5.0%**	**3.1%**	**0.0%**	**14.3%**	**22.4%**	**20.5%**
	S1-12	**Fecal Coliform**	**5.0%**	**4.3%**	**1.1%**	**35.5%**	**45.9%**	**43.9%**
	E1-12	**Fecal Coliform**	**5.0%**	**8.2%**	**4.1%**	**10.6%**	**28.0%**	**28.0%**
	S1-13	**Fecal Coliform**	**5.0%**	**6.0%**	**0.0%**	**4.4%**	**15.4%**	**11.3%**
	W1-14	**Fecal Coliform**	**5.0%**	**5.4%**	**0.0%**	**14.4%**	**24.9%**	**20.8%**
	S1-14	**Fecal Coliform**	**5.0%**	**7.8%**	**0.6%**	**2.3%**	**15.7%**	**15.3%**
	S1-15	**Fecal Coliform**	**5.0%**	**5.2%**	**0.0%**	**0.0%**	**10.2%**	**0%**
	S1-16	**Fecal Coliform**	**5.0%**	**3.8%**	**0.0%**	**0.0%**	**8.8%**	**0%**
	S1-17	**Fecal Coliform**	**5.0%**	**2.9%**	**0.0%**	**0.0%**	**7.9%**	**0%**
	S1-18	**Fecal Coliform**	**5.0%**	**4.9%**	**0.0%**	**10.6%**	**20.5%**	**16.6%**
		Total Lead	**5.0%**	**0.6%**	**0.0%**	**1.3%**	**6.9%**	0%

Table 28. SMB Watershed-Wide Modeling Results – RAA Demonstration of Compliance with Final Limits

Analysis Region	Pollutant	Quantified Load Reductions as a Percentage of Baseline Loads for the 1995 Critical Year					Target Load Reduction
		Non-Modeled Programmatic BMPs	Public Incentives + Redevelopment	Existing/ Planned BMPs	Proposed BMPs	Cumulative Load Reduction	
Santa Monica Bay	**Fecal Coliform**	5.0%	4.3%	0.7%	4.4%	14.4%	7.3%

5.3.2 REASONABLE ASSURANCE ANALYSIS – DRY WEATHER

Table 29 summarizes the qualitative dry weather RAA conducted for each of the CMLs. If any evaluation criteria are met, this constitutes demonstration of reasonable assurance of compliance with the TMDL limits and water quality objectives for all WBPCs addressed in this EWMP.

As shown by the evaluation criteria in **Table 29**, reasonable assurance has been demonstrated for dry weather at the Santa Monica Bay compliance monitoring locations. The NSMBCW EWMP Group will work to remain in compliance, consistent with the Permit's requirement to eliminate 100 percent of non-exempt dry weather MS4 discharges.

Since the dry weather compliance deadlines for the SMB beaches bacteria 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.

Table 29. Dry Weather RAA Evaluation

CML	Effective Diversion/ Disinfection at Analysis Region Outlet?	WMG MS4 Outfall Absent?[1]	Monitoring Data Show Dry Weather Compliance Demonstrated?[2]	Non-Exempt Dry Weather MS4 Discharges Absent?[3,4]	Dry Weather Reasonable Assurance Demonstrated?
SMB 1-1[5]	N/A	N/A	No	N/A	N/A
SMB 1-2	No	Yes	No	Yes	Yes
SMB 1-3	No	No	No	Yes	Yes
SMB 1-4	No	No	No	Yes	Yes
SMB 1-5	No	Yes	No	Yes	Yes
SMB 1-6	No	No	No	Yes	Yes
SMB 1-7	Yes[6]	No	No	Yes	Yes
SMB 1-8	No	No	No	Yes	Yes
SMB 1-9	No	Yes	No	Yes	Yes
SMB 1-10	No	Yes	No	Yes	Yes
SMB 1-11	No	No	No	Yes	Yes
SMB 1-12	Yes[6]	No	No	Yes	Yes
SMB 1-13	No	Yes	No	Yes	Yes
SMB 1-14	No	No	No	Yes	Yes
SMB 1-15	No	No	No	Yes	Yes
SMB 1-16	No	Yes	Yes	Yes	Yes
SMB 1-17	No	Yes	No	Yes	Yes
SMB 1-18	No	No	No	Yes	Yes
SMB 4-1	No	Yes	No	Yes	Yes

[1] See **Figure 23**, which shows all NSMBCW Agency-owned MS4 outfalls within the NSMBCW EWMP Area.

[2] If both the winter dry and summer dry allowable exceedance days have been met in four out of the past five years and the most recent two years.

[3] Observations were made on August 19, October 21, 29, 30, and November 12, 2014 for major outfalls; and on April 13, 2014, May 19, 2015, and June 19, 2015 for minor outfalls. A "yes" in this column indicates that no non-stormwater, dry weather flows were present during any of these screenings.

[4] Exempt discharges include natural flows and conditionally exempt discharges such as runoff from landscape irrigation.

[5] SMB 1-1 is the reference beach. Monitoring data shows that winter dry weather samples have not achieved compliance in four of the past five years.

[6] Observations confirm that no bypass is occurring from these BMPs during dry weather, and that effluent concentrations are consistently less than the FIB water quality objectives.

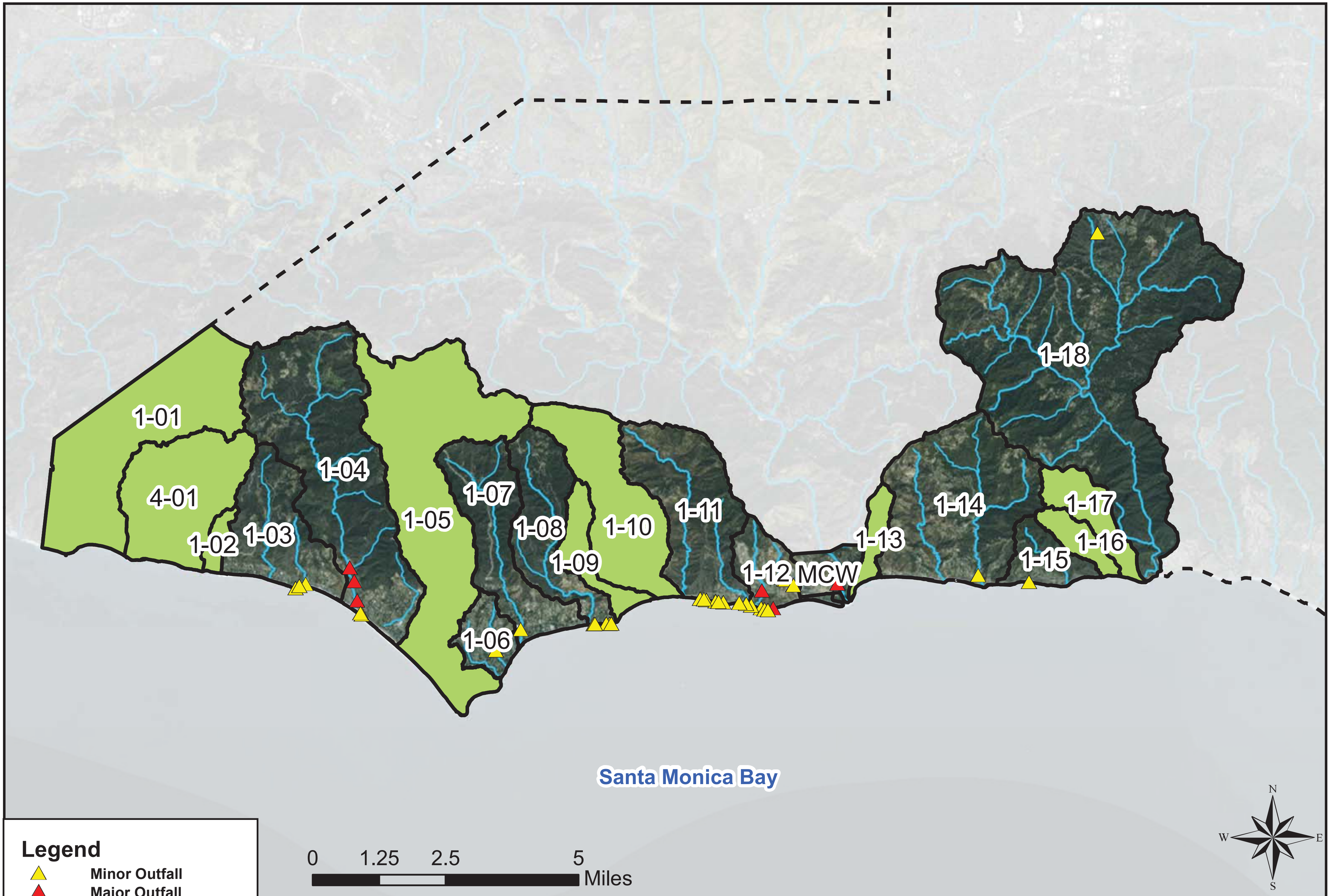


Figure 23. NSMBCW Outfall Locations
NSMBCW EWMP

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5.4 MULTIPLE BENEFITS

Not only is reasonable assurance demonstrated for the WQBEL and RWLs in the Permit, but some of the proposed projects also provide multiple benefits beyond pollutant load reduction. Such benefits may include:

- **Beneficial Use Protection**. The reduction of MS4-generated bacteria loads throughout the NSMBCW EWMP Area will help to protect recreational beneficial uses and support public health at Santa Monica Bay Beaches.
- **Neighborhood Greening**. Increased green space can positively impact the aesthetics, as well as property values, of developed areas. Property value tends to increase when a neighborhood has green space or trees in sight (CNT, 2010). Green infrastructure and green space can also alleviate urban heat-island effects by reducing temperatures by about 5°F through shade and evaporation (CNT, 2010), and may provide traffic calming measures, which increases public safety.
- **Water Conservation/Supply**. Stormwater retained in capture-and-use BMPs can be reused for irrigation and other on-site, non-potable uses, thus promoting water conservation and offsetting reliance on the potable water supply (SWRCB, 2012a). Landscaping retrofits and upgrades to irrigation systems also help to eliminate runoff and reduce the use of potable water.
- **Public Education/Awareness**. Public education and outreach engages the public's interest in preventing stormwater pollution and is achieved most effectively through an understanding of the varying levels of public background knowledge about stormwater management and pollution prevention (EPA, 2014). Public outreach is a major facet of the public retrofit incentives element of the RAA approach, which is directed at incentivizing the decrease of stormwater runoff from private properties, specifically via downspout disconnects. Outreach for this incentive may occur in the form of direct conversations, a variety of media, and/or short training courses. Structural BMPs proposed in the EWMP will also serve as public education opportunities in the form of on-site educational materials, such as placards and interpretive signage posted at construction and completed sites.

6 MALIBU CREEK WATERSHED DEMONSTRATION OF COMPLIANCE

The results of the RAA for the Malibu Creek Watershed are presented below, including a summary of the TLRs, the BMPs selected for implementation in the NSMBCW EWMP Area, and a summary of load reductions achieved by the selected BMPs. As stated previously, the NSMBCW EWMP Group is responsible for the portion of the Malibu Creek Watershed within the City of Malibu. This area is approximately 618 acres in size, or 0.87 percent of the entire 70,651 acre Malibu Creek Watershed. Approximately 306 acres of the 618-acre watershed are tributary to Malibu Legacy Park.

Malibu Legacy Park, located between Civic Center Way and Pacific Coast Highway adjacent to Malibu Lagoon, officially opened on October 2, 2010. Legacy Park is an integrated multi-benefit regional EWMP project that 1) improves water quality to Malibu Creek, Malibu Lagoon, and nearby beaches by capturing, detaining, screening, filtering, and treating dry and wet weather runoff from the 306 acre Civic Center drainage area to remove pathogens, nutrients, and other pollutants; 2) integrates and beneficially uses captured and treated runoff to offset potable water usage; and 3) creates a public amenity that provides valuable habitat, education, and passive recreation opportunities in conjunction with water quality improvement opportunities.

The project, which diverts runoff flows to an 8 acre-foot (85th percentile volume) pretreatment and transient storage vegetated detention pond located at the Legacy Park site, is the only existing regional EWMP project within the NSMBCW EWMP Area. The pond at Legacy Park stores captured runoff from Civic Center Way, Cross Creek Road, and Malibu Road, regulating flow into the Civic Center Storm Water Treatment Facility (SWTF), which feeds potable water resources uses such as irrigation at the park or other Civic Center area landscaping. The Civic Center SWTF is able to treat and disinfect up to 1,400 gallons per minute (gpm) of non-stormwater and stormwater runoff. The Civic Center SWTF is also used to recirculate and maintain the quality of flows within Legacy Park during periods of storage for water resources use.

Legacy Park was designed to retain the 0.75-inch design storm for most of the 306-acre Civic Center drainage areas, as well as dry weather flows from the other two drains which are tributary to the project. Because the 85th percentile, 24-hour design storm over the entire Legacy Park tributary area is approximately 0.65 inch, the park currently qualifies as a regional EWMP project.

Modeling results are not presented for the tributary area to Malibu Legacy Park, since it is considered a regional EWMP project capable of capturing and retaining the 85th percentile, 24-hour storm.

6.1 WET WEATHER TARGET LOAD REDUCTIONS

The processes for establishing TLRs for the modeled WBPCs within the NSMBCW EWMP-portion of the Malibu Creek Watershed are described in the following section. Flows in Malibu Creek originating from upstream of the City boundary were excluded from this analysis, such that only discharges from the NSMBCW EWMP Agency-owned lands immediately adjacent to both sides of Malibu Creek were considered. A separate EWMP has been drafted for the portion of the Malibu Creek Watershed outside of the NSMBCW EWMP Area that will be submitted by the MCW EWMP Group.

Of the 618 acres of land within the NSMBCW EWMP Area tributary to Malibu Creek, approximately 306 acres is tributary to Malibu Legacy Park, a regional EWMP project on the western side of Malibu Creek (see Section 6.2.4.1). The remaining area, which is almost entirely on the eastern side of Malibu Creek, is a uniquely developed area requiring special consideration when modeling as part of the RAA. This area (identified as the "MCW" analysis region, as shown in **Figure 24**) contains approximately 312 acres of sparsely developed space, with a total impervious coverage of approximately 12 percent. The development in this analysis region contains mostly low density (rural) single family residential. There are no NSMBCW Agency-owned storm drains in this analysis region and streets do not have curbs or gutters. Besides the 85 acres of state- and federally-owned land, the developed neighborhood is privately owned property, including private roads. None of the developed area is directly connected to Malibu Creek. Instead, all impervious areas are disconnected via densely vegetated fields and flow paths. **Figure 25** photos show a few of the streets in this analysis region.

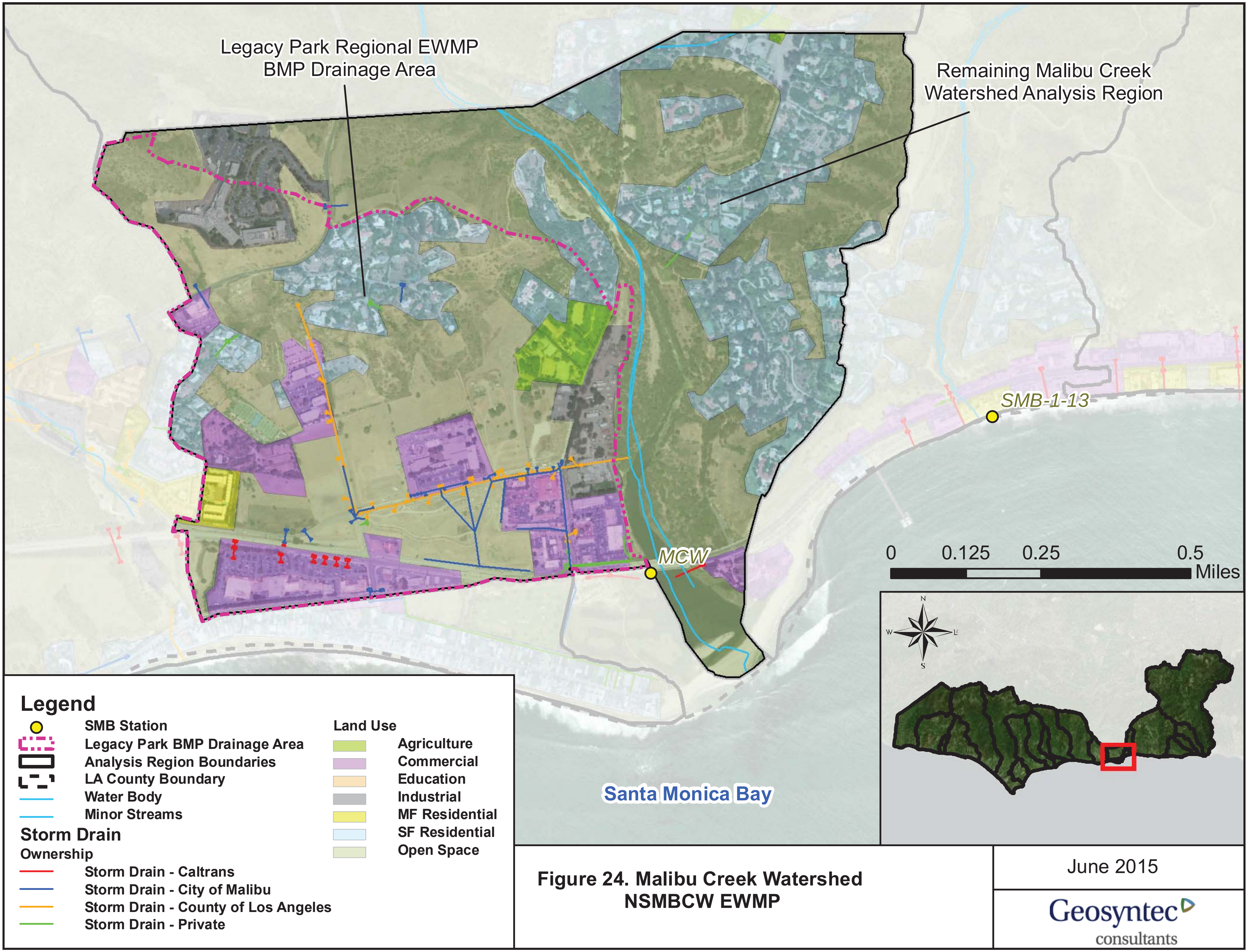

Figure 24. Malibu Creek Watershed NSMBCW EWMP

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Figure 25. Photographs showing the private Serra Canyon Community on the eastern side of Malibu Creek within the City of Malibu.

To represent this disconnected imperviousness, baseline conditions for the developed areas in this analysis region were modeled as being tributary to vegetated swales. This modeling procedure is similar to the downspout disconnect modeling procedure described in Section 5.2.3.3.

6.1.1 BACTERIA (MALIBU CREEK)

The process for calculating the bacteria TLR within the Malibu Creek Watershed mirrors the Santa Monica Bay process (See Section 0), with the exception of Step 4. For this step, allowable discharge days were assumed to be equivalent to the TMDL allowable exceedance days (15 days) at the MCW-1 compliance monitoring location. This is due to the assumption that no dilution is taking place in the creek or lagoon (e.g., all discharge days result in an exceedance day), and that upstream dischargers from the NSMBCW EWMP Area are exactly achieving their allowed exceedance days (i.e., no assimilative capacity exists).

The absolute allowed load for fecal coliform[18] within the Malibu Creek Watershed was calculated to be 23.5 x 10^{12} MPN for Model Year 1995. However, the baseline load

[18] While the REC1 fecal coliform objective was removed from the Los Angeles Basin Plan through Order R10-005, fecal coliform is used in this EWMP as the modeling surrogate for *E. coli* due to its more robust modeling input datasets. Therefore, the old REC1 objective for fecal coliform (400 mpn/100mL) is used in this EWMP for setting target load reductions, and this objective is considered equally protective of

reaching Malibu Creek was calculated to be 19.9 x 10^{12} MPN fecal coliform. Therefore, even during the critical year, since the existing load is less than the allowed load, no load reduction is required to meet the allowed load (TLR = 0), and reasonable assurance of compliance with the TMDL limit has been demonstrated.

6.1.2 NITRATE + NITRITE (MALIBU CREEK)

The combination of nitrate as nitrogen plus nitrite is listed as a Category 1 WBPC in Malibu Creek Watershed due to the Malibu Creek Watershed Nutrients TMDL. The Permit expresses the grouped winter waste load allocation for this WBPC as a daily maximum concentration of 8 mg/L. With the underlying assumption that nitrite as nitrogen is negligible in stormwater,[19] a TLR methodology was established based on 90^{th} percentile daily concentrations of nitrate as nitrogen during Model Year 1995.

The allowed load, calculated based on total runoff in the 90^{th} percentile critical year (1995) multiplied by the concentration-based waste load allocation (8 mg/L), was calculated to be 8,680 lbs. The baseline load, calculated based on total runoff in 1995 multiplied by the 90^{th} percentile daily concentration in 1995 (1.6 mg/L), is 1,733 lbs. Therefore, even in a critical condition, no load reduction is required to meet the allowed load (TLR = 0), and reasonable assurance of compliance with the TMDL limit has been demonstrated.

6.1.3 TOTAL NITROGEN AND TOTAL PHOSPHORUS (MALIBU CREEK)

Nutrients (total nitrogen and total phosphorus) are listed as Category 1 WBPCs in Malibu Creek Watershed due to the Malibu Creek and Lagoon Benthic TMDL. The EPA TMDL WLAs are not yet incorporated into the Permit, since the TMDL became effective after the Permit term had begun. Therefore, the wet weather TLR was established using the TMDL's concentration-based WLAs for total nitrogen and total phosphorus for the winter period, which for the most part is when wet weather occurs.

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public health to the 235 mpn/100mL REC1 objective for *E. coli* based on illness relationships reported in the 1986 USEPA recreational water quality criteria documents.

[19] For example, The Los Angeles County cumulative event mean concentrations by land use show that nitrite as nitrogen accounts for 2.2 – 3.4 percent of total nitrogen (County of Los Angeles, 2000). In addition, annual nutrient reporting for the Machado Lake Nutrient TMDL by the Peninsula Cities found nitrite above the detection limit in less than 3 percent of their total samples (Northgate Environmental Management, Inc., 2014).

The TMDL concentration-based WLAs are expressed as seasonal average concentrations that include both dry and wet weather winter days. The TMDL states that, "the total nutrient in-stream loading capacities are to be measured as seasonal summer and winter averages since total nutrient discharges vary substantially within seasons, and short term pulses of high nutrient loading have not been shown to be specifically responsible for short term benthic algal growth increases or benthic community index decreases. This TMDL focuses on reducing loads on a seasonal basis" (USEPA, 2013). Therefore, nutrient TLRs were calculated based on annual wet weather concentrations and volumes of total nitrogen and total phosphorus from SBPAT for the 90th percentile year. Since nutrient concentrations are typically higher during wet weather (which is the only weather condition modeled by SBPAT), this approach is considered conservative. Actual baseline winter seasonal average concentrations (i.e., a blend of concentrations measured on dry and wet days) are expected to be lower than those modeled by SBPAT.

The following approach, or conceptual model, was implemented to calculate TLRs for both total nitrogen and total phosphorus in the NSMBCW EWMP Area tributary to Malibu Creek:

1. The analysis region was modeled in SBPAT for the 90th percentile wet year (Model Year 1995).
2. The existing, baseline condition (i.e., without any BMPs) was modeled in SBPAT, resulting in a mean baseline pollutant load for the 90th percentile wet year.
3. The allowed load was calculated by multiplying the concentration-based WLA of each pollutant by the baseline runoff volume for the 90th percentile wet year.
4. The difference between the baseline load (step 2) and the allowed load (step 3) was used to set the TLR for the 90th percentile year, which is the load reduction required to meet the TMDL WLA during a critical year. The TLR is expressed in this report as a percent of the baseline annual load (step 2).

Appendix C provides an example TLR calculation for nutrients.

6.1.3.1 TOTAL NITROGEN

The TMDL establishes a final concentration-based waste load allocation for total nitrogen of 4.0 mg/L (average winter season load). Within the NSMBCW EWMP-portion of the Malibu Creek Watershed, the total nitrogen baseline load reaching the receiving water for Model Year 1995 (2,170 lbs) was calculated to be less than the allowed load (4,340 lbs); therefore, load reductions are not anticipated to be necessary to meet the TMDL winter total nitrogen WLA (i.e., the TLR is zero), and reasonable assurance of compliance has been demonstrated.

6.1.3.2 TOTAL PHOSPHORUS

The TMDL establishes a final concentration-based waste load allocation for total phosphorus of 0.2 mg/L (average winter season load). Within the NSMBCW EWMP-portion of the Malibu Creek Watershed, the total phosphorus baseline load reaching the receiving water for Model Year 1995 (211 lbs) was calculated to be less than the allowed load (217 lbs); therefore, load reductions are not anticipated to be necessary to meet the TMDL WLAs (i.e., the TLR is zero), and reasonable assurance of compliance has been demonstrated.

6.2 BEST MANAGEMENT PRACTICES

6.2.1 METHODS TO SELECT AND PRIORITIZE

BMPs were selected and prioritized in the Malibu Creek Watershed in the same manner in which they were in the Santa Monica Bay Watershed. See Section 5.2.1 for a description of this process.

BMP load reductions were evaluated for the period between the effective dates and final compliance deadlines for the Malibu Creek Bacteria TMDL. These dates are summarized in **Table 30**.

Table 30. TMDL Effective Dates and Final Compliance Dates

TMDL	TMDL Effective Date	Final Compliance Deadline
Malibu Creek Bacteria TMDL	January 10, 2006	July 15, 2021

These dates were used in the Malibu Creek Watershed since bacteria was generally found to be the controlling pollutant throughout Santa Monica Bay; and since TLRs of zero were calculated for bacteria, nitrate, total nitrogen, and total phosphorus within the portion of the Malibu Creek Watershed covered by this EWMP.

6.2.2 RECOMMENDED MINIMUM CONTROL MEASURES

Minimum control measures for the Malibu Creek Watershed portion of the NSMBCW EWMP Area are the same as those described in Section 5.2.2.

6.2.3 QUANTIFIED NON-STRUCTURAL BMPS

Non-structural BMPs within the Malibu Creek Watershed were modeled consistent with those in the SMB Watershed (see Section 5.2.3). However, public retrofit incentives in the form of downspout disconnection programs were not modeled, since all impervious areas within this watershed are disconnected (i.e., no direct connections to Malibu Creek exist in the watershed within the NSMBCW EWMP Area).

6.2.4 STRUCTURAL BMPS

6.2.4.1 EXISTING REGIONAL EWMP PROJECT – MALIBU LEGACY PARK

Legacy Park was designed to retain the 0.75-inch design storm for most of the 306-acre Civic Center drainage areas, as well as dry weather flows from the other two drains which are tributary to the project. Because the 85th percentile, 24-hour design storm over the entire Legacy Park tributary area is approximately 0.65 inch, the park currently qualifies as a regional EWMP project. Future modifications will lead to an increased capacity of Legacy Park, including: 1) the implementation of distributed low impact development (LID) BMPs throughout portions of the tributary watershed, which may lower the runoff volume tributary to Legacy Park; and 2) pump upgrades which will increase the pump stations capacity from 200 gpm to 300 gpm, increasing the project's overall capture efficiency. The tributary area to Malibu Legacy Park is shown in **Figure 26**.

Per Section VI.E.2.e.i(4) of the Permit, the NSMBCW EWMP Group is deemed in compliance with all applicable final WQBELs and RWLs for the WBPCs in this tributary area, since the project fully retains all non-stormwater runoff and stormwater runoff up to and including the volume equivalent to the 85th percentile, 24-hour event. Therefore, modeling and quantification of benefits in this project tributary area is not included as part of this RAA.

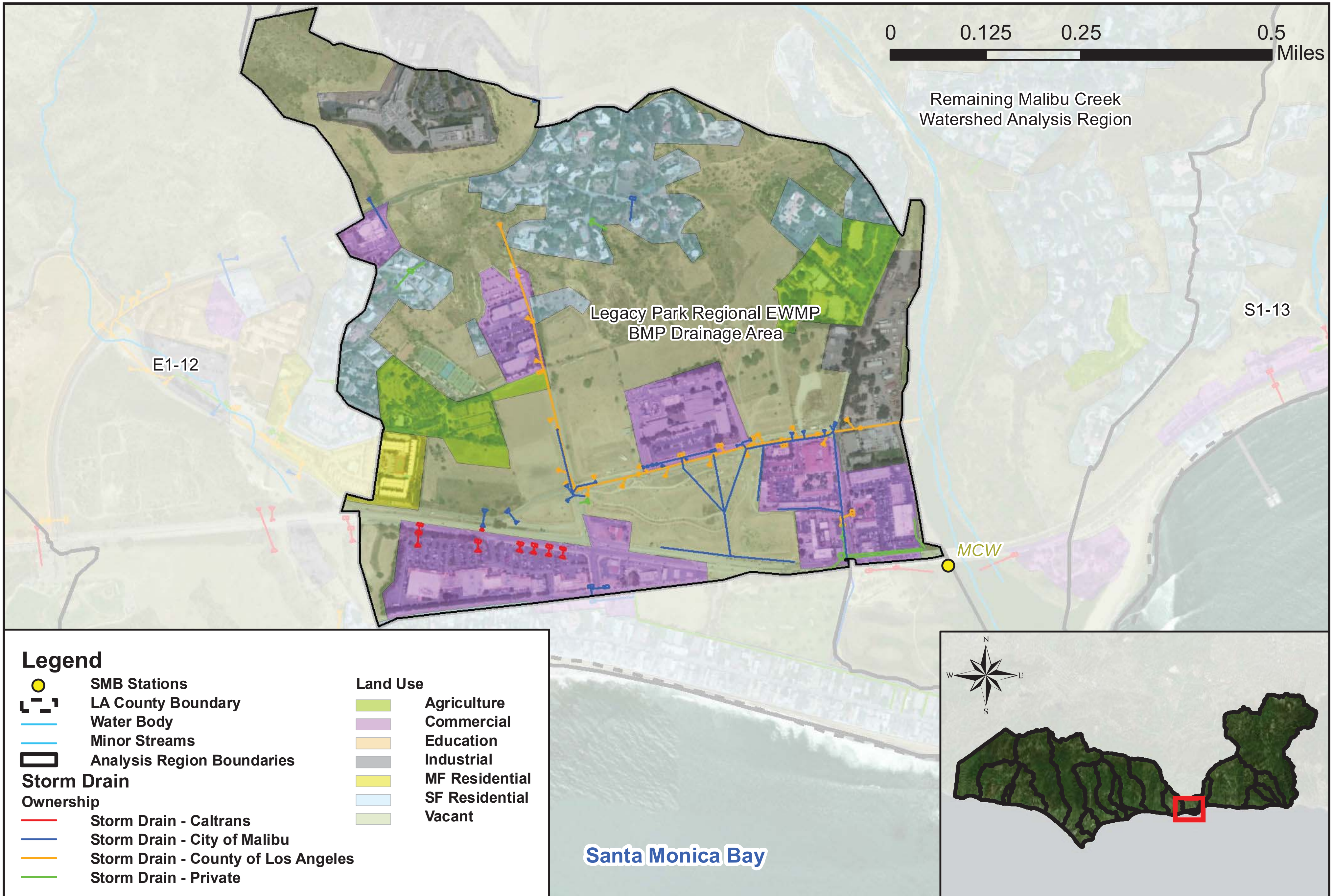

Figure 26. Legacy Park Regional EWMP BMP Drainage Area
NSMBCW EWMP

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6.3 REASONABLE ASSURANCE ANALYSIS

6.3.1 REASONABLE ASSURANCE ANALYSIS – WET WEATHER

Within the Malibu Creek Watershed analysis region, reasonable assurance of compliance with all WBPC allowed loads was demonstrated since there is no required load reduction. As such, no new structural BMPs have been proposed for this watershed (Analysis Region MCW). Load reductions associated with the implementation of non-structural BMPs were quantified and range from 7 to 24 percent of baseline loads for the critical year for each modeled pollutant. These are summarized in **Table 31** below.

Table 31. Malibu Creek Watershed Modeling Results – RAA Demonstration of Compliance with Final Limits

Pollutant	Quantified Load Reductions as a Percentage of Baseline Loads for the 1995 Critical Condition					Target Load Reduction
	Non-Modeled Programmatic BMPs	Public Incentives + Redevelopment	Existing/ Planned BMPs	Proposed BMPs	Cumulative Load Reduction	
Fecal Coliform	5.0%	8.2%	0.0%	0.0%	13.2%	0.0%
Nitrate + Nitrite	5.0%	18.8%	0.0%	0.0%	23.8%	0.0%
Total Nitrogen	5.0%	2.0%	0.0%	0.0%	7.0%	0.0%
Total Phosphorus	5.0%	2.2%	0.0%	0.0%	7.2%	0.0%

6.3.2 REASONABLE ASSURANCE ANALYSIS – DRY WEATHER

Within the Malibu Creek Watershed, all dry weather flows tributary to Legacy Park are captured, treated, and retained by Legacy Park. Therefore, dry weather discharges from this area do not exist. In the remaining portion of the Malibu Creek Watershed, the only storm drain infrastructure is a small rectangular channel on the eastern side of Malibu Creek. This drain is privately owned, and is not directly connected to the Creek. In addition, dry weather screenings have shown that dry weather flows do not occur here. Therefore, no dry weather discharges are known to occur from the NSMBCW EWMP Area within the Malibu Creek Watershed, and reasonable assurance of compliance with applicable dry weather bacteria TMDL WQBELs and nutrient TMDL WLAs is demonstrated on this basis.

6.4 MULTIPLE BENEFITS

Not only is reasonable assurance demonstrated for the WQBEL and RWLs in the Permit, Malibu Legacy Park provides multiple benefits beyond pollutant load reduction. Included photos (**Figure 27** and **Figure 28)** below highlight a few of these benefits, which include:

- **Beneficial Use Protection.** The reduction of MS4-generated bacteria and nutrient loads within the Legacy Park drainage area may help to protect recreation public health at Malibu Lagoon, while also reducing eutrophication.
- **Neighborhood Greening and Recreation.** The Legacy Park project transformed 15 acres in the heart of Malibu into a central park that includes the restoration/creation of riparian habitats and the establishment of an open space area for passive recreation and environmental education. Walking trails meander through natural landscape planted with California native plants. The park itself showcases six regionally significant habitats, including the coastal prairie, woodlands, coastal bluffs, riparian corridor, wetland meadows, and vernal pools.

Figure 27. Photographs of Malibu Legacy Park, highlighting some of the multiple benefits of the Project including public education/awareness and neighborhood greening and recreation

- **Water Conservation/Supply**. Runoff retained at Legacy Park is used (and potable water offset) for irrigation at the park and surrounding areas, thus offsetting reliance on the potable water supply (SWRCB, 2012a).

- **Groundwater Recharge (Where Feasible).** Although infiltration at Legacy Park is small, it does still occur in the pond at Legacy Park, thereby reducing runoff volumes, lowering peak flood elevations, and lessening the erosive potential of surface water flow. In addition, the increased pervious area created as a result of the park leads to increased infiltration and evapotranspiration.
- **Public Education/Awareness.** Not only did Legacy Park create a public amenity that provides valuable habitat and passive recreation opportunities in conjunction with water quality improvement opportunities, it also incorporates educational material throughout the park, thereby improving the public's knowledge about stormwater management and pollution prevention. It offers a living learning center, informational kiosks, an outdoor classroom, a cultural interpretive center, and numerous other features to provide information and education about flora and fauna along the Southern California coast.

Figure 28. Additional photographs of Malibu Legacy Park and some of the benefits provided to the Public

7 EWMP COMPLIANCE SCHEDULE

7.1 COMPLIANCE SCHEDULE

Compliance schedules for the WBPCs in the NSMBCW EWMP Area are discussed below. For some WBPCs, compliance schedules are set forth in respective TMDLs; for others, compliance schedules are established in the sections below.

7.1.1 TMDL-ESTABLISHED COMPLIANCE SCHEDULES

Table 32 summarizes the compliance schedules for WBPCs within the NSMBCW EWMP Area that have been established in a TMDL. These include bacteria and trash/debris in Santa Monica Bay and Malibu Creek.

Table 32. Water Body Pollutant Prioritization for the NSMBCW EWMP Area

Water Body	Pollutant	Compliance Deadline
SMB Beaches	Dry Weather Bacteria	July 15, 2006: Final summer RWLs (AEDs)
		November 1, 2009: Final winter RWLs (AEDs)
	Wet Weather Bacteria	July 15, 2009: 10% cumulative percentage reduction from total exceedance day reductions
		July 15, 2013: 25% cumulative percentage reduction from total exceedance day reductions
		July 15, 2018: 50% cumulative percentage reduction from total exceedance day reductions
		July 15, 2021: Final RWLs (AEDs)
SMB	Trash/Debris	March 20, 2016: 20% reduction of baseline load
		March 20, 2017: 40% reduction of baseline load
		March 20, 2018: 60% reduction of baseline load
		March 20, 2019: 80% reduction of baseline load
		March 20, 2020: 100% reduction of baseline load
Malibu Creek and Lagoon	Dry Weather Bacteria	January 24, 2012: Final single sample AED RWLs met
	Wet Weather Bacteria	July 15, 2021: Final single sample AED RWLs
Malibu Creek	Trash	July 7, 2013: 20% reduction of baseline load
		July 7, 2014: 40% reduction of baseline load
		July 7, 2015: 60% reduction of baseline load
		July 7, 2016: 80% reduction of baseline load
		July 7, 2017: 100% reduction of baseline load

7.1.2 ADDITIONAL WBPC COMPLIANCE SCHEDULES

Compliance schedules for other WBPCs are described below. In general, no additional compliance schedules are established herein, given the results of the RAA and the lack of known NSMBCW Agency contributions at this time. In all cases, future water quality data collected under the CIMP may inform the NSMBCW EWMP Group that compliance schedules may need to be revised. This process is discussed in more detail in the Adaptive Management section below (Section 8).

7.1.2.1 NUTRIENTS (MALIBU CREEK)

Since both nutrient-related TMDLs in the Malibu Creek Watershed were developed by the USEPA, no compliance schedules are contained therein. However, Permit Section VI.E.3.c.iv. references the Malibu Creek Nutrient TMDL, stating that “in no case shall the time schedule to achieve the final numeric WLAs exceed five years from the effective date of this Order." The schedule must therefore have a final date not exceeding December 28, 2017. This date is only specified for the WLAs in the Nutrient TMDL, not the Benthic TMDL. The Benthic TMDL recommends interim targets, but states that it is expected to take up to between one to two Permit cycles to meet the interim targets, and another one to two Permit cycles to meet the final targets (USEPA, 2013).

Based on the RAA results, and considering the fact that the area tributary to Legacy Park is fully captured, treated, and retained for all storms up to the 85th percentile, 24-hour depth, there is reasonable assurance that the NSMBCW EWMP Group is in compliance with all applicable nutrient WLAs. Therefore, no compliance schedule for these WBPCs is proposed, and the effective date of each TMDL (March 21, 2003 for the Malibu Creek Nutrient TMDL and July 2, 2013 for the Malibu Creek and Lagoon Benthic TMDL) is the compliance date for the respective WBPCs.

Final compliance with the TMDL-established WLAs may be demonstrated by the NSMBCW Agencies by any one of the following:

1. No violations of the seasonal average concentration-based WLA is found in the discharge at the Permittee's MS4 outfall(s) within the Malibu Creek Watershed, including outfalls that collect discharges from multiple Permittee's jurisdictions;
2. No exceedances of the seasonal average concentration-based WLA is found in the receiving waters at, or downstream of, the Permittee's outfall(s);
3. The calculated seasonal nutrient load from the entire MS4 group is less than or equal to the load-based WLA;
4. The calculated seasonal nutrient load from an individual MS4 agency is less than or equal to the area-weighted fractional load-based WLA;
5. No direct or indirect discharge from the Permittee's MS4 to the receiving water has occurred during the time period subject to the WLA; or
6. All non-stormwater and all stormwater runoff up to and including the volume equivalent to the 85th percentile, 24-hour event is retained for the Permittee's drainage area tributary to the Malibu Creek Watershed.

7.1.2.2 DDT AND PCBS (SMB OFFSHORE/NEARSHORE)

Load-based WQBELs for DDTs and PCBs established by the TMDL were set equivalent to the estimated existing stormwater loads (i.e., based on data used in the

TMDL, no MS4 load reduction is expected to be required). As a result, since the TMDL effectively implements an antidegradation approach, and the NSMBCW Agencies are presumed to be achieving the waste load allocations, no compliance schedule is proposed.

7.1.2.3 TOTAL LEAD (TOPANGA CANYON CREEK)

As discussed in Section 5.1.2, discharges from the NSMBCW EWMP Group are currently expected to be in compliance with proposed (CTR-based) numeric targets during the critical condition. As a result, no compliance schedule for this WBPC is proposed, and the compliance date is the pending effectiveness date of the EWMP.

Compliance with the proposed numeric targets can be demonstrated in any one of the following ways:

1. No exceedances of the concentration-based numeric target for either total or dissolved lead is found in the discharge at the Permittee's MS4 outfall(s) within the Topanga Creek subwatershed, including outfalls that collect discharges from multiple Permittee's jurisdictions;
2. No exceedances of the concentration-based numeric target for either total or dissolved lead is found in the receiving waters at the Permittee's receiving water monitoring station;
3. No direct or indirect discharge from the Permittee's MS4 to the receiving water has occurred during the time period subject to the targets; or
4. All non-stormwater and all stormwater runoff up to and including the volume equivalent to the 85^{th} percentile, 24-hour event is retained for the Permittee's drainage area tributary to the Topanga Creek Watershed.

No NSMBCW Agency-owned major outfalls are known to exist in the Topanga Creek subwatershed. Since "cause or contribute" based non-compliance cannot be demonstrated solely based on receiving water monitoring data, outfall monitoring may be found to be needed at a later time. Therefore, if receiving water monitoring data collected under the CIMP show exceedances of the lead numeric targets in Topanga Creek, outfall sampling at non-major outfalls may be added at that time.

7.1.2.4 SULFATES AND SELENIUM (MALIBU CREEK)

Due to the fact that there is currently no evidence supporting a linkage between MS4 discharges and exceedances of water quality objectives for selenium and sulfates, and due to the treatment ability of Malibu Legacy Park (which captures and retains all dry weather runoff and stormwater runoff above and beyond the 85th percentile design storm), the NSMBCW EWMP Group is not believed to be causing or contributing to exceedances of applicable water quality objectives in Malibu Creek. As a result, no compliance schedule for these WBPCs is proposed.

7.1.2.5 pH (Malibu Lagoon)

Due to the fact that there is currently no evidence supporting a linkage between MS4 discharges and exceedances of the pH objective, and due to the treatment ability of Malibu Legacy Park (which captures and retains all dry weather runoff and stormwater runoff above and beyond the 85th percentile design storm), the NSMBCW EWMP Group is not believed to be causing or contributing to exceedances of the applicable numeric target in Malibu Lagoon. As a result, no compliance schedule for this WBPC is proposed.

7.2 Demonstration of Interim Compliance

Based on the existing compliance schedules outlined in Section 7.1, interim compliance is only demonstrated for bacteria in Santa Monica Bay and trash/debris in Santa Monica Bay and Malibu Creek. All other WBPCs are believed to be achieving final compliance.

7.2.1 Bacteria

Scheduling of BMP implementation is based on the feasibility of completing projects and milestones of the SMB Beaches Wet Weather Bacteria TMDL.[20] The final wet weather compliance deadline for the TMDL (July 15, 2021) is proposed to be met through a combination of non-structural BMPs, distributed green streets BMPs, and regional BMPs. The structural BMPs (distributed and regional) are planned to be implemented no later than July 15, 2021.

The only remaining interim compliance deadline for the TMDL requires a 50 percent reduction in total wet weather exceedance days by July 15, 2018. Permit Attachment M presents these interim receiving water limits as combined exceedance days per Jurisdictional Group that can occur beyond those allowed during wet weather.

- For the Jurisdictional Group 1 sites, 218 exceedance days can occur beyond those allowed during wet weather. Since a total of 272 wet weather exceedance

[20] This chapter only refers to interim targets. Therefore, any TMDL for which final compliance deadlines have passed are not discussed in this section.

days are allowed for these compliance monitoring locations per the final receiving water limitations, a total of 490 wet weather exceedance days must be met to achieve the 50 percent reduction milestone by July 15, 2018.

- For Jurisdictional Group 4 sites (SMB 4-1), 8 exceedance days can occur beyond those allowed during wet weather. Since a total of 14 wet weather exceedance days are allowed for this compliance monitoring location per the final receiving water limitations, a total of 22 wet weather exceedance days must be met to achieve the 50 percent reduction milestone by July 15, 2018.

Based on historical monitoring data, Jurisdictional Group 1 compliance monitoring locations have had less than 490 exceedance days every year beginning in 2007. Similarly, the single compliance monitoring location in Jurisdictional Group 4 (SMB 4-1) has had less than 22 exceedance days ever year beginning in 2005.[21] These results are presented in **Table 33** below. In addition, for compliance monitoring locations subject to the antidegradation implementation provision in the TMDL, there has been no increase in exceedance days during the implementation period above those estimated for each location during the critical year. Therefore, based on historical monitoring data, compliance with the 50 percent interim compliance milestone is currently being achieved.

[21] When analyzing the historical monitoring data, results from sites for which weekly sampling was conducted were conservatively multiplied by 7 to estimate the total daily exceedances.

Table 33. Historical SMBBB TMDL Exceedance Days, Compared to Interim Single Sample Bacteria Receiving Water Limitations, 2005 - 2013

CML	AEDs	Interim AEDs	2005	2006	2007	2008	2009	2010	2011	2012	2013
SMB 1-1	17	-	28	7	0	7	14	21	35	28	0
SMB 1-2	5		21	0	0	0	0	0	14	-	-
SMB 1-3	3		14	0	0	0	0	0	7	0	7
SMB 1-4	17		21	35	7	35	21	21	49	0	0
SMB 1-5	17		28	7	0	28	21	7	42	7	0
SMB 1-6	17		21	49	7	0	14	7	7	7	28
SMB 1-7	17		56	35	28	42	28	28	56	28	7
SMB 1-8	17		42	84	0	7	21	49	21	35	0
SMB 1-9	17		28	35	7	28	28	28	21	21	7
SMB 1-10	17		35	35	7	7	21	21	42	21	14
SMB 1-11	17		14	21	0	35	21	28	21	14	0
SMB 1-12	17		63	63	7	28	35	35	35	7	35
SMB 1-13	17		42	49	21	14	7	28	42	14	21
SMB 1-14	17		49	49	0	0	21	28	14	14	7
SMB 1-15	17		21	28	7	21	14	7	35	7	0
SMB 1-16	14		42	14	0	0	7	7	14	0	0
SMB 1-17	12		14	0	0	7	0	0	0	0	0
SMB 1-18	17		40	37	6	15	19	32	31	20	6
JG 1 Total	**272**	**490**	**579**[1]	**548**[1]	**97**	**274**	**292**	**347**	**486**	**223**	**132**
SMB 4-1	14	22	14	7	0	14	7	0	14	7	0
JG 4 Total	**14**	**22**	**14**	**7**	**0**	**14**	**7**	**0**	**14**	**7**	**0**

[1] Years that exceed the interim single sample bacteria receiving water limitations.

7.2.2 TRASH/DEBRIS

In Santa Monica Bay, compliance with the Trash/Debris TMDLs will be met through a phased retrofit of all catch basins throughout the NSMBCW 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.

In Malibu Creek, all storm drains and outfalls owned by the NSMBCW Agencies are tributary to Malibu Legacy Park, and are therefore achieving compliance with the trash TMDL. One other drainage structure exists outside of the Legacy Park drainage area, but this is a private drain on the eastern side of Malibu Creek, in the Serra Canyon Community.

8 ASSESSMENT AND ADAPTIVE MANAGEMENT FRAMEWORK

Adaptive management is a critical component of the EWMP implementation process, and EWMP updates are required at two-year cycles by the Permit. The CIMP will gather additional data on receiving water conditions and stormwater/non-stormwater quality. These data will support adaptive management at multiple levels, including: (1) tracking improvements in water quality over the course of EWMP implementation and (2) generating data not previously available to support model updates. Furthermore, over time the experience gained through intensive BMP implementation will provide lessons learned to support modifications to the control measures identified in the EWMP.

The adaptive management process also includes a schedule for developing and reporting on the EWMP updates, the approach to conducting the updates, and the process for implementing any modifications to the RAA and EWMP to reflect the updates.

The adaptive management approach for the NSMBW EWMP area is designed to address the EWMP planning process and the relationship between monitoring, scheduling, and BMP planning. The adaptive management process outlines how the EWMP will be modified in response to monitoring results, updated modeling results, and lessons learned from BMP implementation. It is designed to accomplish three goals:

1. Clarify the short-term and long-term commitments of the NSMBW EWMP group within the EWMP.
2. Provide a structured decision-making process for modifications to the EWMP based on the results of monitoring data.
3. Propose a structure for evaluating compliance with water-quality based permit requirements within an adaptive structure.

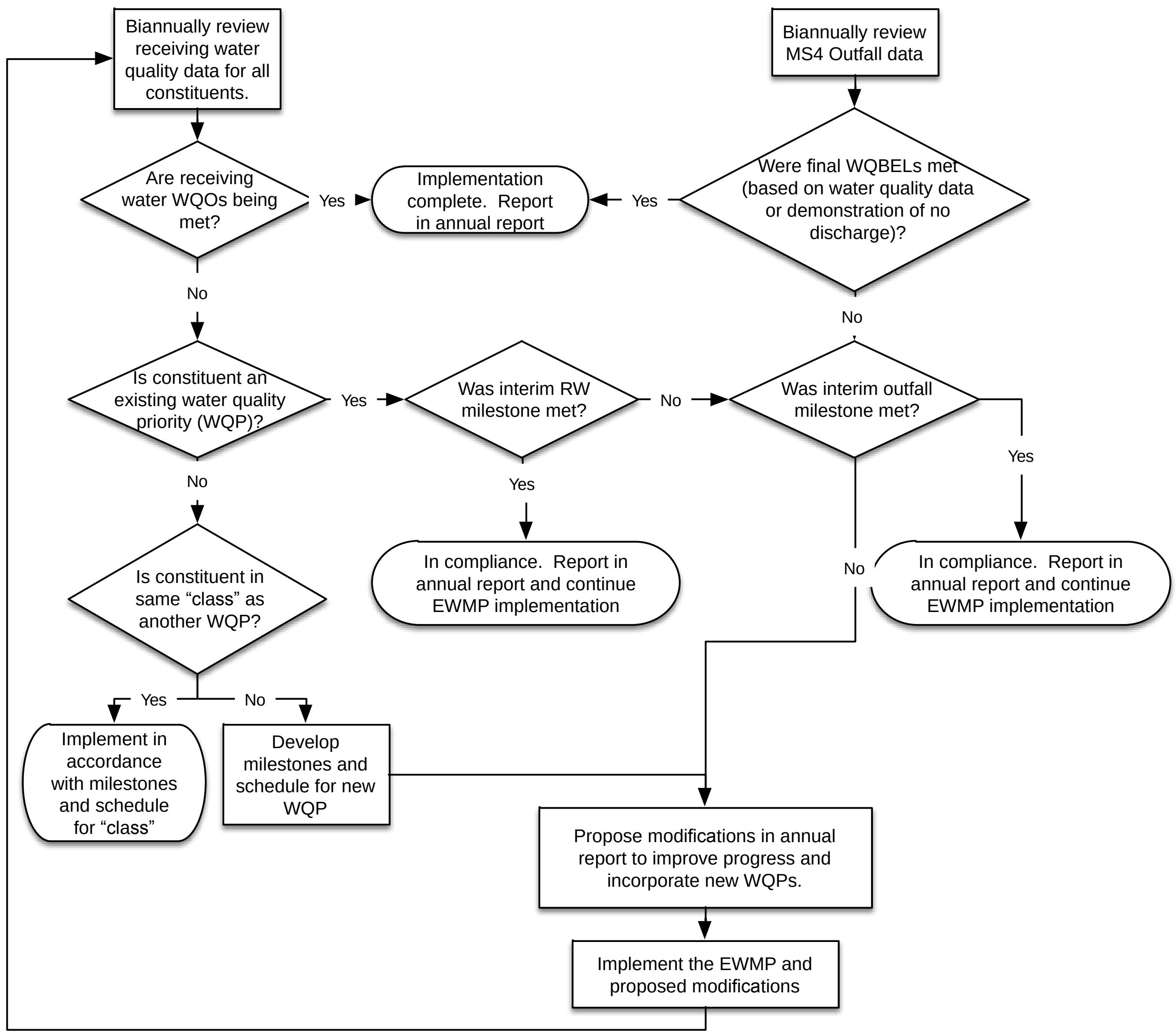
As outlined in Section 7, the schedule and milestones for the EWMP have been designed around meeting the interim and final TMDL requirements for bacteria. While the EWMP identifies actions that will lead to compliance with the final TMDL limitations, the specific actions taken will be informed by monitoring data collected under the CIMP, special studies that may be conducted during implementation, and any applicable regulatory changes that could influence the remaining interim and final milestones and schedule. For example, bacteria is prevalent throughout the watershed including numerous natural, non-anthropogenic, non-MS4 sources. Therefore, during the remaining compliance period, the NSMBCW EWMP Group may consider options to perform special studies to evaluate the SMB Beaches Bacteria TMDL's dry and wet weather WLAs. Various pathways are available to reopen the TMDL and modify the WLAs, including use of microbial source tracking to support a natural source exclusion, and quantitative microbial risk assessment to develop site specific objectives. Furthermore, TMDL WLA changes are anticipated if the pending statewide bacteria objectives are adopted. The proposed marine water changes include removal of the total coliform, fecal coliform, and fecal-to-total coliform ratio objectives, changing the enterococcus single sample maximum of 104 MPN/100ML to a statistical threshold value (10% allowed exceedances in a 30 day period) of 110 MPN/100mL, and other clarification and implementation guidance. Through the adaptive management process, the RAA may be reevaluated after any changes to the statewide objectives, TMDL WLAs, and/or Permit limits.

Monitoring data will be utilized to measure progress towards achieving RWLs and WQBELs. An evaluation of monitoring data will be carried out on a biennial basis in accordance with **Figure 29** to determine if modifications to the EWMP are necessary. Modifications that are warranted because final milestones are achieved *more quickly* than anticipated can be made at any time (i.e. no more actions are needed if fewer control measures result in meeting RWLs and/or WQBELs). Modifications that are warranted because insufficient progress is being made will be noted every two years in the annual report and a schedule for implementation will be provided. A full update to the EWMP and the RAA is not anticipated as the schedule for bacteria compliance is only six years long. Updating the EWMP and RAA is a significant and costly undertaking that is not necessary unless conditions change significantly and additional modeling is needed to inform implementation decisions, or if otherwise required by the Regional Board or State Board. However, at any point, the NSMBCW Agencies could choose to update the EWMP and the associated RAA, particularly if deemed appropriate based on monitoring data.

If at any point during the implementation period any of the permit conditions are modified in response to a regulatory action, TMDL modification, or local studies, the receiving water and outfall monitoring data will be compared to the new RWLs and WQBELs. The same procedure will be followed for evaluating the data and adapting the EWMP, but the new RWLs and WQBELs will be used for the analysis.

The process outlined in **Figure 29** applies during the implementation period for the EWMP. At the end of the implementation period for the TMDLs, if the final RWL and/or WQBELs are not being met, either the TMDL must be modified to adjust the schedule or the permittees will need to apply for a Time Schedule Order or other mechanism to get an extension of the compliance deadlines.

Figure 29. Adaptive Management Approach



9 FINANCIAL ANALYSIS

9.1 METHODOLOGY TO ESTIMATE BMP COSTS

Total capital costs estimated for structural BMPs include "hard" costs, such as construction and materials, as well as "soft" costs, such as design, construction management, and permitting. Operation and maintenance costs were also estimated for structural BMPs, as discussed below.

9.1.1 HARD COST ASSUMPTIONS

Hard costs were determined using a line item unit cost approach, which separately accounts for each material cost element required for the construction and installation of a given BMP. Quantities for each line item were calculated based on BMP storage/treatment volumes and typical design configurations. A safety factor was applied to the BMP footprints for calculation of design parameters, for both the low and high cost estimates. Unit costs were taken from RS Means,[22] past projects based in Southern California, recent cost/bid information for construction projects, and vendors. Since the majority of proposed BMPs were located on publicly-owned land to reduce land acquisition costs to the extent possible, land acquisition costs were not considered as part of this analysis.

9.1.2 SOFT COST ASSUMPTIONS

Soft costs are project costs that cannot be calculated on a unit cost basis. For conceptual cost estimating, these costs are generally calculated as a percentage of total capital costs. The soft costs considered for each BMP were:

- **Utility Realignment** - Costs associated with the relocation of utilities that are located within the proposed BMP footprint or inhibit construction activities.
- **Mobilization and Demobilization** – The costs associated with activation/deactivation of equipment and manpower resources for transfer to/from a construction site until completion of the contract.

[22] RS Means is a unit cost database that is updated annually (http://www.rsmeansonline.com/). When costs from literature were not available, a project's design criteria and unit costs from the database were used to estimate the project's cost.

- **Planning, Permitting, Bond, and Insurance** – Cost, including planning and permit fees and personnel hours, of obtaining required permits for BMP installation. Examples of permits needed may include grading, building, stormwater, construction, environmental (e.g., CEQA), and access permits. Potential bond and insurance costs are also included.
- **Engineering and Planning** – Costs associated with BMP and site design, as well as access for maintenance, environmental mitigation, safety/security, traffic control, and site restoration.
- **Construction Management** – The costs associated with management and oversight of the construction of the BMP, from project initiation until completion of the contract.

Estimated soft costs as percent of total project capital costs are presented in **Table 34**. These percentages were based on literature, client input, best professional judgment, and data from past projects (Brown and Schueler, 1997; International Cost Engineering Council, 2014).

Table 34. Assumed Soft Costs for Distributed and Regional Projects as a Percent of Capital

Cost Item	Percent of Capital Cost
Utility Realignment	3%
Mobilization/Demobilization[1]	10%
Planning, Permitting, Bond, and Insurance[2]	10%
Engineering and Planning[2]	40%
Construction Management	15%

[1] $2,000 minimum fee

[2] Cost percentages provided by the County of Los Angeles

9.1.3 *OPERATIONS AND MAINTENANCE*

Annual operations and maintenance (O&M) costs were assumed to be six percent of the capital cost for green streets (USEPA, 2005; Weiss et al., 2007). O&M for green streets includes repairs to eroded areas, incremental landscape maintenance, minimal media and gravel replacement once clogged and surface scarification is no longer effective, removal of trash and debris, and removal of aged mulch with installation of a new layer. O&M costs have been summarized as 20-year lifecycle costs, with no discounting applied. O&M costs also include post-construction monitoring.

Additional maintenance will be necessary after the 20-year lifecycle. Green streets BMPs are estimated to have a useful life of approximately 25 years (USEPA, 2005). After 25 years, they should be excavated, disposing of existing soil media, and backfilled with new soil media. It is estimated that the cost associated with this reconstruction is approximately 90 percent of capital costs. This additional cost is not included in the 20-year lifecycle costs estimated below.

9.1.4 ADDITIONAL DESIGN ASSUMPTIONS

Additional design-related assumptions were made to support development of the cost opinion presented herein, including, but not limited to:

- The percentage of excavated material requiring hauling;
- The type and length of BMP inflow and outflow conveyance structures;
- The type and quantity of vegetation required for the post-BMP condition;
- The percentage of the parcel area requiring hydroseeding for the post-BMP condition;
- The type of pre-treatment used for each BMP.

It is assumed that a project may benefit multiple agencies, and therefore the cost burden for each individual agency is not defined herein.

9.2 STRUCTURAL BMP COSTS

Table 35 summarizes the total estimated capital cost to construct or implement each structural BMP and associated 20-year O&M costs. In order to account for possible variations in BMP design, BMP configurations, and site-specific constraints, as well as for uncertainties in available BMP unit costs from literature or estimated BMP unit costs, inherent factors of safety are included.

Table 35. Estimated Capital and O&M Costs for Proposed Structural BMPs

Analysis Region	Subwatershed	Capital Cost	20 Year O&M	20 Year Life Cycle
E1-07	Ramirez Cyn	$3,200,000	$2,200,000	$5,400,000
S1-09	Latigo Cyn	$240,000	$160,000	$400,000
E1-11	Corral Cyn	$1,500,000	$980,000	$2,500,000
S1-12	Marie Cyn	$11,000,000	$7,400,000	$18,400,000
E1-12	Winter Cyn	$2,100,000	$1,400,000	$3,500,000
S1-13	Carbon Cyn	$250,000	$170,000	$420,000
W1-14	Las Flores Cyn	$3,100,000	$2,100,000	$5,200,000
S1-14	Las Flores Cyn	$140,000	$93,000	$230,000
S1-18	Topanga Cyn	$11,000,000	$7,200,000	$18,200,000
Total		**$32,500,000**	**$21,700,000**	**$54,200,000**
Total Cost (County)		**$20,500,000**	**$13,600,000**	**$34,100,00**
Total Cost (City)		**$12,000,000**	**$8,100,000**	**$20,100,000**

9.3 FINANCIAL COMMITMENT

The purpose of this section is to present the financial strategy for addressing the additional costs of compliance with the 2012 MS4 permit to implement the extensive set of BMPs or “recipe for compliance”, identified in Section 6.0.

The financial strategy for implementing the EWMP consists of the identification of existing funding sources and a process for identifying future funding sources for the estimated costs that are not covered by existing funding sources.

9.3.1 CURRENTLY AVAILABLE REVENUE

The agencies within this group historically utilized general funds to support their stormwater programs and will continue to do so. However, the cost estimates exceed expected available general fund revenue for stormwater programs. Therefore, the cities will be pursuing funds from multiple, additional sources.

9.3.2 FUNDING SOURCES

A number of potential funding sources have been identified that will be considered by the NSMBCW EWMP Group to supply the remaining funding estimated to be necessary to meet the final cost estimates for the EWMP. The potential funding strategies, potential uses, and constraints on the use of the strategy are included in **Table 36**.

Table 36. Potential Funding Strategies

Type	Background	Potential	Process	Conditions	Challenges
Enhanced Infrastructure Financing Districts (EIFDs)	Government entity created by City or County to construct or improve infrastructure, governed by a public financing authority (PFA) to use a portion of property taxes from the participating jurisdictions or other fees or investments to fund regional infrastructure projects	Signed into law in Fall 2014, will allow cross jurisdictional projects to collaboratively fund improvements affecting water problems which don't follow jurisdictional boundaries	• Determine if the prerequisites are met • ID projects, stakeholders, district members • Establish PFA • Formalize EIFD • Develop Infrastructure Financing Plan (IFP) • Review with public • Adopt IFP and begin work	• Receive Finding of Completion (FOC) • Certify no SA assets under litigation will benefit • Comply with State Controller's asset transfer review	New concept which will need time to become standard practice will require educating local decision makers of the benefits of EIFDs
State Revolving Fund (SRF) Loans	Funding source for any city county or district to fund projects including stormwater treatment, water reclamation and wastewater treatment systems	Continuously available for application	Application available online on SWRCB site,	Limitations apply to types of projects eligible	Limited supply of funds
Bonds	Traditional infrastructure bonds	Vary by project funding needs and jurisdiction	Traditional bond development and approval processes	Vary by type of bond and details	• Lack of public support from lack knowledge of infrastructure funding shortcomings • Timelines of bond issuance process don't always match project timelines

Type	Background	Potential	Process	Conditions	Challenges
Prop 1. Grants	The bond measure approved by voters in fall of 2014 will enact the Water Quality, Supply, and Infrastructure Improvement Act of 2014	$7.5 billion law to be enacted, funds generated by the act will become available under a variety of programs and through various agencies and timelines	Prop 1 Water Bond contained: • $520 million to improve water quality for "beneficial use," for reducing and preventing drinking water contaminants • $1.495 billion for competitive grants for multi-benefit ecosystem and watershed protection and restoration projects • $810 million for expenditures on, and competitive grants and loans to, integrated regional water management projects • $2.7 billion for water storage projects, dams and reservoirs • $725 million for water recycling and advanced water treatment technology • $900 million for competitive grants and loans for groundwater contamination cleanup • $395 million for flood management projects	Will vary by program, information about availability will be arriving from different agencies administering funds in 2015. Governor's budget calls for spending $532 million in 2015 of Prop 1 funds	Will vary by program

Type	Background	Potential	Process	Conditions	Challenges
IRWM Grants	Grant funding program for projects related to all aspects of water resources, including multi-jurisdiction projects	Stormwater management projects are eligible for funding	• Application process overseen by DWR. • Applications for the current round of Prop 84 funding will be due in fall of 2015, draft program guidelines to be released in spring 2015 • $1.1 billion in spending from the 2006 flood bond Prop 1E proposed in Governor's 2015 budget	To be outlined in guidelines	Limited supply of funds
Climate Change/Greenhouse Gas Emission Funding	AB32 established a comprehensive emission reduction program, including a "cap and trade" program that will auction emission credits creating up to $3billion annually, investment of these funds will be potential funding source	Emission trading funds investment plan does include "water use and supply" projects that reduce GHG as eligible	Emission trading market still developing	Still to be determined	Role of stormwater projects in the cap and trade program and quantification of associated emission reduction is still to be determined
Stormwater Fees	Standard utility type fee assessed on a parcel basis included as part of property tax or sewer service bill, varies in %		Varies by jurisdiction, ordinance development and approval process typically included	Various exemptions and exceptions related to sizing and type of surface/storm water management systems and requirements	Lack of public support from lack knowledge of infrastructure funding shortcomings

Type	Background	Potential	Process	Conditions	Challenges
Collaborative opportunities with Other Agencies	Mutually beneficial program partnerships to share resources and meet regulatory requirements	Will be well suited to be developed via the EIFD process above	Varies on type of jurisdictions or entities included	Varies on type of jurisdictions or entities included	Case by case management can be resource intensive
Public/Private Partnerships	Synergistic partnerships to develop funding opportunities	Vary by jurisdictions, smaller scale projects may be more attainable or allow proof of concept	Vary by project type and scale	Vary by project	May not be repeatable or of sufficient scale to justify public resource expenditure

9.3.3 *NEXT STEPS*

The Group as a whole, as well as individual members, will prioritize and select the specific financing strategies that best fit their needs.

10 LEGAL AUTHORITY

The NSMBCW EWMP Agencies, including the City of Malibu, County of Los Angeles, and Los Angeles County Flood Control District, have adequate legal authority to implement and enforce the requirements in the 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.

As required by the Permit, each Agency has submitted and will continue to submit as part of its Annual Report a statement certified by its chief legal counsel that verifies their legal authority. What follows is a summary of each Agency's legal authority.

10.1 CITY OF MALIBU

The primary source of the City's authority is Article 11, § 7 of the California Constitution. The City also has authority under § 13002 of the California Water code to adopt and enforce ordinances conditioning, restricting, and limiting activities which might degrade the quality of waters of the State. Pursuant to Article 11, § 7 of the California Constitution and § 13002 of the California Water Code, the City adopted Chapter 13.04 of the Malibu Municipal Code, which contains the City's regulations enabling it to impose the legal requirements of the Permit. The City's Local Coastal Program as certified by the California Coastal Commission includes a Land Use Plan and Local Implementation Plan. The LCP details many environmentally protective standards for new development and redevelopment projects, some of which are equally or more stringent than those in the Permit. Thus, the City has the legal authority as required under Part VI.A.2 of the Permit.

Article 11, § 7 also provides the City the authority 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 environmental requirements are also implemented in part through the application of the California Environmental Quality Act (CEQA) process to proposed projects, as enforceable mitigation measures. The City, as a municipal corporation, has authority to enter into contracts that enable it to carry out its necessary functions, including the power to enter into interagency agreements to control the contribution of pollutants from one portion of the shared MS4 to another.

Pursuant to Malibu Municipal Code Chapters 1.10 – Administrative Citation and Penalties, 1.16 – General Penalty, and 13.04 – Storm Water Management and Discharge Control, the City's regulations may be enforced administratively, civilly, and criminally. The Malibu Municipal Code also provides various procedures to modify and/or revoke city-issued permits for unlawful and/or environmentally disruptive activity.

10.2 COUNTY OF LOS ANGELES

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 the Permit requirements, the primary applicable laws and ordinances are:

- Los Angeles County code, Title 12, Chapter 12.80 – Stormwater and Runoff Pollution Control;
- Los Angeles County Code, Title 12, Chapter 12.84 – Low Impact Development Standards;
- Los Angeles County Code, Title 22 – Planning and Zoning, Part 6 – Enforcement Procedures;
- Los Angeles County Code, Title 26 – Building Code;
- California Government Code §6502;
- California Government Code §23004.

10.3 LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

Although many portions of State law, the Charter of the County of Los Angeles, the Los Angeles County Code, and the Los Angeles County Flood Control District Code are potentially applicable to the implementation and enforcement of the Permit requirements, the primary applicable laws and ordinances are:

- Los Angeles County code, Title 12, Chapter 12.80 – Stormwater and Runoff Pollution Control;
- Los Angeles County Code, Title 12, Chapter 12.84 – Low Impact Development Standards;
- Los Angeles County Code, Title 22 – Planning and Zoning, Part 6 – Enforcement Procedures;

- Los Angeles County Code, Title 26 – Building Code;
- LACFCD Code Chapter 21 – Stormwater and Runoff Pollution Control;
- California Government Code §6502;
- California Government Code §23004;
- California Water Code §8100 et. seq.

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APPENDIX A

Notice of Intent

April 7, 2014

Mr. Jim Thorsen, City Manager
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Public Works Department
23825 Stuart Ranch Road
Malibu, CA 90265

Ms. Gail Farber, Director
County of Los Angeles
Department of Public Works
Watershed Management Division, 11th Floor
900 South Fremont Avenue
Alhambra, CA 91803

Ms. Gail Farber, Chief Engineer
Los Angeles County Flood Control District
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Alhambra, CA 91803

APPROVAL OF REVISED NOTIFICATION OF INTENT TO DEVELOP AN ENHANCED WATERSHED MANAGEMENT PROGRAM FOR THE NORTH SANTA MONICA BAY COASTAL WATERSHED, PURSUANT TO THE LOS ANGELES COUNTY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT (NPDES PERMIT NO. CAS004001; ORDER NO. R4-2012-0175)

Dear Permittees participating in the North Santa Monica Bay Coastal Watershed:

In a letter dated November 26, 2013, the California Regional Water Quality Control Board, Los Angeles Region (Regional Water Board or Board) provided its review of the North Santa Monica Bay (SMB) Coastal Watershed agencies' notification of intent (NOI) to develop an enhanced watershed management program (EWMP). As part of their NOI, Permittees pursuing an EWMP are required to identify, and commit to fully implement by June 28, 2015, a structural best management practice (BMP) or suite of BMPs at a scale that provides meaningful water quality improvement within each watershed covered by the EWMP. The structural BMP(s) must be in addition to BMPs that are required to meet interim or final trash TMDL effluent limitations or other final effluent limitations applicable in the watershed with deadlines prior to April 28, 2016. The structural BMP(s) identified in the NOI are subject to Executive Officer approval. The NOI identified the Broad Beach Biofiltration project, Wildlife Road Storm Drain Improvement project, and the Malibu Legacy Park Pump Station Improvement project in the Santa Monica Bay Watershed Management Area as the structural BMPs to meet the above mentioned requirement.

In its letter, the Board requested additional information about each of the projects and the water quality improvements to be achieved by these three projects. Specifically, for the Board to fully evaluate the three projects, Permittees needed to provide the size of drainage area; the volume of storm water to be treated; the additional volume to be treated at Legacy Park; and an estimate of pollutant load reductions.

On December 17, 2013, the Regional Water Board received an amended NOI for the North SMB Coastal Watershed EWMP. Board staff has reviewed the revised NOI for compliance with all notification requirements of Part VI.C of Order No. R4-2012-0175 and has determined that all the notification requirements, of Part VI.C of Order No. R4-2012-0175, have been met.

Pursuant to section VI.C.4.b.iii.(5) of the Order, the proposed structural best management practices (BMPs) are subject to approval by the Regional Water Board Executive Officer. The City of Malibu proposes to implement the Broad Beach Biofiltration project; the Wildlife Road Storm Drain Improvement project; and the Malibu Legacy Park Pump Station Improvement project. During Board staff review of the BMPs, discrepancies were found with the calculation of the design volumes for the Broad Beach Biofiltration project and the Wildlife Road Storm Drain Improvement project. In addition, the completion date for the Malibu Legacy Park Pump Station Improvement project was past the 30 month implementation deadline of June 28, 2015. On March 11, 2014, the Board received a second revised NOI, which addressed these concerns.

The Broad Beach Biofiltration project consists of the installation of biofilters within eight catch basins along Broad Beach Road to treat storm water and urban runoff prior to discharge into the Pacific Ocean adjacent to the Eastern Section of the Laguna Point to Latigo Point Area of Special Biological Significance (ASBS). The eight catch basins will capture runoff from a drainage area of 12.4 acres and will be designed to treat the runoff from a 0.75 inch 24-hour storm event. The biofilters have an estimated removal efficiency of 95% to 99% for fecal coliform, E. coli and enterococcus; and a total suspended solids (TSS) removal efficiency of approximately 85%.

The Wildlife Road Storm Drain Improvement project consists of the installation of bioretention swales along Wildlife Road and Whitesands Place and installation of biofilters within two catch basins to treat storm water and urban runoff prior to discharge into the Pacific Ocean adjacent to the ASBS. The two catch basins will capture runoff from a drainage area of 8.8 acres and will be designed to treat the runoff from a 0.75 inch 24-hour storm event. The biofilters have an estimated removal efficiency of 95% to 99% for fecal coliform, E. coli and enterococcus; and a TSS removal efficiency of approximately 85%.

The Malibu Legacy Park Pump Station Improvement project will upgrade the existing storm drain pumps at the Cross Creek Pump Station and the Malibu Road Pump Station. The objective of the pump station upgrades is to increase the pumping capacity at Cross Creek and Malibu Road to capture and convey the 85th percentile 24-hour storm event to Malibu Legacy Park for treatment. The Cross Creek Pump Station and the Malibu Road Pump Station currently have a maximum pumping capacity of 200 gallons per minute. These two pump stations will be upgraded with new pumps and other improvements to increase the volume of water pumped to Legacy Park for treatment.

The Board has concluded that these three projects will result in meaningful improvements in water quality by preventing and removing bacteria and other pollutants from storm water before discharging into the Pacific Ocean. Therefore, the proposed Broad Beach Biofiltration project; the Wildlife Road Storm Drain Improvement project; and the Malibu Legacy Park Pump Station Improvement project are approved.

The work plan for development of the North SMB Coastal Watershed EWMP is due by June 28, 2014. Please submit the work plan to losangeles@waterboards.ca.gov with the subject line "LA County MS4 Permit – Enhanced Watershed Management Program Work Plan" with copies to Ivar.Ridgeway@waterboards.ca.gov and Rebecca.Christmann@waterboards.ca.gov.

If you have any questions, please contact Mr. Ivar Ridgeway, Storm Water Permitting, at (213) 620-2150 or Ms. Rebecca Christmann at (213) 576-6786.

Sincerely,

Samuel Unger

Samuel Unger, P.E.
Executive Officer

cc: Jennifer Brown, City of Malibu
Rob DuBoux, City of Malibu
Angela George, County of Los Angeles, Department of Public Works
Gary Hildebrand, Los Angeles County Flood Control District
David Smith, NPDES Program, USEPA Region IX
Jennifer Fordyce, Office of Chief Counsel, State Water Board

NOTICE OF INTENT
North Santa Monica Bay Coastal Watersheds Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program

Submitted to:
Los Angeles Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013
losangeles@waterboards.ca.gov

Submitted by:
City of Malibu
County of Los Angeles
Los Angeles County Flood Control District

March 11, 2014

SECTION 1. PROGRAM TYPE AND PERMITTEES

MS4 Permit Section VI.C.4.b.i and Attachment E Section IV.C.1.

This Notice of Intent (NOI) is being submitted in accordance with Part VI.C.4.b.i of Order R4-2012-0175. The Permittees (listed in **Table 1**) that are party to this NOI hereby notify the Los Angeles Regional Water Quality Control Board (Regional Water Board) of their intent to develop an Enhanced Watershed Management Program (EWMP) for the portions of the Santa Monica Bay (SMB) Watershed Management Area located within SMB Jurisdictional Group (JG) 1, SMB JG 4, and the portion of the Malibu Creek Watershed (SMB JG 9) located within the City of Malibu's boundaries, hereafter collectively referred to as the North Santa Monica Bay Coastal Watersheds (NSMB) EWMP Area. The geographic scope of the EWMP addressed in this NOI is further discussed in Section 5 of this document. The Permittees meet the Low Impact Development (LID) and green streets conditions, will submit an EWMP Work Plan within 18 months of the effective date of the Order R4-2012-0175 (June 28, 2014), and will submit the Draft EWMP within 30 months of the effective date (June 28, 2015).

Additionally, the Permittees (listed in **Table 1**) that are party to this NOI hereby notify the Regional Water Board of their intent to develop a Coordinated Integrated Monitoring Program (CIMP). The Permittees intend to follow a CIMP approach for each of the required monitoring program elements and will submit the CIMP within 18 months of the effective date of Order R4-2012-0175 (June 28, 2014).

Table 1. Enhanced Watershed Management Program Permittees
City of Malibu
County of Los Angeles
Los Angeles County Flood Control District

SECTION 2. TOTAL MAXIMUM DAILY LOADS ESTABLISHED WATER QUALITY BASED EFFLUENT LIMITATIONS

MS4 Permit Section VI.C.4.b.ii

Table 2 lists the Total Maximum Daily Loads (TMDLs) that have specifically been developed for areas that are included in the NSMB EWMP Area. **Table 3** lists applicable interim and final trash Water Quality Based Effluent Limitations (WQBELs) and all other final WQBELs and receiving water limitations (RWLs) established by TMDLs with compliance deadlines occurring prior to the anticipated approval date of the

EWMP (April 28, 2016). The watershed control measures that will be implemented to meet the requirements of the interim and final trash WQBELs and all other final WQBELs are described in Section 3 of this NOI.

Table 2. Total Maximum Daily Loads Applicable to the North Santa Monica Bay Enhanced Watershed Management Program Area

TMDL	Regional Board Resolution	Effective Date and/or EPA Approval Date
Santa Monica Bay Beaches Dry Weather TMDL	2002-004	07/15/2003
Santa Monica Bay Beaches Wet Weather TMDL	2002-022	07/15/2003
Malibu Creek Watershed Bacteria TMDL	2004-019R	01/24/2006
Malibu Creek Watershed Trash TMDL	2008-007	07/07/2009
Malibu Creek Nutrient TMDL	Not Assigned	03/21/2003
Santa Monica Bay Nearshore and Offshore Debris TMDL	R10-010	03/20/2012
Santa Monica Bay DDTs and PCBs TMDL	Not Assigned	03/26/2012

Table 3. Applicable Interim and Final Trash WQBELs and all other Final WQBELs and Receiving Water Limitations[1] Occurring Before Enhanced Watershed Management Program Approval

TMDL Order	WQBEL/RWL	Interim/ Final	Compliance Date [2]
Santa Monica Bay Beaches Dry Weather Bacteria 2002-004	*Total Coliform* [3] Daily Maximum: 10,000 MPN/100 mL *(WQBEL)* Geometric Mean: 1,000 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Fecal Coliform Daily Maximum: 400 MPN/100 mL *(WQBEL)* Geometric Mean: 200 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Enterococcus Daily Maximum: 104 MPN/100 mL *(WQBEL)* Geometric Mean: 35 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Compliance with allowable exceedance days for summer and winter dry weather single sample maximum *(RWL)*	Final	12/28/2012

(Table continued on the next page)

Table 3. Applicable Interim and Final Trash WQBELs and all other Final WQBELs and Receiving Water Limitations[1] Occurring Before Enhanced Watershed Management Program Approval

TMDL Order	WQBEL/RWL	Interim/ Final	Compliance Date [2]
Malibu Creek and Lagoon Dry Weather Bacteria 2004-019R	*Total Coliform [3] (Malibu Lagoon)* Daily Maximum: 10,000 MPN/100 mL *(WQBEL)* Geometric Mean: 1,000 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Fecal Coliform (Malibu Lagoon) Daily Maximum: 400 MPN/100 mL *(WQBEL)* Geometric Mean: 200 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Enterococcus (Malibu Lagoon) Daily Maximum: 104 MPN/100 mL *(WQBEL)* Geometric Mean: 35 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	E. coli (Malibu Creek) Daily Maximum: 235 MPN/100 mL *(WQBEL)* Geometric Mean: 126 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Compliance with allowable exceedance days for summer and winter dry weather single sample maximum *(RWL)*	Final	12/28/2012
Malibu Creek Trash R4-2008-007	80% of baseline (i.e., 20% reduction)	Interim	7/7/2013
	60% of baseline (i.e., 40% reduction)	Interim	7/7/2014
	40% of baseline (i.e., 60% reduction)	Interim	7/7/2015
Santa Monica Bay Nearshore and Offshore Debris R10-010	80% of baseline (i.e., 20% reduction)	Interim	3/20/2016

1 Per Order R4-2012-0175, interim and final WQBELs are listed for trash TMDL and final WQBELs are listed for other pollutants.

2 Per Order R4-2012-0175, WQBELs and RWLs are required to be met at the effective date of the Order. TMDL implementation plans required responsible parties to meet Santa Monica Bay Bacteria TMDL allowable exceedance days during summer dry weather on 7/15/2006 and winter dry weather on 7/15/2009 and Malibu Creek Bacteria TMDL allowable exceedance days during summer dry weather on 1/24/09 and winter dry weather on 1/24/2012.

3 Total coliform density shall not exceed a daily maximum of 1,000 MPN/ 100 mL, if the ratio of fecal-total coliform exceeds 0.1.

SECTION 3. IDENTIFY TMDL CONTROL MEASURES

MS4 Permit Sections VI.C.4.b.ii and VI.C.4.d

The Permittees that are participating in this EWMP are responsible for four TMDLs with interim (trash only) and final WQBELs deadlines that occur prior to the anticipated approval of the EWMP (April 28, 2016). **Table 4** identifies the structural control measures that have been or will be implemented by the Permittees for each TMDL. The Permittees will continue to implement these measures during the development of the EWMP.

In addition to the structural control measures listed in Table 4, the City of Malibu has implemented a number of non-structural source control measures that go beyond the minimum control measures in the permit to support implementation of the TMDLs. These measures include a proactive illicit connection/illicit discharge program that places elimination of all runoff as a priority including irrigation runoff, the City of Malibu Local Coastal Program (discussed in more detail below), annual or more frequent commercial inspections through the Clean Bay Restaurant Certification program (the permit requires 2 inspections during the 5-year permit term), annual inspections of automotive service/retail gasoline outlets (the permit requires 2 inspections during the 5-year permit term), and marine debris reducing ordinances such as plastic bag and polystyrene packaging bans and banning smoking on beaches.

The Los Angeles County Flood Control District submitted a revised Time Schedule Order request to address compliance with the Malibu Creek and Lagoon Dry Weather Bacteria TMDL.

Table 4. Structural Control Measures Implemented to Address Total Maximum Daily Loads[1]

TMDL	Permittees	Implementation Plan and Control Measures	Status of Implementation
Santa Monica Bay Beaches Dry Weather Bacteria 2002-004	City of Malibu	Paradise Cover Stormwater Treatment Facility[2]	Completed (June 2010)
	County of Los Angeles	Advanced treatment septic systems for beach restrooms at Malibu/Surfrider, Point Dume, Topanga, and Zuma Beaches	In progress (12 out of 18 completed as of June 2013)
	County of Los Angeles, Los Angeles County Flood Control District, and City of Malibu	Marie Canyon Water Quality Improvement Project[1,2]	Completed (October 2007)
Malibu Creek and Lagoon Dry Weather Bacteria 2004-019R [4]	City of Malibu and Los Angeles Flood Control District	Civic Center Stormwater Treatment Facility [3]	Completed (February 2007)
		Malibu Legacy Park Project [3]	Completed (October 2010)
Malibu Creek Trash R4-2008-007 [4]	City of Malibu	Malibu Legacy Park Project achieves full capture of 100% of City's drainage area to the Creek.	Completed (October 2010)
		Civic Center Stormwater Treatment Facility screens and filters all runoff to Legacy Park.	Completed (February 2007)
Santa Monica Bay Nearshore and Offshore Debris R10-010	City of Malibu	Distributed Best Management Practices (BMPs) to reduce baseline by 20%	Will complete by March 2016
	County of Los Angeles	Trash Monitoring & Reporting Plan's (TMRP) Minimum Frequency of Assessment and Collection (MFAC)	County will implement the subject MFAC once the Regional Water Board approves the TMRP.
		Plastic Pellets Monitoring and Reporting Plan	County will submit the subject plan by the September 20, 2013 deadline.
		Full capture trash inserts in catch basins to reduce baseline by 20%	Will complete by March 2016

1 These control measures are complete and/or are being implemented concurrently with EWMP Development.

2 From existing Santa Monica Bay Beaches Wet-Weather Bacteria Total Maximum Daily Load Implementation Plan Jurisdictional Groups 1 and 4.

3 These control measures also reduce the bacteria loading to the Santa Monica Bay beaches near the outlet of Malibu Creek and thereby support compliance with the Santa Monica Bay Beaches Dry Weather Total Maximum Daily Load as well.

4 The measures the County has been implementing or will implement to address the TMDLs that are specific to the Malibu Creek Watershed are not discussed in this NOI because the areas within the Malibu Creek Watershed that the County is responsible for will be addressed in a separate NOI and EWMP, specifically, the Malibu Creek Watershed Group EWMP.

SECTION 4. DEMONSTRATION OF MEETING LID ORDINANCE AND GREEN STREET POLICY REQUIREMENTS

MS4 Permit Sections VI.C.4.b.iii.(6), VI.C.4.c.iv.(1), and VI.C.4.c.iv.(2)

The Permittees that are party to this NOI have draft LID ordinances and Green Streets policies. **Table 5** and **Table 6** summarize the status of the Permittees' LID ordinances and Green Streets policies, respectively, for the EWMP area covered by this NOI. As a member of the Los Angeles Permit Group, the City of Malibu will be utilizing the draft LID ordinance and the green streets policy developed by the subject group to meet the requirements to complete a draft LID ordinance and Green Streets policy prior to NOI submittal. The County of Los Angeles has drafted its own LID ordinance and Green Streets policy. More than 50 percent of the area that will be addressed by the EWMP is covered by the City of Malibu's and County's LID ordinances and Green Streets policies.

In addition to utilizing the aforementioned draft ordinance, the City of Malibu has been implementing LID and proactive environment protection requirements for years. The City of Malibu implements a certified Local Coastal Program (LCP) with adopted Local Implementation Plan (LIP), which is considered to be one of the most stringent in regard to development standards in the State. It contains standards addressing a wide range of coastal development issues, many of which serve to reduce water runoff and improve water quality. The standards include:

- limitations on development size and area such as:
    - limiting the interior square footage of commercial projects to 15 percent of the parcel size,
    - allowing for up to 20 percent of the parcel size to be used for commercial projects in the Civic Center Area if the project contains public benefits and amenities, including public open space and habitat restoration or enhancement,
    - requiring that 65 percent of a commercial parcel be retained as landscaping and open space;
- basing residential structure size for non-beachfront lots on lot area, less slopes of 1:1 and steeper (for steep lots, this means the calculation is based on the area of the lot flatter than 1:1, resulting in smaller structures on steep lots);
- encouraging the use of permeable surfaces, especially for driveways;
- requiring that development be planned to fit the topography, soils, geology, hydrology, and other conditions existing on the site so that grading is kept to an absolute minimum while placing an actual limit on the quantity of grading;

- prohibiting new agricultural uses and confined animal uses in environmentally sensitive habitat areas and associated buffer zones, as well as on slopes greater than 3:1;
- requiring setbacks from parklands, streams, wetlands, and coastal bluffs;
- requiring that disturbed areas be protected from erosion; minimize irrigation requirements through the use of native and drought-tolerant plants (which includes a restriction on the amount of turf) and protect existing native areas by the minimization of clearing and the prohibition of invasive, non-native species;
- requiring parking areas to have landscaping; and
- encouraging the use of graywater for irrigation where feasible.

Table 5. Status of Low Impact Development Ordinance Coverage

Permittee	Jurisdictional Area	LID Ordinance Status	MS4 EWMP Area for which Permittee is Responsible [acres]	MS4 EWMP Area Covered by Permittee's LID Ordinance [acres]	Percentage of EWMP Area
City of Malibu	JG1	Draft Ordinance	11,062	11,062	20.1%
	JG4	Draft Ordinance	998	998	1.8%
	JG9	Draft Ordinance	599	599	1.1%
County of Los Angeles	JG1	Draft Ordinance	42,217	42,217	76.6%
	JG4	Draft Ordinance	245	245	0.4%
LACFCD	N/A	N/A	N/A	N/A	N/A
	Total EWMP Area		55,121		
	Total EWMP Area Covered by LID Ordinances			55,121	
	% of EWMP Area Covered by LID Ordinance				100%

Status Description:

- Draft Ordinance – Permittee has completed, or will complete by June 28, 2013, the development of a draft LID Ordinance that is in compliance with the requirements of Order R4-2012-0175 for its portion of the MS4 watershed.

Table 6. Status of Green Street Policy Coverage

Permittee	Jurisdictional Area	Green Street Policy Status	MS4 EWMP Area for which Permittee is Responsible [acres]	MS4 EWMP Area Covered by Permittee's Green Street Policy [acres]	Percentage of EWMP Area
City of Malibu	JG1	Draft Policy	11,062	11,062	20.1%
	JG4	Draft Policy	998	998	1.8%
	JG9	Draft Policy	599	599	1.1%
County of Los Angeles	JG1	Draft Policy	42,217	42,217	76.6%
	JG4	Draft Policy	245	245	0.4%
LACFCD		N/A	N/A	N/A	N/A
	Total EWMP Area		55,121		
	Total EWMP Area Covered by Green Street Policies			55,121	
	% of EWMP Area Covered by Green Street Policies				100%

Status Descriptions:

- Draft Policy – Permittee has completed, or will complete by June 28, 2013, the development of a draft Green Street Policy that is in compliance with the requirements of Order R4-2012-0175 for its portion of the MS4 watershed.

SECTION 5. GEOGRAPHIC SCOPE OF ENHANCED WATERSHED MANAGEMENT PROGRAM

MS4 Permit Section VI.C.4.b.iii.(1)

The EWMP and CIMP will address MS4 areas within the North Santa Monica Bay Coastal Watersheds (that is, SMB JG 1, SMB JG 4, and the portion of SMB JG 9 located within the City of Malibu's boundaries) that are under the jurisdiction of the City of Malibu and the County of Los Angeles and the Los Angeles County Flood Control District's facilities within those areas, as shown in **Figure 1**. The EWMP and CIMP will not address State of California (State) and Federal lands within SMB JG 1, SMB JG4, and the portion of SMB JG 9 located within the City of Malibu's boundaries. The area covered by the EWMP is 55,121 acres and includes portions of 18 subwatersheds. **Table 7** provides a breakdown of each jurisdictional group within the EWMP area. Geographic descriptions of each of the jurisdictional groups are discussed in the following sections.

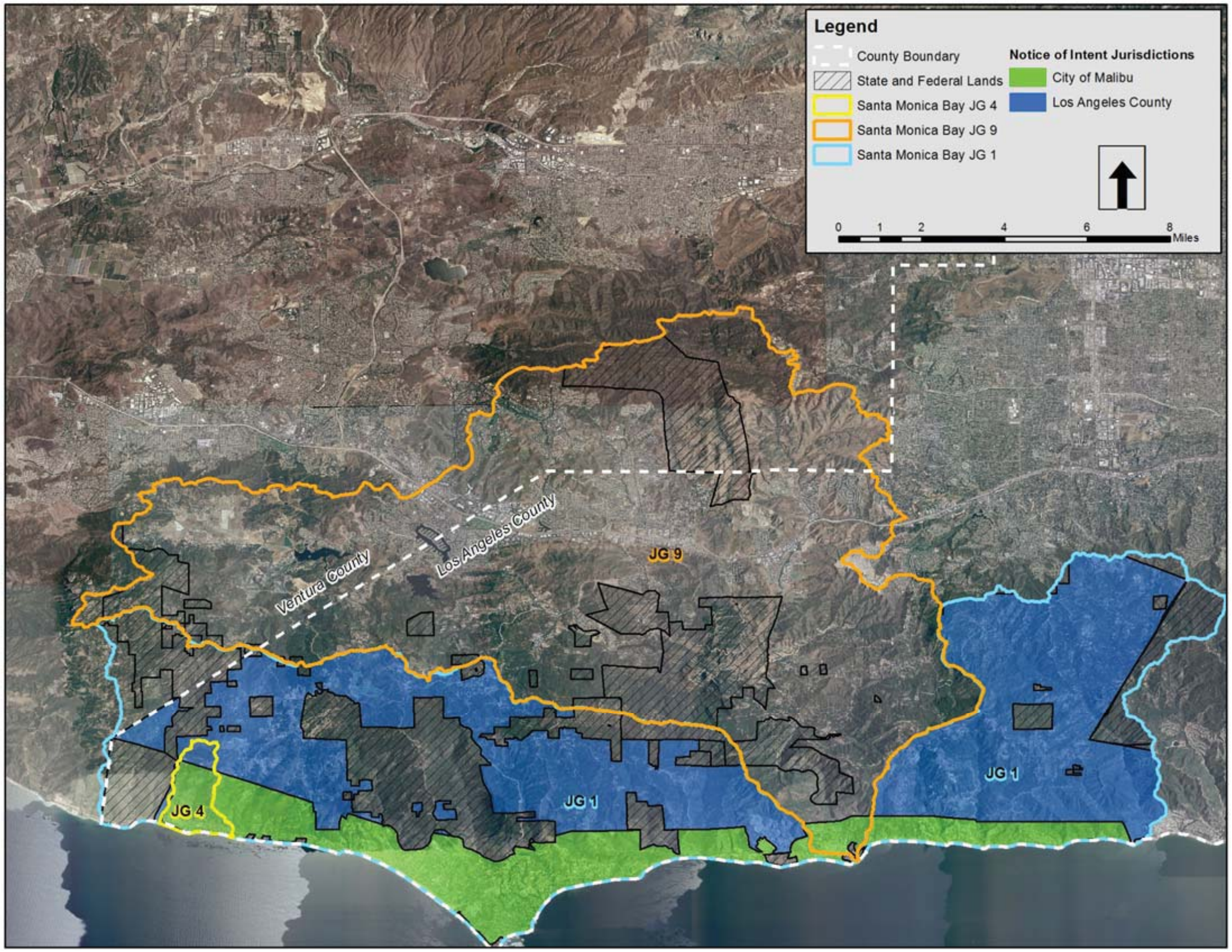

Figure 1. Geographic Scope of the Portions of Santa Monica Bay Jurisdictional Groups 1, 4, and 9 to be covered by the Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program (areas that are not highlighted constitute areas that are not within the geographic scope of the NSMB EWMP)

Table 7. North Santa Monica Bay Coastal Watersheds Land Area Distribution and Enhanced Watershed Management Program and Coordinated Integrated Monitoring Plan Participation

Jurisdictional Group	Responsible Party	EWMP Party	Land Area (Acres)	Percent of JG Area
Jurisdictional Group 1	City of Malibu	Yes	11,062	19.0%
	County of Los Angeles	Yes	42,217	72.5%
	Total JG 1 Area Covered by this EWMP and CIMP		**53,279**	
	Cities of Calabasas and Los Angeles, Caltrans, and State and Federal parks, Santa Monica Mountains Conservancy, and the Mountains Recreation and Conservation Authority	No	4,935	8.5%
	Total Area of Jurisdictional Group 1		**58,214**	
Jurisdictional Group 4	City of Malibu	Yes	998	80.2%
	County of Los Angeles	Yes	245	19.7%
	Total JG 4 Area Covered by this EWMP and CIMP		**1,243**	
	Caltrans	No	1	0.1%
	Total Area of Jurisdictional Group 4		**1244**	
Jurisdictional Group 9	City of Malibu	Yes	599	0.9%
	Total JG 9 Area Covered by this EWMP and CIMP		**599**	
	Cities of Calabasas, Westlake Village, Agoura Hills, Hidden Hills, Simi Valley and Thousand Oaks, unincorporated areas of the Counties of Los Angeles and Ventura, Caltrans, State and Federal parks, Santa Monica Mountains Conservancy, and the Mountains Recreation and Conservation Authority	No	69,831	99.1%
	Total Area of Jurisdictional Group 9		**70,430**	
Total Area Covered by this EWMP and CIMP			***55,121***	
Total Area of Jurisdictional Groups 1, 4, and 9			***129,888***	

Jurisdictional Group 1 Geographic Description

The entire SMB JG 1 area encompasses approximately 58,214 acres and is comprised of portions of the Cities of Malibu, Calabasas, and Los Angeles, unincorporated areas of the County of Los Angeles, Caltrans, State and Federal parks, Santa Monica Mountains Conservancy, and the Mountains Recreation and Conservation Authority. The watershed is comprised of 16 subwatersheds:

Arroyo Sequit	Los Aliso	Encinal	Trancas
Zuma	Ramirez	Escondido	Latigo
Solstice	Corral	Carbon	Las Flores
Piedra Gorda	Pena	Tuna	Topanga

The portion of the SMB JG 1 area covered by this NOI encompasses approximately 53,279 acres and only consists of portions of the City of Malibu and unincorporated areas of the County of Los Angeles. Permittees do not have jurisdiction over lands within the Cities of Calabasas and Los Angeles, Caltrans, and lands owned by the State of California and the Federal government, but will seek collaboration with these agencies during the development of the EWMP. Of the total watershed area, the Permittees have jurisdiction over 91.5% of the land area in SMB JG1. **Figure 2** provides a map of SMB JG1 watershed boundaries and highlights the geographic areas covered by this NOI.

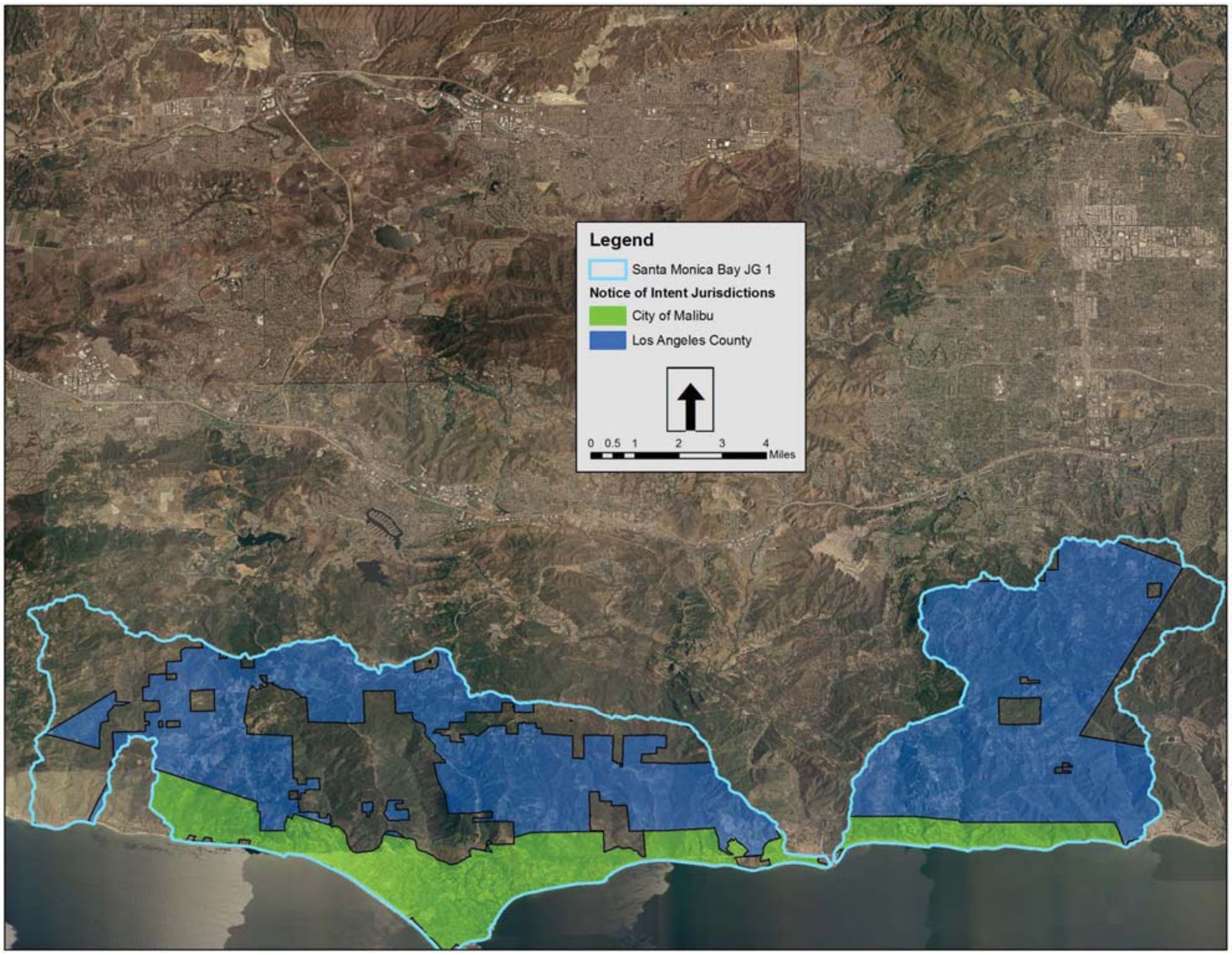

Figure 2. Geographic Scope of the Portion of Santa Monica Bay Jurisdictional Group 1 to be covered by the Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program (areas that are not highlighted constitute areas that are not within the geographic scope of the NSMB EWMP)

Jurisdictional Group 4 (Nicolas Canyon Subwatershed) Geographic Description

The SMB JG 4 area encompasses approximately 1,244 acres and is only comprised of portions of the City of Malibu, unincorporated areas of the County of Los Angeles, and Caltrans. The Permittees have jurisdiction over 99.9% of the total watershed area. Permittees do not have jurisdiction over the lands owned by Caltrans, but will seek collaboration with Caltrans during the development of the EWMP. The entire watershed consists only of the Nicholas Canyon subwatershed. **Figure 3** provides a map of the watershed boundaries and highlights the geographic areas covered by this NOI.

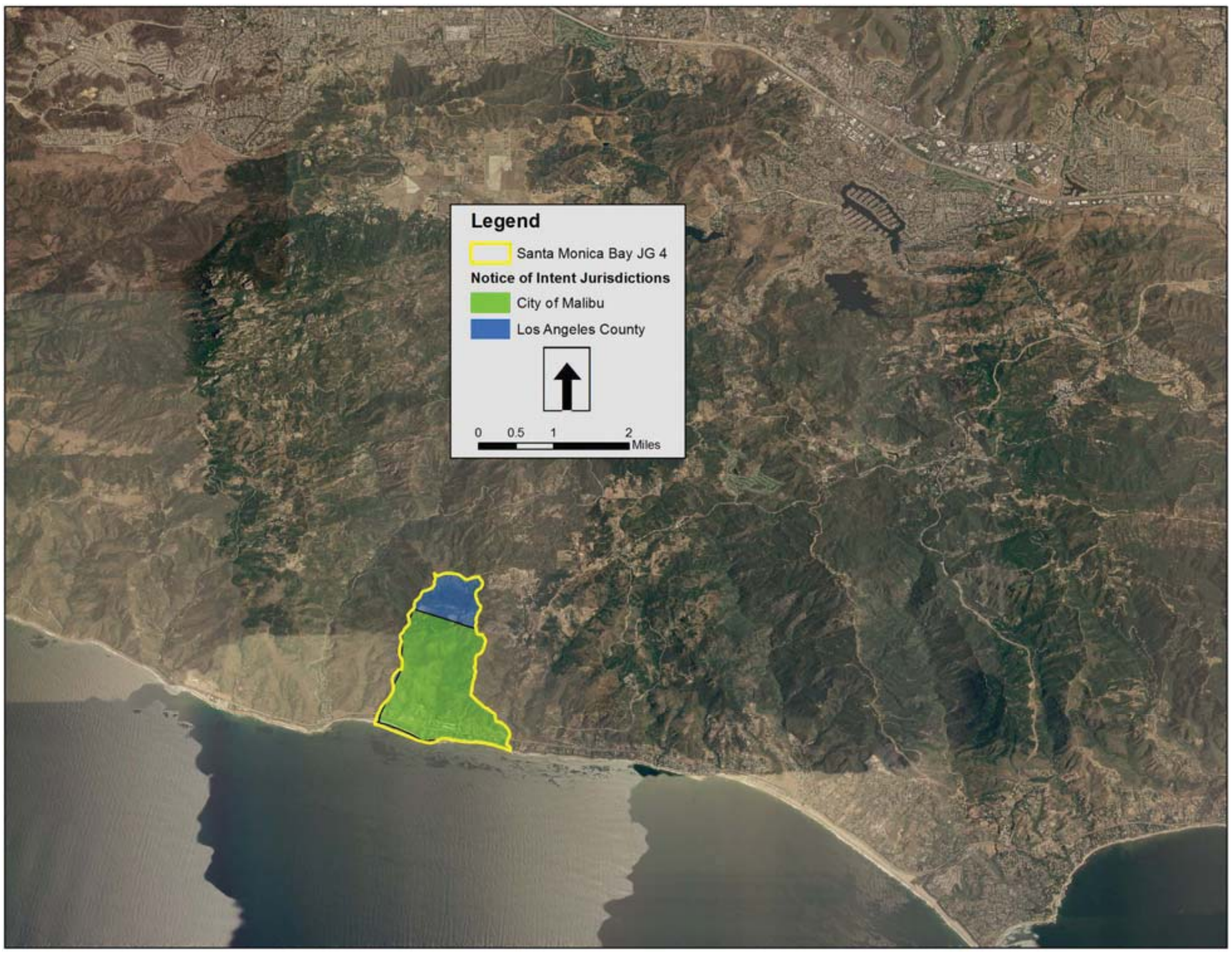

Figure 3. Geographic Scope of the Portion of the Santa Monica Bay Jurisdictional Group 4 area to be covered by the Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program (areas that are not highlighted constitute areas that are not within the geographic scope of the NSMB EWMP)

Jurisdictional Group 9 (Malibu Creek Watershed) Geographic Description

SMB JG9 area encompasses approximately 70,430 acres and is known as the Malibu Creek watershed. It is comprised of portions of the Cities of Agoura Hills, Calabasas, Hidden Hills, Malibu, Simi Valley, and Thousand Oaks, and Westlake Village; (unincorporated areas of) the Counties of Los Angeles and Ventura; Caltrans; State and Federal parks; Santa Monica Mountains Conservancy; and the Mountains Recreation and Conservation Authority.

As previously mentioned, the EWMP and CIMP identified in this NOI will only address the portion of SMB JG 9 within the jurisdictional limits of the City of Malibu, which encompasses approximately 599 acres and only consists of a portion of the City of Malibu. Of the total watershed area, the City of Malibu has jurisdiction over 0.9% of the area in SMB JG 9. The City of Malibu does not have jurisdiction over lands within the rest of the watershed, but will seek collaboration with the other agencies in the watershed during development of the EWMP. **Figure 4** provides a map of the watershed boundaries and highlights the geographic areas covered by this NOI.

The County of Los Angeles and Los Angeles County Flood Control District are partnering with agencies in the Malibu Creek Watershed (other than the City of Malibu) in the development of a Malibu Creek Watershed Group EWMP and a CIMP, which will address the portions of JG9 that are under the responsibility of the agencies that are participating in the development of that EWMP.

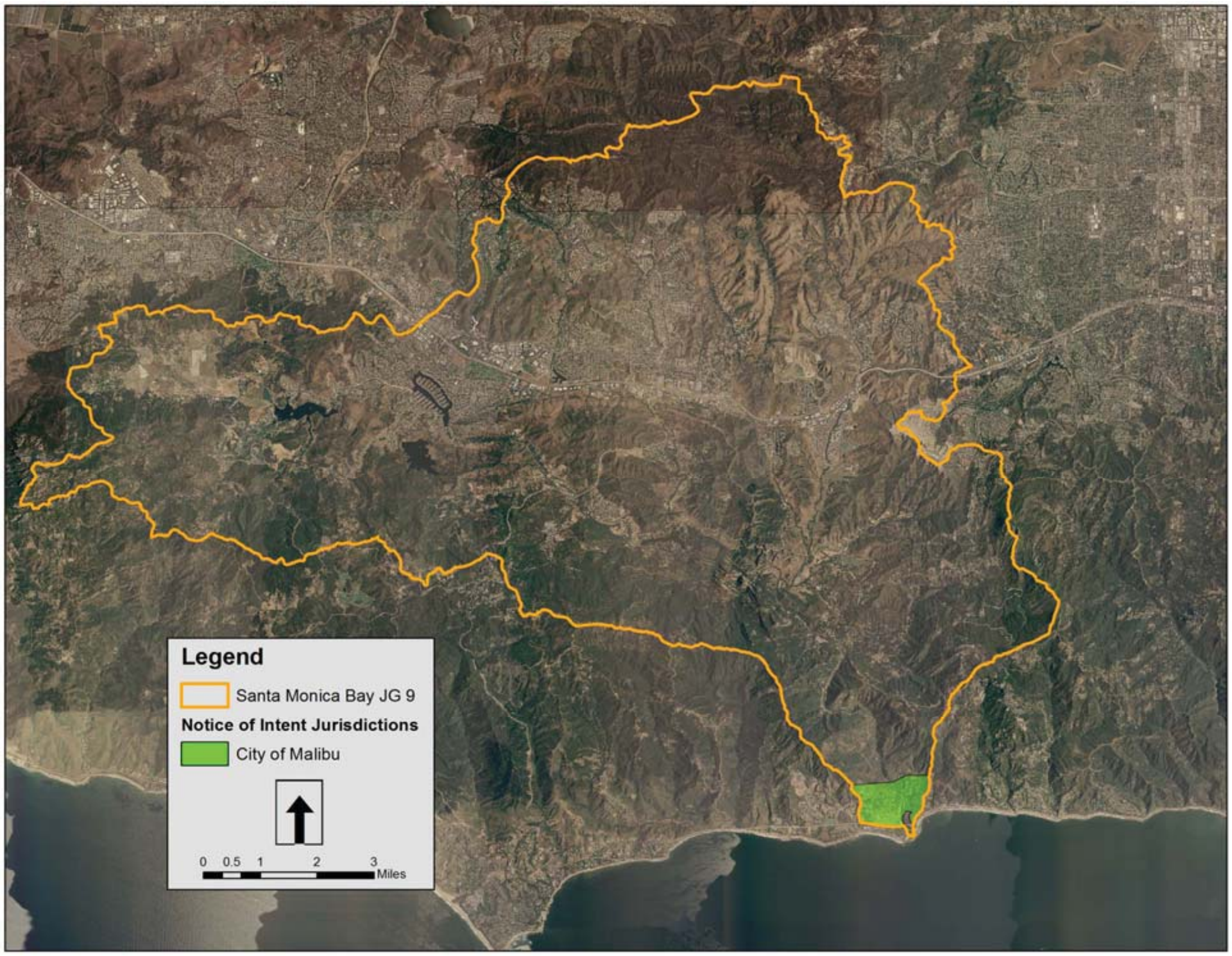

Figure 4. Geographic Scope of the Portion of Santa Monica Bay Jurisdictional Group 9 to be covered by the Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program (areas that are not highlighted constitute areas that are not within the geographic scope of the NSMB EWMP)

SECTION 6. PLAN CONCEPT AND INTERIM MILESTONES AND DEADLINES

MS4 Permit Sections VI.C.4.b.iii.(1) and VI.C.4.b.iii.(4)

The Permittees were directly involved in the development of implementation plans with strategies for compliance with the Malibu Creek and Lagoon Bacteria TMDL and Santa Monica Bay Beaches TMDL and have a track record of successfully and proactively implementing multi-benefit projects in the subwatersheds covered by the NOI to address other TMDL requirements. The Permittees' EWMP will build on the implementation plans and completed control measures to ensure proposed actions consider multiple pollutants and meet the permit requirements. The Permittees' EWMP will re-evaluate watershed control measures that have been proposed, but have not yet been implemented, and will identify improvements that can be made to these control measures to provide the maximum benefit to all stakeholders. Finally, the EWMP will evaluate opportunities for regional projects that could retain all non-stormwater runoff and stormwater from the 85th percentile, 24-hour storm event and identify additional watershed control measures for those areas in the watershed that cannot be addressed by a regional project.

Based on the available information, the Permittees believe that opportunities exist, within the Permittees' collective jurisdictional areas, for collaboration on multi-benefit projects that will meet the intent of the EWMP approach. The Permittees have shown the ability to identify and implement large, regional projects that retain the 85th percentile, 24-hour storm event and provide opportunities for multiple benefits. One example of such a project that has been implemented by the Permittees is the Malibu Legacy Park Project. The Malibu Legacy Park Project encompasses an area of approximately 17 acres. The total cost of the project was in excess of $50 million. The multiple benefits of the project include:

- Elimination of all non-stormwater discharges and stormwater discharges resulting from the 85th percentile, 24-hour storm event.
- Improving the water quality of Malibu Creek, Malibu Lagoon, and nearby beaches by screening, filtering, and disinfecting stormwater and incidental runoff from the local watershed to remove pathogens and other pollutants.
- Developing the Legacy Park site into a public amenity that provides valuable habitat, education, and passive recreation opportunities in conjunction with water quality improvement opportunities.
- Conserving water by using the retained and treated runoff for irrigation in the Park.

Building on the lessons learned from implementing the Malibu Legacy Park Project, the Permittees will continue to seek opportunities for regional projects that retain all non-stormwater and stormwater runoff from the 85th percentile, 24-hour storm event. Where such regional projects cannot be identified, the Permittees will identify smaller-scale watershed control measures.

To ensure adequate progress is being made to achieve the permit deadlines, interim milestones and deadlines were identified and are summarized in **Table 9**. Interim milestones in **Table 9** are the expected due dates of draft Technical Memoranda that will summarize the information and approaches for development of the specified components of the final Work Plan, CIMP, and EWMP. It is expected that the draft technical memos will not be finalized; instead the information presented in the memos will be revised based on comments and presented in the Work Plan, CIMP, and EWMP Plan.

Table 9. Enhanced Watershed Management Program Interim Milestones and Deadlines

Milestone	Deadline
Develop draft technical memorandum of water quality priorities	March 2014
Complete internal draft of EWMP Work Plan	April 2014
Complete internal draft of CIMP	April 2014
Submit final EWMP Work Plan to the Regional Water Board	June 2014
Submit CIMP to the Regional Water Board	June 2014
Develop draft technical memorandum describing approach to US EPA TMDLs	March 2015
Complete internal draft of EWMP	May 2015
Submit draft EWMP to Regional Water Board	June 2015
Submit Final EWMP to Regional Water Board (revised based on to Regional Water Board comments)	January 2016

SECTION 7. COST ESTIMATE

MS4 Permit Section VI.C.4.b.iii.(2)

The cost estimate for the development of the EWMP and CIMP is $400,000. Additionally, it is expected that the Permittees will contribute several hundred thousand dollars of in-kind services toward the development of the EWMP and CIMP and attendance at EWMP and Technical Advisory Committee meetings, and will have additional implementation costs.

SECTION 8. PERMITTEE MEMORANDUM OF AGREEMENT

MS4 Permit Section VI.C.4.b.iii.(2)

Attachment A includes a draft of the Memorandum of Understanding between the Permittees that are participating in the development of the EWMP and CIMP addressed in this NOI. Attachment B includes the Permittees' letters of intent with regard to execution of the MOU.

SECTION 9. COMMITMENT TO IMPLEMENT A STRUCTURAL BMP OR SUITE OF BMPS

MS4 Permit Section VI.C.4.b.iii.(5)

The Permittees listed in **Table 10** will implement the identified structural BMPs to fulfill the obligations under Part VI.C.b.iii.(5). The structural BMPs listed in Table 10 are further described in Attachment C.

Table 10. Structural BMP or Suite of Best Management Practices to be Implemented in the Enhanced Watershed Management Program Area

Jurisdictional Group	Permittee	Structural BMP or Suite of BMPs to be Implemented	Planned Implementation Date
SMB JG 1	City of Malibu	**Broad Beach Biofiltration Project –** installation of biofilters at 9 catch basins on Broad Beach Road.	September 2013 (Commencement of Construction) April 2014 (Completion)
		Wildlife Road Storm Drain Improvements – installation of biofilters along Wildlife Road and Whitesands Place, and catch basin filters at 2 existing catch basins.	September 2013 (Commencement of Construction) April 2014 (Completion)
SMB JG 9	City of Malibu	**Malibu Legacy Park Pump Station Improvements –** upgrade the existing storm drain pumps so that the system can treat an increased volume of runoff.	June 2015 (Completion)

ATTACHMENT A
MEMORANDUM OF UNDERSTANDING

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE CITY OF MALIBU AND PARTICIPATING AGENCIES
(LOS ANGELES COUNTY FLOOD CONTROL DISTRICT AND COUNTY OF LOS ANGELES)

REGARDING THE ADMINISTRATION AND COST SHARING FOR THE DEVELOPMENT OF THE
NORTH SANTA MONICA BAY COASTAL WATERSHEDS
ENHANCED WATERSHED MANAGEMENT PROGRAM
AND COORDINATED INTEGRATED MONITORING PROGRAM

This Memorandum of Understanding (MOU) is made and entered into as of the date of the last signature set forth below by and between the City of Malibu (CITY), a municipal corporation, and PARTICIPATING AGENCIES (Los Angeles County Flood Control District (LACFCD) and County of Los Angeles). Collectively, these entities shall be known herein as "PARTIES" or individually as "PARTY."

WITNESSETH

WHEREAS, the Los Angeles Regional Water Quality Control Board (Regional Board) adopted the National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Permit Order No. R4-2012-0175 (MS4 Permit); and

WHEREAS, the MS4 Permit became effective on December 28, 2012, and requires that the LACFCD, County of Los Angeles, and 84 of the 88 cities (excluding Avalon, Long Beach, Palmdale, and Lancaster) within the County of Los Angeles comply with the prescribed elements of the MS4 Permit; and

WHEREAS, the PARTIES have agreed to collaborate in the development of an Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Program (CIMP) for the areas and facilities in the North Santa Monica Bay Coastal Watersheds controlled by the LACFCD, County of Los Angeles, and CITY to comply with of certain elements of the MS4 Permit; and

WHEREAS, the PARTIES agree that each shall assume full and independent responsibility for ensuring its own compliance with the MS4 Permit despite the collaborative approach of this MOU; and

WHEREAS, the PARTIES collaboratively prepared a final Scope of Work and Request for Proposal to obtain a Consultant to assist the PARTIES with compliance with certain elements of the MS4 Permit, as specified in the Scope of Work, which is incorporated into this MOU by reference; and

WHEREAS, the PARTIES have determined that hiring a Consultant, as set forth in paragraph (5)b, to prepare and deliver a Final Work Plan, an EWMP, and a CIMP (collectively, PLANS) in compliance with certain elements of the MS4 Permit will be beneficial to the PARTIES; and

WHEREAS, the PARTIES have agreed that the total cost for developing the PLANS shall not exceed $521,218, which includes the cost of the Consultant contract, contract administration fee, and a ten percent (10%) contingency, as detailed on Exhibit A; and

WHEREAS, the PARTIES have agreed to contribute funds to the CITY, which will contract with the Consultant for the preparation of the PLANS, in accordance with the cost allocation and timeline shown in Exhibit A.

NOW, THEREFORE, in consideration of the mutual benefits to be derived by the PARTIES, and of the promises contained in this MOU, the PARTIES agree as follows:

(1) Recitals: The recitals set forth above are fully incorporated as part of this MOU.

(2) Purpose: The purpose of this MOU is to cooperatively fund the preparation and submittal of the PLANS to the Regional Board.

(3) Voluntary: This MOU is voluntarily entered into for the purpose of preparing and submitting the PLANS to the Regional Board.

(4) Terms: This MOU shall become effective on the latest date of execution by a PARTY and shall remain in effect until (i) the Regional Board's final approval date of the last outstanding portion of the PLANS, (ii) the CITY has provided the PARTIES with an accounting as set forth in paragraph (5)g, and (iii) the PARTIES have paid all outstanding invoices.

(5) The CITY shall provide the services and performance as follows:

a. CITY shall solicit proposals for, award, and administer a Consultant contract for the preparation and delivery of the PLANS.

b. CITY shall invoice the PARTIES for their share of the cost for the preparation and delivery of the PLANS as described in Exhibit A.

c. CITY will administer the Consultant contract. For this service, LACFCD and County of Los Angeles will pay CITY a contract administration fee equivalent to ten percent (10%) of the respective PARTY's contribution toward the Consultant contract.

d. Contingency: CITY will notify the PARTIES if actual expenditures are anticipated to require use of the contingency funds specified in Exhibit A and will obtain written approval of such expenditures from all PARTIES prior to expenditures. Expenditures that exceed the ten percent (10%) contingency will require an amendment of this MOU.

e. CITY shall utilize the funds deposited by the PARTIES only for the preparation and completion of the PLANS and the administration of the Consultant contract.

f. CITY shall provide the PARTIES with an electronic copy of the technical memos, draft PLANS, and completed PLANS within seven (7) business days after receipt from the Consultant.

g. CITY shall provide an accounting upon the early termination of this MOU pursuant to paragraph (6)p 60 days after the date the Regional Board gives final approval for the last outstanding portion of the PLANS, or three (3) years after the execution of this MOU, whichever comes first. At the completion of the accounting, CITY shall return the unused portion of all funds deposited with the CITY in accordance with the cost allocation formula set forth in Exhibit A.

h. CITY shall instruct the Consultant to not submit any PLANS to the Regional Board unless and until the PLANS have been approved, in writing, for submittal by all PARTIES to this MOU, which approval will not be unreasonably withheld. If the PARTIES cannot agree on the final language of the PLANS to be submitted to the Regional Board, then this MOU shall terminate and each PARTY shall be entitled to copies of the Consultant's materials prepared to date for use by each individual PARTY.

(6) THE PARTIES FURTHER AGREE:

a. To make a full faith effort to cooperate with one another to achieve the purposes of this MOU by providing information about project opportunities, reviewing deliverables, and informing their respective administrators, agency heads, and/or governing bodies of matters associated with this MOU in a timely manner.

b. To fund the cost of the preparation and delivery of the PLANS and to pay the CITY for the preparation and delivery of the PLANS within 60 days of receiving an invoice. Funding shall be as specified in Exhibit A.

c. To grant reasonable access rights and entry to the CITY and the Consultant during the terms of this MOU to the PARTY's facilities (i.e. storm drains, channels, catch basins, properties, etc.) (collectively, THE FACILITIES) to achieve the purposes of this MOU, provided, however, that prior to entering any PARTY's FACILITIES, the CITY or its Consultant shall secure written authorization to enter from the applicable PARTY.

d. The CITY shall require the Consultant retained pursuant to this MOU to agree to indemnify, defend, and hold harmless each PARTY, its special districts, elected and appointed officers, employees, and agents, from and against any and all liability, including but not limited to demands, claims, actions, fees, costs, and expenses (including attorney and expert fees), arising from or connected with the Consultant's performance of its agreement with CITY. In addition, the CITY shall require the Consultant to carry, maintain, and keep in full force and effect an insurance policy or policies, and each PARTY, its officers, employees, attorneys, and designated volunteers shall be named as additional insured on the policy(ies) with respect to liabilities arising out of the Consultant's work.

e. Each PARTY shall indemnify, defend, and hold harmless each other PARTY, including its special districts, elected and appointed officers, employees, and agents, from and against any and all liability, including but not limited to demands, claims, actions, fees, costs, and expenses (including attorney and expert witness fees), arising from or connected with the respective acts of each PARTY arising from or related to this MOU; provided, however, that no PARTY shall indemnify another PARTY for that PARTY's own negligence or willful misconduct.

f. In light of the provisions of Section 895.2 of the Government Code of the State of California imposing certain tort liability jointly upon public entities solely by reason of such entities being parties to an agreement (as defined in Section 895 of said Code), each of the PARTIES hereto, pursuant to the authorization contained in Section 895.4 and 895.6 of said Code, shall assume the full liability imposed upon it or any of its officers, agents, or employees, by law for injury caused by any act or omission occurring in the performance of this MOU to the same extent that such liability would be imposed in the absence of Section 895.2 of said Code. To achieve the above stated purpose, each PARTY indemnifies, defends, and holds harmless each other PARTY for any liability, cost, or expense that may be imposed upon such other PARTY solely by virtue of said Section 895.2. The provisions of Section 2778 of the California Civil Code are made a part hereof as if incorporated herein.

g. The PARTIES are, and shall at all times remain as to each other, wholly independent entities. No PARTY to this MOU shall have power to incur any debt, obligation, or liability on behalf of any other PARTY unless expressly provided to the contrary by this MOU. No employee, agent, or officer of a PARTY shall be deemed for any purpose whatsoever to be an agent, employee, or officer of another PARTY.

h. Any notices, bills, invoices, or reports relating to this MOU, and any request, demand, statement, or other communication required or permitted hereunder shall be in writing and shall be delivered to the representatives of the PARTIES at the addresses set forth in Exhibit B.

i. This MOU shall be binding upon, and shall be to the benefit of the respective successors, heirs, and assigns of each PARTY; provided, however, neither PARTY may assign its respective rights or obligations under this MOU without the prior written consent of the other PARTIES.

j. This MOU is governed by, interpreted under, and construed and enforced in accordance with the laws of the State of California.

k. If any provision of this MOU shall be determined by any court to be invalid, illegal, or unenforceable to any extent, the remainder of this MOU shall not be affected, and this MOU shall be construed as if the invalid, illegal, or unenforceable provision had never been contained in this MOU.

l. All PARTIES have been represented by counsel in the preparation and negotiation of this MOU. Accordingly, this MOU shall be construed according to its fair language. Any ambiguities shall be resolved in a collaborative manner by the PARTIES and shall be rectified by amending this MOU as described in paragraph (6)o.

m. Each of the persons signing below on behalf of a PARTY represents and warrants that he or she is authorized to sign this MOU on behalf of such PARTY.

n. Each PARTY shall have no financial obligation to the other PARTIES of this MOU, except as herein expressly provided.

o. The terms and provisions of this MOU may not be amended, modified, or waived, except by an instrument in writing signed by all PARTIES.

p. Early Termination or Withdrawal

    1. This MOU may be terminated upon the express written agreement of all PARTIES. If this MOU is terminated, all PARTIES must agree on the equitable redistribution of remaining funds deposited, if there are any, or payment of invoices due at the time of termination. Completed work shall be owned by all PARTIES. Rights to uncompleted work by the Consultant still under contract will be held by the PARTY or PARTIES who fund the completion of such work.

    2. A PARTY may withdraw from this MOU upon 60 days written notice to the other PARTIES, subject to payment of any invoice received from CITY prior to or during the 60-day notice period for its share of the cost of the work completed as of the date of its notice of withdrawal, calculated in accordance with the cost-sharing percentages set forth in Exhibit A. The effective withdrawal date shall be the sixtieth (60^{th}) day after CITY receives the withdrawing PARTY's notice to withdraw from this MOU. CITY shall refund to the withdrawing PARTY any unused funds paid by the withdrawing PARTY's effective withdrawal date. All PARTIES understand, acknowledge, and agree that withdrawal from this MOU will terminate any responsibility, liability, or obligation of the withdrawing PARTY

under this MOU commencing on the effective withdrawal date and that the withdrawing PARTY shall remain liable for its share of any loss, debt, or liability incurred prior to the withdrawal date, and for any work which could not be suspended. Work completed prior to the effective withdrawal date shall be owned by all PARTIES. Rights to the remaining work will be held by the PARTY or PARTIES who fund the completion of such work. Withdrawal from this MOU does not release any PARTY from the obligations set forth in the MS4 Permit.

3. If a PARTY fails to comply with any of the terms or conditions of this MOU, that PARTY shall forfeit its rights to work completed through this MOU, but no such forfeiture shall occur unless and until the defaulting PARTY has first been given notice of its default and a reasonable opportunity to cure the alleged default.

IN WITNESS WHEREOF, the PARTIES hereto have caused this MOU to be executed by their duly authorized representatives and affixed as of the date of signature of the PARTIES:

CITY OF MALIBU

By ________________________ 10/15/13
JIM THORSEN
CITY MANAGER

Date

ATTEST:

By ________________________ 10.15.13
LISA POPE
CITY CLERK

Date

APPROVED AS TO FORM:

By ________________________
CHRISTI HOGIN
CITY ATTORNEY

COUNTY OF LOS ANGELES

By Christopher Stone

for GAIL FARBER
Director of Public Works

9-19-13
Date

APPROVED AS TO FORM:

John F. Krattli
County Counsel

By

Associate

9/17/2013
Date

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

By Christopher Stone
for GAIL FARBER
Chief Engineer

9-19-13
Date

APPROVED AS TO FORM:

John F. Krattli
County Counsel

By [signature]
Associate

9/17/2013
Date

North Santa Monica Bay Coastal Watersheds EWMP and CIMP
Funding Contributions

Consultant Contract Cost = $446,200

Funding Contributions

The LACFCD will contribute 10 percent of the total project cost. Ten (10) percent of the remaining 90 percent of the total project cost will be distributed equally between the other PARTIES (i.e., the City of Malibu and the County of Los Angeles); this shall be known as the Base Fee. The remaining balance will be distributed based on the percent of the combined land area for which each PARTY is responsible.

Table 1: Agency Contributions

Party	Base Fee	Land Area (Acres)	Percent of Land Area	Contribution Based on Land Area	Total Contribution toward Consultant Contract	Contract Administration Fee	Total
LACFCD	N/A	N/A	N/A	N/A	$44,620	$4,462	$49,082
City of Malibu	$20,079	12,659	22.9658%	$83,004	$103,083	N/A	$103,083
County of Los Angeles	$20,079	42,462	77.0342%	$278,418	$298,497	$29,850	$328,347
Total	$40,158	55,121	100%	$361,422	$446,200	$34,312	$480,512

Table 2: Invoicing Timeline

Party	1st Invoice (50%) [See note 1]	2nd Invoice (50%) July 1, 2014	Total Invoice Amount	Contingency (10%) [See note 2]	Total Including Contingency
LACFCD	$24,541	$24,541	$49,082	$4,908	$53,900
City of Malibu	$51,541	$51,541	$103,083	$10,308	$113,391
County of Los Angeles	$164,174	$164,174	$328,347	$32,835	$361,182
Total	$240,256	$240,256	$480,512	$48,051	$528,563

Notes:

1. The first invoice shall be sent once the MOU becomes effective, as set for in Section 4, or on October 1, 2013, whichever comes first
2. The ten percent (10%) contingency includes a 10 percent contingency on the cost of the consultant contract plus the corresponding contract administration fee.

EXHIBIT B

North Santa Monica Bay Coastal Watersheds EWMP
Responsible Agencies Representatives

1. City of Malibu
   Public Works Department
   23825 Stuart Ranch Road
   Malibu, CA 92065
   Rob DuBoux
   E-mail: rduboux@malibucity.org
   Phone: (310) 456-2489 x339
   Fax: (310) 317-0950

2. County of Los Angeles
   Department of Public Works
   Watershed Management Division, 11th Floor
   900 South Fremont Avenue
   Alhambra, CA 91803-1331
   Angela George
   E-mail: ageorge@dpw.lacounty.gov
   Phone: (626) 458-4300
   Fax: (626) 457-1526

3. Los Angeles County Flood Control District
   Department of Public Works
   Watershed Management Division, 11th Floor
   900 South Fremont Avenue
   Alhambra, CA 91803-1331
   Gary Hildebrand
   E-mail: ghildeb@dpw.lacounty.gov
   Phone: (626) 458-4300
   Fax: (626) 457-1526

ATTACHMENT B

LETTERS OF INTENT

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

GAIL FARBER, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

June 24, 2013

IN REPLY PLEASE
REFER TO FILE: WM-7

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

Attention Ms. Renee Purdy

Dear Mr. Unger:

**LETTER OF INTENT – COUNTY OF LOS ANGELES
NORTH SANTA MONICA BAY COASTAL WATERSHEDS
ENHANCED WATERSHED MANAGEMENT PROGRAM
AND COORDINATED INTEGRATED MONITORING PROGRAM**

The County of Los Angeles (County) submits this Letter of Intent to participate in and share the cost of the development of an Enhanced Watershed Management Program (EWMP) and a Coordinated Integrated Monitoring Program (CIMP) with the North Santa Monica Bay Coastal Watersheds Group. This Letter of Intent serves to satisfy the EWMP notification requirements of Section VI.C.4.b.iii(3) of Order No. R4-2012-0175 (Municipal Separate Storm Sewer System Permit) and the CIMP requirements of Section IV.C.1 of Attachment E of the Municipal Separate Storm Sewer System Permit.

The North Santa Monica Bay Coastal Watersheds Group consists of the following agencies: City of Malibu as coordinating agency for EWMP and CIMP development, County, and Los Angeles County Flood Control District. The North Santa Monica Bay Coastal Watersheds Group has included a final draft Memorandum of Understanding as Attachment A of the Notice of Intent. The County intends to submit a final Memorandum of Understanding to its Board of Supervisors for approval prior to December 28, 2013.

If you have any questions, please contact Ms. Angela George at (626) 458-4325 or ageorge@dpw.lacounty.gov.

Very truly yours,

GAIL FARBER
Director of Public Works

MB:jht
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cc: City of Malibu (Jennifer Brown, Rob DuBoux)

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

GAIL FARBER, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: WM-7

June 24, 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

Attention Ms. Renee Purdy

Dear Mr. Unger:

LETTER OF INTENT – LOS ANGELES COUNTY FLOOD CONTROL DISTRICT NORTH SANTA MONICA BAY COASTAL WATERSHEDS ENHANCED WATERSHED MANAGEMENT PROGRAM AND COORDINATED INTEGRATED MONITORING PROGRAM

The Los Angeles County Flood Control District (LACFCD) submits this Letter of Intent to participate in and share the cost of the development of an Enhanced Watershed Management Program (EWMP) and a Coordinated Integrated Monitoring Program (CIMP) with the North Santa Monica Bay Coastal Watersheds Group. This Letter of Intent serves to satisfy the EWMP notification requirements of Section VI.C.4.b.iii(3) of Order No. R4-2012-0175 (Municipal Separate Storm Sewer System Permit) and the CIMP requirements of Section IV.C.1 of Attachment E of the Municipal Separate Storm Sewer System Permit.

The North Santa Monica Bay Coastal Watersheds Group consists of the following agencies: City of Malibu as coordinating agency for EWMP and CIMP development, County of Los Angeles, and LACFCD. The North Santa Monica Bay Coastal Watersheds Group has included a final draft Memorandum of Understanding as Attachment A of the Notice of Intent. The LACFCD intends to submit a final Memorandum of Understanding to the County of Los Angeles Board of Supervisors (which is the LACFCD's governing body) for approval prior to December 28, 2013.

If you have any questions, please contact Ms. Terri Grant at (626) 458-4309 or tgrant@dpw.lacounty.gov.

Very truly yours,

for GAIL FARBER
Chief Engineer of the Los Angeles County Flood Control District

MB:jht
P:\wmpub\Secretarial\2013 Documents\Letter\LOI NSMBCW LACFCD.doc\C13182

cc: City of Malibu (Jennifer Brown, Rob DuBoux)

City of Malibu

23825 Stuart Ranch Road · Malibu, California · 90265-4861
Phone (310) 456-2489 · Fax (310) 456-3356 · www.malibucity.org

June 26, 2013

Samuel Unger, Executive Officer
Los Angeles Regional Water Quality Control Board
320 W. Fourth Street, Suite 200
Los Angeles, CA 90013

RE: Participation in the North Santa Monica Bay Coastal Watersheds Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program

Dear Mr. Unger:

The City of Malibu is confirming its intent to participate in the development of and share the cost of the North Santa Monica Bay Coastal Watersheds Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP). This Letter of Intent serves to satisfy the notification requirements of Section VI.C.4.b.iii (3) and Section IV.C.1 of Attachment E of Order No. R4-2012-0175 (Permit). The final Memorandum of Understanding between the City and other participating agencies is scheduled for approval by Malibu City Council prior to December 28, 2013.

The North Santa Monica Bay Coastal Watersheds agencies subject to the Permit and participating in this EWMP and CIMP include the City of Malibu, County of Los Angeles, and the Los Angeles County Flood Control District. The City is taking an active role as the coordinating agency in this effort. There are additional agencies which have land draining to the North Santa Monica Bay Coastal Watersheds that are not currently participating in this EWMP and CIMP. Some are agencies which are already participating in other local EWMPs. Others are Caltrans, National Parks Service, California Department of Parks and Recreation, the Santa Monica Mountains Conservancy, and Mountains Recreation Conservation Authority. Therefore, lands owned by those agencies are not included in the subject EWMP coverage area. However, the participants are making efforts to collaborate and/or include other agencies in the process where feasible.

Should you have any questions, please contact Jennifer Brown, Senior Environmental Programs Coordinator at (310) 456-2489 extension 275 or jbrown@malibucity.org, or Rob DuBoux, Senior Civil Engineer, on extension 339 or rduboux@malibucity.org.

Sincerely,

Jim Thorsen
City Manager

cc: County of Los Angeles

Recycled Paper

ATTACHMENT C

Broad Beach Project

Jurisdictional Group	Permittee	Structural BMP or Suite of BMPs to be Implemented	Planned Implementation Date
SMB JG 1	City of Malibu	**Broad Beach Biofiltration Project** – installation of biofilters at 8 catch basins on Broad Beach Road.	January 2014 (Commencement of Construction) June 2014 (Completion)

BACKGROUND/DESCRIPTION

The Broad Beach Biofiltration Project is located in JG1 in Northern Malibu on Broad Beach, near the intersection of Pacific Coast Highway (PCH) and Trancas Canyon Road, adjacent to ASBS areas. Broad Beach Road parallels and is located at the toe of the PCH embankment slope. Single family residential homes separate Broad Beach Road from the Pacific Ocean. The Project consists of the installation of different types of biofilters at nine catch basins within the City Right of Way, treating stormwater and urban runoff prior to the entering of flows into City-owned catch basins, which discharge to privately owned storm drain systems. The project location is shown below in Figure 1.

Figure 1. Broad Beach Project Locations

Design constraints include proximity to septic systems, slope stability of adjacent Caltrans embankments and slopes, parking restrictions, local geotechnical concerns, and other constraints. An example of a typical Broad Beach Road biofilter (small footprint) is shown below in Figure 2.

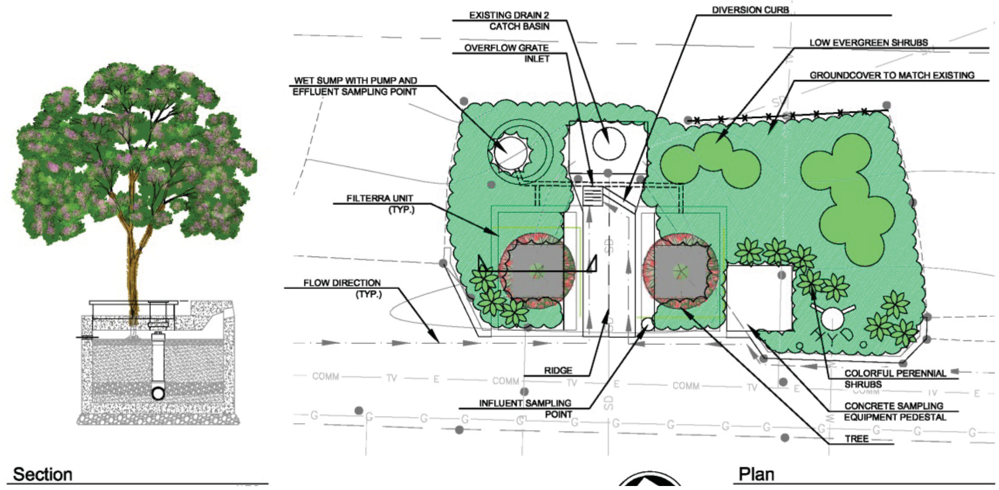

Figure 2. Typical Small Footprint Biofilter

Project includes a combination of biofilters, and flow control, with potential to incorporate harvest and use systems for Malibu drains. In general terms, three types of biofilters are contemplated.

- Small footprint biofilters such as the Filterra™ or Bacterra™ systems, which incorporate flow-based design, smaller right of way requirements, and higher treatment capacity. A schematic of the Filterra system is provided as Figure 3.
- Biofilters with volume control that provide not only biofiltration, but control discharges into the storm drain system though integrated storage and pumping. This is a volume-based design approach. The extended hydraulic residence time in vegetated soil media matrix are design to partially mimic subsurface flow wetland performance and eliminate dry weather flows into the MS4 (catch basin).
- Harvest and use systems incorporated with biofilters are not currently planned but could be contemplated as a future retrofit. This approach seeks to incorporate integrated water resource and potable water offset concepts with water quality. Given local site limitations including steep slopes and onsite wastewater treatment systems, the objective is to store captured water for application to safely apply to landscaping. This design element if incorporated, could examine usage of Opti-RTC (real time controller) technologies for stormwater management, though it is not currently planned.

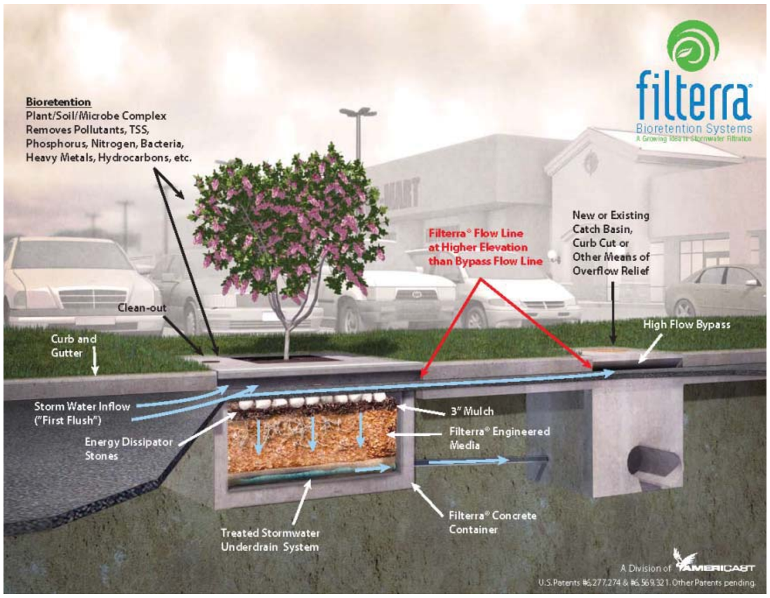

Figure 3. Filterra (TM) Concept

DRAINAGE AREA AND EQUIVALENT WATER QUALITY VOLUMES

Catch basin locations are shown above in Figure 1. The following table (Table 1) lists drainage areas and approximate equivalent design volumes and flow rates for the catch basin locations. Drainage areas are primarily single family residential, roadway, and slope runoff. The basis for design is the Standard Urban Stormwater Mitigation Plan (0.75 in storm).

Table 1.
Approximate Drainage Areas and Equivalent Design Volumes for Project Catchments.

Catchment No.	Drainage Area (Acres)	Runoff Coef. (Cd)	WQ Volume (ft3)[1]	WQ Flow Rate (cfs)
1	2.3	0.29	1794	0.13
2W	0.6	0.17	283	0.02
2E	1.6	0.17	754	0.06
3	0.8	0.20	427	0.03
4	1.5	0.16	651	0.05
5AW	0.9	0.17	422	0.03
5AE	1.7	0.17	797	0.06
6	1.1	0.18	546	0.04
7W	0.8	0.19	413	0.03
7E	0.3	0.19	155	0.01
8	0.8	0.23	494	0.04
Total	12.4		6,736	

POLLUTANT LOAD REDUCTIONS

- For biofilters (flow-through systems) estimates for pollutant loading are provided by the manufacturer for reference. Lab analyses report removal efficiencies ranging from 77% - 99%. Field investigations report removal efficiencies of 95% - 99% for fecal coliform, E.coli,

[1] Note that where flow based BMPs are implemented, the basis for design would be flow based.

and enterococcus; TSS removal efficiencies of 85%. Influent and effluent concentrations are not reported, but given anticipated influent loading, pollutant reduction, particularly for the Bacterra media, is expected to be significant (see Figure 4).
(http://www.filterra.com/index.php/product/bacterra/)

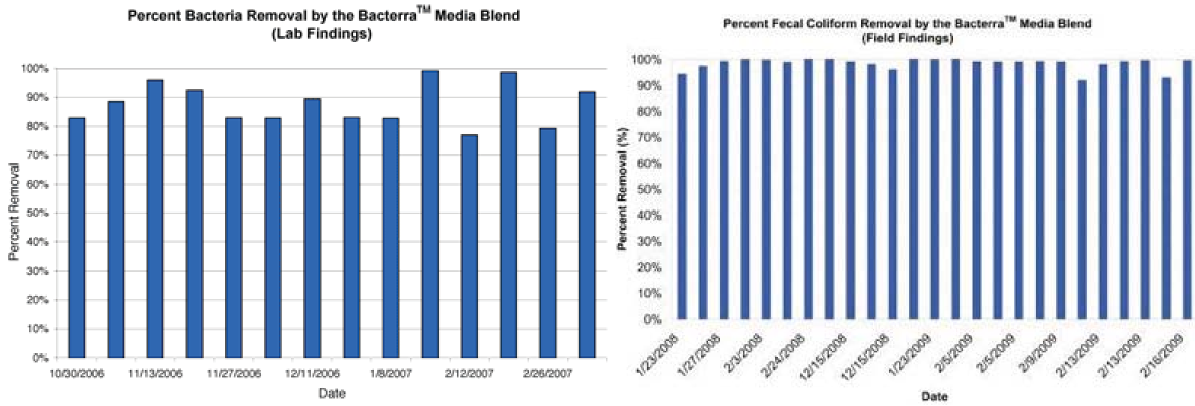

Figure 4. Filterra (TM)/Bacterra reported pollutant removal efficiencies.

- For biofilters with flow control. Water quality is expected to be similar to the quality of subsurface flow wetlands, which have proven to be highly effective for pollutant removal (in many cases 2-log to 3-log removal). Full bacteria treatment is expected for any discharges from biofilters. Furthermore, flow control systems will minimize discharge occurrences, enhancing compliance with the TMDL and ASBS exception provisions.
- For harvest and use systems, though not currently planned, there would be no discharge and therefore captured water would receive 100% pollutant reduction of all stormwater and urban runoff pollutants.

WILDLIFE ROAD

Jurisdictional Group	Permittee	Structural BMP or Suite of BMPs to be Implemented	Planned Implementation Date
SMB JG 1	City of Malibu	**Wildlife Road Storm Drain Improvements –** installation of biofilters along Wildlife Road and Whitesands Place, and catch basin filters at 2 existing catch basins.	September 2013 (Commencement of Construction) April 2014 (Completion)

BACKGROUND/DESCRIPTION

The Wildlife Road Storm Drain Improvements Project is located in JG1 in Northern Malibu on Wildlife Road and Whitesands Place, adjacent to ASBS areas. This project is located within a developed residential neighborhood. Two existing storm drain inlets, SD-1 and SD-2 are located on Whitesands Place and Wildlife Road. The project site map is shown on Figure 5. The Project consists of the installation of bioretention swales and biofilters within the City Right of Way, treating stormwater and urban runoff prior to the entering of flows into City-owned catch basins.

Figure 5. Wildlife Road Storm Drain Improvements Locations

Due to the limited about of space within the City's Right of Way, the project will include a combination of bioretention swales and biofilters.

- Small foot print biofilters such as the Filterra™ or Bacterra™ systems, which incorporate flow-based design, smaller right of way requirements, and higher treatment capacity. A schematic of the Filterra system is provided as Figure 3.
- Bioretention swales will be constructed adjacent to the existing roadway without significant impact to the existing intrastructure (driveways, hardscape and landscaping). The bioretention swales are vegetated shallow depressions that prove above ground storage, evapotranspiration, infiltration, and hydro-modification of stormwater runoff. Runoff from the road way will enter into the bioretention swales where the proposed vegetation will assist in removing the pollutants through plant uptake. The remaining stormwater runoff is infiltrated through the bottom of swale into the native soils

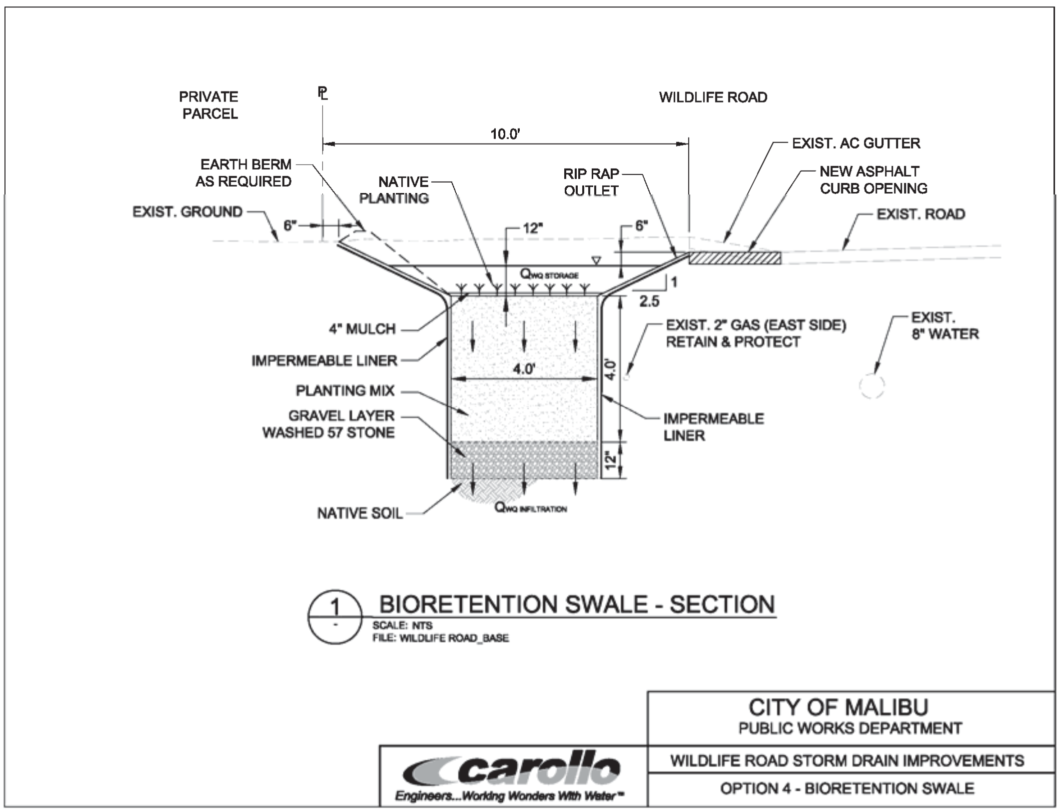

Figure 6. Typical Bioretention Swale

DRAINAGE AREA

Catch basin locations are shown above in 5. The following table (2) lists drainage areas and approximate equivalent design volumes and flow rates for the catch basin locations. Drainage areas are primarily single family residential, and roadway runoff. The basis for design is the Standard Urban Stormwater Mitigation Plan (0.75 in storm).

Table 2.
Approximate Drainage Areas and Equivalent Design Volumes for Project Catchments.

Catchment No.	Drainage Area (acres)	Runoff Coef. (Cd)	WQ Volume (ft3)[2]	WQ Flow Rate (cfs)
SD1	4.91	0.32	4,792	0.35
SD2	3.90	0.47	5,663	0.40
Total	8.81		10,455	

POLLUTANT LOAD REDUCTIONS

- For the Filtera biofilters (flow-through systems) estimates for pollutant loading are provided by the manufacturer for reference. Lab analyses report removal efficiencies ranging from 77% - 99%. Field investigations report removal efficiencies of 95% - 99% for fecal coliform, E.coli, and enterococcus; TSS removal efficiencies of 85%. Influent and effluent concentrations are not reported, but given anticipated influent loading, pollutant reduction, particularly for the Bacterra media, is expected to be significant (see Figure 4).
- For the bioretention swales the water quality is expected to be similar to the quality of subsurface flow wetlands, which have proven to be highly effective for pollutant removal (in many cases 2-log to 3-log removal). Full bacteria treatment is expected since all storm flows captured will be infiltrated. It is expected that these bioretention swales will provide full compliance with the TMDL and ASBS exception provisions.

LEGACY PARK

Jurisdictional Group	Permittee	Structural BMP or Suite of BMPs to be Implemented	Planned Implementation Date
SMB JG 9	City of Malibu	**Malibu Legacy Park Pump Station Improvements –** upgrade the existing storm drain pump stations so that the system can treat an increased volume of runoff.	June 2015 (Completion)

BACKGROUND/DESCRIPTION

Malibu Legacy Park is a Regional Project that provides water quality and water resources benefits. The project exceeds requirements to put over 300 acres of Malibu (including City Hall) into full compliance with Malibu Creek Bacteria TMDL requirements, providing a capture volume consistent with Los Angeles Standard Urban Stormwater Mitigation Plan requirements (assuming no upstream LID or source control measures). Captured water is managed, disinfected, and utilized to offset potable water uses for park irrigation. A schematic of the design flow processes is provided in the schematic below (Figure 7).

[2] Note that where flow based BMPs are implemented, the basis for design would be flow based.

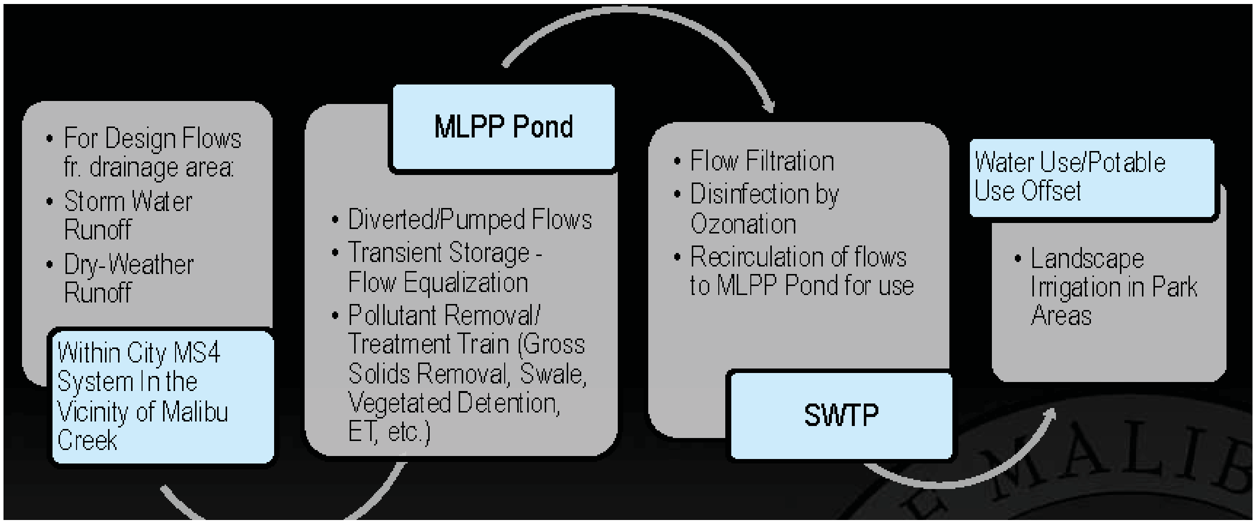

Figure 7. Legacy Park Flow Process

Drainage Area

There are three primary tributary areas associated with the (pre-project) hydrology as shown below in Figure 8. The majority of water originates from the Civic Center Drainage Area and drains directly to Legacy Park. Two smaller drainage areas originate from the Cross Creek (AKA Texaco Drain) drainage area and Malibu Road drainage area. Currently, water from Cross Creek and Malibu Road are pumped through a force main to Legacy Park. The proposed project contemplates an upgrade to the pumping system (Figure 9).

A summary of drainage areas are tabulated below.

- Malibu Road Outfall ~ 55 acres
- Cross Creek (Texaco Drain) ~15 acres
- Civic Center~270 acres
- Total Drainage Area ~ 340 acres

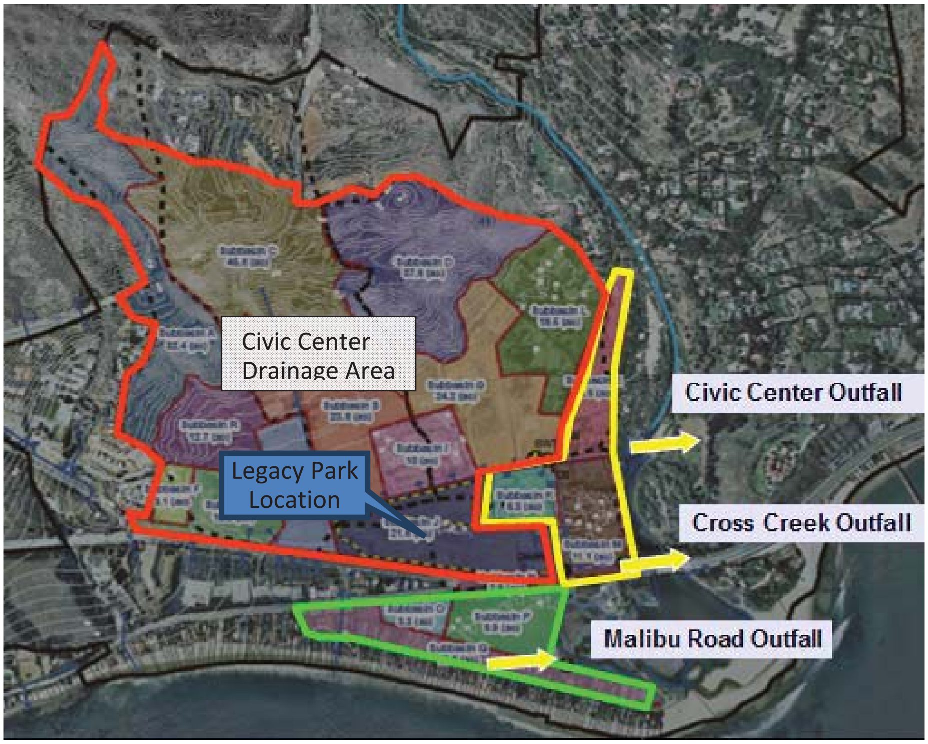

Figure 8. Legacy Park Drainage Areas

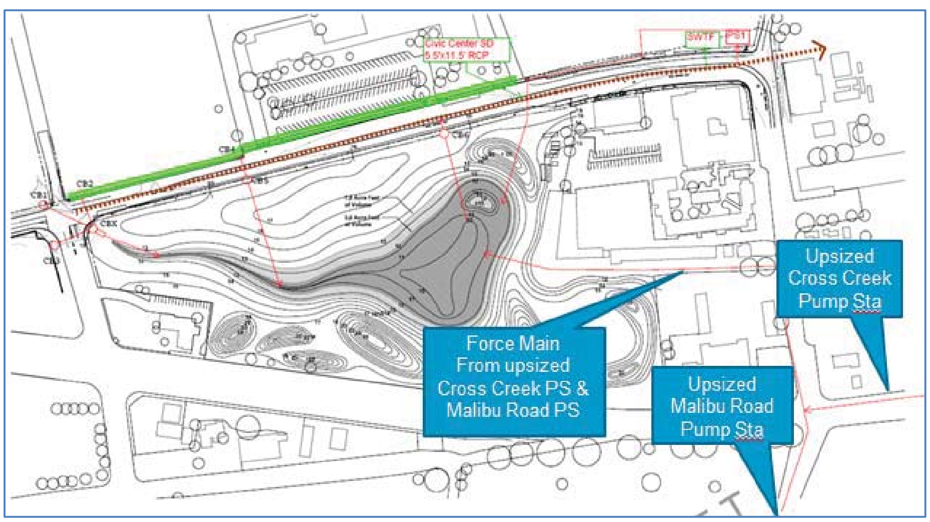

Figure 9. Legacy Park Project Upgrades

Volume of Water Treated

The hydraulics of the Civic Center Drain system were analyzed through a continuous 50-year simulation to model compliance with the Bacteria TMDL. The results of this simulation are provided below in Figure 10. Prior to the project, it was estimated that the Cross Creek and Malibu Road may have exceeded Bacteria TMDL criteria 15-35% of the time. Studies have shown that increasing pumping capacity could increase compliance to 90-98% of the time (Susilo et. al 2007).

The objective of the pump station upgrades is to increase the pumping capacity to capture and convey the 85th Percentile 24-hour storm event to Malibu Legacy Park. The Cross Creek Pump

Station and Malibu Road Pump Station currently have a maximum pumping capacity of 200 gallons per minute. These pump stations will be upgraded with new pumps and other improvements to increase the capacity at these locations.

Currently the park has a storage capacity (utilized for both extended detention and transient water storage) of 8 acre feet, or 348,480 cubic feet. Since the 85th Percentile 24-hour storm event volume for the pond is 240,000 cubic feet, the existing Malibu Legacy Park configuration has sufficient capacity once the pump stations are upgraded.

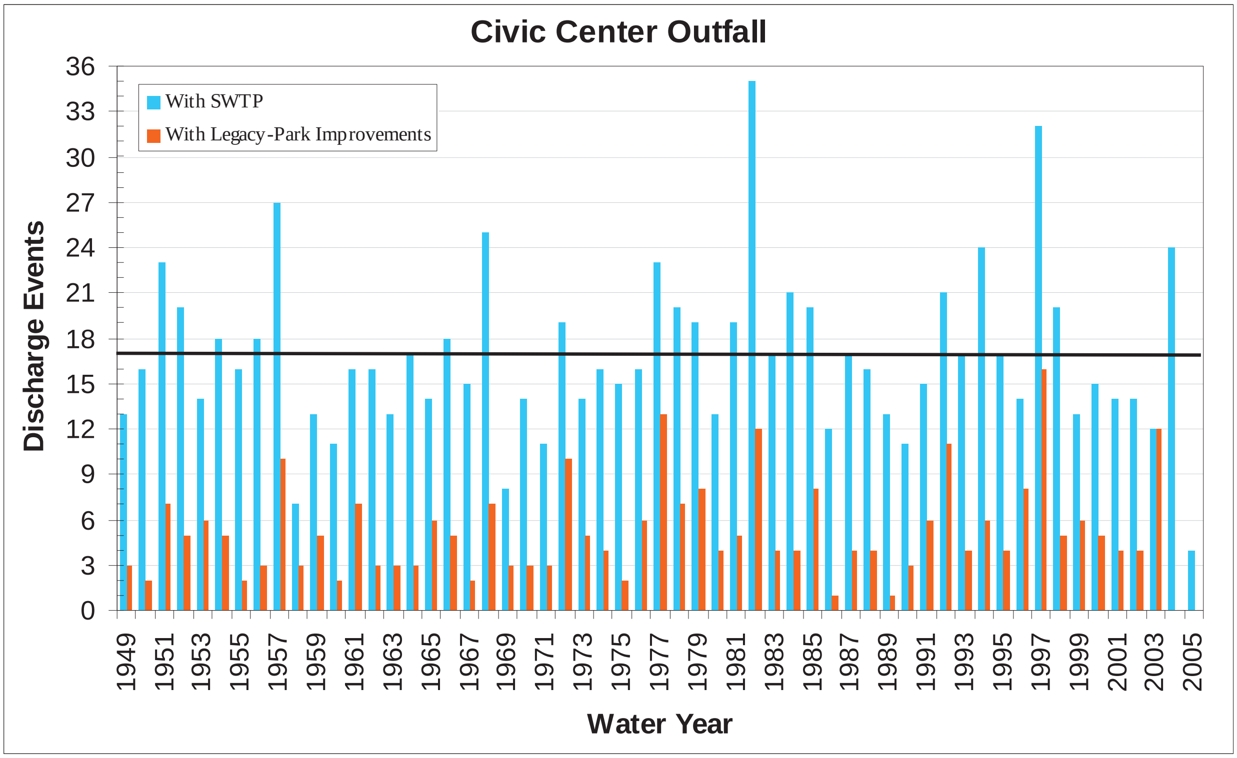

Figure 10. Civic Center Drain TMDL Compliance

Pollutant Load Reductions

As previously stated the capacity of Legacy Park is 8 acre-feet, significantly more than the 85th Percentile 24-hour storm volume. Because this is an actively managed, disinfection, and harvest and use system, it is expected that all pollutant loading associated with this design storm will be fully mitigated.

References

Susilo, Brager, Cameron, West. 2007. Multi-Benefit Stormwater Concept Implementation: Malibu's Legacy Park Project. CASQA Conference. Costa Mesa, CA

APPENDIX B

DRAFT EWMP WORK PLAN

Enhanced Watershed Management Program (EWMP) Work Plan

For the North Santa Monica Bay Coastal Watersheds EWMP Group

Prepared for:

The Los Angeles Regional Water Quality Control Board

June 2014

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LIST OF ACRONYMS

AED	Allowable Exceedance Days
ASBS	Area of Special Biological Significance
ASCE	American Society of Civil Engineers
BMP	Best Management Practice
CEDEN	California Environmental Data Exchange Network
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CIMP	Coordinated Integrated Monitoring Program
CML	Compliance Monitoring Location
CSMP	Coordinated Shoreline Monitoring Plan
CTR	California Toxic Rules
CWA	Clean Water Act
DDT	Dichloro-diphenyl-trichloroethane
ED	Exceedance Day
EMC	Event Mean Concentration
EWMP	Enhanced Watershed Management Program
FIB	Fecal Indicator Bacteria
GIS	Geographic Information System
GM	Geometric Mean
HSPF	Hydrological Simulation Program - Fortran
IBD	International BMP Database
IC/ID	Illicit Connection/Illicit Discharge
LACDBH	Los Angeles County Department of Beaches and Harbors
LACFCD	Los Angeles County Flood Control District
LID	Low Impact Development
LVMWD	Las Virgenes Municipal Water District
MCM	Minimum Control Measure
MPN	Most Probable Number
MST	Microbial Source Tracking
MS4	Municipal Separate Storm Sewer System

NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NSMBCW	North Santa Monica Bay Coastal Watersheds
OWTS	Onsite Wastewater Treatment Systems
PCB	Polychlorinated Biphenyl
QA/QC	Quality Assurance/Quality Control
RAA	Reasonable Assurance Analysis
RWL	Receiving Water Limitation
SBPAT	Structural BMP Prioritization and Analysis Tool
SCCWRP	Southern California Coastal Watershed Research Project
SMB	Santa Monica Bay
SMBB	Santa Monica Bay Beaches
SWMM	Storm Water Management Model
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
TMRP	Trash Monitoring and Reporting Plan
TOC	Total Organic Carbon
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WBPC	Water Body-Pollutant Combination
WERF	Water Environment Research Foundation
WLA	Waste Load Allocation
WMA	Watershed Management Area
WMMS	Watershed Management Modeling System
WQBEL	Water Quality-Based Effluent Limitation
WRF	Water Reclamation Facility

1 INTRODUCTION

The 2012 Municipal Separate Storm Sewer System (MS4) Permit[1] (Permit) was adopted on November 8, 2012 by the Los Angeles Regional Water Quality Control Board (Regional Board) and became effective December 28, 2012. The Permit was created for the purpose of protecting the beneficial uses in the receiving waters in the Los Angeles region by ensuring that MS4s in the County of Los Angeles are not causing or contributing to exceedances of applicable water quality objectives. The Permit allows the permittees to customize their stormwater programs through the development and implementation of an Enhanced Watershed Management Program (EWMP) to achieve compliance with certain receiving water limitations (RWLs) and water quality based effluent limits (WQBELs). Following the adoption of the Permit, the City of Malibu (Malibu), County of Los Angeles (County), and Los Angeles County Flood Control District (LACFCD) agreed to collaborate on the development of an EWMP for the North Santa Monica Bay Coastal Watersheds (NSMBCW, consisting of Santa Monica Bay Jurisdictional Groups 1 and 4 and the portion of Malibu Creek within Malibu's jurisdiction). This group of permittees is referred to as the NSMBCW EWMP Group.

In compliance with Section VI.C.4.b of the Permit, the NSMBCW EWMP Group submitted a Notice of Intent (NOI) to develop an EWMP on June 27, 2013. As a next step in EWMP development, the NSMBCW EWMP Group is required by Section VI.C.4.c.iv of the Permit to submit a work plan for development of the EWMP no later than June 30, 2014. This document has been drafted to serve as the NSMBCW EWMP Work Plan.

The purpose of the Work Plan is to present the basis for, and define the elements of, the methodology that will be utilized by the NSMBCW EWMP Group, specifically by:

- Soliciting meaningful community and stakeholder input (Section VI.C.1.f.v);
- Identifying water quality priorities within the NSMBCW EWMP Area (Section VI.C.5.a);
- Identifying, selecting, and quantifying best management practices (BMPs) to achieve Permit compliance (Section VI.C.5.b); and
- Developing an approach to perform a Reasonable Assurance Analysis (RAA) for the water quality priorities within the watershed (Section VI.C.5.b.iv(5)).

A schedule is included herein which details the timeframe for completion of the EWMP as well as a funding strategy and interim compliance milestones. Furthermore, the EWMP is a dynamic

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

and evolving process, and it will include adaptive management principles to adapt to changes in the watershed.

The NSMBCW EWMP Group is also in the process of developing a Coordinated Integrated Monitoring Program (CIMP) to meet the monitoring requirements set forth in Attachment E of the Permit. The CIMP is not part of this EWMP Work Plan, but will be submitted to the Regional Board as a separate document.

2 Stakeholder Process

Section VI.C.1.f.v of the Permit requires that an opportunity be provided for meaningful stakeholder input to the EWMP. The EWMP Group has initiated both public and focused outreach efforts to support EWMP development. Recently, a public workshop was jointly held with the Malibu Creek Watershed Group on May 22, 2014 at King Gillette Ranch in Calabasas, California. Information presented at this meeting, along with other current and regularly updated EWMP information, is available at the City of Malibu's EWMP web page (www.malibucity.org/EWMP). The Permit also requires participation in the Permit-wide technical advisory committee (TAC), and the NSMBCW EWMP Group has, and will continue to, actively participate in the TAC throughout the EWMP process.

The NSMBCW EWMP Group is planning to conduct additional EWMP-related outreach meetings with community groups, non-government organizations (NGOs), the general public, and/or other potential project partners and stakeholders to solicit input on the content of the EWMP. Feedback received will be considered and incorporated as appropriate.

3 Background and NSMBCW EWMP Area Description

3.1 Geographical Scope and Characteristics

The EWMP Group's geographical area includes the jurisdictional areas for the participating agencies within Santa Monica Bay (SMB) Jurisdictional Group (JG) 1, SMB JG 4, and the portion of SMB JG 9 within the City of Malibu's borders. This area is known as the NSMBCW EWMP Area and is shown in Figure 1. It does not include land owned by other jurisdictions, including the State of California and Federal lands.

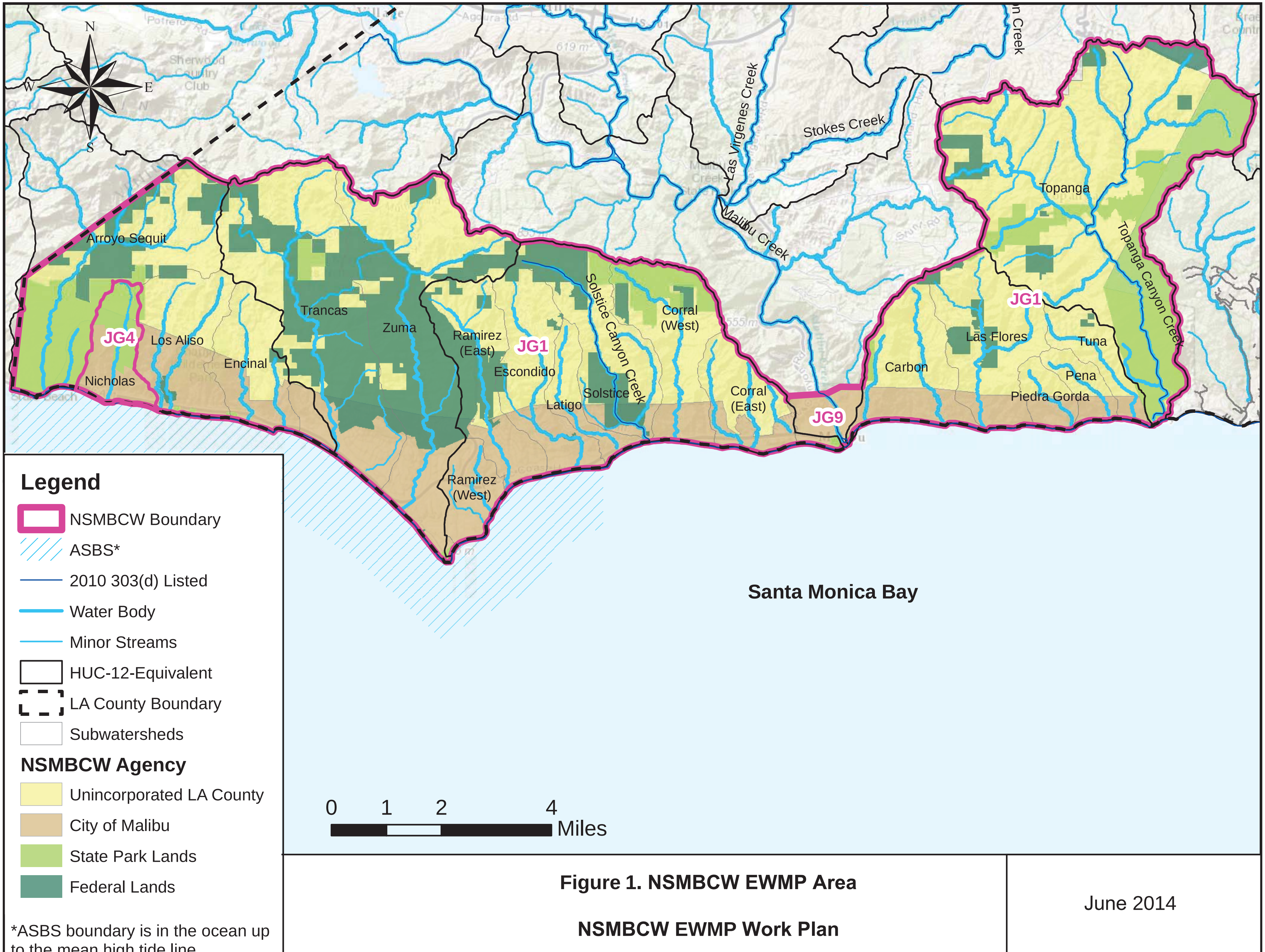


Figure 1. NSMBCW EWMP Area

NSMBCW EWMP Work Plan

June 2014

The NSMBCW EWMP Area encompasses 55,121 acres, including portions of six HUC-12 watersheds, 18 subwatersheds, and 28 freshwater coastal streams as defined by the Los Angeles Basin Plan (Regional Board, 1995. Updated 2011). Each coastal stream is directly tributary to SMB. The EWMP Area is over 93% vacant land, with minimal EWMP Group-owned storm drains serving the undeveloped areas. Of the 7% of the watershed that is developed, a majority is not served by a traditional storm drain system. Many roads do not have curbs and gutters. The majority of drains owned by the EWMP Group Agencies are limited to culverts that simply transport water from one side of a road to the other. The EWMP Group land use breakdowns by JG and HUC-12 watershed are shown in Table 3-1. Land use is also shown in Figure 2.

Table 3-1. Land Use Distributions within the NSMBCW EWMP Area

JG	HUC-12 Watershed	Vacant (%)	Agriculture (%)	Commercial (%)	SFR[a] (%)	MFR[a] (%)	Industrial[b] (%)	Education (%)
1	Zuma Canyon	89.0%	1.9%	0.5%	7.7%	0.5%	0.1%	0.3%
1	Solstice Canyon	87.7%	0.7%	0.6%	8.8%	0.7%	0.1%	1.4%
1	Santa Monica Beach	91.7%	0.0%	0.8%	7.0%	0.4%	0.0%	0.0%
1	Garapito Creek	94.9%	0.6%	0.2%	4.1%	0.2%	0.0%	0.1%
1/4	Arroyo Sequit	96.5%	0.9%	0.2%	2.2%	0.1%	0.0%	0.0%
9	Cold Creek-Malibu Creek	95.8%	0.7%	0.2%	3.0%	0.2%	0.2%	0.0%
	Total	93.1%	0.8%	0.4%	5.0%	0.3%	0.1%	0.3%

[a] SFR = Single Family Residential; MFR = Multi-Family Residential

[b] Minor areas within the NSMBCW CIMP Area are zoned for industrial use, although the actual land use is not associated with manufacturing or similar industrial activities.

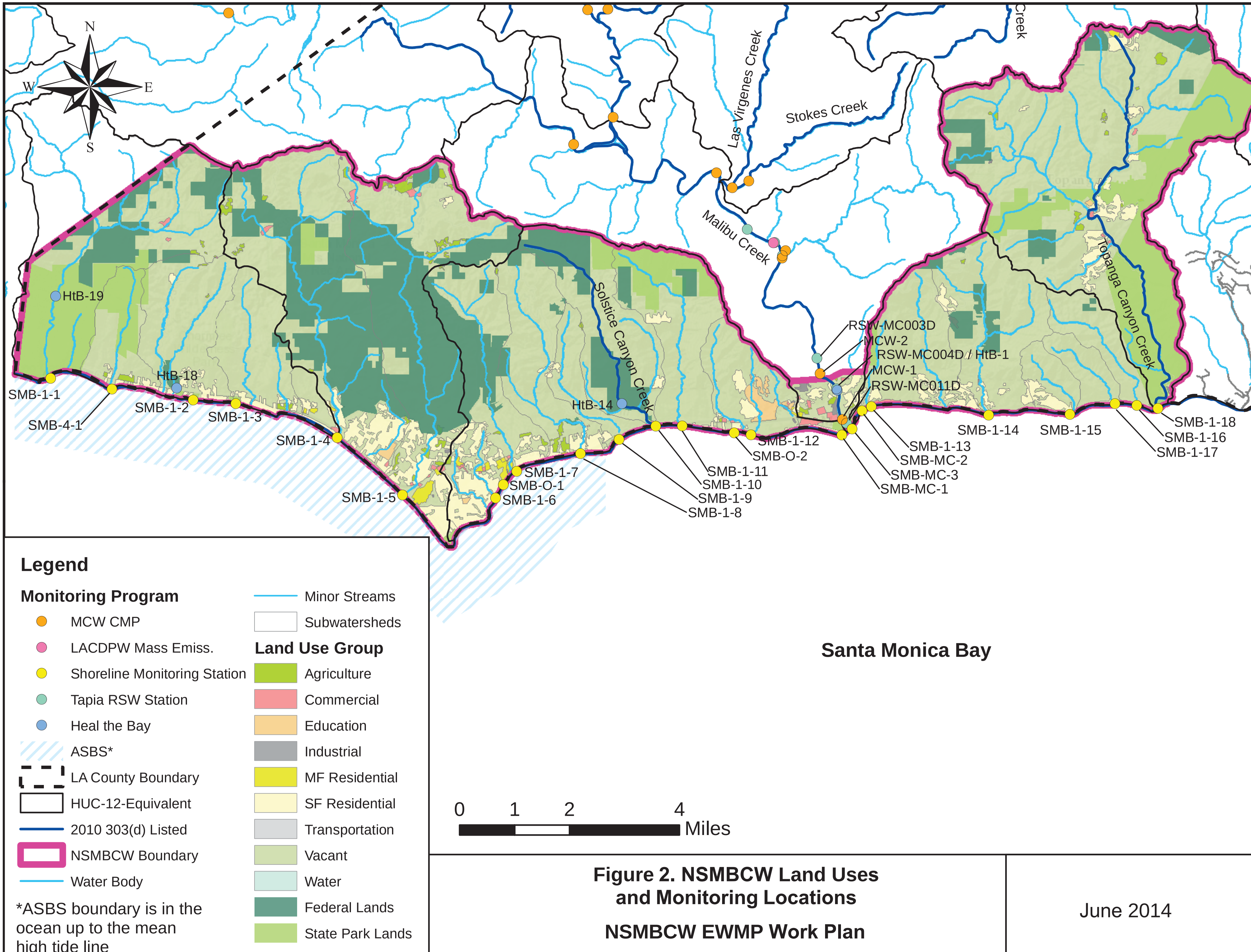


Figure 2. NSMBCW Land Uses and Monitoring Locations

NSMBCW EWMP Work Plan

June 2014

3.2 Receiving Water Bodies

The NSMBCW subwatersheds are tributary to Santa Monica Bay. Figure 1 identifies the receiving waters in these jurisdictions, as depicted in the Water Quality Control Plan, Los Angeles Region (Basin Plan) (Regional Board, 1995, Updated 2011). All receiving water bodies are ultimately tributary to the SMB, thus making the regulations set forth in the California Ocean Plan (SWRCB, 2012a) applicable to the NSMBCW. The Ocean Plan regulates waste discharges to protect the quality of ocean waters for use and enjoyment by the general public. In particular, the Ocean Plan designates Areas of Special Biological Significance (ASBS), which are areas requiring special protection of species or biological communities to the extent that maintenance of natural water quality is assured. One of these ASBS designations within the NSMBCW area includes the area from Laguna Point to Latigo Point, known as ASBS 24. The Permit defines this area as:

"Ocean water within a line originating from Laguna Point at 34° 5' 40" north, 119° 6'30" west, thence southeasterly following the mean high tideline to a point at Latigo Point defined by the intersection of the mean high tide line and a line extending due south of Benchmark 24; thence due south to a distance of 1000 feet offshore or to the 100 foot isobath, whichever distance is greater; thence northwesterly following the 100 foot isobath or maintaining a 1,000-foot distance from shore, whichever maintains the greater distance from shore, to a point lying due south of Laguna Point, thence due north to Laguna Point."

As a result of this ASBS designation, the NSMBCW agencies were required by the State Water Resources Control Board (SWRCB) to either cease the discharge of stormwater and nonpoint sources of waste into ASBS 24 or request an exception to the Ocean Plan. The NSMBCW agencies each submitted a request for an exception. In March of 2012, the SWRCB granted these exceptions, finding that such discharge exceptions will not compromise protection of ocean waters for beneficial uses. As a stipulation of the exceptions, discharges by the NSMBCW agencies are required to meet the following criteria:

- The discharges must be covered under an appropriate authorization to discharge waste to the ASBS, such as an NPDES permit and/or waste discharge requirements;
- The authorization must incorporate all of the Special Protections required by the SWRCB in Resolution No. 2012-0012 (SWRCB, 2012b); and
- The exception applies to stormwater and nonpoint source waste discharges only.

The details of the Ocean Plan exceptions are provided in SWRCB Resolution No. 2012-0012 (SWRCB, 2012b).

In addition to the Ocean Plan, the Basin Plan also sets forth water quality regulations which are applicable to the NSMBCW agencies. These regulations are based on assigned beneficial uses to receiving water bodies. Beneficial use designations for these water bodies within the NSMBCW include the following:

- Municipal and Domestic Supply (MUN),
- Ground Water Recharge (GWR),
- Navigation (NAV),
- Water Contact Recreation (REC-1),
- Non-Contact Water Recreation (REC-2),
- Warm Freshwater Habitat (WARM),
- Cold Freshwater Habitat (COLD),
- Estuarine Habitat (EST),
- Marine Habitat (MAR),
- Wildlife Habitat (WILD),
- Rare, Threatened, or Endangered Species (RARE),
- Migration of Aquatic Organisms (MIGR),
- Spawning, Reproduction, and/or Early Development (SPWN), and
- Wetland Habitat (WET).

Table 3-2 summarizes the beneficial uses for each water body in the NSMBCW geographical area, as designated in the Basin Plan.

Table 3-2. NSMBCW Water Bodies and Beneficial Uses Designated in the Basin Plan

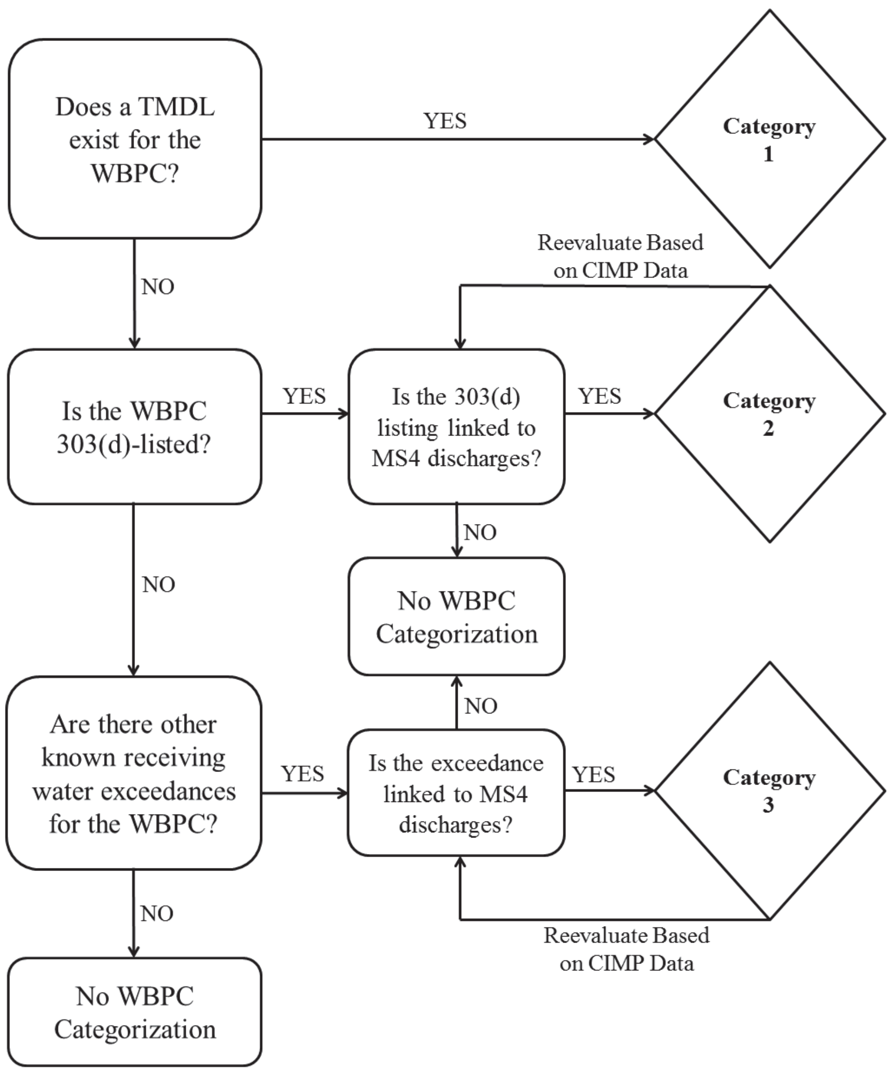
Water Body	MUN	GWR	NAV	REC1	REC2	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	WET[a]
Malibu Lagoon			E	E	E			E	E	E	E	E	E	E
Malibu Creek	P*			E	E	E	E			E	E	E	E	E
Arroyo Sequit	P*	I		E	E	E	E			E	E	E	E	E
Nicholas Canyon Creek	P*			I	I	I				E				
Los Alisos Canyon Creek	P*			I	I	I				E	E			
Lechuza Canyon Creek	P*			I	I	I				E				
Encinal Canyon Creek	P*			I	I	I				E	E			
Trancas Canyon Creek	E*			E	E	E				E	E			
Zuma Canyon Creek	E*			E	E	E	E			E	E	P	P	
Ramirez Canyon Creek	I*			I	I	I				E			P	
Escondido Canyon Creek	I*			I	I	I				E	E			
Latigo Canyon Creek	I*			I	I	I				E	E			
Puerco Canyon Creek	I*			I	I	I				E				
Solstice Canyon Creek	E*			E	E	E				E		P	P	
Corral Canyon Creek	I*			I	I	I				E				
Carbon Canyon Creek	P*			I	I	I				E				
Las Flores Canyon Creek	P*			I	I	I				E				
Piedra Gorda Canyon Creek	P*			I	I	I				E				
Pena Canyon Creek	P*			I	I	I	E			E				
Tuna Canyon Creek	P*			I	I	I				E				
Topanga Canyon Creek	P*			I	I	E	E			E		P	I	

E = Existing beneficial use
I = Intermittent beneficial use
P = Potential beneficial use
*Asterisked MUN designations are designated under SB 88-63 and RB 89-03. Some designations may be considered for exemption at a later date.
[a] Water bodies designated as WET may have wetlands habitat associated with only a portion of the water body. Any regulatory action would require a detailed analysis of the area.

4 WATER BODY-POLLUTANT PRIORITIZATION

As part of the Work Plan, the Permit requires the NSMBCW EWMP Group to identify water quality priorities within their watershed management area (WMA). To accomplish this, receiving waters within the NSMBCW EWMP Area were screened for water quality priorities by reviewing Total Maximum Daily Loads (TMDLs), the State's 303(d) list, and additional water quality data. Each identified water quality priority for a given receiving water body was categorized as a water body-pollutant combination (WBPC). Figure 3 provides a brief conceptual overview of the process used to identify and categorize the WBPCs within the NSMBCW EWMP Area.

Figure 3. Process for Categorizing Water Body-Pollutant Combinations



This section of the EWMP Work Plan presents the evaluation of the water quality conditions within the geographical scope of the NSMBCW EWMP, identifies water quality priorities, determines water body-pollutant classifications, and assesses pollutant sources.

4.1 Water Quality Objectives/Criteria

The 2010 Clean Water Act (CWA) Integrated Report and updated 303(d) list were approved by the State Water Resources Control Board on August 4, 2010 and by the United States Environmental Protection Agency (USEPA) on October 11, 2011. The 2010 303(d)-listed water bodies and associated pollutants within the NSMBCW are summarized in Table 4-1 below.

Table 4-1. 2010 303(d)-Listed Water Bodies in NSMBCW

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 Trash 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
Solstice Canyon Creek	Miscellaneous	Invasive species	Not a Stormwater Issue
Topanga Canyon Creek	Metals/Metalloids	Lead	TMDL Does Not Currently Exist
Malibu Creek	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
	Nutrients	Nutrients (Algae)	Addressed by USEPA Nutrient TMDL and USEPA Benthic TMDL
	Hydromodification	Fish Barriers (Fish Passage)	Not a Stormwater Issue
	Sediment	Sedimentation/Siltation	Addressed by USEPA Benthic TMDL
	Nuisance	Scum/Foam- Unnatural	Addressed by Nutrient TMDL
	Metals	Selenium	TMDL Does Not Currently Exist
	Trash	Trash	Addressed by Trash TMDL
	Other Inorganics	Sulfates	TMDL Does Not Currently Exist
	Miscellaneous	Invasive Species	Not a Stormwater Issue
		Benthic-Macroinvertebrate Bioassessments	Addressed by USEPA Benthic TMDL
Malibu Lagoon	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
		Swimming Restrictions	Addressed by Bacteria TMDL
		Viruses (enteric)	Addressed by Bacteria TMDL
	Nutrients	Eutrophic	Addressed by Nutrient TMDL and USEPA Benthic TMDL
	Miscellaneous	Benthic Community Effects	Addressed by USEPA Benthic TMDL
		pH	TMDL Does Not Currently Exist

The water bodies listed in Table 4-1 are subject to water quality objectives in the Basin Plan, or Basin Plan Amendments, such as those to implement TMDLs. There are currently eight TMDLs in effect for the water bodies within the NSMBCW geographical scope as listed in Attachment M of the MS4 Permit, plus two TMDLs which have not yet been approved by the USEPA and are therefore not yet effective. These TMDLs are summarized in Table 4-2.

Table 4-2. NSMBCW TMDLs

TMDL Name	Agency	Effective Date
SMB Beaches (SMBB) Bacteria TMDL, Reconsideration of Certain Technical Matters of the SMBB Bacteria TMDL, Resolution R12-007[a]	Regional Board	Not yet effective
Malibu Creek and Lagoon Bacteria TMDL, Resolution R12-009[a]	Regional Board	Not yet effective
Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments (Benthic TMDL)	USEPA	July 2, 2013
SMB TMDL for DDT and PCBs	USEPA	March 26, 2012
SMB Nearshore Debris TMDL, Resolution R10-010	Regional Board	March 20, 2012
Malibu Creek Watershed Trash TMDL, Resolution R4-2008-007	Regional Board	July 7, 2009
TMDL for Bacteria in the Malibu Creek Watershed, Resolution 2004-019R	Regional Board	January 24, 2006
SMB Beaches (SMBB) Bacteria TMDL, Dry Weather, Resolution 2002-004[b]	Regional Board	July 15, 2003
SMB Beaches (SMBB) Bacteria TMDL, Wet Weather, Resolution 2002-022[b]	Regional Board	July 15, 2003
Malibu Creek Watershed Nutrients TMDL (Nutrient TMDL)	USEPA	March 21, 2003

[a] This TMDL revision is not yet approved by USEPA.
[b] This TMDL was revised pursuant to Resolution R12-2007.

Table 4-3 identifies the applicable Water Quality Based Effluent Limitations (WQBELs) and/or Receiving Water Limitations (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. Pollutant-specific compliance deadlines are discussed in Section 4.4 below.

Table 4-3. Final Permit RWLs and WQBELs for NSMBCW TMDLs

TMDL	Parameter	Effluent Limitation/ Receiving Water Limitation
SMB Nearshore Debris TMDL	Trash	Zero
	Plastic Pellets	Zero
SMB PCBs/DDT TMDL	DDT[a]	27.08 g/yr (based on 3-year avg)
	PCBs[a]	140.25 g/yr (based on 3-year avg)
SMBB Bacteria TMDL	Total coliform (daily maximum)	10,000/100 mL
	Total coliform (daily maximum), if the ratio of fecal-to-total coliform exceeds 0.1	1,000/100 mL
	Fecal coliform (daily maximum)	400/100 mL
	Enterococcus (daily maximum)	104/100 mL
	Total coliform (geometric mean[b])	1,000/100 mL
	Fecal coliform (geometric mean[b])	200/100 mL
	Enterococcus (geometric mean[b])	35/100 mL
Malibu Creek and Lagoon Bacteria TMDL	Total coliform (daily maximum) –Malibu Lagoon	10,000/100 mL
	Total coliform (daily maximum), if the ratio of fecal-to-total coliform exceeds 0.1-Malibu Lagoon	1,000/100 mL
	Fecal coliform (daily maximum) –Malibu Lagoon	400/100 mL
	Enterococcus (daily maximum)-Malibu Lagoon	104/100 mL
	E. coli (daily maximum) – Malibu Creek	235/100 mL
	Total coliform (geometric mean[b]) –Malibu Lagoon	1,000/100 mL
	Fecal coliform (geometric mean[b]) –Malibu Lagoon	200/100 mL
	Enterococcus (geometric mean[b]) –Malibu Lagoon	35/100 mL
	E. coli (geometric mean[b]) – Malibu Creek	126/100 mL
Malibu Creek Watershed Trash TMDL	Trash	Zero
Malibu Creek Watershed Nutrients TMDL	Nitrate + Nitrite (summer daily maximum) [a]	8 lbs/day (based on 1.0 mg/L numeric target)
	Total Phosphorus (summer daily maximum) [a]	0.8 lbs/day (based on 0.1 mg/L numeric target)
	Nitrate + Nitrite (winter daily maximum) [a]	8 mg/L
Malibu Creek and Lagoon Benthic TMDL	Total Nitrogen (summer)[c]	0.65 mg/L
	Total Phosphorus (summer)[c]	0.1 mg/L
	Total Nitrogen (winter)[c]	4.0 mg/L
	Total Phosphorus (winter)[c]	0.2 mg/L

[a] The Permit identifies these thresholds as grouped WLAs without identifying them as RWLs or WQBELs, which imply where the point of compliance is located (i.e., receiving water or MS4 outfall). Group load-based WLAs are for the applicable MS4 discharger group; the individual load-based WLAs for each NSMBCW MS4 agency would be area-weighted fractions of these.

[b] The rolling 30-day geometric mean is calculated based on the previous 30 days. If weekly sampling is conducted, the weekly sampling result will be assigned to the remaining days of the week. The reopened 2012 TMDL, which has not yet been approved by USEPA, modified this to weekly calculation of a rolling six week geometric mean using five or more samples, starting all calculation weeks on Sunday.

[c] Values shown are TMDL WLAs, and are not yet explicitly included in the Permit (e.g., as RWLs or WQBELs).

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 AEDs are summarized in Table 4-4 below. The CSMP monitoring stations are shown in Figure 2. These final grouped RWLs are currently effective for dry weather and will be effective for wet weather on July 15, 2021.

Table 4-4. Allowable Number of Exceedance Days for NSMBCW Shoreline Monitoring Stations

Station	Station Name	Summer Dry Weather (Apr 1 – Oct 31)		Winter Dry Weather (Nov 1 – Mar 31)		Wet Weather (Year-Round)	
		Daily Sample[a]	Weekly Sample	Daily Sample[a]	Weekly Sample	Daily Sample[a]	Weekly Sample
SMB 1-1	Leo Carillo Beach (REFERENCE BEACH)	0	0	9	2	17	3
SMB 1-2	El Pescador State Beach	0	0	1	1	5	1
SMB 1-3	El Matador State Beach[b]	0	0	1	1	3	1
SMB 1-4	Trancas Creek	0	0	9	2	17	3
SMB 1-5	Zuma Creek	0	0	9	2	17	3
SMB 1-6	Walnut Creek	0	0	9	2	17	3
SMB 1-7	Ramirez Creek	0	0	9	2	17	3
SMB 1-8	Escondido Creek	0	0	9	2	17	3
SMB 1-9	Latigo Canyon Creek	0	0	9	2	17	3
SMB 1-10	Solstice Creek	0	0	5	1	17	3
SMB 1-11	Wave wash of unnamed creek on Puerco Beach	0	0	9	2	17	3
SMB 1-12	Marie Canyon Storm Drain on Puerco Beach	0	0	9	2	17	3
SMB 1-13	Sweetwater Creek on Carbon Beach	0	0	9	2	17	3
SMB 1-14	Las Flores Creek	0	0	6	1	17	3
SMB 1-15	Big Rock Beach at 19948 Pacific Coast Hwy[b]	0	0	9	2	17	3
SMB 1-16	Pena Creek	0	0	3	1	14	2
SMB 1-17	Tuna Canyon Creek	0	0	7	1	12	2
SMB 1-18	Topanga Creek	0	0	9	2	17	3
SMB 4-1	San Nicholas Canyon Creek	0	0	4	1	14	2
SMB MC-1	Malibu Point, Malibu Colony Dr.	0	0	9	2	17	3
SMB MC-2	Surfrider Beach (breach point of Malibu Lagoon)	0	0	9	2	17	3
SMB MC-3	Malibu Pier on Carbon Beach	0	0	9	2	17	3

[a] SMB 1-18 and MC-2 are the only monitoring sites that are sampled daily; all others are sampled weekly (on average).

[b] SMB 1-3 and 1-15 are both open beach monitoring locations which are not associated with creeks or storm drain outfalls.

4.2 Characterization of Receiving Water Quality

Water-quality conditions were characterized based on available data. A review of previous studies was conducted to characterize the receiving water bodies within the NSMBCW subwatersheds. The characterization process consisted of the following steps:

1. Gathering relevant data and information from numerous sources including, but not limited to, 303(d) listings, WQBELs, RWLs, established TMDLs, bacteria data analyzed as part of the CSMP, Bight ’08, Heal the Bay, nutrient data from Las Virgenes Municipal Water District (LVMWD, 2011), and Joint Powers Authority of the LVMWD/Triunfo Sanitation District; and
2. Conducting a data analysis to identify constituents with exceedances of water quality objectives.

The receiving water quality analysis resulted in the list of prioritized pollutants summarized in Section 4.4 below.

4.3 Characterization of Discharge Quality

Stormwater and non-stormwater discharges have not been well characterized within the NSMBCW EWMP Area. No data were available for this assessment, but discharge characterization will occur as part of the implementation of the CIMP. It is unlikely that data from the CIMP will be available for EWMP development. As a result, if needed to support the source assessment or sequencing, information from regional studies and/or TMDL technical reports may be used to characterize the discharge.

4.4 Water Body-Pollutant Prioritization

Based on the water quality characterization performed by the NSMBCW EWMP Group, the water body-pollutant combinations were classified into one of three categories, in accordance with Section IV.C.5(a).ii of the Permit. This categorization is intended to prioritize water body-pollutant combinations in order to guide the implementation of structural and institutional BMPs. The three categories include:

- Category 1 (Highest Priority): WBPCs for which WQBELs and/or RWLs have been established in an approved TMDL.
- Category 2 (High Priority): Pollutants for which data indicate water quality impairment in the receiving water according to the State’s 303(d) list and for which MS4 discharges may be causing or contributing to the impairment.
- Category 3 (Medium Priority): Pollutants which exceed applicable RWLs contained in the Permit and for which MS4 discharges may be causing or contributing to the exceedances, but which do not have an approved TMDL or are not listed on the 303(d) list.

Table 4-5 presents the prioritized water body-pollutant combinations within the NSMBCW area. These water body-pollutant combinations will be used in the EWMP to prioritize BMP implementation. Water body pollutant combinations categorized below are subject to change based on future data collected as part of the CIMP or other monitoring program.

Table 4-5. Water Body Pollutant Prioritization for the NSMBCW EWMP Area (First and Last Applicable Deadlines Included)

<table>
<tr><th>Category</th><th>Water Body</th><th>Pollutant</th><th colspan="2">Compliance Deadline</th></tr>
<tr><td rowspan="8">1</td><td>Malibu Creek and Lagoon</td><td>Nutrients</td><td colspan="2">Compliance schedule will be determined in the EWMP, with the final compliance deadline not exceeding December 28, 2017</td></tr>
<tr><td>SMB Beaches</td><td>Dry Weather Bacteria</td><td>7/15/2006 (Final: Single sample summer AEDs met)</td><td>11/1/2009 (Final: Single sample winter AEDs met)[a]</td></tr>
<tr><td>SMB Beaches</td><td>Wet Weather Bacteria</td><td>7/15/2009 (Interim: 10% Single sample ED reduction)</td><td>7/15/2021 (Final: Single sample AED and GM targets met)</td></tr>
<tr><td>Malibu Creek and Lagoon</td><td>Indicator Bacteria</td><td>1/24/2012 (Final: Dry weather single sample AED targets met)</td><td>7/15/2021 (Final: Wet weather single sample AED targets met)</td></tr>
<tr><td>Malibu Creek</td><td>Trash</td><td>7/7/2013 (20% reduction)</td><td>7/7/2017 (100% reduction)</td></tr>
<tr><td>SMB</td><td>Trash/Debris</td><td>3/20/2016 (20% reduction)</td><td>3/20/2020 (100% reduction)</td></tr>
<tr><td>SMB</td><td>DDTs</td><td colspan="2">Compliance schedule may be developed through the EWMP [b]</td></tr>
<tr><td>SMB</td><td>PCBs</td><td colspan="2">Compliance schedule may be developed through the EWMP [b]</td></tr>
<tr><td rowspan="3">2</td><td>Topanga Canyon Creek</td><td>Lead</td><td colspan="2">NA</td></tr>
<tr><td>Malibu Creek</td><td>Sulfates & Selenium</td><td colspan="2">NA</td></tr>
<tr><td>Malibu Lagoon</td><td>pH</td><td colspan="2">NA</td></tr>
<tr><td>3</td><td colspan="4">None</td></tr>
</table>

[a] Compliance date per 2013 reopened TMDL, which is not yet effective (i.e., USEPA and Office of Administrative Law approval is pending)

[b] 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."

4.4.1 Category 1 – Highest Priority

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]." These water body-pollutant combinations include:

- SMB beaches for bacteria (wet and dry weather). These are considered Category 1 due to the SMB Beaches Bacteria TMDL.
- Malibu Creek and Lagoon for bacteria. These are considered Category 1 due to the Malibu Creek and Lagoon Indicator Bacteria TMDL.
- Malibu Creek for nutrients. This is considered Category 1 due to the USEPA-established Nutrients TMDL and Benthic TMDL in the Malibu Creek Watershed.[2]
- SMB Offshore/Nearshore for DDT and PCBs.[3] These are considered Category 1 due to the USEPA TMDL for DDT and PCBs for Santa Monica Bay Offshore/Nearshore. However, it is important to note that the load-based WQBELs for DDTs and PCBs established by the TMDL were set equivalent to the estimated existing stormwater loads (i.e., based on data used in the TMDL, no MS4 load reduction is expected to be required). As a result, it is anticipated that for the EWMP RAA, no reductions in DDT and PCB loading from the NSMBCW MS4s are required to meet the TMDL WQBELs. And while DDTs and PCBs cannot be modeled as a stormwater pollutant for the RAA (due to the lack of land use EMCs and BMP performance data), they will be qualitatively evaluated. It will also be noted that the implementation of any future BMPs throughout the NSMBCW will lead to a reduction in runoff volume and suspended sediment loading from the MS4s, thereby further reducing the existing mass load of any sediment-bound DDT and/or PCBs to SMB. For these reasons, while DDT and PCBs will be included as Category 1 pollutants, they will be evaluated further through the efforts of the CIMP to determine whether pollutant-specific measures are necessary.
- SMB Offshore/Nearshore for debris. These are considered Category 1 due to the TMDL for debris for Santa Monica Bay Offshore/Nearshore. Section VI.E.5.b(i) of the Permit states, "Pursuant to California Water Code section 13360(a), Permittees may comply with the trash [debris] effluent limitations using any lawful means. Such compliance options are broadly classified as full capture, partial capture, institutional controls, or minimum frequency of assessment and collection… and any combination of these may be employed to achieve compliance." While trash will not be modeled as part of the RAA, the RAA will address how the NSMBCW agencies will comply with the TMDL WQBELs by providing details on the planned implementation of the methods listed above, primarily through their Trash Monitoring and Reporting Programs.
- Malibu Creek for trash. This is considered Category 1 due to the Malibu Creek Trash TMDL.

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[2] The Regional Board is currently developing a new Malibu Creek Nutrient TMDL. Until this TMDL is approved, the USEPA TMDL will be adhered to.

[3] SMB Offshore/Nearshore is 303(d)-listed for fish consumption advisory due to DDT and PCBs. Therefore, the fish consumption advisory will be assumed to be addressed by the DDT and PCB categorization.

It is important to note that these "Highest Priority" water body-pollutant combinations have been assigned based strictly on the Permit definition. At this time, not all of these pollutants (e.g., DDT and PCBs as exceptions) have been definitively linked to MS4 sources. As a result, this categorization and subsequent prioritization within this Category will be reevaluated based on results from the future water quality monitoring efforts conducted under the CIMP.

4.4.2 Category 2 – High Priority

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." As summarized in Table 4-1, a number of water body-pollutant combinations within the NSMBCW jurisdiction have been listed on the SWRCB's 2010 303(d) list. Aside from those water body-pollutant combinations already listed as Category 1, the remaining water body-pollutant combination list can be condensed by excluding pollutants which are not stormwater related[4] as well as pollutants which are already being addressed (directly or indirectly) by one of the TMDLs.[5]Therefore, the condensed list of Category 2 water body-pollutant combinations includes[6]:

- Topanga Canyon Creek for lead. This qualifies as a Category 2 water body-based pollutant on the 303(d) listing for lead.
- Malibu Creek for sulfates and selenium. This qualifies as a Category 2 water body-based pollutant on the 303(d) listing for sulfates and selenium. However, due to the fact that there is currently no evidence supporting a linkage between MS4 discharges and exceedances of selenium and sulfates, these pollutants will not be modeled as part of the

[4] These include invasive species in Solstice Canyon and Malibu Creek, as well as fish barriers in Malibu Creek.

[5] These include: the fish consumption advisory in SMB, which is being addressed by the PCB and DDT TMDL; sediment in Malibu Creek, which is being addressed by the Benthic TMDL; scum and foam in Malibu Creek, which is being addressed by the Nutrients TMDL; benthic-macroinvertebrate bioassessments in Malibu Creek, which is being addressed by the Benthic TMDL; swimming restrictions and viruses in Malibu Lagoon, which is being addressed by the Malibu Lagoon Indicator Bacteria TMDL; eutrophy in Malibu Lagoon, which is being addressed by the Nutrients TMDL; and benthic community effects in Malibu Lagoon, which is being addressed by the Benthic TMDL.

[6] SMB Offshore/Nearshore is also 303(d)-listed for sediment toxicity. However, the USEPA PCB and DDT TMDL states the following regarding sediment toxicity: "There is little evidence of sediment toxicity in Santa Monica Bay…Our evaluation of the data showed only 3 out of 116 samples exhibited toxicity. Following the California listing policy, Santa Monica Bay is meeting the toxicity objective and there is sufficient evidence to delist sediment toxicity. We therefore make a finding that there is no significant toxicity in Santa Monica Bay and recommend that Santa Monica Bay not be identified as impaired by toxicity in the California's next 303(d) list." For this reason, sediment toxicity will be excluded as a Category 2 pollutant, and excluded from the EWMP and RAA.

NSMBCW RAA, but will be qualitatively evaluated as part of the EWMP. Monitoring for these pollutants will occur under the CIMP. If monitoring data suggest that the NSMBCW Agencies' MS4s may cause or contribute to exceedances of these pollutants in the receiving water, the EWMP will be revised accordingly.

- Malibu Lagoon for pH. This qualifies as a Category 2 water body-based pollutant on the 303(d) listing for pH. However, due to the fact that there is currently no evidence supporting a linkage between MS4 discharges and exceedances of pH, pH will not be modeled as part of the NSMBCW RAA, but will be qualitatively evaluated as part of the EWMP. Monitoring for pH will occur under the CIMP. If monitoring data suggest that the NSMBCW Agencies' MS4s may cause or contribute to pH exceedances in the receiving water, the EWMP will be revised accordingly.

4.4.3 Category 3 – Medium Priority

Category 3 (Medium Priority) designations are to be applied to water body-pollutant combinations which 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.

Based on information received from the NSMBCW EWMP Agencies, there are currently no known available data demonstrating exceedances of receiving water limits within the NSMBCW area, aside from those water body-pollutant combinations described previously as Category 1 and 2. As a result, no Category 3 combinations are designated at this time.

The agencies understand that data collected as part of their approved CIMP may result in future Category 3 designations in instances when receiving water limits 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.

4.5 Source Assessment

To complement the water quality prioritization process, permittees must identify known and suspected stormwater and non-stormwater sources influencing MS4 discharges by utilizing existing information for the water body-pollutant combinations in Categories 1 and 2. The intent of the Source Assessment is to identify potential sources within the watershed for the water body-pollutant combinations and to support prioritization and sequencing of management actions.

A preliminary source assessment and literature review has been conducted. Since sources of pollutants for the various water bodies within the NSMBCW are essentially identical (e.g., sources of trash within SMB and Malibu Creek are believed to be the same), the source assessment is presented by pollutant in Table 4-6.

Table 4-6. Water Body Pollutant Source Assessment

Pollutant	Potential Sources
Indicator Bacteria	• Human sources[a] - sanitary sewer overflows and leaks, onsite wastewater treatment systems, homeless encampments, swimmers • Land uses[b] – agricultural, commercial, educational, residential, open space, industrial, transportation, recreational • Non-anthropogenic sources[c] - plants, algae, decaying organic matter, beach wrack, beach sands, sediment, bird feces, dogs • Urban runoff and stormwater • Illicit discharges and connections • Other sites not covered under the Phase I MS4 Permit including Construction General Permit sites, Phase II MS4 Sites, State/Federal owned lands, recreational areas, private storm drains, and Caltrans' MS4
DDT and PCBs	• Palos Verdes Shelf[d] • Stormwater and dry weather runoff from urban land uses
Trash	• Litter from adjacent land areas • Roadways • Direct dumping and deposition • Storm drains (Regional Board, 2008)
Nutrients	• Natural sources - birds, tidal inflow, and sediment release[e] • Septic systems • Undeveloped and developed land • Agriculture/livestock areas • Golf courses • Tapia Water Reclamation Facility • Land uses - agriculture, residential, vacant/open space, industrial, educational, commercial, transportation.
Lead	• Non-point sources • Land uses - agricultural industrial, commercial, high density single family residential, transportation, multi-family residential, educational, open space (Geosyntec Consultants, 2012, Stein *et al* 2007)
pH	• Unknown
Selenium/ Sulfates	• Northern tributaries of Malibu Creek with Monterrey Formation type geology (LVMWD, 2011)[f]

[a] Monitoring results from microbial source tracking studies conducted in the NSMBCW area indicate that human fecal contributions are minor or non-existent (City of Malibu, 2012). This is supported by a recent USGS study (2011) conducted in the Malibu Lagoon area, which found that bacteria in groundwater wells were nearly absent even in wells that contained water with a wastewater history, likely due to a combination of microbial filtration, sorption, death, predation, and other factors within the soil.

[b] A study by SCCWRP investigated bacteria runoff concentrations from various land uses in the Los Angeles region (Stein *et al*, 2007).

[c] 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, Weston Solutions 2010.

[d] The largest concentration of DDT and PCBs within Santa Monica Bay is contained within the Palos Verdes shelf, which is being addressed by the USEPA as a CERCLA site. Loadings from the shelf to the bay are large and have been well characterized (USEPA, 2012).

[e] Sutula et al (2004) found that sediment enriched in particulate nitrogen and phosphorus was deposited in Malibu Lagoon during the wet season. These particulate nutrients were remobilized as dissolved inorganic nutrients to the

surface waters during dry season. The study reported that sediment release approximately equals 18% of the total nitrogen source and 5% of the total phosphorus source from other nonpoint source inputs to the Lagoon during the dry season (Sutula et al, 2004).

[f] Undeveloped areas with Monterey Formation geology are a significant nonpoint source of phosphate within a number of subwatersheds in the upper Malibu Creek Watershed (LVMWD, 2011).

The final source assessment will be conducted using available data and information from annual reports, established TMDLs, and information received from the EWMP agencies. The following data sources will be reviewed as part of the source assessment for the Category 1 and 2 water body-pollutant combinations:

- Findings from the Permittees' Illicit Connections and Illicit Discharge Elimination Programs (IC/ID);
- 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 contribute to the highest water quality priorities.

Where source information specific to the watershed is unavailable, pertinent literature will be utilized to provide direction for further assessment. Additional water quality data will be needed to quantify the contribution of MS4 discharges – particularly relative to the many other identified sources that have been documented within the NSMBCW. MS4 outfall monitoring (through the CIMP) and source identification (through the non-stormwater screening and monitoring program) will be essential to support future BMP planning and EWMP updates.

5 Watershed Control Measures

The Permit requires the NSMBCW EWMP Group to identify strategies, control measures, and BMPs[7] to implement within their WMA. Specifically, the Permit specifies that BMPs are expected to be implemented so that MS4 discharges meet effluent limits as established in the

[7] For simplification, the term "BMP" will be used throughout this Work Plan to collectively refer to strategies, control measures, and/or best management practices.

Permit and to reduce impacts to receiving waters from stormwater and non-stormwater runoff. This expectation assumes the implementation of both types of BMPs – non-structural and structural – by the EWMP permittees.

5.1 Structural BMP Categories and Design Characteristics

Structural BMPs are BMPs that involve the construction of a physical control measure to alter the hydrology or water quality of incoming stormwater or non-stormwater. There are two categories of structural BMPs, defined by the runoff area treated by the BMP: regional BMPs[8] and distributed BMPs. Regional BMPs are designed to treat runoff from a large drainage area expected to include multiple parcels and various land uses. Distributed BMPs are designed to treat runoff from smaller drainage areas and are normally installed to collect runoff close to the source from a limited number of parcels. Relevant regional and distributed structural BMPs are described below.

Infiltration Basins

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 all influent up to the design storm is infiltrated at the BMP.

Dry Extended Detention Basins

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,

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[8] The term "regional BMP" does not necessarily indicate that the project can capture and retain the 85th percentile storm, as described in the Permit. A nomenclature for regional BMPs that can capture and retain the 85th percentile storm will be useful to the EWMP process. The term "regional EWMP project" is recommended for those regional BMPs that are expected to be able to capture and retain the 85th percentile storm.

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.

Subsurface Flow Wetlands

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 International BMP database 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.

Constructed Surface Flow Wetlands

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 treatment 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.

Sanitary Diversions

Sanitary (or low-flow) diversions 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. Because Malibu is not sewered, sanitary diversions may not be applicable within Malibu.

Treatment Facilities

This BMP type includes the complete or partial diversion of the water quality 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.

Cisterns

Cisterns are a harvest-and-use BMP, typically designed to capture a water quality design storm. Captured water is infiltrated or reused for irrigation, thereby reducing runoff and associated pollutants. Because cisterns are typically a full-capture BMP, the pollutant removal effectiveness of cisterns is considered comparable to infiltration basins. Capture-and-use regulations currently in place in the NSMBCW EWMP Group effectively require captured water to be used for landscape irrigation only.

Bioretention/Biofiltration

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil- and plant-based filtration device that removes pollutants through a variety of 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, where infiltration can occur in addition to filtration. 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") to enhance the amount of retention and incidental infiltration achieved by the BMP.

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 via 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.

Green Roofs

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.

Porous / Permeable Pavements

Permeable pavements are infiltration-type BMPs that contain significant voids to allow water to pass through to a 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 (porous concrete or permeable asphalt). All permeable pavements with a stone reservoir base treat stormwater and remove sediments and metals to some degree. While conventional non-permeable pavement results in increased rates and volumes of surface runoff, porous 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 roadways, parking lots, and sidewalks. The paving surface, subgrade, and installation requirements of permeable pavements are more complex than those for conventional asphalt or concrete surfaces. For porous 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.

Media Filters

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 drain 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. Media filters can be used as stand-alone or pre-treatment measures to extend the life and effectiveness of downstream BMPs.

Hydrodynamic Separators

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. Like media filters, hydrodynamic separators can be used as stand-alone or pre-treatment measures to extend the life and effectiveness of downstream BMPs.

5.2 Summary of Existing and Planned BMPs

This section provides a summary of existing, planned, and potential BMPs within the NSMBCW EWMP Area. Existing BMPs are those BMPs that have been constructed and are functional at the time of drafting the EWMP Work Plan (and were constructed after adoption of TMDLs). Planned BMPs are those BMPs which have been identified for implementation and conceptual designs have been initiated. These BMPs are not necessarily funded at this time and their future construction depends on a number of factors which have not necessarily been evaluated at this stage of the EWMP development. Such factors include technical feasibility, constructability, cost, and modeled performance during the reasonable assurance analysis, among others. Potential BMPs are those BMPs which have been identified for possible implementation, but no design plans have been initiated at this time.

5.2.1 Existing Regional BMPs

Aside from Malibu Legacy Park and the Civic Center Stormwater Treatment Facility (SWTF), which is collectively considered a regional EWMP project (see Section 5.3), Paradise Cove Stormwater Treatment Facility and Marie Canyon Water Quality Improvement Project are summarized below due to their significance with respect to stormwater quality within the NSMBCW EWMP Area. Although these BMPs do not necessarily meet the Permit's design criterion for a regional EWMP project, they do capture and/or treat runoff from large tributary areas which include multiple parcels. Locations of these BMPs are shown on Figure 4. Details for each BMP are provided in Appendix B.

Paradise Cove Stormwater Treatment Facility

On June 28, 2010, Malibu completed and held its grand opening of the Paradise Cove SWTF. In 2006, Malibu applied for funding through the Clean Beaches Initiative Grant program and was awarded $920,000 for the construction of a treatment facility to treat flows from Ramirez Canyon Creek where it discharges at Paradise Cove. The system is designed as a 3-stage system which removes sediment prior to filtration and UV treatment of the creek water: Stage 1- sediment removal (Bay Saver Technologies type device); Stage 2- filtration; and Stage 3- ultraviolet disinfection. The treatment flow rate for sediment removal is 3600 gpm and the treatment flow rate for UV/filtration is 900 gpm.

Marie Canyon Water Quality Improvement Project

Opened in 2007 by the LACFCD with the support of Malibu, the Marie Canyon Water Quality Improvement Project was designed to filter and treat up to 100 gallons per minute of dry and wet weather runoff at Marie Canyon drain. The Marie Canyon facility uses ultraviolet radiation to kill bacteria in stormwater and urban runoff and then returns the clean water to the creek, which empties into the ocean.

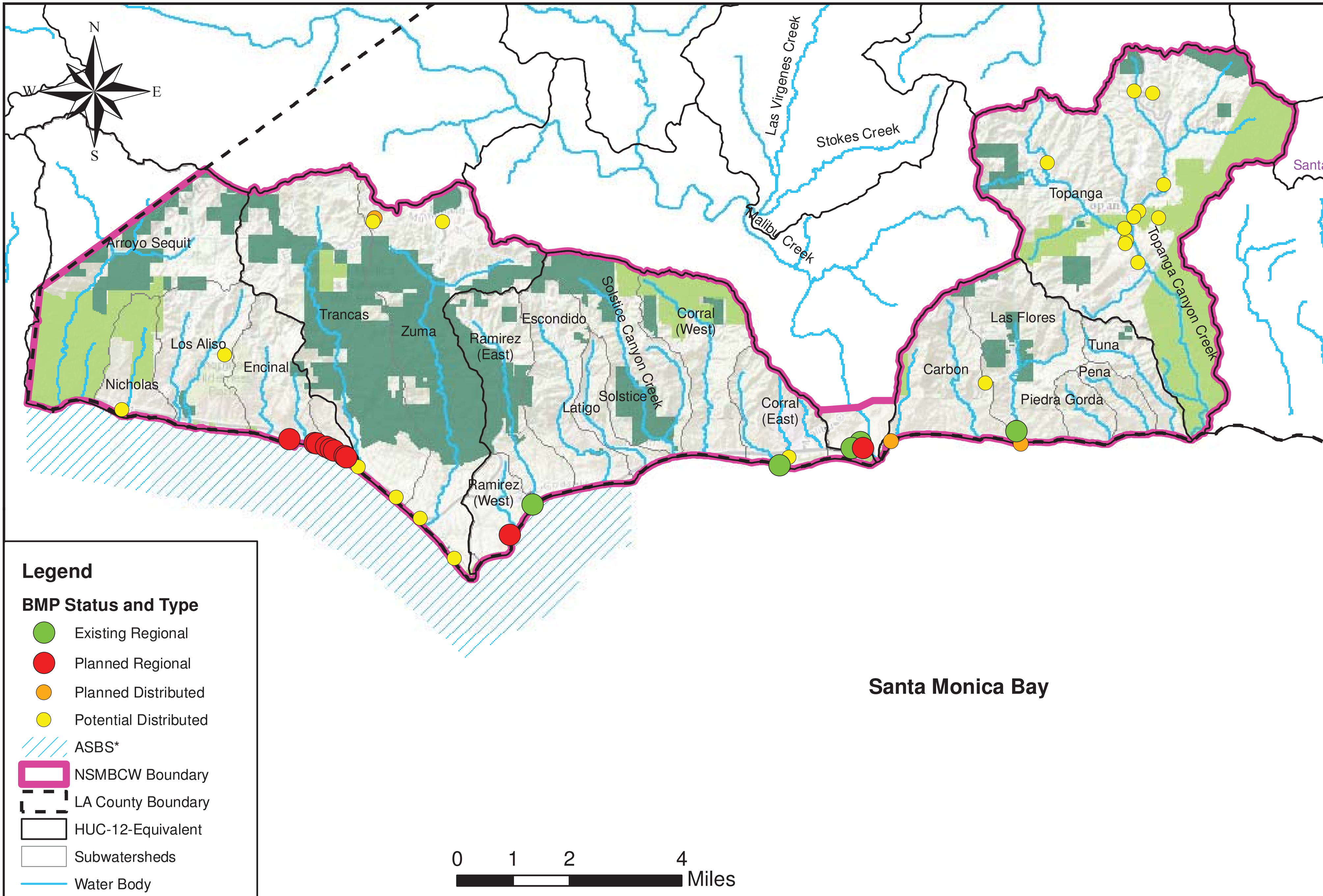

Figure 4. Existing Regional BMPs, Planned and Potential Distributed BMPs, and Planned Regional BMPs NSMBCW EWMP Work Plan

June 2014

5.2.2 *Existing Distributed BMPs*

The appendices of the 2011-2012 Unified Annual Stormwater Report compiled by the Los Angeles County Department of Public Works (LACDPW, 2012) summarizes installed (Appendix B) and maintained (Appendix C) structural BMPs within the area referred to as "Malibu Creek and Rural Santa Monica Bay." Table 5-1 provides a compilation of installed and maintained BMPs from the 2011-2012 Unified Annual Stormwater Report for the NSMBCW EWMP Group. The table reflects a combination of two distinct tables in the Unified Annual Stormwater Report – the installed BMP summary table and the maintained BMP summary table.

Table 5-1. Summary of Installed and Maintained BMPs by Jurisdiction and BMP Type

		Existing BMPs (Installed and Maintained)			
BMP Category	**BMP Type**	**County**	**LACFCD**	**Malibu**	**Total**
Biofiltration/ Bioretention	Biofiltration	0	0	17	17
	Bioswale	0	0	24	24
Infiltration	Infiltration Trenches	0	0	13	13
	Drywell	0	0	2	2
Permeable Pavement	Geo Block Porous Pavement	0	0	15	15
Rainfall Harvesting	Cistern	0	0	4	4
Source Control	Catch Basin	0	0	139	139
	Catch Basin Insert	0	0	23	23
	CDS Gross Pollutant Separators	3	0	0	3
	Clean Screen Catch Basin Inserts	39	0	0	39
	Downspout Filter	0	0	2	2
	Fossil Filter Catch Basin Inserts	14	0	1	15
	Restaurant Vent Traps	1	0	0	1
	Debris Boom/Net	0	1	0	1
Treatment Facility	Treatment Facility/Low Flow Diversion	0	1	2	3
	TOTAL	**57**	**2**	**242**	**301**

5.2.3 *Planned/Potential Regional BMPs*

Regional BMPs which have been planned within the NSMBCW EWMP Area include those detailed in the NSMB J1/J4 Bacteria TMDL Implementation Plan, the County J1/J4 Implementation Report, and previous work conducted on behalf of the City of Malibu. There are five planned/potential regional BMPs within the NSMBCW EWMP Area. These BMPs are not necessarily funded at this time and their future construction depends on a number of factors which have not necessarily been evaluated at this stage of the EWMP development. Such factors include technical feasibility, constructability, cost, and modeled performance during the RAA, among others. The BMPs included in the NSMBCW EWMP Group's Notice of Intent are explained below.

Broad Beach Biofiltration Project – Malibu is currently preparing to construct a project to install biofilters at nine catch basins on Broad Beach Road. Construction is planned to commence in summer of 2014 and be completed mid-2015.

Wildlife Road Storm Drain Improvements – Malibu has begun construction of a project to install biofilters along Wildlife Road and Whitesands Place, as well as catch basin filters at two existing catch basins. The project is expected to be complete in summer of 2014.

Malibu Legacy Park Pump Station Improvements – Malibu plans on investigating the feasibility of upgrading the existing storm drain pumps at Malibu Legacy Park so that the system can treat an increased volume of runoff. If feasible, Malibu hopes to implement these upgrades by April 2016.

In addition to these three BMPs, two other BMPs, currently known as "Trancas-2" and "Trancas-3," have been identified as potential BMPs but have not reached a conceptual design stage at this point in time. They will be evaluated further as part of the EWMP RAA. Locations of these five BMPs are shown on Figure 4. Details for each BMP are provided in Appendix B.

5.2.4 Planned/Potential Distributed BMPs

Table 5-2 summarizes the planned/potential distributed BMPs within the NSMBCW EWMP Area. These BMPs are not necessarily funded at this time and their future construction depends on a number of factors which have not necessarily been evaluated at this stage of the EWMP development. Such factors include technical feasibility, constructability, cost, and modeled performance during the RAA, among others. Locations of these BMPs are shown on Figure 4 where location information was available. Details for each BMP are provided in Appendix B.

Table 5-2. Summary of Planned/Potential Distributed BMPs by Jurisdiction and Type

Permittee	Number of Planned/Potential Distributed BMPs				
	Bioretention	Cistern	Permeable Pavement	Infiltration	Treatment Facility
Malibu	2	-	-	2	-
County[a]	6	1	2	24	1
Total	8	1	2	26	1

[a] County includes the Los Angeles County Department of Beaches and Harbors, which have 18 planned infiltration BMPs at beaches per the 2005 J1/J4 Implementation Plan.

5.3 Regional EWMP Projects

Participation in an EWMP requires collaboration among permittees on multi-benefit regional projects that, wherever feasible, retain (i) all non-stormwater runoff and (ii) all stormwater runoff from the 85th percentile, 24-hour storm event for the drainage areas tributary to the projects, while also achieving other benefits including flood control and water supply, among others.

The 85th percentile, 24-hour storm within the NSMBCW EWMP Group area ranges from approximately 0.6-inches along some of the coastal beaches to 1.1-inch in some of the mountainous areas. At this time, Malibu Legacy Park (Legacy Park) is the only known regional EWMP project within the NSMBCW EWMP Group area, as detailed in the NSMBCW EWMP Group's Notice of Intent.

5.3.1 Malibu Legacy Park

Legacy Park, located between Civic Center Way and Pacific Coast Highway adjacent to Malibu Lagoon, officially opened on October 2, 2010. Legacy Park is an integrated multi-benefit project that 1) improves water quality to Malibu Creek, Malibu Lagoon, and nearby beaches by capturing, detaining, screening, filtering, and treating dry and wet weather runoff from the local watershed to remove pathogens, nutrients, and other pollutants, 2) integrates and beneficially uses captured and treated runoff to offset potable water usage, and 3) creates a public amenity that provides valuable habitat, education, and passive recreation opportunities in conjunction with water quality improvement opportunities.

The project, which diverts runoff flows to an 8 acre-foot pretreatment vegetated detention pond located at the Legacy Park site, is the only known regional EWMP project within the NSMBCW EWMP Area. The pond at Legacy Park temporarily stores captured runoff prior to conveyance to the Civic Center SWTF, and also stores water for water resources uses, such as irrigation at the park or other Civic Center area landscaping. The Civic Center SWTF is able to treat and disinfect up to 1,400 gallons per minute (gpm) of urban and stormwater runoff. The runoff is pumped from Civic Center Way, Cross Creek Road, and the Malibu Road storm drains to Legacy Park, and then the Civic Center SWTF. The Civic Center SWTF is also used to recirculate and maintain the quality of flows within Legacy Park during periods of storage for water resources use.

Legacy Park was originally designed to capture the 0.75" design storm for most of the 330-acre Civic Center drainage areas, as well as dry weather flows from the other two drains which are tributary to the project. Because the 85th percentile, 24-hour design storm over the entire Legacy Park tributary area is approximately 0.65", the park currently qualifies as a regional EWMP project. Future modifications may lead to an increased capacity of Legacy Park, including: 1) the implementation of low impact development (LID) BMPs throughout portions of the tributary watershed, which may lower the runoff volume tributary to Legacy Park; and 2) pump upgrades which would increase the project's overall capacity.

5.3.2 *Additional Regional EWMP Projects*

Additional regional BMPs that do exist may not currently be designed to fully capture the stormwater runoff from the 85th percentile, 24-hour storm event. However, potential upgrades to existing regional BMPs may provide sufficient capacity to capture the 85th percentile storm. Potential regional EWMP projects within the NSMBCW EWMP Area may therefore include:

- Existing regional BMPs which may be redesigned and upgraded to capture and retain the runoff from the 85th percentile, 24-hour storm event within the BMP's tributary area, as well as existing regional BMPs which can increase their design capture efficiency by adding distributed BMPs throughout the tributary watershed;
- Planned regional BMPs which can be designed and constructed to capture and retain the runoff from the 85th percentile, 24-hour storm event within the BMPs tributary area; and
- Additional regional EWMP projects that are identified as part of the EWMP planning process.

The following planned regional BMPs require further analysis to determine if potential exists for these BMPs to meet the design requirements to qualify as a regional EWMP project.

Broad Beach Biofiltration Project

As stated previously, this biofiltration project is still in the design stages, but based on the final drainage area and sizing characteristics of the biofilters as well as potential to implement upstream distributed BMPs, the Broad Beach Biofiltration Project will be evaluated to determine if it can qualify as a regional EWMP project.

Wildlife Road Storm Drain Improvements

Because this project is currently in construction, there is likely little that can be done at this time to immediately increase its capacity. However, upon completion, the project design capacity will be evaluated to determine if it meets the Permit criteria of a regional EWMP project. Additionally, opportunities for the implementation of upstream distributed BMPs will be evaluated to determine if these can increase the design capacity of the regional BMP so it can capture the 85th percentile, 24-hour storm event.

Each of these BMPs will be analyzed in greater detail to determine which have the greatest potential of meeting the Permit requirements for regional EWMP projects.

5.4 Process for Identifying and Evaluating Additional Structural BMPs

Additional structural BMPs, including regional EWMP projects, will be identified during the EWMP planning process. These projects will be identified using a combination of stakeholder input, computer modeling with the Structural BMP Prioritization and Analysis Tool (SBPAT), and desktop-level screening to identify areas that are suitable for BMPs. SBPAT will also be used to quantitatively evaluate the identified BMPs. A more detailed description of the modeling process implemented by SBPAT is provided in Section 6 - RAA Approach. In particular, Section 6.2.3 describes the process used to identify and evaluate additional structural BMPs.

5.5 Minimum Control Measures

Non-structural BMPs are BMPs that prevent or reduce the release of pollutants or transport of pollutants within the MS4 area but do not involve construction of physical facilities. Non-structural BMPs are often implemented as programs or strategies which seek to reduce runoff and/or pollution close to the source. Examples include but are not limited to: street sweeping, downspout disconnect programs, pet waste cleanup stations, or illicit discharge elimination. Minimum control measures (MCMs) as set forth in the Permit are a subset of non-structural BMPs even though some MCMs include measures that require the implementation of structural BMPs by private parties.

Participating agencies are continuing to implement the MCMs required under the 2001 MS4 Permit. Applicable new MCMs will be implemented by the time the EWMP is approved by the Regional Board.

5.5.1 Identification of Additional or Modified Non-Structural BMPs

The Permit allows permittees developing an EWMP the opportunity to customize the MCMs specified in the Permit to focus resources on high priority issues within their watersheds. Modifications to the MCMs must be appropriately justified and still be consistent with 40 CFR § 122.26(d)(2)(iv)(A)-(D). A control measure may only be eliminated based on the justification that it is not applicable to a particular permittee (per Section IV.C.5.b.iv.1(c) of the Permit. Customized measures, once approved as part of the EWMP, will replace in part or in whole the prescribed MCMs in the Permit. The Planning & Land Development Program is not eligible for customization in that it may be no less stringent than the baseline requirements in the Permit. However, it can be enhanced over the baseline permit requirements such as LA County has done in its LID ordinance, thereby yielding additional pollutant and stormwater volume control for the watershed. The Permit-specified MCMs (baseline MCMs) build upon the MCMs in the previous MS4 Permit (Order 01-182). Although similar in many ways to the previously-required MCMs, in most cases the baseline MCMs contain more prescriptive record-keeping and/or implementation requirements.

General Framework for MCM Customization

As previously stated, permittees are implementing the existing MCMs under Order 01-182 and in some cases MCM program enhancements have been implemented to address watershed priorities for TMDL implementation which may be more stringent or more targeted than the baseline MCMs. The task of MCM customization is to identify which MCMs should be customized in order to address the identified water quality priorities.

The Regional Board has stated that a permittee must show an "equivalent effectiveness" to justify customization of an MCM.[9] In order to accomplish this, a permittee must compare the effectiveness of proposed customized MCMs with the corresponding effectiveness of the baseline MCMs in the context of the identified water quality priorities.

An approach for evaluating existing institutional MCMs has been developed and will be used to develop the customized MCMs, if any, proposed in the EWMP. The following steps provide a general framework for MCM customization:

- **Identify MCMs for potential customization**. This may include identifying:
    - MCM requirements prescribed by the Permit which are not already being implemented by the permittee;
    - Currently implemented MCMs which have been enhanced over the previous Permit as part of TMDL implementation, e.g., Clean Bay Restaurant Program;
    - Programmatic solutions/non-structural controls identified in TMDL implementation plans which may not yet have been implemented; and
    - MCMs which are currently being implemented but which may be excessive in scope. For example, commercial inspections being conducted of retail gasoline facilities which are already heavily regulated through other environmental programs in areas that have no receiving water impairments for the pollutants of concern may be carried out less frequently, or discontinued indefinitely.
- **Identify MCMs which are not applicable**. A control measure may be eliminated based on the justification that it is not applicable to a particular permittee. For example if it is the policy of a permittee not to use pesticides in public agency activities, then there is no need for tracking of pesticide use and this MCM may be proposed for elimination.
- **Assess the effectiveness of the incremental baseline MCM requirements with respect to water quality priorities**. The data necessary to quantify this will vary greatly by MCM, but may include information such as: receiving water quality, inspection and reporting records, number of qualifying projects (e.g., number of construction projects greater than 1 acre), number of pet station bags used, amount of material picked up by street sweeping activities, number of employees trained, and maintenance records. Additionally, the California Stormwater Quality Association (CASQA) provides a tool to

[9] Stated on page E-2 of response to comments on the Tentative Order Minimum Control Measures, found here: http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/StormSewer/CommentLetters/E_MCM%20Matrix%2010-26-12%20Final.pdf

estimate the effectiveness of stormwater management programs. The tool recommends possible assessment metrics that can be used for various stormwater programs.

- **Quantify the additional resources required to implement the incremental baseline MCMs.** This may include estimating additional staff resources in terms of full-time employees, consulting resources, and contracted services.
- **Assess the effectiveness and resources required to implement the customized MCM**. The process to quantify these will be the same as the process used to quantify the baseline effectiveness of the existing MCM.
- **Compare the assessed effectiveness and resources required to implement the incremental baseline MCMs and the customized MCMs**. Customization can be justified in several ways:
    - If the customized MCM effectiveness is equal to or greater than the baseline MCM, customization can be justified.
    - If an MCM requirement is not applicable, then elimination is justified.
    - If the incremental MCM requires additional resources that are disproportionate to the increased effectiveness achieved, then retention of the existing MCM may be justified.
- **Document the customized MCM justification**.

This customization framework provides a general process to justify customization of MCMs. The NSMBCW EWMP Group will conduct the customization, develop justification, and provide the materials for documentation in the EWMP. These materials may include any of the information outlined in the above framework to modify or eliminate a MCM. The customization of MCMs will be evaluated separately by each Agency and included in the EWMP, although coordination among the NSMBCW EWMP Agencies will occur where feasible.

6 Reasonable Assurance Analysis Approach

The Permit-required RAA identifies and evaluates potential BMP implementation scenarios within the NSMBCW EWMP Area. Specifically, the Permit requires that the RAA be conducted for the prioritized WBPCs identified in the EWMP. The RAA must demonstrate that the proposed BMP implementation scenario(s) will reasonably achieve compliance with applicable water quality standards.

The Regional Board has developed a guidance document titled, "Guidelines for Conducting Reasonable Assurance Analysis in a Watershed Management Program, Including an Enhanced Watershed Management Program (March 25, 2014)." Although the guidance document presents guidelines and not necessarily requirements, the RAA approach presented in this document has been developed to conform to the Regional Board guidance document where appropriate. The approach outlined herein was presented to the Regional Board on April 9, 2014 (Geosyntec, 2014) and June 6, 2014 and was found to be consistent with their guidelines.

6.1 Model Selection for RAA Analysis

The recommended RAA approach leverages the strengths of the publicly available, Permit-approved, Geographical Information System (GIS)-based model that has been developed for the region: the SBPAT.[10] The following describes the rationale for utilization of this model for the wet weather RAA. A non-modeling based methodology is recommended for the dry weather RAA. This methodology is described in Section 6.3.8.[11]

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 NSMBCW RAA in the manner described below is based on the model capabilities and the unique characteristics of the NSMBCW, specifically:

1. **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;
2. **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;
3. **Availability of new open space water quality loading data** – Recently developed Event Mean Concentration (EMC) data are consistent with SBPAT and were developed in SMB as part of this RAA-development effort;
4. **Capability to conduct opportunity and constraints investigations** – SBPAT is capable of supporting structural BMP placement, prioritization, and cost-benefit quantification,

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[10] 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.

[11] A similar methodology will also be adhered to for open beach compliance monitoring locations, where drainage areas are not defined and MS4 discharges are not immediately present.

and has been applied for such purposes previously in the NSMBCW and other nearby SMB subwatersheds;

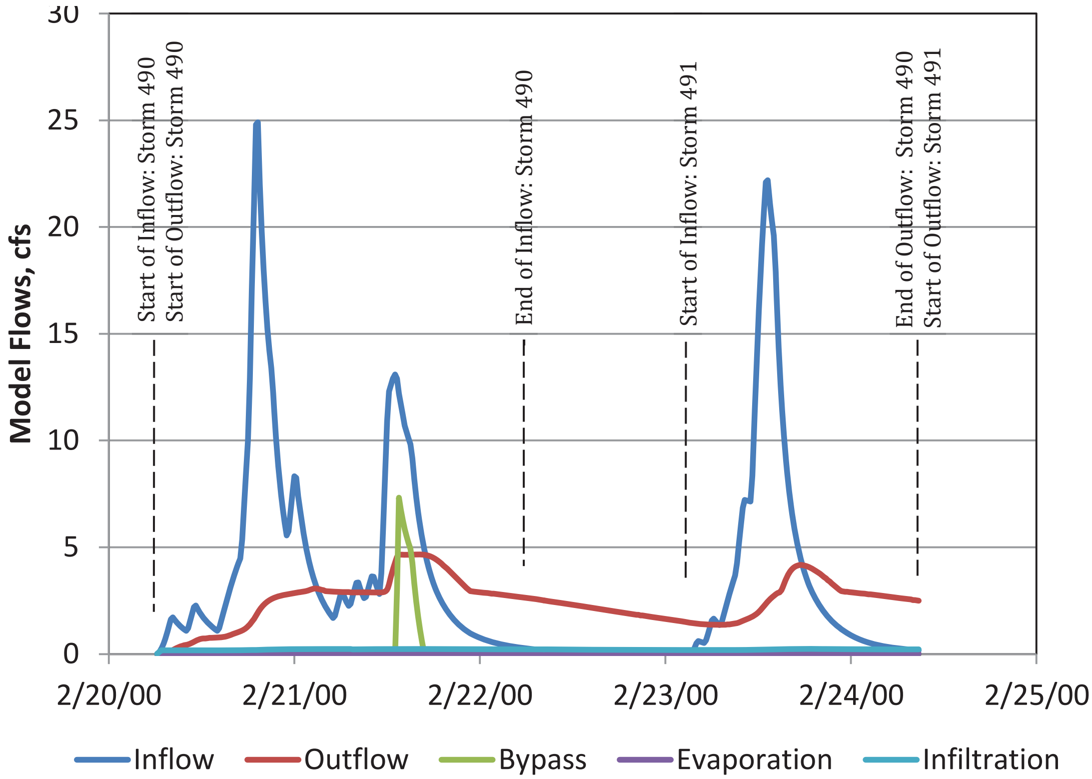
5. **Characterization of water quality variability** – SBPAT is capable of quantifying model output variability and confidence levels, which is a component of the Regional Board's recent RAA guidance; and
6. **Supports quantification of interim milestones, consistent with methods addressing both structural and non-structural BMPs** – SBPAT is a wet weather tool, but implementation is easily compatible with methods for addressing dry weather and non-structural BMPs.

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, 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.

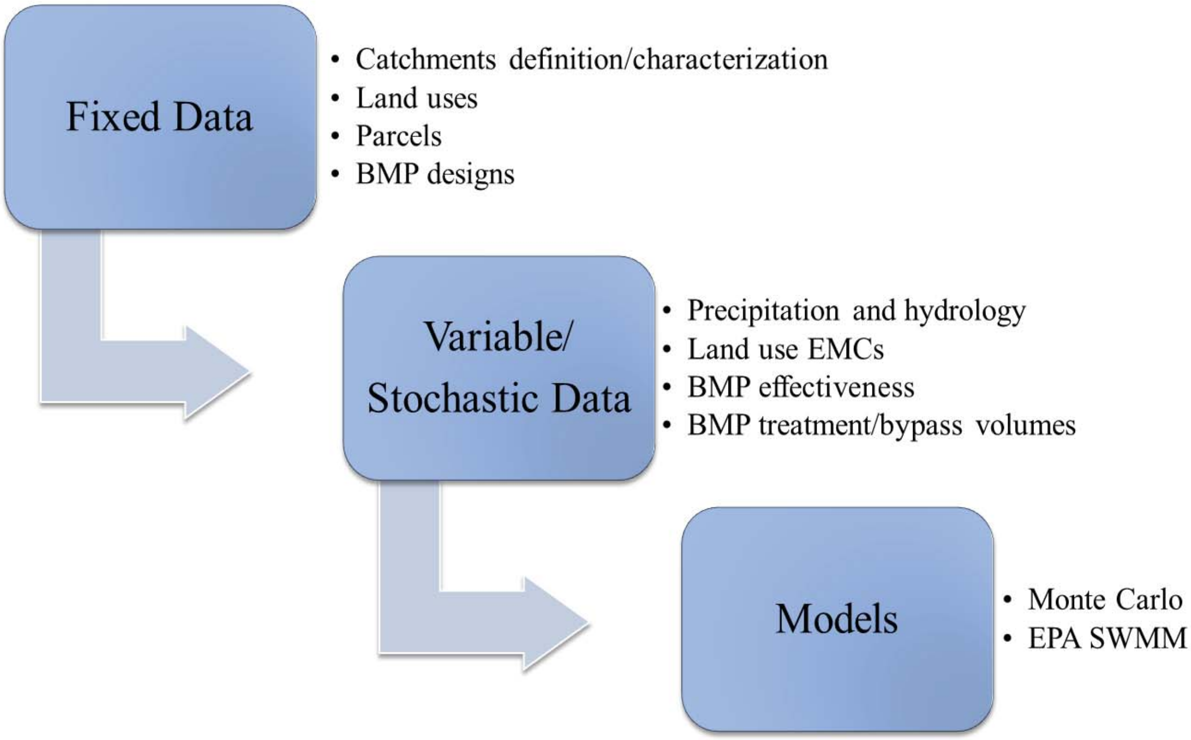
An example of the SBPAT (and EPA SWMM) hydrologic and watershed modeling approach is illustrated below in Figure 5.

Figure 5. Example of SBPAT/SWMM Hydrologic Modeling Consideration of Storms in Long Term Record



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 to quantify water quality benefits and uncertainties. Model data flow is provided below in Figure 6.

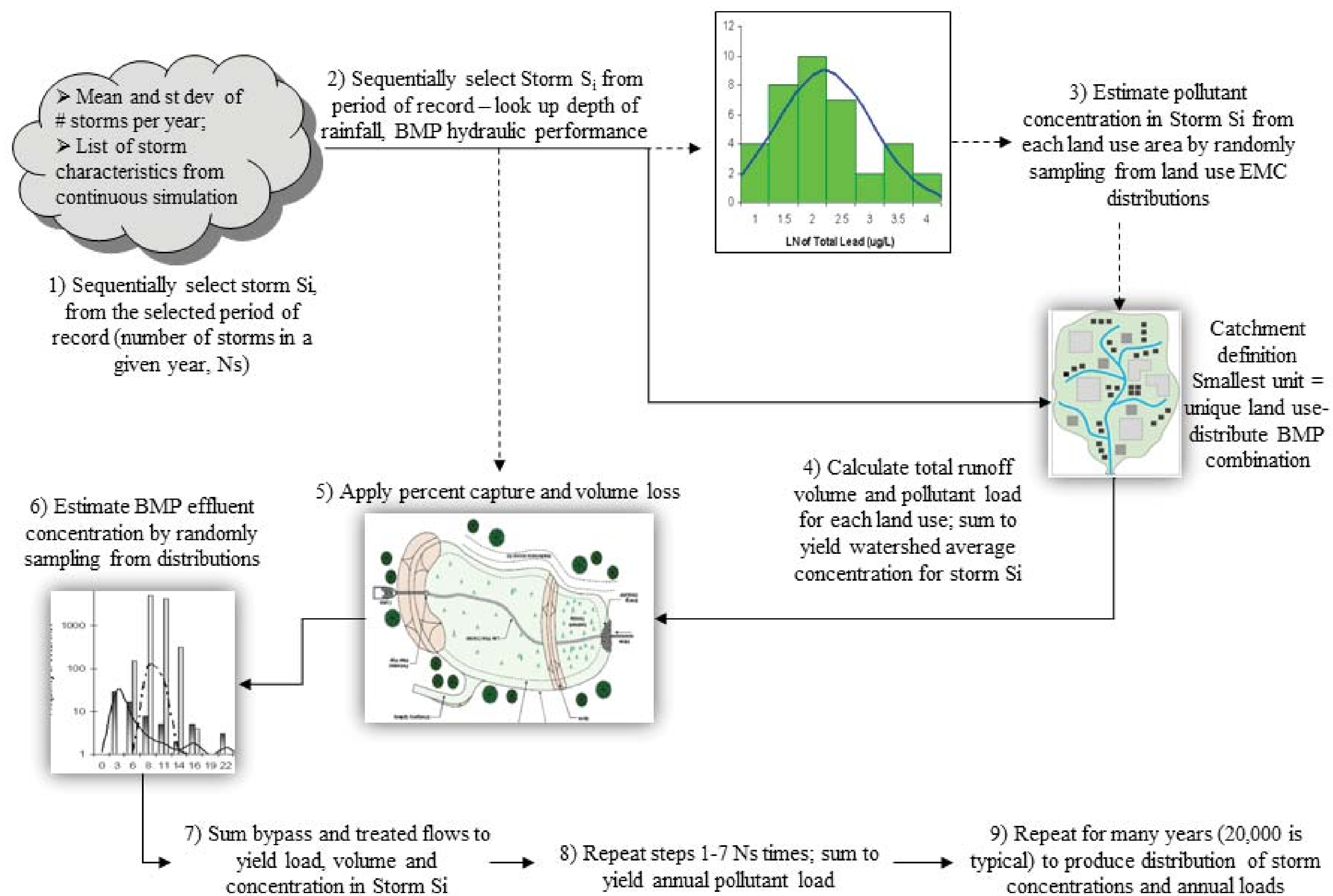
Figure 6. SBPAT Model Data Flow



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 7.

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

Figure 7. SBPAT Monte Carlo Method Components



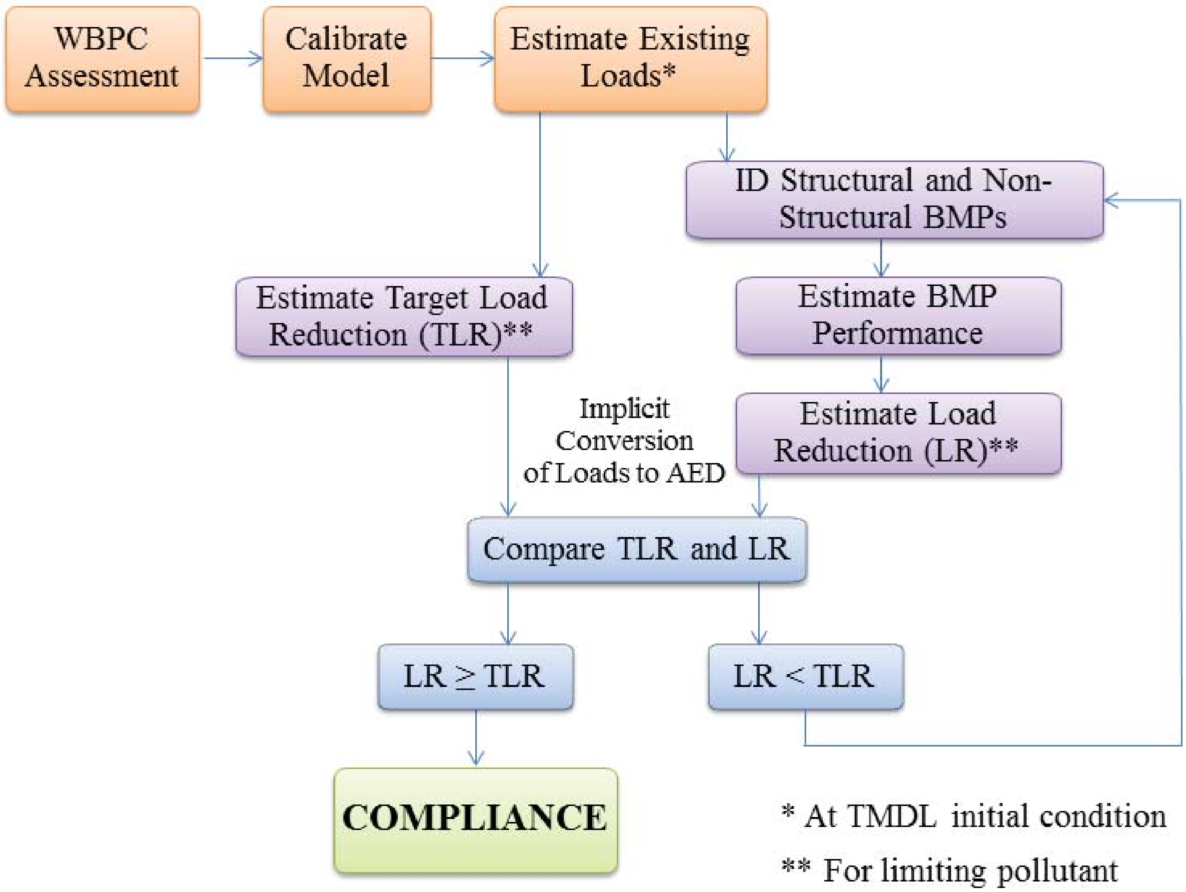
6.2 Overview of RAA and BMP Selection Process

6.2.1 RAA Process

The RAA process, depicted in Figure 8, 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.);
- Develop target load reductions for average and 90^{th} percentile years based on Permit and Regional Board guidance;
- Identify structural and non-structural BMPs that were either 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 targets; and
- Revise the BMP implementation scenario by identifying additional BMP's until targets are met.

Figure 8. RAA Process Overview



Target load reductions represent a numerical expression of the Permit compliance metrics (e.g., bacteria allowable exceedance days (AEDs) for dry and wet weather) that can be modeled and can serve as a basis for confirming that the EWMP is in compliance with the Permit and that the efforts described therein, if appropriately implemented, will reasonably demonstrate and assure Permit compliance. For bacteria, an additional step will be taken to establish that, for a representative NSMBCW subwatershed, modeled annual fecal coliform loads (from the subwatershed) are predictive of measured annual wet weather exceedance days (based on surf zone sampling data for all bacteria indicators). Target load reductions for bacteria will then be established through the following steps:

- Calculate each subwatershed's baseline (natural condition) loading, assuming the land use distribution of the Arroyo Sequit subwatershed (approximately 95% open space) to represent an "allowable" annual load[12] that reflects the reference condition;
- Calculate "existing" (pre-EWMP implementation) loading using existing land uses and BMPs to represent the current load; and
- Subtract the two load estimates to determine the target load reduction needed to achieve reference watershed conditions.

This approach requires a new open space land use event mean concentration (EMC) dataset for fecal coliform that reflects wet weather freshwater samples collected from the NSMBCW reference watershed, Arroyo Sequit. This new open space EMC dataset is shown in Table 6-1.

Table 6-1. Default and Revised Fecal Coliform EMC Statistics for Open Space/Vacant Land Use Category (Arithmetic Estimates of Log Mean And Log Standard Deviation Values Shown)

	Mean (MPN/100 mL)	Standard Deviation (MPN/100 mL)
SBPAT Default based on Southern California Coastal Watershed Research Project (SCCWRP) 2007b (n=2)	6310	1310
Revised based on Arroyo Sequit samples (n=11)	484	806

For subwatersheds with SMB Beaches Bacteria TMDL compliance monitoring locations that have anti-degradation-based allowable exceedance days, a target load reduction of zero will be assumed, consistent with the TMDL's approach which acknowledges that historic bacteria exceedance rates for each of these subwatersheds are lower than that of the reference beach, on average.

Target load reductions for lead, a 303(d)-listed pollutant for Topanga Canyon, will be estimated based on the load required to meet the California Toxics Rule (CTR) objective in MS4 discharges to this water body. This will be done by subtracting the "allowable" annual load (or existing annual runoff volume multiplied by the CTR objective) from the existing annual load. Nutrients in lower Malibu Creek will be addressed similarly, with the nutrient and benthic TMDL waste load allocations (WLAs) used to set the allowable annual loads. Zero target load reductions will be set for PCBs and DDT (with Total Suspended Solids [TSS] as a surrogate for

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[12] The 50th and 90th percentile years will be selected based on direction from the Regional Board.

these particulate-associated pollutants), consistent with the USEPA TMDL which sets MS4 WLAs based on existing loads.

6.2.2 Alternative Approaches

The above approach describes one method for demonstrating reasonable assurance. Alternatively, fecal coliform target load reductions can also be estimated using an SBPAT modeling approach where a hypothetical infiltration basin at each subwatershed outlet is sized so that discharge frequency meets the AEDs, with the target load reduction values then set equivalent to the load reduction achieved by the hypothetical outlet infiltration basin. On June 6, 2014, this alternative approach for estimating TLRs for bacteria was presented to the Regional Board, who expressed support of the approach.

6.2.3 BMP Selection Process

The RAA modeling process will begin with the evaluation of new or enhanced, quantifiable non-structural BMPs and existing structural BMPs to assess water quality improvements (load reductions) which have occurred to date since the effective dates of applicable TMDLs. Next, if compliance is not met based on non-structural and existing BMPs, planned/potential non-structural and structural BMPs will be modeled with consideration of scheduled completion in the context of the prioritized WBPCs and compliance deadlines (including interim milestone dates). If compliance is still not achieved by the combination of both built and planned BMPs, additional BMPs will be identified, evaluated to assess water quality improvements, and discussed with the NSMBCW Agencies in order to achieve compliance.

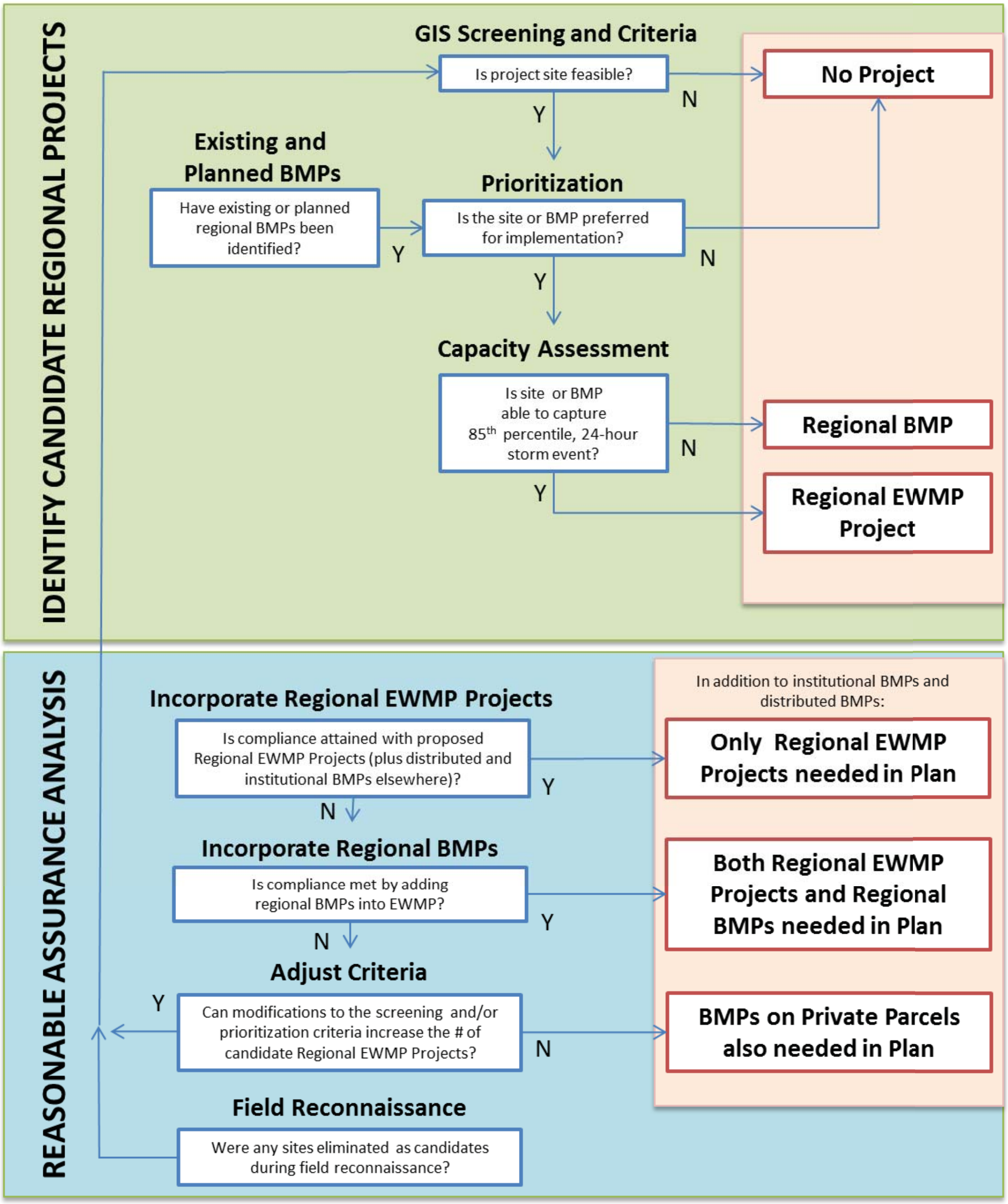
Additional potential regional BMPs, including regional EWMP projects, will first be identified using SBPAT's catchment prioritization process. SBPAT prioritizes catchments based on water quality needs and identifies parcels which provide opportunities for structural BMP implementation. After first evaluating and prioritizing catchments within a watershed with the highest water quality improvement need, SBPAT identifies potential BMP opportunities by calculating a BMP opportunity score for every catchment within a watershed. The BMP score is determined by examining parcel ownership, size, land use, and distance from major storm drains and then an area-weighted parcel score is calculated for every catchment. These BMP scores are then compared with the calculated catchment prioritization results, resulting in a prioritized list of BMP opportunity sites based on parcel characteristics as well as water quality considerations. A desktop-level GIS screening will also take place in order to evaluate potential BMP sites based on additional factors, such as infiltration capacity and proximity to environmentally sensitive areas. Identified potential BMPs that are estimated to have sufficient capacity to capture runoff from the 85^{th} percentile storm even will be categorized as potential regional EWMP projects. Identified potential BMPs that cannot retain at least this storm event will be categorized as potential regional BMPs.

After categorization, the identified potential BMPs will be prioritized based on feedback from the NSMBCW EWMP Agencies. Field reconnaissance will then be conducted on these prioritized projects. Each field reconnaissance will include a preliminary soils analysis and will be followed by an initial environmental study to support a feasibility analysis.

Identified/prioritized regional BMPs will be evaluated (i.e., quantification of costs and water quality benefits) using SBPAT. The prioritization module of SBPAT supports BMP selection by identifying those BMPs best suited to mitigate the specific pollutants of concern that drive water quality needs in each catchment area. Included in this evaluation is a relative cost comparison.

The water quality priorities defined in Section 4.4 will be the emphasis of the RAA analysis, which will focus on quantifiable MS4-derived pollutants. An overview of the proposed process to evaluate existing regional BMPs and identify new candidate sites for regional EWMP projects is portrayed in Figure 9.

Figure 9. Regional EWMP Project Screening, Prioritization, and Selection Framework



6.2.4 *SCHEDULING*

There is a need for linking RAA outcomes to interim and final TMDL compliance dates. The steps described above in Sections 6.2.1 through 6.2.3 are developed for final TMDL compliance.

Once the BMP implementation approach is developed for final compliance, specific activities and the potential scheduling of said activities will be established within the context of local opportunities and constraints. It is expected that to assess compliance with interim milestones, the RAA analysis will need to be implemented for interim BMP implementation scenarios. These are expected to include different levels of non-structural BMPs, implemented over time (e.g., LID ordinance implementation). It is also recognized that in some cases there will be overlapping implementation efforts (e.g., non-structural outreach BMPs in areas where there are also structural BMPs). These instances will be evaluated on a case-by-case basis so that double-counting of water quality benefits is avoided.

Quantifiable non-TMDL (and non-303(d)) pollutants can also be addressed using SBPAT, but these pollutants may not include a reference to a target load reduction; i.e., their quantification would only serve to express the additional water quality benefits of the existing, planned, and proposed BMPs.

6.2.5 Uncertainty and Variability

The proposed RAA approach, which directly utilizes monitoring data to characterize natural variability, as well as Monte Carlo methods to develop stochastic relationships, is conducive to the production of metrics that quantify variability and confidence limits (which reflect the uncertainty of predicted output, such as average annual loads). These relationships are important in determining the level of BMP implementation and assessing reasonableness. The SBPAT methods can provide statistics annualized over a longer period of record (e.g., 10-years) or can be conducted for numerous individual years. The structural BMP methodologies described herein are also easily paired with non-structural BMP quantification methods.

6.3 Modeling Approach

6.3.1 Spatial Domain

The spatial domain of the RAA will include the priority catchments within the NSMBCW EWMP Area, excluding drainage areas already addressed by regional EWMP projects (as defined herein). Adjustments may be made to account for contributions from agencies not party to this EWMP (e.g., State/Caltrans, Federal, etc.).

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

- Storm drains
- Soils
- Rain gage polygons
- Parcels
- Land use

- Catchments

6.3.2 *HYDROLOGY*

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 Lechuza Gauge (County Gauge No. 454) within the NSMBCW area will be used for the RAA.

Calibration

The hydrology component of SBPAT will be calibrated for Topanga Creek, a HUC-12 subwatershed located within the eastern portion of the NSMBCW EWMP 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 (dry weather) baseflow removed. Hourly rainfall data will be used from the nearby Lechuza Patrol Station #72 gauge (gauge reference ID 352b) 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 (ID No. F54C-R) will be 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 will serve as calibration parameters. The calibrated input parameter values will be used for the NSMBCW RAA.

6.3.3 *WATER QUALITY*

The priority WBPCs for the NSMBCW EWMP Area, combined with data availability, will dictate which WBPCs the RAA will address. 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 Table 6-2 for summary statistics and Appendix C for a data summary) and BMP effluent concentrations (presented in Section 6.3.4) for each storm are then randomly sampled from their log-normal 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 low (25^{th} percentile), average (mean), and high (75^{th} percentile) values for the annual volume, pollutant loads, and pollutant concentrations in stormwater runoff from the modeled area, with and without BMPs implemented.

Table 6-2. Proposed SBPAT EMCs for NSMBCW Watersheds – Arithmetic Estimates of the Log-normal 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 ug/L	Tot Cu ug/L	Tot Pb ug/L	Diss Zn ug/L	Tot Zn ug/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 (1,490,000)
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[c] (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[d] (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[e] (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."

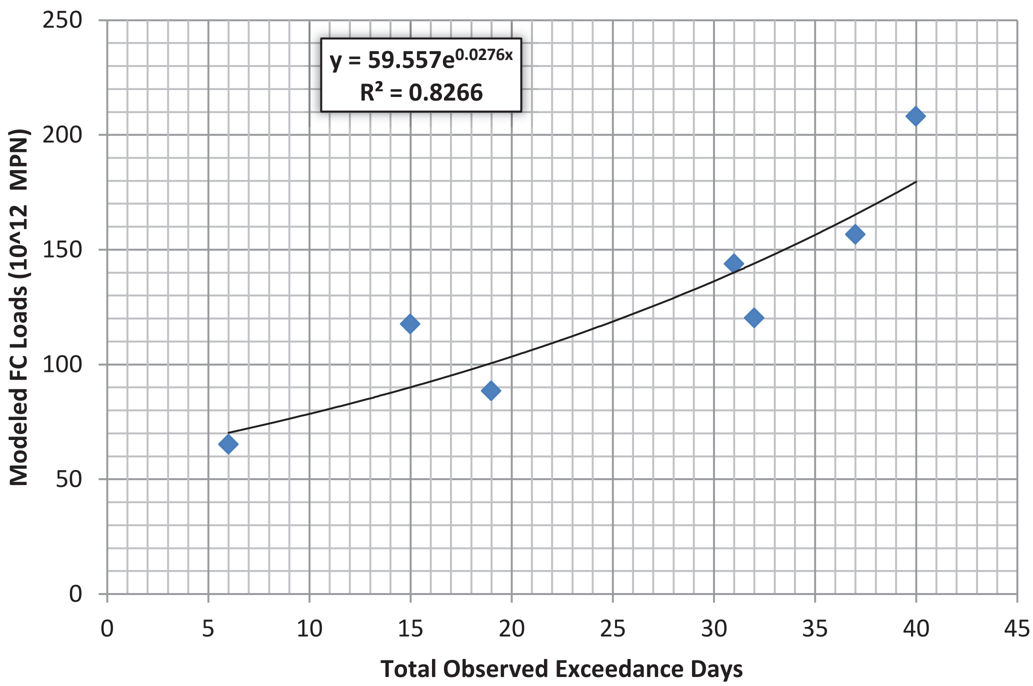
[c] Multi Family Residential EMC used since educational land use site not available in the SCCWRP fecal coliform dataset.

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

[e] 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).

For bacteria 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 REC1 daily maximum water quality objectives) is critical to establish reasonable assurance that the ocean monitoring locations will be in compliance with the Permit limits for the SMB Beaches Bacteria TMDL and the Malibu Creek and Lagoon Bacteria TMDL. To establish this linkage, an analysis was conducted using shoreline monitoring data from Topanga Canyon[13] (SMB 1-18) between 2005 and 2013. Figure 10 illustrates a reasonable correlation between modeled annual fecal coliform loads and observed annual exceedance days.

Figure 10. Correlation between Modeled Fecal Coliform Loads and Observed Exceedance Days



6.3.4 *Summary of BMP Performance Data*

The performance of existing and planned BMPs in the NSMBCW will be evaluated through 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. Due to a lack of project-specific monitoring data quantifying the performance of an installed BMP, modeling of expected BMP performance will be based on existing, peer-reviewed pollutant reduction data for similar types

[13] This watershed is 88% open space. This is a daily sampled compliance shoreline monitoring site.

of pollutants and BMPs. Coupled with information on the capacity/volume of each BMP in question, modeling will predict the impact of each BMP on water quality.

Expected BMP performance will be modeled using data from the International Stormwater BMP Database (IBD; www.bmpdatabase.org), which is 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 is more reliable in modeling stormwater treatment rather than percent removal, which assumes a linear influent-to-effluent relationship (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):

1. 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);
2. The variability in percent removal is often more broad than the variability in effluent pollutant concentration;
3. A high percent removal may still result in a high pollutant concentration, thereby leading to a false determination that BMPs are performing well; and
4. Different percent removals can be calculated within the same dataset (i.e., when looking at individual pairs of influent/effluent samples).

For the reasons stated above, percent removal 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.

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 (EMCs), 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.[14] 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 6-3.

Table 6-3. BMPs and Constituents Modeled[a]

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)[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	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)	

[a] All constituents are addressed for all BMPs that provide treatment (i.e., excluding those identified as "volume reduction only").

[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.

[14] The bootstrap approach randomly samples the dataset several thousand times and computes the desired statistic from the subset of data.

Table 6-4 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% non-detect ratio). Table 6-5 summarizes arithmetic averages and Table 6-6 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 6-7 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.

Table 6-4. Summary of Number of Data Points and Percent Non-Detects for BMP Effluent Concentration Data from the IBD

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 6-5. IBD 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 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 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 6-6. IBD 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 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 reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

Table 6-7. IBD 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 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 reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

In some cases, performance data are not available for all types of BMPs requiring a performance assessment as part of the RAA. If the unit treatment processes (e.g., filtration, sedimentation, etc.) for a BMP with data ("BMP 1") can be expected to be similar for a BMP without data ("BMP 2"), then equivalent performance for "BMP 2" is assumed based on the performance of "BMP 1". However if no data exist and unit treatment processes cannot be associated with a BMP with data, then no treatment is assumed except for load reductions associated with simulated volume loss. Table 6-8 summarizes the performance assumptions for each of the BMPs that will be modeled in the RAA. Additionally, bioretention with underdrains will be assessed in the RAA using a vegetated swale BMP from the IBD, which represents some incidental volume reduction as well as a certain percent treated discharge and a certain percent bypass discharge. These inputs will be modified to match the proposed implementation. Effluent quality assigned to treated underdrain discharge will be based on the better performing characteristics of the "media filter" and "bioretention" categories for each pollutant.

Table 6-8. Assumptions and Source Data for BMP Performance

BMP	Source Data and Assumptions
Vegetated Swale (Bioswale)	Strictly from vegetated swale category from the IBD
Cistern	No treated effluent; volume reductions only
Bioretention w/o underdrain	No treated effluent; volume reductions only
Porous Pavement	No treated effluent; volume reductions only
Green Roof	No treated effluent; volume reductions only
Low Flow Diversion	No treated effluent; volume reductions only
Media Filter	Strictly from media filter category from the IBD; includes non-bio media filters (e.g., sand filters)
Subsurface Flow Wetland	Lowest of all IBD categories; except for Fecal Coliform where 90% removal is used [a]
Constructed Wetland / Retention Pond (w/o Extended Detention)	Based on combined wetland basin and retention pond IBD categories (basis per Geosyntec 2008)
Treatment Plant	Secondary Drinking Water Standards or Minimum of all BMP types, whichever is less
Dry Extended Detention Basin	Strictly detention basin category from the IBD
Hydrodynamic Separator	From Geosyntec, 2008
Infiltration Basin	No treated effluent; volume reductions only
Constructed Wetland / Retention Pond (w/ Extended Detention)	Based on retention pond IBD category (basis per Geosyntec 2008)

[a] SSF (subsurface flow) wetlands provide multiple unit treatment processes provided by other BMPs (e.g., sedimentation, filtration, biochemical, etc.). 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.

6.3.5 *Representation of Individual BMPs*

MCMs and Other Non-structural BMPs

Existing, recently-initiated non-structural BMPs (i.e., those not modeled in the initial establishment of the TMDLs and compliance requirements) and planned non-structural BMPs will be evaluated in terms of ability to reduce loads at each of the compliance modeling locations within the NSMBCW area. Both wet and dry weather water quality benefits of these BMPs will be evaluated for all TMDL and 303(d) pollutants (excluding trash) where data are available to support such estimates.

Non-structural BMPs will be quantified with assumptions and references documented. For example, bacteria and dry weather runoff reduction BMPs will be quantified consistent with methodologies utilized in recent San Diego Combined Load Reduction Plans (examples available at http://www.sbpat.net/example.html).

Structural BMPs

The goal of this step will be to achieve the remaining target load reductions by utilizing structural BMPs in combination with the benefits of non-structural BMPs. The RAA will consider existing jurisdictional, sub watershed, and conveyance facility characteristics to delineate pollutant source, runoff control, and outfall monitoring strategies. This will involve a detailed review of existing conditions and datasets. This step will include the following components:

- Existing (i.e., implemented post-TMDL) and planned structural BMPs will be described by the Agencies with sufficient conceptual design detail to support quantitative analysis. Based on agency input on BMP preferences, additional "proposed" structural BMP opportunities will be identified and prioritized using SBPAT's structural retrofit planning methodology, and these potential projects will be reviewed by the agencies prior to RAA modeling. The final TMDL compliance scenario will reflect the dates in which the final TMDL limits become effective.
- The water quality benefits (in terms of expected pollutant load reductions) associated with existing, planned, and proposed structural BMPs will be evaluated for wet weather using SBPAT, as described previously in this document.

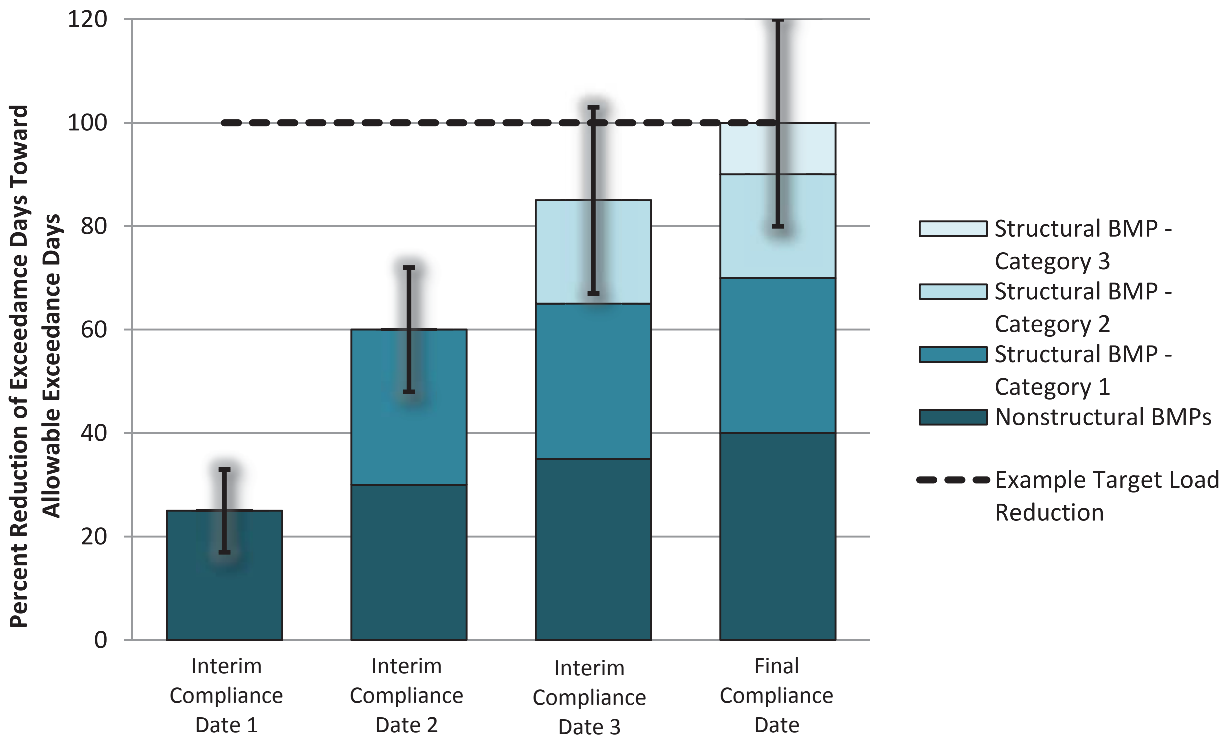
6.3.6 *Representation of Cumulative Effect of all BMPs and New BMP Selection Support*

Following evaluation of the water quality benefits associated with non-structural and structural BMPs, additional pollutant load reductions necessary to achieve the target load reductions will be calculated to determine whether additional BMPs are needed to demonstrate reasonable assurance (see **Error! Reference source not found.**8). To avoid double-counting of load reductions when non-structural and structural BMPs overlap (e.g., for a catchment where irrigation overspray reduction programs will be targeted and a downstream diversion to a regional BMP exists), the greater load reduction of each BMP will be applied; but load reductions will not be additive.

Estimated load reductions will be compared with the target pollutant load reductions and, for bacteria, will represent exceedance day-based compliance demonstration. Expected pollutant reduction ranges will be provided, thereby capturing the variability inherent to precipitation patterns, land use runoff concentrations, and BMP performance. The NSMBCW Agencies may then use discretion, based on their specific compliance risk tolerance, to interpret “reasonable assurance” based on a number of statistical options, such as whether the target annual load reductions (which may correspond to a TMDL critical condition, such as a 90^{th} percentile wet year) are met by the predicted average or 75^{th} percentile annual load reductions (i.e., there is a 25% probability of compliance based on the modeling analysis). It is recognized that the Technical Advisory Committee and/or its RAA subcommittee may also express preferences or guidance for how such model output are reported.

Figure 11 depicts an example of a phased implementation approach to reach the desired target load reduction. In the case that BMPs address several pollutants simultaneously, this process will be evaluated for the limiting pollutant.

Figure 11. Conceptual Approach to Phased Implementation



6.3.7 *Regional Project (85TH Percentile Design) Definition*

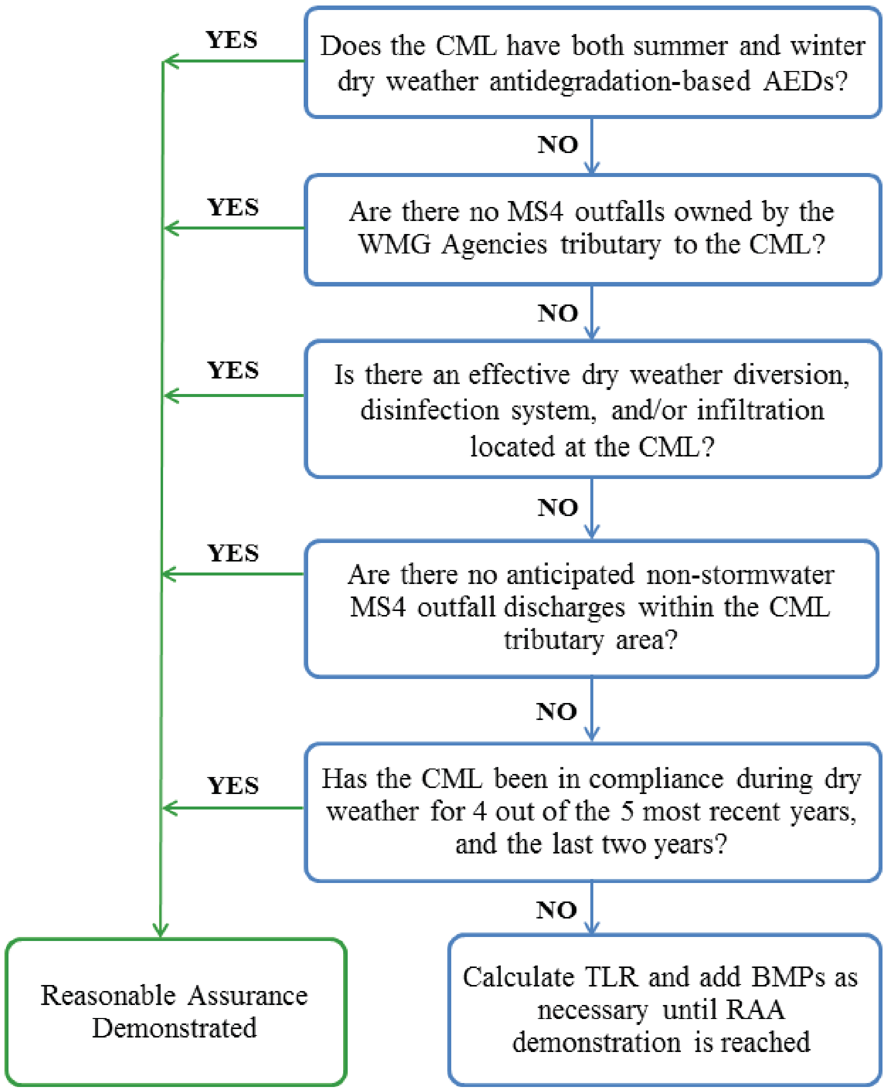
Regional EWMP projects meeting the 85th percentile design basis negate the need for RAA on their drainage areas. This design criterion can be met in a variety of ways. The simplest approach would be to design a single structural BMP to retain the 85th percentile, 24-hour design volume, which may be computed using the County's Modified Rational Method and design hydrology processes. This approach is the easiest to design, but the most difficult to construct due to the required facility capacity, land availability, and operations and maintenance constraints, among numerous other factors. An alternate approach to retain the 85th percentile storm would be to incorporate and account for the impacts of a combination of distributed BMPs upstream of the regional BMP. This would result in the effective design capacity of the regional BMP increasing over time as distributed BMPs are progressively implemented. Lastly, it may also be possible to meet the 85th percentile design criteria at a smaller regional BMP by incorporating a real-time controller in combination with infiltration and/or capture and use systems. This more innovative approach may require assumptions of different disposal options as future non-structural BMPs.

6.3.8 *Dry Weather RAA Approach*

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 modeled. Therefore, to perform the RAA for dry weather for the NSMBCW EWMP Area, a semi-quantitative methodology has been developed to follow a permit compliance structure. Because fecal indicator bacteria are considered the “controlling” pollutants of concern during dry weather in the NSMBCW (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 based on bacteria. The following series of questions form the proposed dry weather RAA methodology. Each question is to be answered for each Coordinated Shoreline Monitoring Plan (CSMP) compliance monitoring location (CML). If one question is affirmative then “reasonable assurance” is considered to be demonstrated. This methodology is illustrated in Figure 12.

1. Are the allowed dry weather (summer and winter) single sample exceedance days based on an anti-degradation approach at the CML?
2. Are there no MS4 outfalls owned by the NSMBCW Agencies within the CML’s drainage area, and therefore MS4 discharges could not be contributing to pollutant concentrations at the CML?
3. Is a dry weather diversion, infiltration, or disinfection system located at the CML? To meet this criterion, any such system should have records to show that it is consistently operational, well maintained, properly sized, and effectively removing bacteria in the treated effluent (in the case of disinfection facilities) so that it is effectively eliminating freshwater surface discharges to the surf zone during year-round dry weather days. If all dry weather creek flows tributary to the CML are known to be captured, infiltrated, diverted, or disinfected prior to discharging at the beach, reasonable assurance is assumed to be demonstrated.
4. Are there no non-stormwater MS4 outfall discharges within the CML’s drainage area? For this criterion to be met, supporting records from the non-stormwater outfall screening program should be supplied.
5. Have the allowed dry weather (summer and winter) single sample exceedance days been met in four of the past five years and during the last two years, based on recent monitoring data?

Figure 12. Dry Weather RAA Methodology Outline



For all CMLs which have not demonstrated reasonable assurance by the steps above, the total load reduction required to meet the applicable receiving water limit will be calculated based on historic monitoring data. This is accomplished by iteratively applying a reduction fraction to the historic bacteria concentration dataset until the receiving water limit (in allowable exceedance days) is met during all years. This reduction fraction will then be compared with expected dry weather BMP load (or volume) reductions within the tributary watershed. If the calculated BMP load reduction exceeds the total required load reduction, then reasonable assurance has been demonstrated.

If the calculated BMP load reduction is less than the necessary load reduction, additional BMPs (non-structural and/or structural) will be iteratively implemented in the tributary watershed until reasonable assurance can be demonstrated (i.e., until the calculated BMP load reduction exceeds the total load reduction required). Where necessary and feasible, it may be assumed that structural BMPs (such as permeable street gutters and catch basin dry wells) will be implemented to a level to eliminate existing significant non-stormwater MS4 discharges (as defined in the NSMBCW CIMP).

In the ASBS-portion of the NSMBCW EWMP Area and in accordance with the General Exception, non-authorized dry weather discharges have effectively been stopped and responsible agencies will continue to take necessary actions to prevent dry weather discharges.

6.4 Proposed Approach for RAA Output

6.4.1 Jurisdictional Responsibilities

This RAA approach was developed with an emphasis on encouraging collaborative, watershed-based planning within the jurisdictional planning departments of the NSMBCW EWMP Group members. Pollutant load reduction opportunities will be determined irrespective of jurisdictional boundaries. Once high priority areas and sources are identified, the NSMBCW EWMP Agencies will identify the most feasible and effective BMPs to maximize pollutant removal and meet target load reduction requirements.

6.4.2 Example Output/Format

Table 6-9 and Table 6-10 illustrate example SBPAT output for the parameters modeled. This list will be limited to the identified Category/Priority 1 and 2 WBPCs identified in Section 4.4 for the actual RAA. This output will include non-structural and phased structural BMPs so that target load reductions can be expected to be met for the scheduled compliance dates. Ranges of results will also be reported (e.g., load +/- confidence interval).

Table 6-9. Example SBPAT Output for Each Compliance Assessment Site

Constituent	Units	Average Annual MS4 Loads and Volumes			% of MS4 Load Removed	
		Pre-BMP	w/ Dist. BMPs	w/ Dist. + Reg. BMPs	w/ Dist. BMPs	w/ Dist. + Reg. BMPs
Total runoff volume	Acre-ft	220	172	172	22%	22%
DCu	lbs	8.8	6.9	6.8	22%	23%
DP	lbs	170	125	118	27%	30%
DZn	lbs	163	73	63	55%	62%
FC	10^12 MPN	52.8	35.4	24.3	33%	54%
NH3	lbs	435	276	190	37%	56%
NO3	lbs	500	384	378	23%	25%
TCu	lbs	18.9	10.7	8.1	43%	57%
TKN	lbs	1645	1257	1194	24%	27%
TPb	lbs	7.63	4.18	3.54	45%	54%
TP	lbs	235	140	98	41%	58%
TSS	Tons	42	19	12	54%	71%
TZn	lbs	218	101	66	54%	70%

Table 6-10. Example Bacteria Output for Different TLRs Including Non-Structural BMPs

Subwatershed	Pollutant	Target Load Reduction	Sum of NS Load Reductions (low-high range)	Sum of Structural Load Reductions (low-high range)	Total Estimated Load Reductions (low-high range)
1	Fecal coliform	100	17 (12-20)	60 (40-85)	77 (52-105)
2	Fecal coliform	75	15 (11-19)	60 (40-85)	75 (51-104)

7 EWMP DEVELOPMENT

7.1 SCHEDULE

The following schedule sets forth the planned timeline that will be met by the NSMBCW EWMP Group to complete their EWMP Plan. The schedule adheres to deliverable dates dictated by the Permit while also setting interim milestones. Dates in bold represent the Permit-specified deliverable dates for submittal to the Regional Board. Interim milestones are not Permit-specified. Therefore, interim milestones may be subject to change. The compliance schedule required per Section VI.C.5.c of the Permit will be included in the EWMP.

Table 7-1. NSMBCW EWMP Compliance Schedule

Item	Date
Final EWMP Work Plan to Regional Board	**June 30, 2014**
Finalize Approach to Addressing Exceedances of Receiving Water Limits	August 2014
Identify and Screen Regional Project(s) (including field screening and feasibility assessment)	September 2014
Identify Selected BMPs and Conduct RAA	December 2014
Develop Project Schedules and Cost Estimates	February 2015
Complete First Draft of EWMP Plan for Internal Review	April 2015
Submit Draft EWMP Plan to Regional Board	**June 30, 2015**
Comments on Draft EWMP Plan Provided by Regional Board	October 31, 2015[a]
Submit Final EWMP Plan to Regional Board	**January 31, 2016[b]**
Approval or Denial of Final EWMP Plan by Regional Board	April 30, 2016[c]

[a] The date specified in the Permit is 4 months after submittal of the Draft EWMP Plan.
[b] The date specified in the Permit is 3 months after receipt of Regional Water Board comments on the draft Plan. Therefore, this date is subject to change based on receipt of comments from the Regional Board.
[c] The date specified in the Permit is 3 months after submittal of the final EWMP Plan.

The schedule above does not include deliverable dates related to the CIMP. It is understood that the CIMP will be submitted to the Regional Board by June 30, 2014, and that initiation of monitoring under the CIMP will commence as specified in the CIMP.

7.2 Costs

Section VI.C.1.g of the Permit requires that a financial strategy is in place for EWMP implementation and that the effectiveness of EWMP funds is maximized through the analysis of various implementation scenarios.

Based on the RAA, preliminary planning level cost opinions will be developed for implementation of the proposed watershed control measures. The cost analysis will include consideration of planning, design, permits, construction, operation and maintenance, land acquisition, and other factors as appropriate. Potential funding mechanisms will be discussed in the EWMP. BMP phasing will then be based on both interim target compliance (based on the RAA) and the projected availability of funds.

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APPENDIX A

Approach to Addressing Receiving Water Exceedances

Appendix A

Approach to Addressing Receiving Water Exceedances Within the North Santa Monica Bay Coastal Watersheds

APPROACH TO ADDRESSING RECEIVING WATER EXCEEDANCES

Sections VI.C.2 and VI.C.3 of the Permit describe how compliance with receiving water limits is attained for the various water body-pollutant combinations identified in a permittee's EWMP. Different actions are required for different types of receiving water limits. Specifically, the following classifications are addressed by the Permit:

- Water Body-Pollutant Combinations Addressed by a TMDL.
- 303(d)-listed Water Body-Pollutant Combinations: Pollutants in the same class as those identified in a TMDL and for which the water body is 303(d)-listed (Section VI.C.2.a.i), and pollutants not in the same class as those identified in a TMDL, but for which the water body is 303(d)-listed (Section VI.C.2.a.ii).
- Non 303(d)-listed Water Body-Pollutant Combinations: Pollutants for which there are exceedances of receiving water limitations, but for which the water body is not 303(d)-listed (Section VI.C.2.a.iii).

Figure A-1 illustrates this process.

Water Body-Pollutant Combinations Addressed by a TMDL

For water body-pollutant combinations addressed by a TMDL, adherence to all requirements and compliance dates as set forth in the approved EWMP will constitute compliance with applicable interim TMDL-based water quality based effluent limits and interim receiving water limits.

303(d)-listed Water Body-Pollutant Combinations

303(d)-listed water body-pollutant combinations are equivalent to the identified Category 2 combinations. Category 2 pollutants that will be addressed by the EWMP are limited to lead in Topanga Canyon Creek.[1] However, with the understanding that water body-pollutant combinations may be added to the Category 2 list based on future monitoring data, an approach to address both types of 303(d)-listed water body-pollutant combinations is provided below.

[1] As detailed in this document, pollutants which have not been definitively tied to MS4 discharges are not included in the EWMP at this time, but will be evaluated as part of future monitoring under the CIMP.

Pollutants in the same class as those identified in a TMDL

If in the future a water body within the NSMBCW EWMP WMA is added to the State's 303(d) list and a direct linkage to MS4 discharges is shown, the requirements of Permit Section VI.C.2.a.i will apply to this water body-pollutant combination, and the following actions will be completed as part of the EWMP:

- Demonstrate that the BMPs selected to achieve the applicable TMDL provisions will also adequately address MS4 contributions of the pollutant(s) within the same class. Assumptions and requirements of the corresponding TMDL provisions must be applied to the additional pollutant(s), including interim and final requirements and deadlines for their achievement, such that the MS4 discharges of the pollutant(s) will not cause or contribute to exceedances of receiving water limitations.
- Perform a RAA for this water body-pollutant combination.
- Identify milestones and dates for their achievement consistent with those in the applicable TMDL.

If outfall and receiving water monitoring under the CIMP indicate that such a listing is not linked to MS4 discharges, the Category 2 designation will be removed and further action for this water-body pollutant combination under the EWMP will cease.

Pollutants not in the same class as those identified in a TMDL

If in the future a water body within the NSMBCW EWMP area is added to the State's 303(d) list and a direct linkage to MS4 discharges is shown, the requirements of Permit Section VI.C.2.a.ii will apply to this water body-pollutant combination. Currently, lead (a 2006 303(d) listing for Topanga Canyon Creek) is the only pollutant that is not in the same class as any existing TMDL within the NSMBCW EWMP area. The source assessment conducted as part of the EWMP Work Plan indicated that, while a definitive linkage was not demonstrated, the MS4 system *may* cause or contribute to the lead impairment. Therefore, the following actions will be completed as part of the EWMP for lead in Topanga Canyon Creek, as well as in the future for any future applicable 303(d) listings:

- This water body-pollutant combination will be included in the RAA.
- If necessary, BMPs will be identified to address contributions of lead from MS4 discharges to the receiving water, such that the MS4 discharges of lead will not cause or contribute to the exceedance of the receiving water limits.
- Enforceable milestones and dates for their achievement will be identified to control MS4 discharges such that they do not cause or contribute to exceedances

of receiving water limitations within a timeframe that is as short as practicable, taking into account the technological, operational, and economic factors that affect the design, development, and implementation of the BMPs that are necessary. The time between dates will not exceed one year. Milestones will relate to a specific water quality endpoint (e.g., percent load reduction) and dates will relate either to taking a specific action or meeting a numeric water quality endpoint. If the identified dates are beyond the term of the Order, then Permit Section VI.C.2.a.ii(5) will apply.

If outfall and receiving water monitoring under the CIMP indicate that lead is not an MS4-related pollutant, the Category 2 designation will be removed and further action for this water-body pollutant combination under the EWMP will cease.

Non 303(d)-listed Water Body-Pollutant Combinations

Permit Section C.2.a.iii discusses the requirements for pollutants for which there are exceedances of receiving water limitations, but for which the water body is *not* 303(d)-listed. Existing data do not indicate the existence of any such water body-pollutant combinations at this time. As a result, these combinations will ultimately be identified based on data collected pursuant to the approved CIMP. If and when sufficient CIMP monitoring data demonstrate that MS4 discharges may[2] have caused or contributed, or have reasonable potential to cause or contribute, to the exceedance of receiving water limitations, then the EWMP will be modified as follows:

- BMPs will be identified to address contributions of the pollutant(s) from MS4 discharges to the receiving water(s), such that the MS4 discharges of the pollutant(s) will not cause or contribute to the exceedance of the receiving water limits.
- A RAA will be conducted for the water body-pollutant combination(s). In some instances this will require modeling of the identified pollutant.
- Enforceable milestones and dates for their achievement will be identified to control MS4 discharges such that they do not cause or contribute to exceedances of receiving water limitations within a timeframe(s) that is as short as practicable, taking into account the technological, operational, and economic

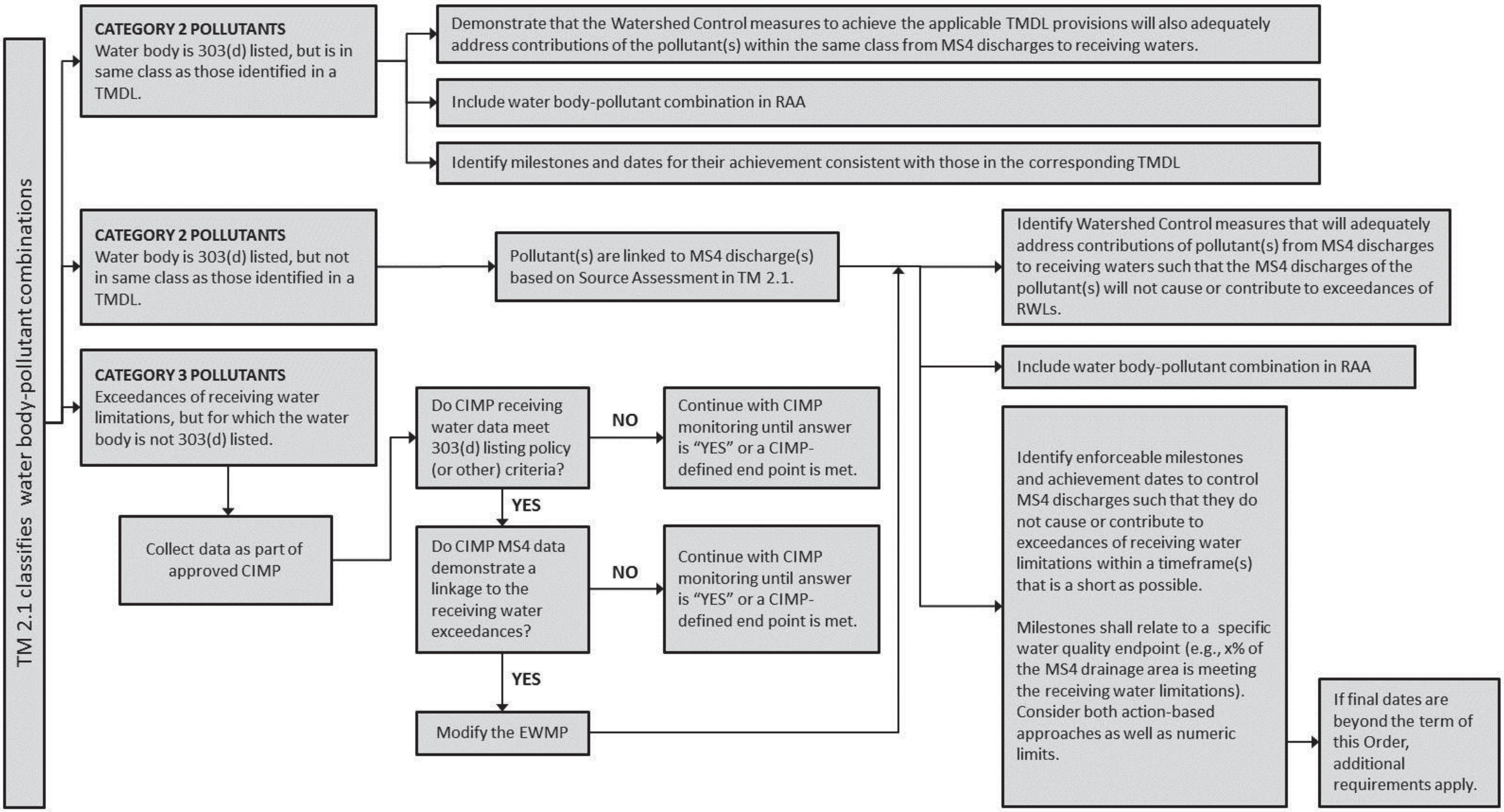
[2] Where CIMP monitoring data demonstrate that MS4 discharges may have caused or contributed to the exceedance of receiving water limitations, it should be noted that this does not constitute any admission of known contributions, but reflects uncertainty in linking datasets.

factors that affect the design, development, and implementation of the BMPs that are necessary. The time between dates will not exceed one year. Milestones will relate to a specific water quality endpoint (e.g., percent load reduction) and dates will relate either to taking a specific action or meeting a milestone. If the identified dates are beyond the term of the Order, then Permit Section VI.C.2.a.iii(2)(d) will apply.

To evaluate if MS4 discharges may have caused or contributed to the exceedance of receiving water limitations, all of the following criteria will be applied:

- Receiving water samples exceed the applicable receiving water limitations at such frequency that they meet the listing criteria in Tables 3.1 and 3.2 in California's Water Control Policy (State Water Board, 2004);
- MS4 outfall samples (taken per the CIMP) exceed the applicable WQBELs or receiving water limits; and
- Data do not exist to demonstrate that the outfall exceedances were a result of other permitted discharges to the MS4 (e.g., permitted dewatering or groundwater treatment projects)

Figure A-1. Compliance with Receiving Water Limitations Not Otherwise Addressed by a TMDL



Appendix B

Summary of NSMBCW BMPs

Appendix B

Summary of Existing and Potential Control Measures Within the North Santa Monica Bay Coastal Watersheds

Existing Regional BMPs

Existing Regional BMPs in the NSMBCW EWMP Area

ID	Subwatershed	Jurisdiction	Project Name	Address	BMP Category	Treatment Volume	Date Active
R1	Ramirez	Malibu	Paradise Cove Dry Weather Treatment Facility		Treatment Facility	1M gal/day	6/28/2010
R2	Marie	LACFCD	Marie Canyon Dry Weather Treatment Facility	Malibu Rd at Marie Canyon	Treatment Facility	100 gpm	10/11/2007
R3	Malibu Creek	Malibu	Civic Center SW Treatment Facility	Civic Center Way and Cross Creek Road, Malibu	Treatment Facility	1200 gpm	2/2/2007
R4			Malibu Legacy Park Detention	23500 Civic Center Way, Malibu	Detention/Treatment Facility	1400 gpm, 8 ac-ft	10/2/2010
R5	Las Flores	Malibu	Las Flores Canyon Restoration	3805 Las Flores Canyon Rd	Biofiltration and infiltration		4/1/2008

Planned & Potential Regional BMPs

Planned & Potential Regional BMPs in the NSMBCW EWMP Area

ID	Subwatershed	Jurisdiction	Data Source	Project Name	Address	BMP Category	Scheduled Completion
D6	Encinal/Trancas	Malibu	NSMBCW EWMP NOI	Broad Beach Biofiltration Project	Broad Beach Road, Malibu	Biofiltration	Apr-14
D7	Trancas	County	J1/J4 IP Implementation, 2009	Trancas-2		Infiltration Trench	Potential
D8			J1/J4 IP Implementation, 2009	Trancas-3		Infiltration Trench	Potential
D9	Ramirez West	Malibu	NSMBCW EWMP NOI	Wildlife Road Storm Drain Improvements	6950 and 6982 Wildlife Road, Malibu	Biofiltration	Apr-14
D10	Malibu Creek	Malibu	NSMBCW EWMP NOI	Malibu Legacy Park Pump Station Improvements	Civic Center Area, Malibu	Treatment Plant	Apr-16

Planned & Potential Distributed BMPs

Planned and Potential Distributed BMPs in the NSMBCW EWMP Area

ID	Subwatershed	Jurisdiction	Data Source	Project Name	Address	BMP Category	Tributary Area Treated (ac)	Existing	Planned	Potential
D1	Nicholas	LACDBH	Table 5.1, J1/4 IP, 2005	Nicholas Canyon County Beach Parking Lot	33850 PCH, Malibu	Infiltration	1.18			X
D2	Los Aliso	Malibu	Table 5.1, J1/4 IP, 2005	Charmlee Nature Center Public Rec Area	2577 South Encinal Canyon Road, Malibu	Infiltration	547			X
D3	Trancas	County	J1/J4 IP Implementation, 2009	Trancas-2/Trancas-3		Infiltration	5			X
D4		LACDBH	Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #7)	30050 PCH, Malibu	Infiltration	1.37			X
D5			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #8)	30050 PCH, Malibu	Infiltration	2.19			X
D6			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #9)	30050 PCH, Malibu	Infiltration	0.64			X
D7			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #10)	30050 PCH, Malibu	Infiltration	0.29			X
D8			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #11)	30050 PCH, Malibu	Infiltration	0.56			X
D9			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #12)	30050 PCH, Malibu	Infiltration	2.04			X
D10		Malibu	Table 5.1, J1/4 IP, 2005	Trancas Canyon Park Public Rec Area	between 6120 & 5942 Trancas Canyon Road, Malibu	Infiltration	15	X		
D11	Zuma	County	J1/J4 IP Implementation, 2009	Zuma-1		Porous Pavement	4.5			X
D12			J1/J4 IP Implementation, 2009	Zuma-3		Bioretention	195			X
D13				Camp Kilpatrick LID	427 South Encinal Canyon Road, Malibu	Treatment Facility	10.8		X	
D14		LACDBH	Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #1)	30050 PCH, Malibu	Infiltration	2.21			X
D15			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #2)	30050 PCH, Malibu	Infiltration	1.72			X
D16			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #3)	30050 PCH, Malibu	Infiltration	0.61			X
D17			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #4)	30050 PCH, Malibu	Infiltration	0.67			X
D18			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #5)	30050 PCH, Malibu	Infiltration	1.15			X
D19			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #6)	30050 PCH, Malibu	Infiltration	0.91			X
D20			Table 5.1, J1/4 IP, 2005	Zuma Beach Maintenance Yard	30100 PCH, Malibu	Infiltration	0.53			X
D21			Table 5.1, J1/4 IP, 2005	Point Dume County Beach Parking Lot	7103 Westward Beach Road, Malibu	Infiltration	2.45			X
D22	Corral West	County	J1/J4 IP Implementation, 2009	Corral West-1		Infiltration	7.6			X
D23	Marie Canyon	Malibu		Malibu Road Biofiltration		Bioretention			X	
D24	Carbon	LACDBH	Table 5.1, J1/4 IP, 2005	Malibu Lagoon County Beach (Surfrider) Parking Lot	23000 PCH, Malibu	Infiltration	0.68			X
D25		County	J1/J4 IP Implementation, 2009	Carbon-1		Bioretention	31			X
D26	Las Flores	Malibu	Table 5.1, J1/4 IP, 2005	Las Flores Creek Park Public Rec Area	3755 Las Flores Canyon Road, Malibu	Infiltration	4		X	
D27				Las flores Biofilter at PCH		Bioretention			X	
D28	Topanga	LACDBH	Table 5.1, J1/4 IP, 2005	Topanga County Beach (East Lot)	18700 PCH, Malibu	Infiltration	0.97			X
D29			Table 5.1, J1/4 IP, 2005	Topanga County Beach (West Lot, unpaved)	18700 PCH, Malibu	Infiltration	0.96			X
D30		County	J1/J4 IP Implementation, 2009	Topanga-1/3		Infiltration	116			X
D31			J1/J4 IP Implementation, 2009	Topanaga-2		Infiltration	13			X
D32			J1/J4 IP Implementation, 2009	Topanga-4		Infiltration	2			X
D33			J1/J4 IP Implementation, 2009	Topanga-5		Bioretention	15			X
D34			J1/J4 IP Implementation, 2009	Topanga-7		Bioretention	9.4			X
D35			J1/J4 IP Implementation, 2009	Topanga-8		Bioretention	9.6			X
D36			J1/J4 IP Implementation, 2009	Topanga-9		Bioretention	4.2			X
D37			J1/J4 IP Implementation, 2009	Topanga-10		Infiltration	0.27			X
D38			J1/J4 IP Implementation, 2009	Topanga-11		Cistern	0.15			X
D39			J1/J4 IP Implementation, 2009	Topanga-12		Porous Pavement	0.88			X

Existing Non-Structural BMPs

Non-Structural BMPs in the NSMBCW EWMP Area

Program Element	ID	Activity	Existing County BMP?	Existing Flood Control BMP?	Existing City BMP?
Public Information and Participation Program	1	Maintain storm water website(s)	Yes	Yes	Yes
	2	Reporting hotline for the public (e.g., 888-CLEAN-LA)	Yes	Yes	Yes
	3	Make reporting info available to public	Yes	Yes	Yes
	4	Public service announcements, advertising, and media relations	Yes	Yes	Yes
	5	Educational activities and countywide events	Yes	Yes	Yes
	6	Educate and involve ethnic communities and businesses	Yes	Yes	Yes
	7	Pet Owner Outreach	Yes	Yes	Yes
	8	Outreach to property owners with corralled animals	No	No	Yes
	9	Horse owner outreach/Pilot program	No	No	Yes
	10	Equestrian waste/cleanout signage		No	No
	11	Hiking trailhead signage	Yes	No	No
	12	Septic system guides	Yes	Yes	Yes
	13	Outreach coordination with Pepperdine University	Yes	Yes	Yes
	14	Inter-agency coordination	Yes	Yes	Yes
	15	Irrigation Management Outreach and Retrofits	Yes	Yes	Yes
	16	Ocean Friendly Garden Project	No	No	Yes
	17	Pesticide, Herbicide, Fertilizer Management	No	N/A	Yes
	18	Downspout disconnect program	No	N/A	No
Industrial/Commercial	27	Tracking of critical sources	Yes	N/A	Yes
	28	BMP material available for industrial/commercial owners	Yes	N/A	Yes
	29	Maintained inventory of critical sources annually	Yes	N/A	Yes
	30	Inspections of industrial/commercial facilities	Yes	N/A	Yes
	31	Progressive enforcement of compliance with stormwater requirements	No - Pending	N/A	Yes
	32	Regular restaurant inspections	Yes	N/A	Yes
	33	Restaurant reward and recognition program	No	N/A	Yes
	34	Industry-specific workshops	No	N/A	Yes
	35	Sustainable/Green Business Program	No	N/A	Yes
Planning and Land Development Program	44	Lid Ordinance/Planning and Land Development Program implementation	Yes	N/A	Yes
	45	Green Streets Policy	Yes	N/A	Yes
	46	Plan check process in place for qualifying projects	Yes	N/A	Yes
	47	LID guidance documents available for development community	Yes	N/A	Yes
	48	Tracking database	Yes	N/A	Yes
	49	Post-project inspections	Yes	N/A	No
	50	Require verification of maintenance provisions for BMPs	No	N/A	Yes
	51	Targeted Employee training of Development planning employees	Yes	N/A	Yes
	52	Annual reporting of mitigation project descriptions	No	N/A	No
Development Construction Program	62	Electronic tracking system (database and/or GIS)	Yes	N/A	Yes
	63	Required documents prior to issuance of building/grading permit	Yes	N/A	Yes
	64	Implement technical BMP standards	Yes	N/A	Yes
	65	Progressive enforcement	Yes	N/A	Yes
	66	Require preparation of a Local SWPPP for approval of permitted sites	Yes	N/A	Yes
	67	Inspect construction sites as-necessary	Yes	N/A	Yes
	68	Permittee staff training	Yes	N/A	Yes
Public Agency Activities Program	77	Public construction activities management	Yes	Yes	Yes
	78	Public facility inventory	No - In Progress	No - In Progress	No - In Progress
	79	Inventory of existing development for retrofitting opportunities	No - In Progress	No - In Progress	No - In Progress
	80	Public facility and activity management	Yes	Yes	Yes
	81	Vehicle maintenance, material storage facilities, corporation yard management	Yes	Yes	N/A
	82	Landscape, park, and recreational facilities management	Yes	Yes	Yes
	83	Storm drain operation and maintenance	Yes	Yes	Yes
	84	Streets, roads, and parking facilities maintenance	Yes	Yes	Yes
	85	Parking Facilities Management	Yes	Yes	N/A
	86	Municipal employee and contractor training	Yes - Employees Only	Yes - Employees Only	Yes - Employees Only
	87	Sewage system maintenance, overflow, and spill prevention	Yes	No	N/A
	88	Street Sweeping	Yes	No	Yes
IC/ID Elimination Program	97	Implementation program	Yes	Yes	Yes
	98	MS4 Tracking (mapping) of permitted connections and IC/ID	Yes	Yes	Yes
	99	Procedures for conducting source investigations for IC/IDs	Yes	Yes	Yes
	100	Procedures for eliminating IC/IDs	Yes	Yes	Yes
	101	Procedures for public reporting of ID	Yes	Yes	Yes
	102	Spill response plan	Yes	Yes	Yes
	103	IC/ID response plan	Yes	Yes	Yes
	104	IC/IDs education and training for staff	Yes	Yes	Yes

APPENDIX C

SBPAT Land Use EMC Dataset

Appendix C

SBPAT Default LA County Land Use EMC Datasets

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).

Appendix D

Los Angeles County Flood Control District Background Information

Appendix D

Los Angeles County Flood Control District Background Information

LACFCD Background Information

In 1915, the Los Angeles County Flood Control Act established the LACFCD and empowered it to manage flood risk and conserve stormwater for groundwater recharge. In coordination with the United States Army Corps of Engineers the LACFCD developed and constructed a comprehensive system that provides for the regulation and control of flood waters through the use of reservoirs and flood channels. The system also controls debris, collects surface storm water from streets, and replenishes groundwater with storm water and imported and recycled waters. The LACFCD covers the 2,753 square-mile portion of Los Angeles County south of the east-west projection of Avenue S, excluding Catalina Island. It is a special district governed by the County of Los Angeles Board of Supervisors, and its functions are carried out by the Los Angeles County Department of Public Works. The LACFCD service area is shown in Figure D-1**.**

Unlike cities and counties, the LACFCD does not own or operate any municipal sanitary sewer systems, public streets, roads, or highways. The LACFCD operates and maintains storm drains and other appurtenant drainage infrastructure within its service area. The LACFCD has no planning, zoning, development permitting, or other land use authority within its service area. The permittees that have such land use authority are responsible under the Permit for inspecting and controlling pollutants from industrial and commercial facilities, development projects, and development construction sites. (Permit, Part II.E, p. 17.)

The MS4 Permit language clarifies the unique role of the LACFCD in storm water management programs: "[g]iven the LACFCD's limited land use authority, it is appropriate for the LACFCD to have a separate and uniquely-tailored storm water management program. Accordingly, the storm water management program minimum control measures imposed on the LACFCD in Part VI.D of this Order differ in some ways from the minimum control measures imposed on other Permittees. Namely, aside from its own properties and facilities, the LACFCD is not subject to the Industrial/Commercial Facilities Program, the Planning and Land Development Program, and the Development Construction Program. However, as a discharger of storm and non-storm water, the LACFCD remains subject to the Public Information and Participation Program and the Illicit Connections and Illicit Discharges Elimination Program. Further, as the owner and operator of certain properties, facilities and infrastructure, the LACFCD remains subject to requirements of a Public Agency Activities Program." (Permit, Part II.F**,** p. 18.)

Consistent with the role and responsibilities of the LACFCD under the Permit, the [E]WMPs and CIMPs reflect the opportunities that are available for the LACFCD to collaborate with permittees having land use authority over the subject watershed area. In some instances, the opportunities are minimal, however the LACFCD remains responsible for compliance with certain aspects of the MS4 permit as discussed above.

In some instances, in recognition of the increased efficiency of implementing certain programs regionally, the LACFCD has committed to responsibilities above and beyond its obligations under the 2012 Permit. For example, although under the 2012 Permit the Public Information and Participation Program is a responsibility of each Permittee, the LACFCD is committed to implementing certain regional elements of the PIPP on behalf of all Permittees at no cost to the Permittees. These regional elements include:

- Maintaining a countywide hotline (888-CLEAN-LA) and website (www.888cleanla.com) for public reporting and general stormwater management information at an estimated annual cost of $250,000. Each Permittee can utilize this hotline and website for public reporting within its jurisdiction.
- Broadcasting public service announcements and conducting regional advertising campaigns at an estimated annual cost of $750000.
- Facilitating the dissemination of public education and activity specific stormwater pollution prevention materials at an estimated annual cost of $100,000.
- Maintaining a stormwater website at an estimated annual cost of $10,000.

The LACFCD will implement these elements on behalf of all Permittees starting July 2015 and through the Permit term. With the LACFCD handling these elements regionally, Permittees can better focus on implementing local or watershed-specific programs, including student education and community events, to fully satisfy the PIPP requirements of the 2012 Permit.

Similarly, although water quality monitoring is a responsibility of each Permittee under the 2012 Permit, the LACFCD is committed to implement certain regional elements of the monitoring program. Specifically, the LACFCD will continue to conduct monitoring at the seven existing mass emissions stations required under the previous Permit. The LACFCD will also participate in the Southern California Stormwater Monitoring Coalition's Regional Bioassessment Program on behalf of all Permittees. By taking on these additional responsibilities, the LACFCD wishes to increase the efficiency and effectiveness of these programs.

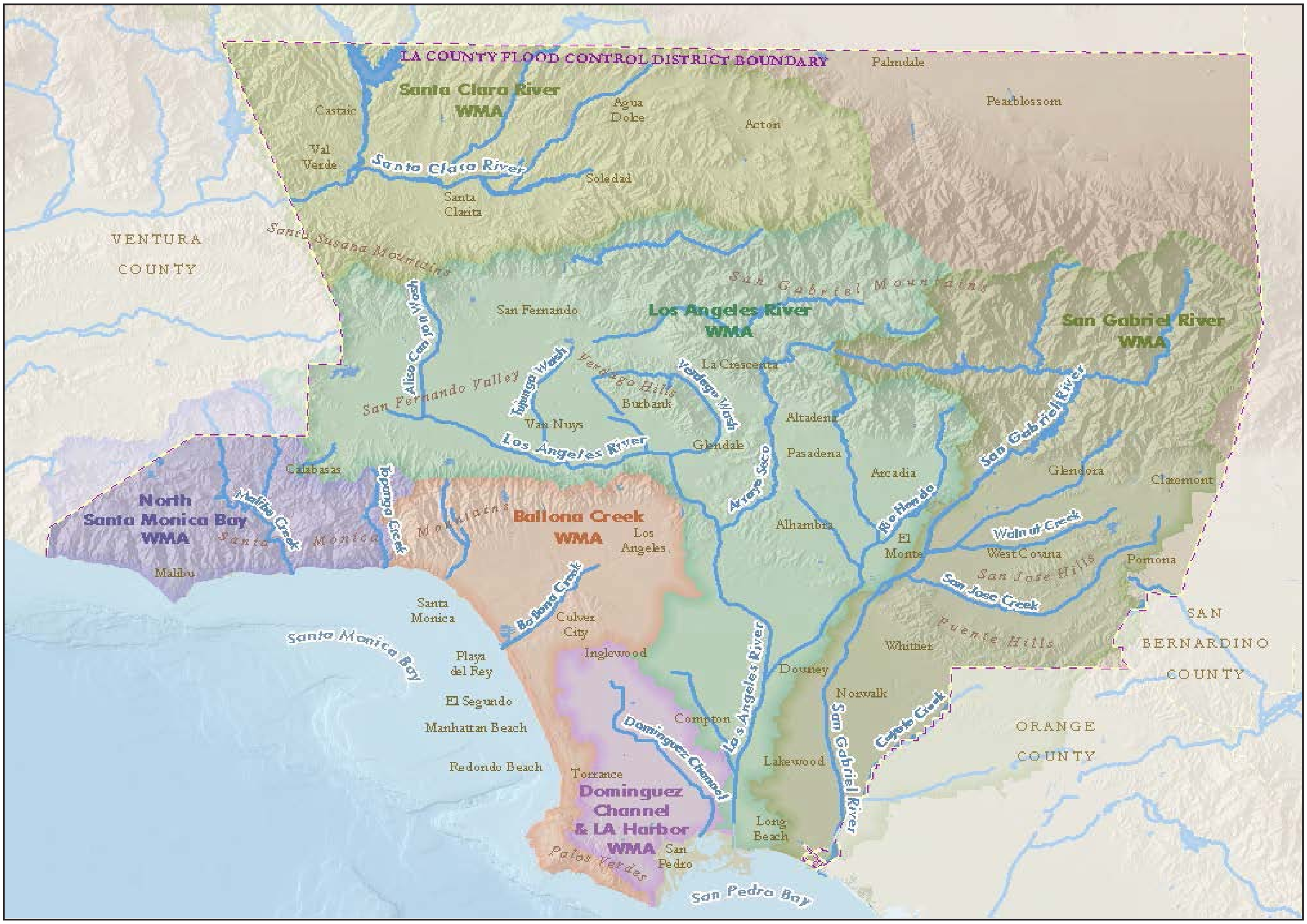


Figure D-1 Los Angeles County Flood Control District Service Area

APPENDIX C

RAA Summary Data

NSMBCW EWMP – RAA Data
June 2015
Appendix C

Data files associated with the Reasonable Assurance Analysis (RAA) have been submitted electronically to the Regional Board. These files include the following:

- Excel workbooks containing post-processed RAA results.
- Excel workbooks containing the TLR and RAA summary sheets.
- SBPAT files for all used RAA runs, including both input and output files and the Scenario Managers used.
- GIS files, including all shapefiles used in the RAA and development of figures in the EWMP.

Included in this Appendix is the following:

- A printout of the RAA summary sheet (Attachment C-1).
- Example TLR calculations for a variety of pollutants addressed in the RAA (Attachment C-2).
- Annual rainfall data within the NSMBCW watershed, used to estimate the 90th percentile year (Attachment C-3).
- Charts comparing single family residential monitoring data and corresponding EMC data used in SBPAT (Attachment C-4).

ATTACHMENT C-1

RAA Summary Calculations

NSMBCW EWMP - RAA Data
June 2015
Attachment C-1

				Historical Monitoring Exceedances (2002-2013)					2003 - 2015						2015-2021										2003-2021		Additional LR Needed			
						Target Load Reduction			SUSMP Redevelopment		Existing BMPs		Total LR (2003 - 2015)		LID Incentives		LID Redevelopment		Non-Structural Non-Modeled		Proposed BMPs		Total LR (2015 - 2021)		Total LR (2003 - 2021)				Target Load Reduction	
Compliance Monitoring Location	Analysis Region (For V lookup)	Analysis Region	Pollutant	All Events	Daily rainfall > 0.10"	Baseline Load	Absolute TLR	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%
	W1-01	W1-01	FC	-	-	0.8	0.0	0.0%	0.00	0.0%	0.0	0.0%	0.00	0%	0.00	0.0%	0.00	0.0%	0.04	5.0%	0.0	0%	0.04	5%	0.04	5.0%	0.00	0.0%	0.0	0%
S1-01	S1-01	S1-01	FC	26%	25%	38.8	0.0	0.0%	0.93	2.4%	0.0	0.0%	0.93	2%	0.00	0.0%	0.42	1.1%	1.94	5.0%	0.0	0%	2.36	6%	3.29	8.5%	0.00	0.0%	0.0	0%
	E1-01	E1-01	FC	-	-	0.7	0.0	0.0%	0.00	0.0%	0.0	0.0%	0.00	0%	0.00	0.1%	0.00	0.0%	0.04	5.0%	0.0	0%	0.04	5%	0.04	5.1%	0.00	0.0%	0.0	0%
S4-01	S4-01	S4-01	FC	13%	20%	30.1	0.0	0.0%	0.20	0.6%	0.0	0.0%	0.20	1%	0.31	1.0%	0.08	0.3%	1.51	5.0%	0.0	0%	1.90	6%	2.09	7.0%	0.00	0.0%	0.0	0%
	E4-01	E4-01	FC	-	-	45.7	0.0	0.0%	0.62	1.4%	0.0	0.0%	0.62	1%	0.71	1.5%	0.28	0.6%	2.29	5.0%	0.0	0%	3.28	7%	3.89	8.5%	0.00	0.0%	0.0	0%
S1-02	S1-02	S1-02	FC	8%	14%	18.9	0.0	0.0%	0.41	2.2%	0.0	0.0%	0.41	2%	0.57	3.0%	0.17	0.9%	0.95	5.0%	0.0	0%	1.68	9%	2.09	11.0%	0.00	0.0%	0.0	0%
S1-03	S1-03	S1-03	FC	5%	9%	130.6	0.0	0.0%	1.83	1.4%	5.4	4.1%	7.22	6%	3.21	2.5%	0.78	0.6%	6.53	5.0%	0.0	0%	10.52	8%	17.74	13.6%	0.00	0.0%	0.0	0%
S1-04	S1-04	S1-04	FC	36%	34%	100.7	0.0	0.0%	1.32	1.3%	0.9	0.9%	2.20	2%	1.66	1.6%	0.58	0.6%	5.04	5.0%	0.0	0%	7.28	7%	9.48	9.4%	0.00	0.0%	0.0	0%
	E1-04	E1-04	FC	-	-	267.3	0.0	0.0%	4.14	1.6%	0.0	0.0%	4.14	2%	6.13	2.3%	1.32	0.5%	13.37	5.0%	0.0	0%	20.81	8%	24.96	9.3%	0.00	0.0%	0.0	0%
S1-05	S1-05	S1-05	FC	26%	32%	398.6	0.0	0.0%	3.59	0.9%	0.0	0.0%	3.59	1%	4.10	1.0%	1.60	0.4%	19.93	5.0%	0.0	0%	25.63	6%	29.22	7.3%	0.00	0.0%	0.0	0%
	E1-05	E1-05	FC	-	-	344.9	0.0	0.0%	6.95	2.0%	0.0	0.0%	6.95	2%	8.85	2.6%	2.38	0.7%	17.25	5.0%	0.0	0%	28.47	8%	35.43	10.3%	0.00	0.0%	0.0	0%
S1-06	S1-06	S1-06	FC	25%	29%	386.0	0.0	0.0%	5.46	1.4%	10.3	2.7%	15.75	4%	8.94	2.3%	2.13	0.6%	19.30	5.0%	0.0	0%	30.37	8%	46.12	11.9%	0.00	0.0%	0.0	0%
S1-07	S1-07	S1-07	FC	54%	66%	78.9	7.5	9.5%	0.89	1.1%	2.0	2.6%	2.93	4%	1.34	1.7%	0.34	0.4%	3.95	5.0%	0.0	0%	5.63	7%	8.57	10.9%	0.00	0.0%	7.5	9.5%
	E1-07	E1-07	FC	-	-	121.5	36.4	29.9%	1.43	1.2%	0.0	0.0%	1.43	1%	2.48	2.0%	0.51	0.4%	6.07	5.0%	26.7	22.0%	35.77	29%	37.20	30.6%	0.00	0.0%	36.4	29.9%
S1-08	S1-08	S1-08	FC	43%	63%	86.5	7.8	9.0%	1.39	1.6%	0.0	0.0%	1.39	2%	1.84	2.1%	0.54	0.6%	4.32	5.0%	0.0	0%	6.71	8%	8.09	9.4%	0.00	0.0%	7.8	9.0%
S1-09	S1-09	S1-09	FC	37%	61%	28.9	3.6	12.5%	0.43	1.5%	0.0	0.0%	0.43	1%	0.49	1.7%	0.20	0.7%	1.45	5.0%	1.6	5.6%	3.76	13%	4.19	14.5%	0.00	0.0%	3.6	12.5%
S1-10	S1-10	S1-10	FC	35%	52%	23.9	1.5	6.1%	0.50	2.1%	0.0	0.0%	0.50	2%	0.22	0.9%	0.23	1.0%	1.19	5.0%	0.0	0.0%	1.65	7%	2.15	9.0%	0.00	0.0%	1.5	6.1%
S1-11	S1-11	S1-11	FC	29%	42%	19.5	0.0	0.0%	0.26	1.4%	0.0	0.0%	0.26	1%	0.30	1.5%	0.11	0.6%	0.97	5.0%	0.0	0.0%	1.38	7%	1.65	8.5%	0.00	0.0%	0.0	0%
	E1-11	E1-11	FC	-	-	54.6	11.2	20.5%	0.67	1.2%	0.0	0.0%	0.67	1%	0.71	1.3%	0.31	0.6%	2.73	5.0%	7.8	14.3%	11.54	21%	12.22	22.4%	0.00	0.0%	11.2	20.5%
S1-12	S1-12	S1-12	FC	49%	60%	86.4	37.9	43.9%	1.57	1.8%	0.9	1.1%	2.50	3%	1.48	1.7%	0.67	0.8%	4.32	5.0%	30.7	35.5%	37.16	43%	39.66	45.9%	0.00	0.0%	37.9	43.9%
	E1-12	E1-12	FC	-	-	58.2	16.3	28.0%	2.64	4.5%	2.4	4.1%	5.00	9%	0.89	1.5%	1.27	2.2%	2.91	5.0%	6.2	10.6%	11.26	19%	16.26	28.0%	0.00	0.0%	16.3	28.0%
MCW - Serra	MCW	MCW	FC	-	-	19.9	0.0	0.0%	1.14	5.7%	0.0	0.0%	1.14	6%	-	-	0.49	2.5%	0.99	5.0%	0.0	0.0%	1.48	7%	2.62	13.2%	0.00	0.0%	0.0	0%
	MCW		NO3	-	-	43.5	0.0	0.0%	5.51	12.7%	0.0	0.0%	5.51	13%	-	-	2.68	6.2%	2.17	5.0%	0.0	0.0%	4.85	11%	10.36	23.8%	0.00	0.0%	0.0	0%
	MCW		TN	-	-	2173.3	0.0	0.0%	30.31	1.4%	0.0	0.0%	30.31	1%	-	-	13.25	0.6%	108.67	5.0%	0.0	0.0%	121.92	6%	152.22	7.0%	0.00	0.0%	0.0	0%
	MCW		TP	-	-	211.2	0.0	0.0%	3.19	1.5%	0.0	0.0%	3.19	2%	-	-	1.39	0.7%	10.56	5.0%	0.0	0.0%	11.95	6%	15.14	7.2%	0.00	0.0%	0.0	0%
S1-13	S1-13	S1-13	FC	42%	46%	57.5	6.5	11.3%	1.91	3.3%	0.0	0.0%	1.91	3%	0.70	1.2%	0.84	1.5%	2.88	5.0%	2.5	4.4%	6.93	12%	8.84	15.4%	0.00	0.0%	6.5	11.3%
	W1-14	W1-14	FC	-	-	142.3	29.5	20.8%	3.70	2.6%	0.0	0.0%	3.70	3%	2.40	1.7%	1.64	1.2%	7.12	5.0%	20.5	14.4%	31.68	22%	35.38	24.9%	0.00	0.0%	29.5	20.8%
S1-14	S1-14	S1-14	FC	31%	54%	53.7	8.2	15.3%	2.08	3.9%	0.3	0.6%	2.39	4%	1.11	2.1%	0.99	1.8%	2.69	5.0%	1.2	2.3%	6.02	11%	8.41	15.7%	0.00	0.0%	8.2	15.3%
S1-15	S1-15	S1-15	FC	25%	33%	72.1	0.0	0.0%	1.38	1.9%	0.0	0.0%	1.38	2%	1.69	2.3%	0.71	1.0%	3.61	5.0%	0.0	0.0%	6.01	8%	7.39	10.2%	0.00	0.0%	0.0	0%
S1-16	S1-16	S1-16	FC	15%	31%	4.6	0.0	0.0%	0.06	1.4%	0.0	0.0%	0.06	1%	0.08	1.7%	0.03	0.7%	0.23	5.0%	0.0	0.0%	0.34	7%	0.40	8.8%	0.00	0.0%	0.0	0%
S1-17	S1-17	S1-17	FC	11%	14%	14.5	0.0	0.0%	0.20	1.3%	0.0	0.0%	0.20	1%	0.13	0.9%	0.10	0.7%	0.73	5.0%	0.0	0.0%	0.95	7%	1.15	7.9%	0.00	0.0%	0.0	0%
S1-18	S1-18	S1-18	FC	58%	63%	311.4	51.8	16.6%	6.46	2.1%	0.0	0.0%	6.46	2%	5.54	1.8%	3.21	1.0%	15.57	5.0%	33.0	10.6%	57.29	18%	63.75	20.5%	0.00	0.0%	51.8	16.6%
	S1-18		TPb	-	-	180.0	0.0	0.0%	0.44	0.2%	0.0	0.0%	0.44	0%	0.40	0.2%	0.23	0.1%	9.00	5.0%	2.3	1.3%	11.90	7%	12.34	6.9%	0.00	0.0%	0.0	0%

ATTACHMENT C-2

EXAMPLE TLR CALCULATIONS

Bacteria

To better illustrate the TLR calculation process, the following example scenario was developed for compliance monitoring location (CML) 1-12 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 1-12 (Analysis Region S1-12) 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 1-12, 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")
49%	60%	28

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

The analysis region was modeled in SWMM5 and resulted in 40 discharge days (i.e., midnight – midnight 24-hour periods where discharge occurred). To reduce the baseline 40 discharge days to the allowable 28 discharge days, the diversion flowrate to a virtual retention BMP was iteratively sized until these two numbers were equal. This process resulted in a retention BMP with a diversion flowrate of 17.7 cubic feet per second (cfs).

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

The baseline condition for the S1-12 analysis region and the virtual retention BMP with a diversion flowrate of 17.2 cfs were modeled in SBPAT for TMDL year 1995. The table below shows the results of this modeling.

Average MS4 Baseline FC Load (10^12 MPN)	Average FC Load assuming virtual retention BMP (10^12 MPN)	MS4 Baseline FC Load Reduced (10^12 MPN)	% MS4 Baseline FC Load Reduced
92.1	48.5	43.6	47%

Nutrients - Total Phosphorus

To better illustrate the nutrient TLR calculation process, the following example scenario was developed for the MCW analysis region for TMDL year 1995 for Total Phosphorus (TP).

Steps 1-2: Model the analysis region in SBPAT to estimate the baseline load

The analysis region was modeled in SBPAT to obtain baseline runoff volume and phosphorus loading. Modeling included impervious areas as tributary to small bioswales to represent actual conditions in the MCW analysis region. The results are shown in the table below:

Baseline Phosphorus Load (lbs)	Average Runoff (ac-ft)
211.2	399

Steps 3: Compute the allowed loading based on MS4 TMDL limit.

The TMDL concentration-based WLA for total phosphorus is 0.2 mg/L for the winter season. The allowed load was computed by multiplying the concentration with the runoff volume obtained from Step 2. The result was 217.0 lbs.

Step 4: Compute TLR based on baseline and allowed loading.

The table below shows the computation results:

Baseline Load (lbs)	Allowed Load (lbs)	Target Load Reduction (lbs)	Target Load Reduction (%)
211.2	217.0	< 0	0%

Metals - Lead

To better illustrate the total lead TLR calculation process, the following example scenario was developed for the Topanga Canyon Creek (S1-18) analysis region for TMDL year 1995.

Steps 1-2: Model the analysis region in SBPAT to estimate the baseline load

The analysis region was modeled in SBPAT to obtain baseline runoff volume for TMDL year 1995. Daily storm loads for TMDL year 1995 were ranked, and the 90th percentile lead concentration was estimated. This concentration was multiplied by the annual runoff volume to estimate the baseline lead load. The results are shown in the table below:

Average Runoff (ac-ft)	90th Percentile Daily Lead Concentration (ug/L)	Baseline Lead Load (lbs)
4,623.5	14.3	180.1

Steps 3: Compute the allowed loading based on MS4 TMDL limit.

The CTR criteria for total lead is 82 ug/L, assuming hardness of 100 mg/L, a conversion factor of 0.791, and a Water Effects Ratio (WER) of 1.0. The allowed load was computed by multiplying the concentration with the runoff volume obtained from Step 2. The result was 1,031 lbs.

Step 4: Compute TLR based on baseline and allowed loading.

The table below shows the computation results:

Baseline Load (lbs)	Allowed Load (lbs)	Target Load Reduction (lbs)	Target Load Reduction (%)
180	1,031	< 0	0%

ATTACHMENT C-3

ANNUAL RAINFALL RECORDS USED IN THE NSMBCW RAA

Percentile	Lechuza Patrol Gauge (ID 044867)			
	Precipitation Total		Number of Wet Days	
	Year	Precip. (in)	Year	Days
2.2%	1961	8.17	1959	30
4.5%	1959	8.23	1961	36
6.8%	1990	9.4	1970	37
9.0%	1976	9.8	1966	42
11.3%	1985	9.8	1960	48
13.6%	1964	9.86	1972	49
15.9%	1972	11	1964	52
18.1%	1984	12	1977	52
20.4%	1994	12.3	1990	52
22.7%	1977	12.4	1985	53
25.0%	1987	12.7	1975	55
27.2%	1965	13.26	1988	56
29.5%	1989	13.4	1965	58
31.8%	1975	13.4	1976	58
34.0%	1960	13.8	1956	59
36.3%	1982	14.6	1962	59
38.6%	1981	14.9	1958	60
40.9%	1988	15.3	1981	60
43.1%	1957	15.38	1967	62
45.4%	1970	15.38	1997	62
47.7%	1963	15.91	1989	63
50.0%	1968	16.02	1968	64
52.2%	1991	17.2	1991	64
54.5%	1955	17.25	1987	65
56.8%	1967	17.89	1963	68
59.0%	1971	19.13	1984	70
61.3%	1997	19.8	1980	74
63.6%	1996	20.5	1982	74
65.9%	1956	22.23	1955	76
68.1%	1974	22.4	1957	76
70.4%	1958	25.19	1971	76
72.7%	1979	25.6	1974	81
75.0%	1966	27.03	1992	82
77.2%	1973	27.1	1969	84
79.5%	1992	31.2	1986	84
81.8%	1962	31.32	1993	84
84.0%	1986	31.5	1996	84
86.3%	1993	32.9	1994	85
88.6%	1980	33.3	1973	86
90.9%	1969	38.29	1995	89
93.1%	1995	39.5	1978	95
95.4%	1978	42	1979	98
97.7%	1983	50.8	1983	130

Percentile	Sepulveda Dam Gauge (ID 048092)			
	Precipitation Total		Number of Wet Days	
	Year	Precip. (in)	Year	Days
1.7%	1982	0.72	1982	11
3.5%	2002	4.21	1997	22
5.2%	2007	4.65	1959	26
7.0%	1961	6.61	1961	32
8.7%	1984	6.65	1970	32
10.5%	1990	6.85	1984	32
12.2%	1997	7.76	1972	34
14.0%	1985	8.05	2008	35
15.7%	1964	8.32	1990	38
17.5%	1976	8.38	1960	39
19.2%	1989	8.45	1964	39
21.0%	1960	8.72	1991	39
22.8%	1972	8.78	2002	39
24.5%	1999	8.9	2007	41
26.3%	1959	9.13	1966	43
28.0%	1963	9.29	1976	43
29.8%	1996	9.39	1987	43
31.5%	1994	10.04	2012	43
33.3%	1970	10.27	1963	45
35.0%	2012	10.49	1977	48
36.8%	1987	10.6	2001	51
38.5%	1957	12	2003	51
40.3%	2009	12.75	2004	52
42.1%	1988	13.17	1957	53
43.8%	1991	13.23	2009	53
45.6%	1965	13.35	1956	54
47.3%	1968	13.45	1962	54
49.1%	2004	13.46	1988	54
50.8%	1955	13.67	2000	55
52.6%	1956	13.84	1975	56
54.3%	2008	14.06	1994	57
56.1%	1977	14.1	1971	58
57.8%	2006	14.74	1989	58
59.6%	1975	15.25	1996	58
61.4%	2000	15.51	1992	59
63.1%	1974	16.08	1999	59
64.9%	1971	16.37	1968	60
66.6%	2003	17.59	2006	60
68.4%	1986	18.32	1973	62
70.1%	2001	19.38	1974	62
71.9%	1967	19.52	2005	62
73.6%	1973	19.81	1979	64
75.4%	1979	20.51	1986	66
77.1%	2010	20.76	1955	67
78.9%	1966	22.48	1985	68
80.7%	1962	22.58	2011	68

Percentile	Sepulveda Dam Gauge (ID 048092)			
	Precipitation Total		Number of Wet Days	
	Year	Precip. (in)	Year	Days
82.4%	2011	22.62	1965	69
84.2%	1958	22.87	1958	70
85.9%	1969	28.63	1969	70
87.7%	1992	28.97	1967	71
89.4%	1978	29.87	2010	71
91.2%	1995	33.15	1995	72
92.9%	1983	34.03	1993	77
94.7%	2005	34.13	1978	82
96.4%	1993	34.81	1983	93
98.2%	1998	39.04	1998	108

ATTACHMENT C-4

COMPARISON OF SINGLE FAMILY RESIDENTIAL MONITORING DATA AND CORRESPONDING EMC DATA USED IN SBPAT

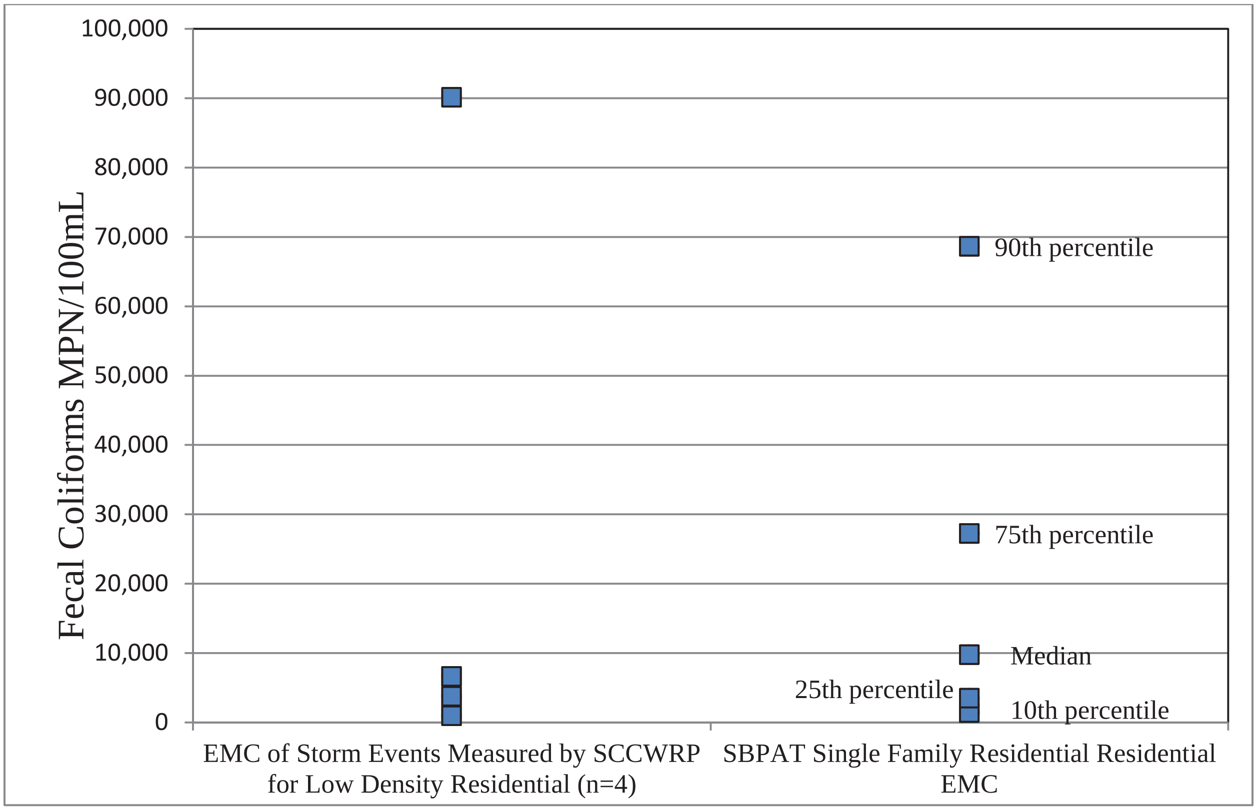


Figure E-1: Comparison of SFR monitoring data and SBPAT modeling data for fecal coliform

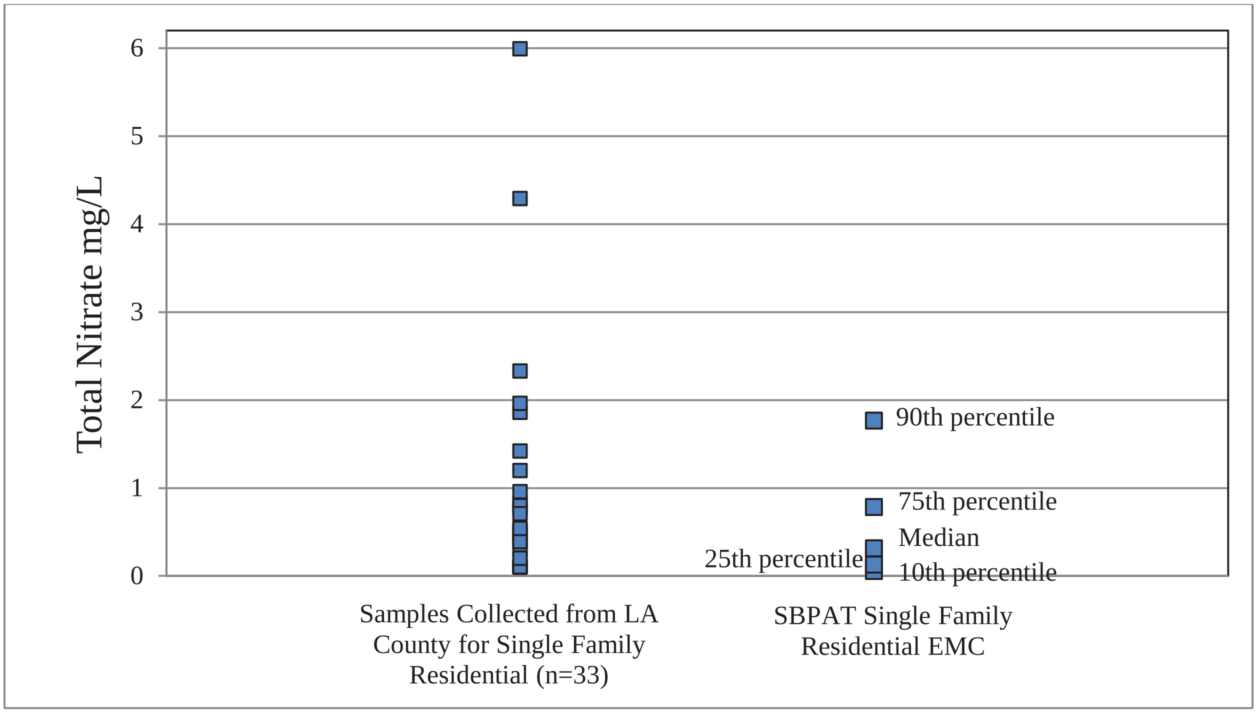


Figure E-2: Comparison of SFR monitoring data and SBPAT modeling data for total nitrate

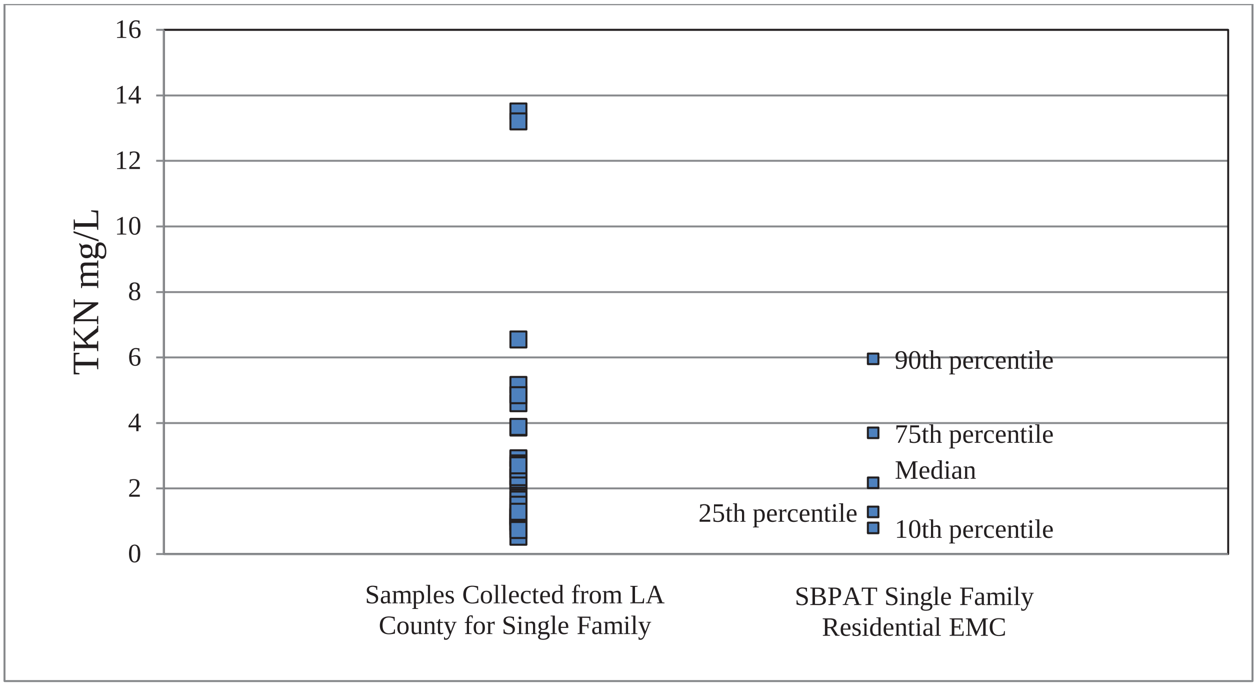


Figure E-3: Comparison of SFR monitoring data and SBPAT modeling data for TKN

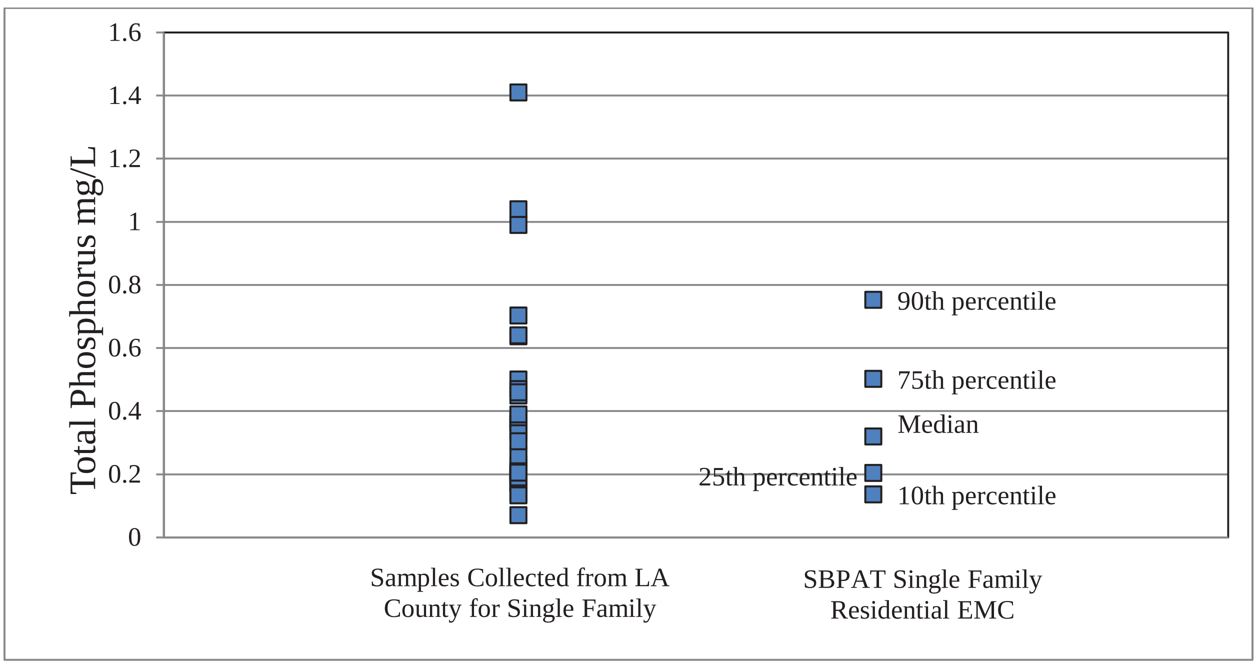


Figure E-4: Comparison of SFR monitoring data and SBPAT modeling data for total phosphorus

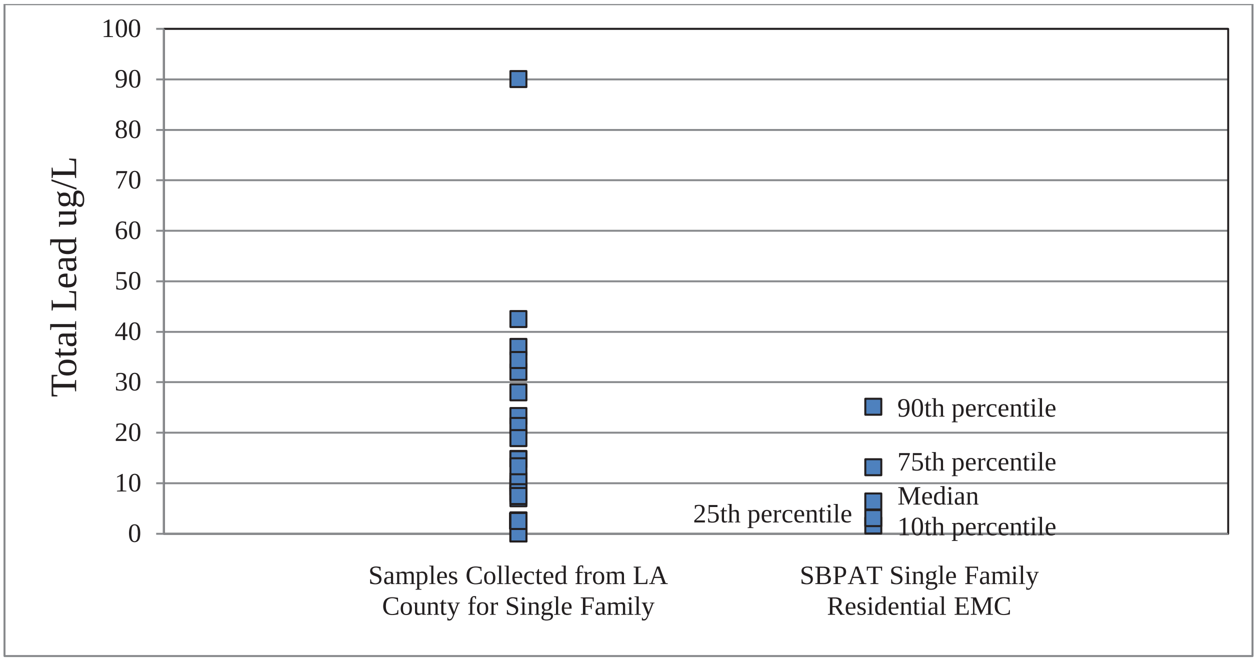


Figure E-5: Comparison of SFR monitoring data and SBPAT modeling data for total lead

APPENDIX D

Summary of Non-Structural BMPs

MCM	2012 Permit Requirement	Implementation			Water Quality Priority Pollutants				Comments
		As-is	Enhanced	Modified	Trash	Nutrients	Lead	Bacteria	
VI.D.2 Progressive Enforcement (Applies D.6, D.7, D.8, and D.10)									
	Develop and maintain a Progressive Enforcement Policy	X			X	X	X	X	
	Conduct follow-up inspection within 4 weeks of date of initial inspection	X			X	X	X	X	
	Take progressive enforcement actions, as necessary and appropriate	X			X	X	X	X	
	Retain records	X			X	X	X	X	
	Refer violations to Regional Board	X			X	X	X	X	
	Investigate complaints from Regional Board (RB)	X			X	X	X	X	
	Assist RB with Enforcement Actions	X			X	X	X	X	
VI.D.5 Public Information and Participation Program (PIPP)									
	Participate in a Countywide PIPP, WMP PIPP, or individual PIPP that measurably increases knowledge and changes behavior, and involves a diversity of socio economic and ethnic communities	X			X	X	X	X	PIPP addresses pollutants that have sources that could be targeted with an outreach campaign.
	Maintain reporting hotline, with hotline information published and point-of-contact identified	X			X	X	X	X	Reporting hotline provides an opportunity for the public to report activities that could address the listed pollutants which likely have sources for which activities could be observed and reported.
	Organize events (e.g., clean ups)	X			X	X		X	
	Residential Outreach (Individually or with group)	X							
	Public Service Announcements	X			X	X	X	X	PIPP addresses pollutants that have sources that could be targeted with an outreach campaign. General requirement to "conduct storm water pollution prevention public service announcements and advertising campaigns," more specificity provided in next two requirements.
	Develop public education materials on: vehicle fluids; household waste; construction waste; pesticides, fertilizers, and integrated pest management (IPM); green wastes; and animal wastes		X		X	X	X	X	PIPP addresses pollutants that have sources that could be targeted with an outreach campaign.
	Distribute public education materials at points of purchase		X		X	X	X	X	Only listed for pollutants that have sources that can be actively purchased now.
	Maintain stormwater website	X			X	X	X	X	PIPP addresses pollutants that have sources that could be targeted with an outreach campaign. Reporting hotline provides an opportunity for the public to report activities that could address the listed pollutants which likely have sources for which activities could be observed and reported.
	Provide schools with materials to educate children (K-12); using state-produced materials is allowed.	X			X	X	X	X	PIPP addresses pollutants that have sources that could be targeted with an outreach campaign.
VI.D.6 Industrial/ Commercial									
	Track Critical Sources - maintain inventory (watershed based or lat/long recorded)	X			X	X	X	X	Will depend on the type of industrial and commercial facilities in watershed
	Educate - notify critical sources of BMP requirements			X	X	X	X	X	
	Implement a Business Assistance Program for select sectors or small businesses - technical assistance, and distribute materials to specific sectors	X			X	X	X	X	
	Inspect Commercial Sources		X		X	X	X	X	The NSMBCW EWMP Group conducts inspections of commercial facilities within the NSMBCW EWMP Area on an annual basis rather than twice per five years as required in the Permit. This includes annual inspections of all food service establishments including restaurants, grocery stores, and coffee shops to reduce this type of business' impact on water quality due to stormwater and dry weather runoff. Malibu is a partner in the Santa Monica Bay Restoration Foundation's Clean Bay Restaurant Certification program that far exceeds the minimum requirements of the previous MS4 Permit. Inspections include a comprehensive 30+
	Inspect Industrial Sources - initial mandatory inspection		X		X	X	X	X	
	Secondary mandatory inspection		X		X	X	X	X	
	No Exposure - evaluate and conduct 2nd inspection at 25% of facilities with a No Exposure Certification to verify the continuity of the no exposure status		X						
	Conduct Progressive Enforcement follow-up inspections (see D.2), as needed.	X			X	X	X	X	

MCM	2012 Permit Requirement	Implementation			Water Quality Priority Pollutants				Comments
		As-is	Enhanced	Modified	Trash	Nutrients	Lead	Bacteria	
VI.D.7 Planning and Land Development									
	Update ordinance/design standards to conform with new requirements (LID and Hydromod)		X			X	X	X	Both the City of Malibu and the County of Los Angeles have LID ordinances that will result in the application of LID BMPs to more projects than the minimum requrements of the Permit.
	Optional: Establish alternative compliance for technical infeasibility, e.g., allow onsite biofiltration or offsite infiltration or gw replenishment or retrofit	X				X	X	X	
	Optional if allowing offsite mitigation: Develop a prioritized list of offsite mitigation projects	X				X	X	X	
	Optional if allowing offsite mitigation: Develop a schedule for completion of offsite projects (must be with 4 yrs of the Certificate of Occupancy of the first project that contributed funds)	X				X	X	X	
	Optional if allowing offsite mitigation: Notice offsite projects to RB website	X				X	X	X	
	Optional if allowing offsite mitigation: Develop a list of mitigation projects descriptions, and estimated pollutant and flow reductions	X				X	X	X	
	Optional if allowing offsite mitigation: Provide aggregated comparison of alternative compliance to results that would have been expected with on site retention of the SWQDv	X				X	X	X	
	Plan Review process - check LID and BMP sizing, etc.,	X				X	X	X	
	Establish internal agreements with structure for communication and authority for departments overseeing plan approval and project construction	X				X	X	X	
	Require project proponents to prepare Operation & Maintenance plan for LID, treatment, and hydromod BMPs	X				X	X	X	
	Implement tracking and enforcement program for LID, treatment, and hydromod BMPs	X				X	X	X	
	Inspect all development sites upon completion and prior to occupancy certificates	X				X	X	X	
	Verify Operation & Maintenance program is implemented on Permittee-operated BMPs through inspection	X				X	X	X	
	Develop maintenance inspection checklist for Permittee-operated BMPs	X				X	X	X	
	Require private parties that operate BMPs, except for simple LID BMPs implemented on single family residences, to document proper Operation & Maintenance; enforce as needed	X				X	X	X	
	Conduct Progressive Enforcement follow-up inspections (see D.2), as needed.	X				X	X	X	
VI.D.8 Construction									
	Update erosion and sediment control ordinance/procedures to conform with new requirements	X					X	X	MCMs that reduce sediment transport will reduce sediment-associated pollutants, if those pollutants are present in soils.
	Sites < 1 acre; inspect based upon water quality threat		X		X		X	X	
	Establish priority inspection process		X				X	X	
	Site < 1 acre; Require sites with soil disturbing activities to implement minimum BMPs	X			X		X	X	
	Sites >= 1 acre: Require construction sites to prepare erosion sediment control plan(ESCP); review and approve	X			X		X	X	
	Verify construction sites coverage under the CGP and 401 cert	X			X		X	X	
	Develop/implement ESCP review checklist	X			X		X	X	
	Implement technical standards for the selection, installation, and maintenance of construction BMPs for all construction sites within the Permittee's jurisdiction	X			X		X	X	
	Conduct inspections at public and private sites >= 1 acre in size in accordance with Table 17 of the MS4 Permit.	X			X		X	X	
	Develop/implement Standard Operating Procedure (SOP)/inspection checklist			X	X		X	X	

MCM	2012 Permit Requirement	Implementation			Water Quality Priority Pollutants				Comments
		As-is	Enhanced	Modified	Trash	Nutrients	Lead	Bacteria	
	Track number of inspections for inventoried sites and verify minimum inspections are completed	X			X		X	X	
	Conduct Progressive Enforcement follow-up inspections (see D.2), as needed.	X			X		X	X	
	Train plan review staff and inspectors	X			X		X	X	
	Staff must be knowledgeable in QSD/P key objectives, local BMPs standards	X			X		X	X	
VI.D.9 Public Agency Activities									
	Require public construction sites to implement Planning and Land Development requirements, implement Erosion and Sediment Control BMPs, and obtain Construction General Permit coverage	X			X		X	X	MCMs that reduce sediment transport will reduce sediment-associated pollutants
	Maintain inventory of Permittee owned facilities (including parks and recreation faclities); Update inventory as required	X			X	X	X	X	
	Develop retrofit opportunity inventory; evaluate and rank			X	X	X	X	X	EWMP regional and distributed project selection process will be utilized to meet these requirements rather than implementing separate evaluations for retrofit opportunities.
	Cooperate with private land owners to encourage site specific retrofitting; includes pilot projects and outreach	X			X	X	X	X	
	Obtain IGP coverage for public facilities where appropriate	X							
	Develop procedures to assess impact of flood management projects on water quality of receiving waters; evaluate to determine if retrofitting is feasible			X	X	X	X	X	EWMP regional and distributed project selection process will be utilized to meet these requirements rather than implementing separate evaluations for retrofit opportunities.
	Evaluate existing structural flood control facilities to determine if retrofitting facility to provide additional pollutant removal is feasible			X	X	X	X	X	EWMP regional and distributed project selection process will be utilized to meet these requirements rather than implementing separate evaluations for retrofit opportunities.
	Implement source control BMPs at Permittee owned facilities/activities	X			X	X	X	X	
	Require city-hired contractors to implement source control BMPs	X			X	X	X	X	
	Prevent vehicle/equipment washing discharges to the MS4, including fire fighting and emergency response vehicles	X				X	X	X	
	Ensure new/redeveloped/replaced wash facilities are plumbed to the sanitary sewer or self contained.	X							
	Implement Integrated Past Management (IPM) program	X							
	Ordinances, policies, and procedures reflect IPM techniques and include commitments and schedules to reduce the use of pesticides that cause impairments	X							
	Update an inventory of pesticides used by agency annually; quantify pesticides used by staff and contractors; demonstrate IPM alternatives to reduce pesticide use	X							
	Use SOPs for pesticide application	X							
	Ensure no application of pesticides or fertilizers when two or more days with a 50% chance of rain is predicted by NOAA; within 48 hrs of 1/2 inch of rain; or when water is flowing off the site	X							
	Ensure staff applying pesticides are certified or working under supervision of a certified applicator in the appropriate category	X							
	Update catch basin map add GPS locations and update priority	X			X	X	X	X	
	Inspect/Clean catch basin in areas not subject to Trash TMDL- Priority A: 3x during wet season, 1x during dry 1x; PriorityB:1x during wet 1x and 1x during dry; Priority C: 1x per yr. Maintain records.	X			X			X	
	Require trash management at public events	X			X			X	
	Place and maintain trash receptacles/capture devices at newly identified high trash generating areas	X			X			X	
	Label storm drains	X			X				
	Inspect storm drain labels prior to each wet season	X			X				
	Record and re-label illegible storm drain labels within 180 days of inspection	X			X				

MCM	2012 Permit Requirement	Implementation			Water Quality Priority Pollutants				Comments
		As-is	Enhanced	Modified	Trash	Nutrients	Lead	Bacteria	
	Post signs at access points to water bodies (open channels, creeks; lakes)	X			X	X	X	X	
	Install trash excluders on catch basins or outfalls in areas defined as Priority A, or implement substantially equivalent BMPs in areas not otherwise subject to the SMB/MCW Trash TMDL.	X			X				
	Inspect and Remove trash and debris from open channels and other drainage structures 1x/yr before rainy season.	X			X			X	
	Eliminate discharge of contaminants during MS4 maintenance	X			X	X	X	X	Will address sediment-transported pollutants, if they are present in sediment.
	Implement controls to limit infiltration of seepage from sanitary sewers to the storm drains			X					Due to lack of municipal sanitary sewer in the majority of the NSMBCW EWMP Area, the MCM will be implemented where applicable; otherwise, controls will be implemented to limit sewage discharges from OWTS to the MS4 by maintaining a Septic System Management Plan and Comprehensive Onsite Wastewater Treatment System Inspection and Operating Permit Program.
	Implement routine preventative maintenance for both systems, survey sanitary sewer and MS4. May use SSO General WDR to fulfill this requirement.			X	X	X	X	X	Due to lack of municipal sanitary sewer in the majority of the NSMBCW EWMP Area, the MCM will be implemented where applicable; otherwise, controls will be implemented to limit sewage discharges from OWTS to the MS4 by maintaining a Septic System Management Plan and Comprehensive Onsite Wastewater Treatment System Inspection and Operating Permit Program.
	Implement inspection and maintenance program for Permittee owned BMPs	X			X	X	X	X	Depends on BMP type. Will address sediment-transported pollutants, if they are present in sediment.
	Manage residual water in treatment control BMPs removed during maintenance	X				X	X	X	Will prevent discharge of any pollutants present in the water.
	Street sweeping - Priority A: 2x/mo; B: 1x/mo; C: as needed, not less than 1x/yr		X		X	X	X	X	Enhanced street sweeping program.
	Implement road construction maintenance BMPs (e.g., restrict paving activity to exclude periods of rain)	X				X	X	X	Will address sediment-transported pollutants, if they are present in sediment.
	Inspect and/or clean Permittee owned parking lots 2x/mo	X			X			X	General training could support reducing all pollutants of concern.
	Train employees and contractors on stormwater requirements	X			X	X		X	General training could support reducing all pollutants of concern.
	Train employees and contractors on pesticide use	X							
VI.D.10 Illicit Connections and Illicit Discharges (IC/ID) Elimination									
	Continue to implement IC/ID program	X			X	X	X	X	
	Devcelop written procedures for conducting investigations and eliminations	X			X	X	X	X	
	Initiate investigations within 72 hours from becoming aware of the discharge	X			X	X	X	X	
	Implement solutions to eliminate discharge; conduct follow-up investigation to verify elimination; follow Progressive Enforcement Plan (see D.2)	X			X	X	X	X	
	When discharge originates upstream of jurisdiction, notify the upstream jurisdiction and Regional Board within 30 days	X			X	X	X	X	
	Initiate investigations within 21 days of reported or discovered illicit connections	X			X	X	X	X	
	Eliminate illicit connections within 180 days of completion of source investigation. If an illicit connection is determined to only discharge allowed stormwater or non-stormwater discharges, document the connection.	X			X	X	X	X	
	Establish a hotline to facilitate public reporting of IC/ID	X			X	X	X	X	
	Install signage adjacent to open channels providing public information on how to report IC/ID			X	X	X	X	X	
	Document calls and actions associated with hotline	X			X	X	X	X	
	Implement procedures for responding to complaints; evaluate and update procedures, as needed	X			X	X	X	X	
	Implement a spill response plan	X			X	X	X	X	
	Train staff and contractors on IC/ID	X			X	X	X	X	
	Create a list of positions and contractors that require ID/IC training	X			X	X	X	X	