City of Malibu

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June 26, 2014

Sam Unger, Executive Officer
Los Angeles Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

RE: Submittal of Watershed Management Program Deliverables Pursuant to the Los Angeles County Municipal Separate Storm Sewer System Permit

Dear Mr. Unger:

On behalf of the City Malibu, the County of Los Angeles, and the County of Los Angeles Flood Control District, enclosed are the Enhanced Watershed Management Program (EWMP) Work Plan and the Coordinated Integrated Monitoring Program (CIMP) for the North Santa Monica Bay Coastal Watersheds (NSMBCW) area in accordance with Los Angeles Regional Water Quality Control Board Order No. R4-2012-0175, Permit No. CAS004001 (Permit).

The EWMP Work Plan establishes the methodology that the NSMBCW participating agencies listed above will use to develop the EWMP including identifying water quality priorities and the best management practices that will achieve Permit compliance, developing an approach to perform the Reasonable Assurance Analysis, and establishing the schedule for completion of the EWMP. The CIMP addresses Total Maximum Daily Loads and other municipal storm drain system monitoring elements including receiving water and outfall monitoring, and the associated standard operating procedures to meet the requirements of the Monitoring and Reporting Program of Attachment E to the Permit.

These documents represent a proactive and comprehensive approach to assessing and protecting the water quality in our region. Our agencies look forward to working with the Regional Board 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 Rob DuBoux, Assistant Public Works Director at (310) 456-2489, extension 339 or rduboux@malibucity.org.

Sincerely,

Jim Thorsen
City Manager

Enclosure

cc: Christi Hogin, City Attorney
Vic Peterson, Environmental Sustainability Director
Robert L. Brager, Public Works Director
Rob DuBoux, Assistant Public Works Director
Jennifer Brown, Senior Environmental Programs Coordinator
Angela George, County of Los Angeles
Terri Grant, Los Angeles County Flood Control District
Renee Purdy, Los Angeles Regional Water Quality Control Board
Ivar Ridgeway, Los Angeles Regional Water Quality Control Board

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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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.

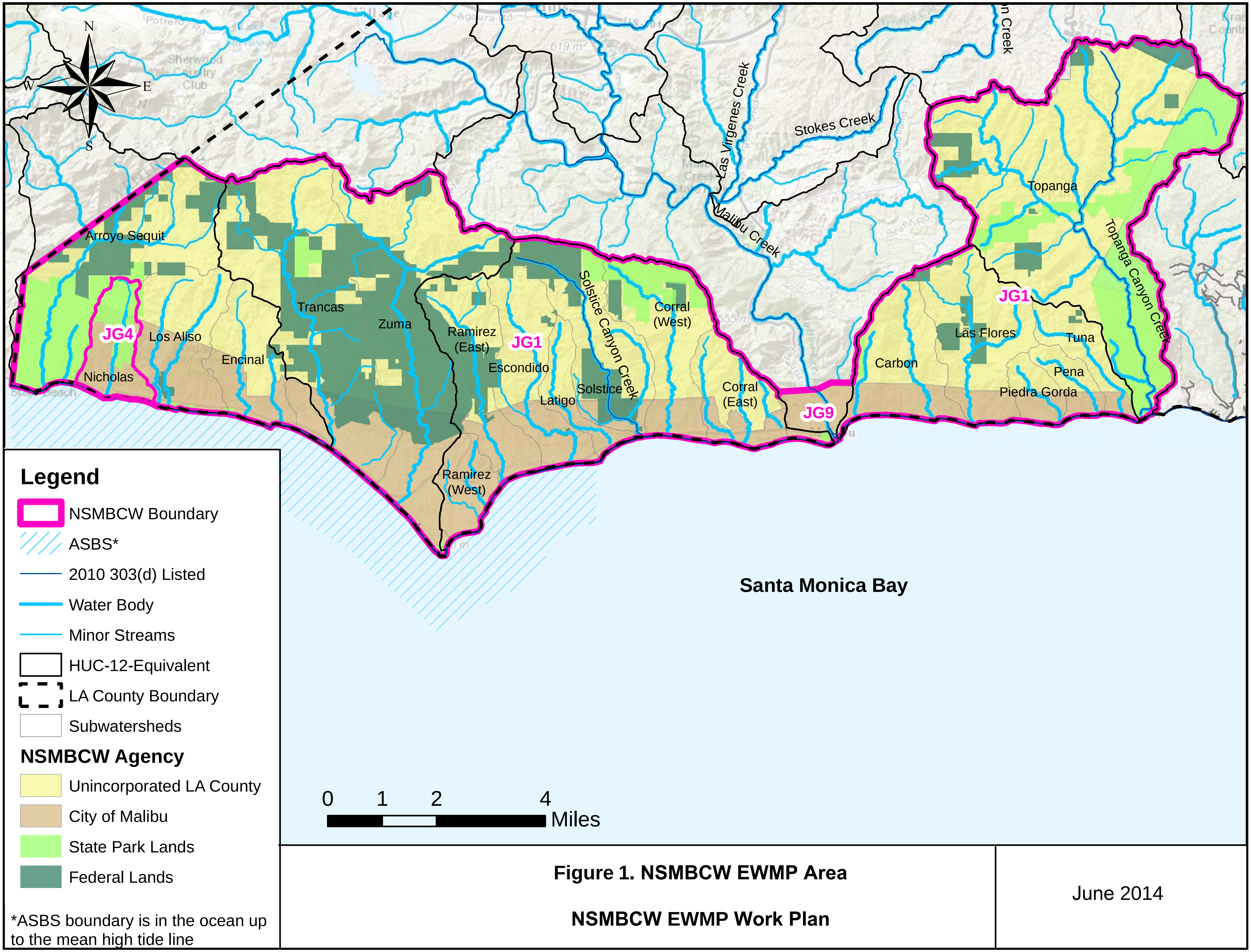


Figure 1. NSMBCW EWMP Area

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.

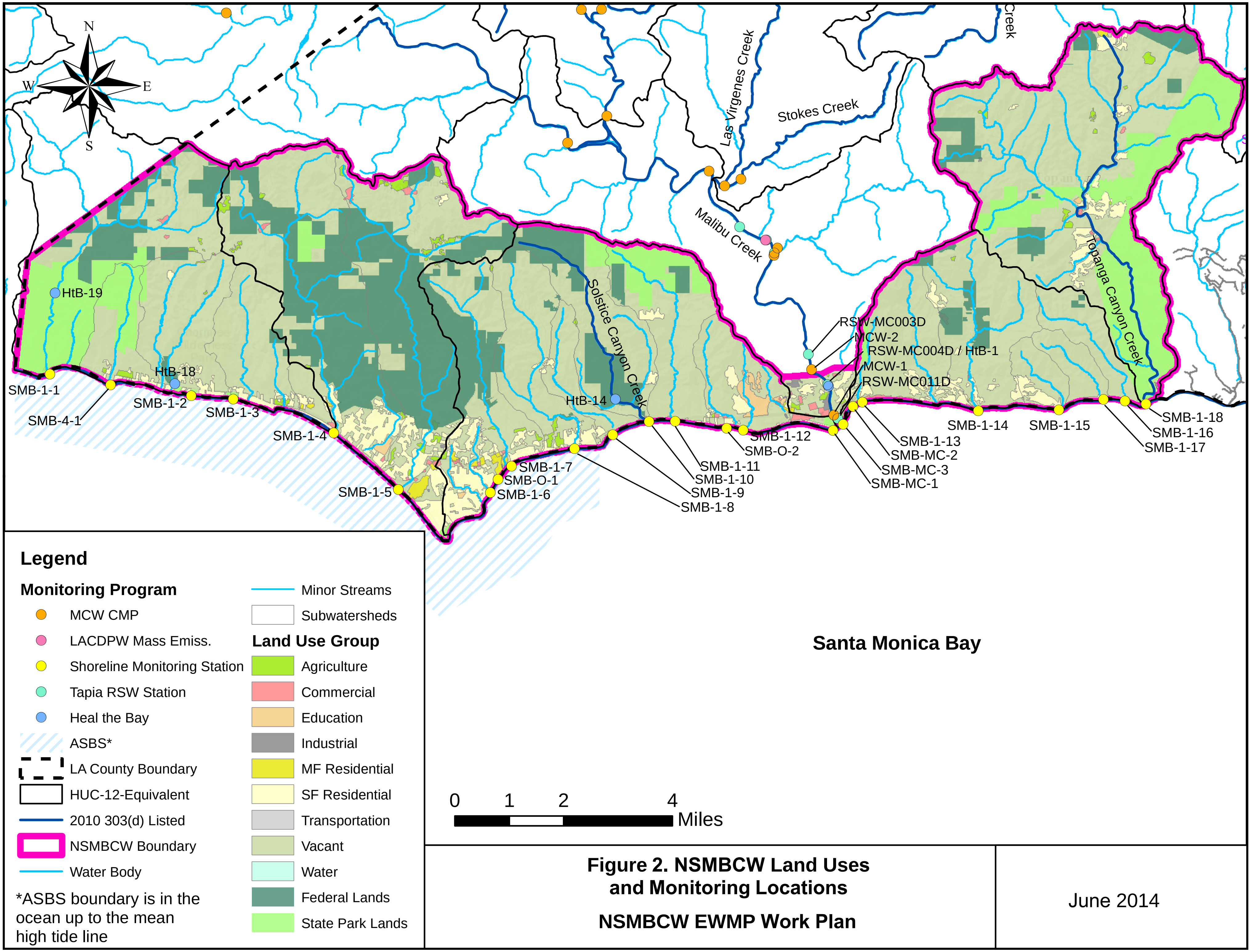


Figure 2. NSMBCW Land Uses and Monitoring Locations

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

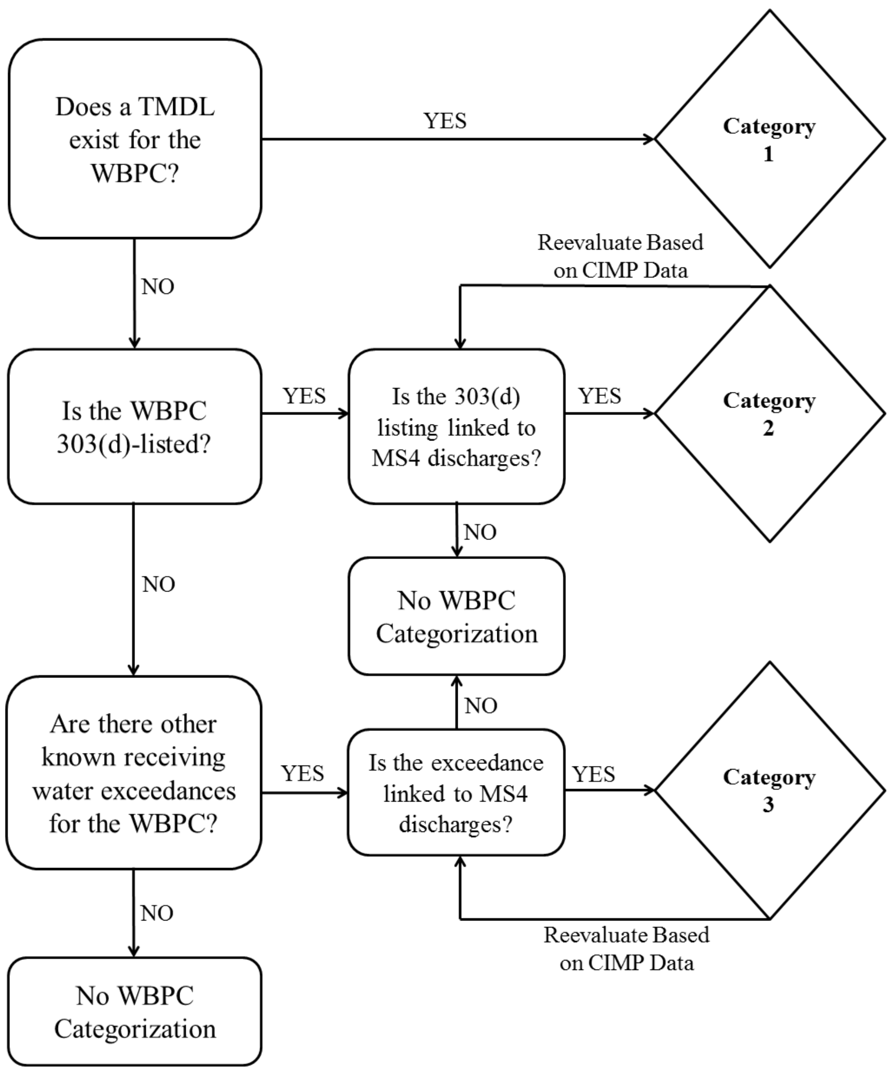
*Asterisked MUN designations are designated under SB 88-63 and RB 89-03. Some designations may be considered for exemption at a later date.

[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)

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

[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,

[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

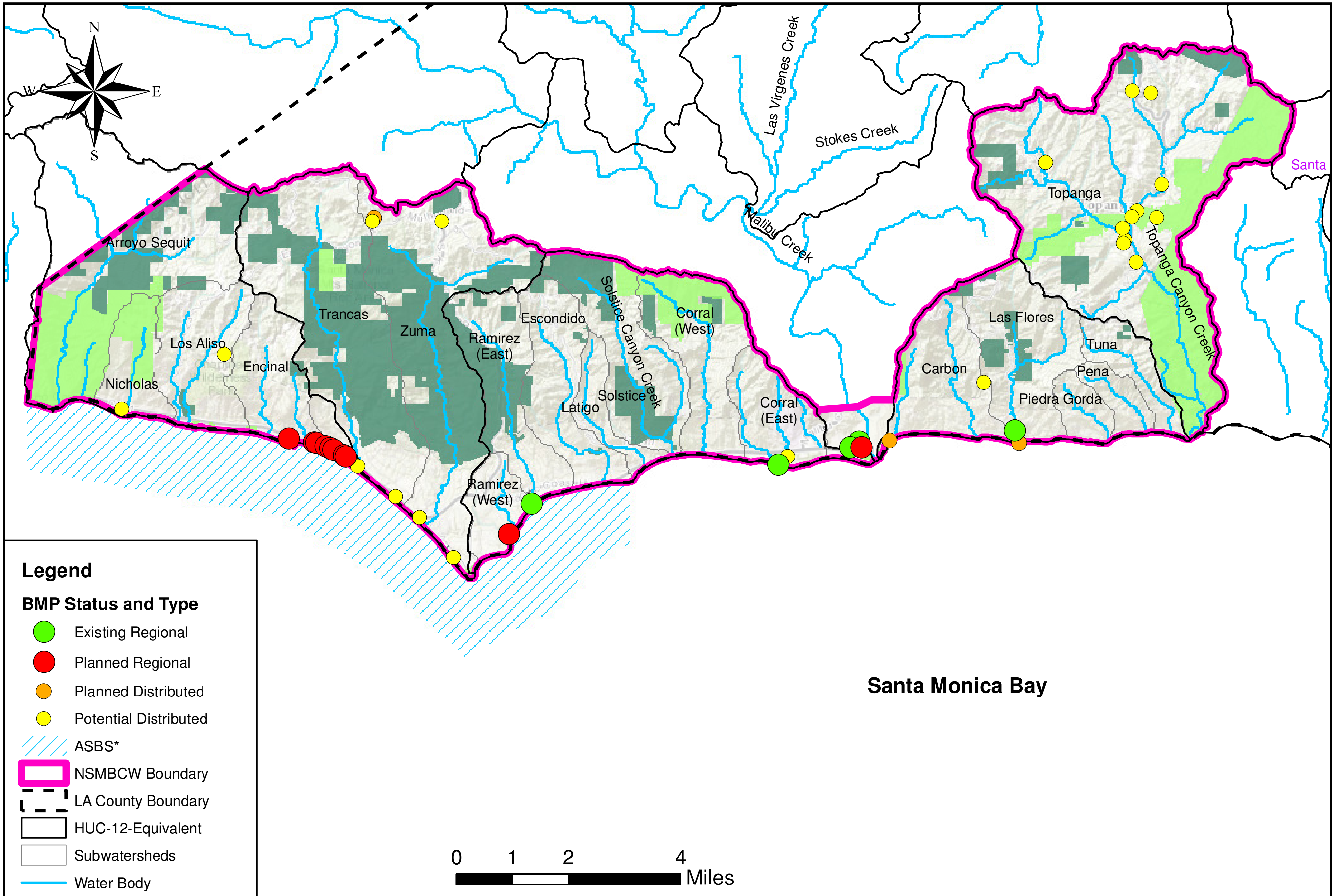
Aside from Malibu Legacy Park and the Civic Center Stormwater Treatment Facility (SWTF), which is collectively considered a regional EWMP project (see Section 5.3), Paradise Cove Stormwater Treatment Facility and Marie Canyon Water Quality Improvement Project are summarized below due to their significance 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.



Legend

BMP Status and Type

- Existing Regional
- Planned Regional
- Planned Distributed
- Potential Distributed
- ASBS*
- NSMBCW Boundary
- LA County Boundary
- HUC-12-Equivalent
- Subwatersheds
- Water Body
- State Park Lands
- Federal Lands

*ASBS boundary is in the ocean up to the mean high tide line

Figure 4. Existing Regional BMPs, Planned and Potential Distributed BMPs, and Planned Regional BMPs NSMBCW EWMP Work Plan

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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

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[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,

[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;

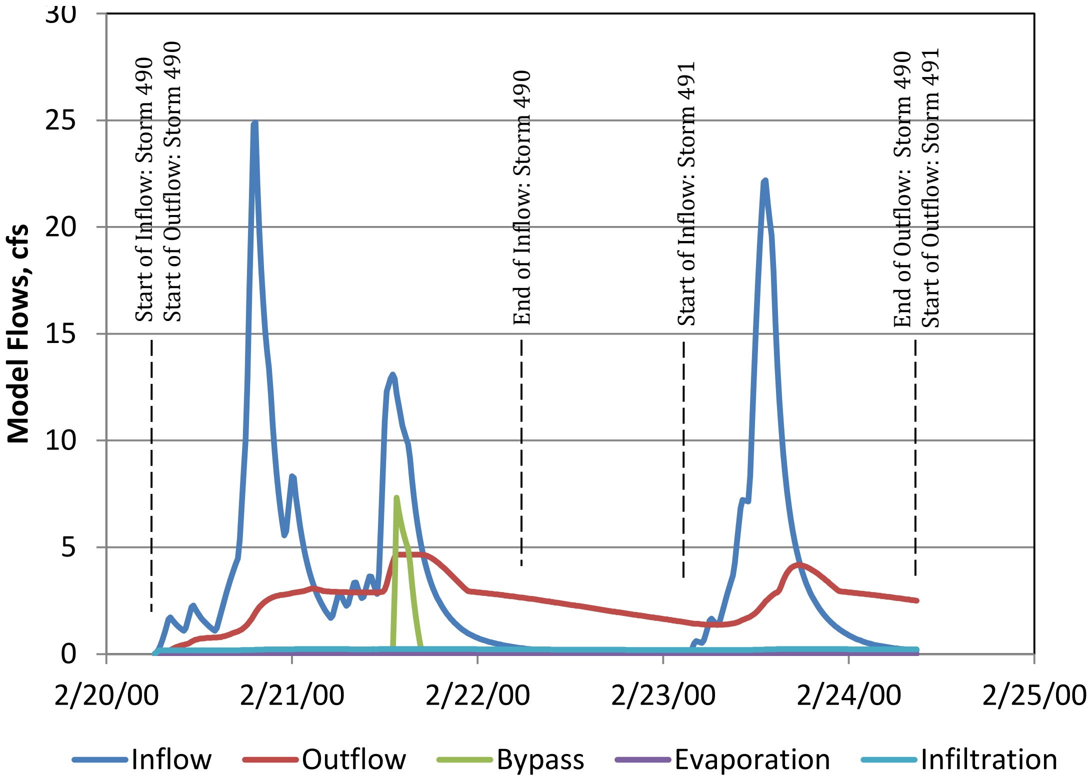
5. **Characterization of water quality variability** – SBPAT is capable of quantifying model output variability and confidence levels, which is a component of the Regional Board's recent RAA guidance; and
6. **Supports quantification of interim milestones, consistent with methods addressing both structural 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.

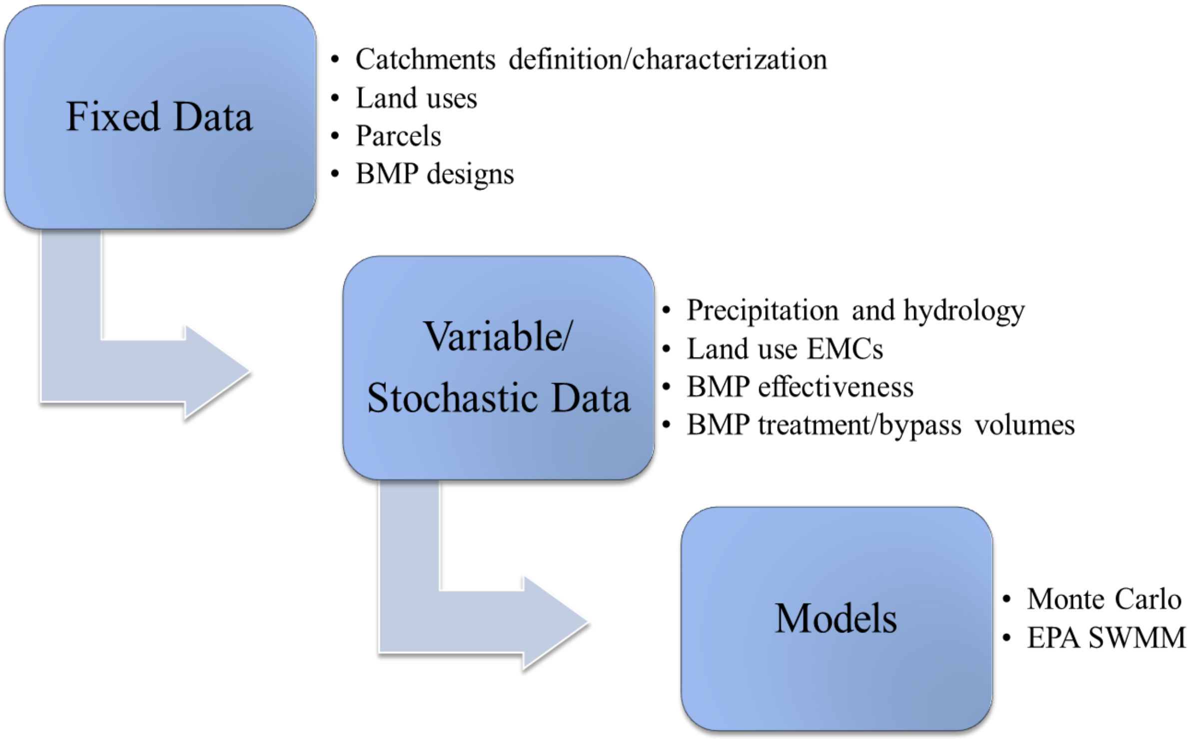
An example of the SBPAT (and EPA SWMM) hydrologic and watershed modeling approach is illustrated below in Figure 5.

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.

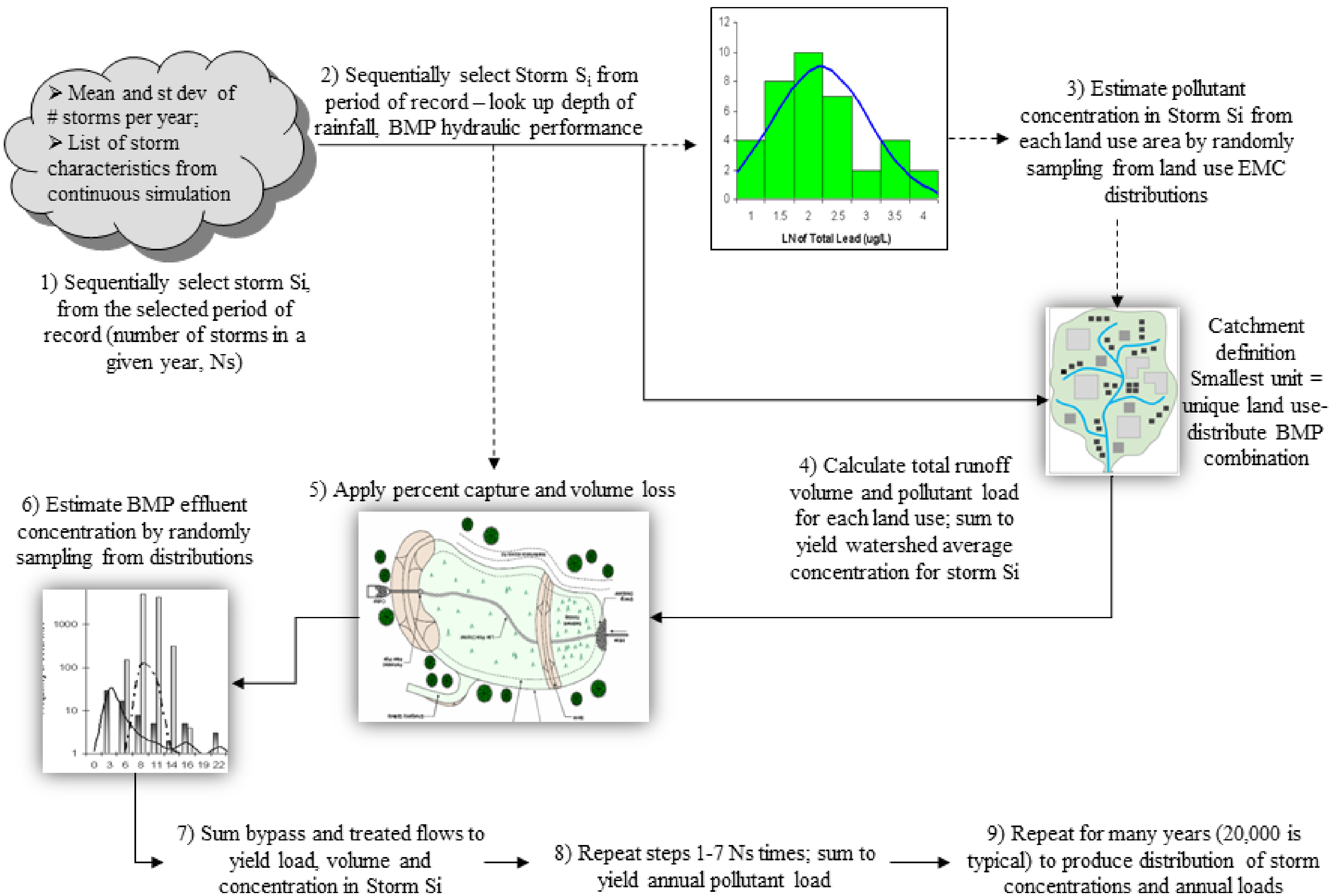
Figure 6. SBPAT Model Data Flow



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



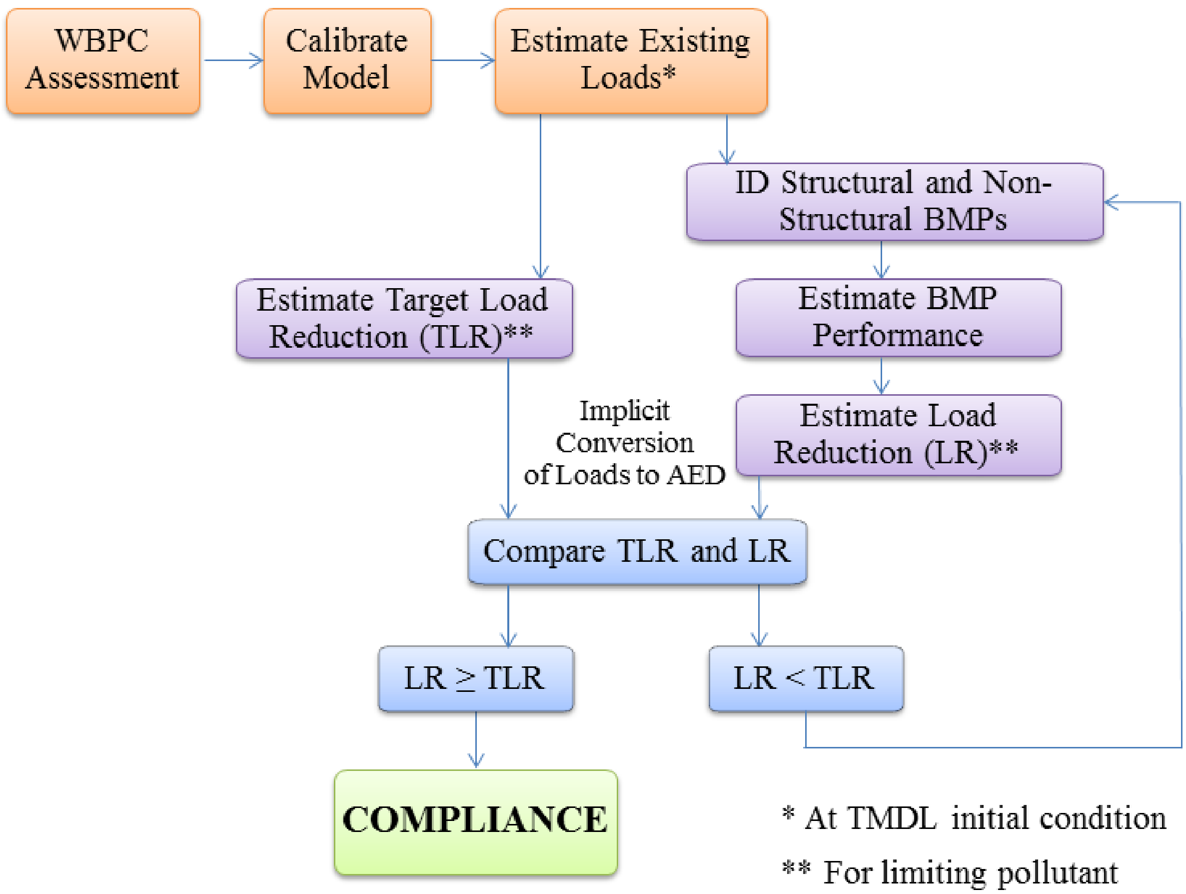
6.2 Overview of RAA and BMP Selection Process

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 90th 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.

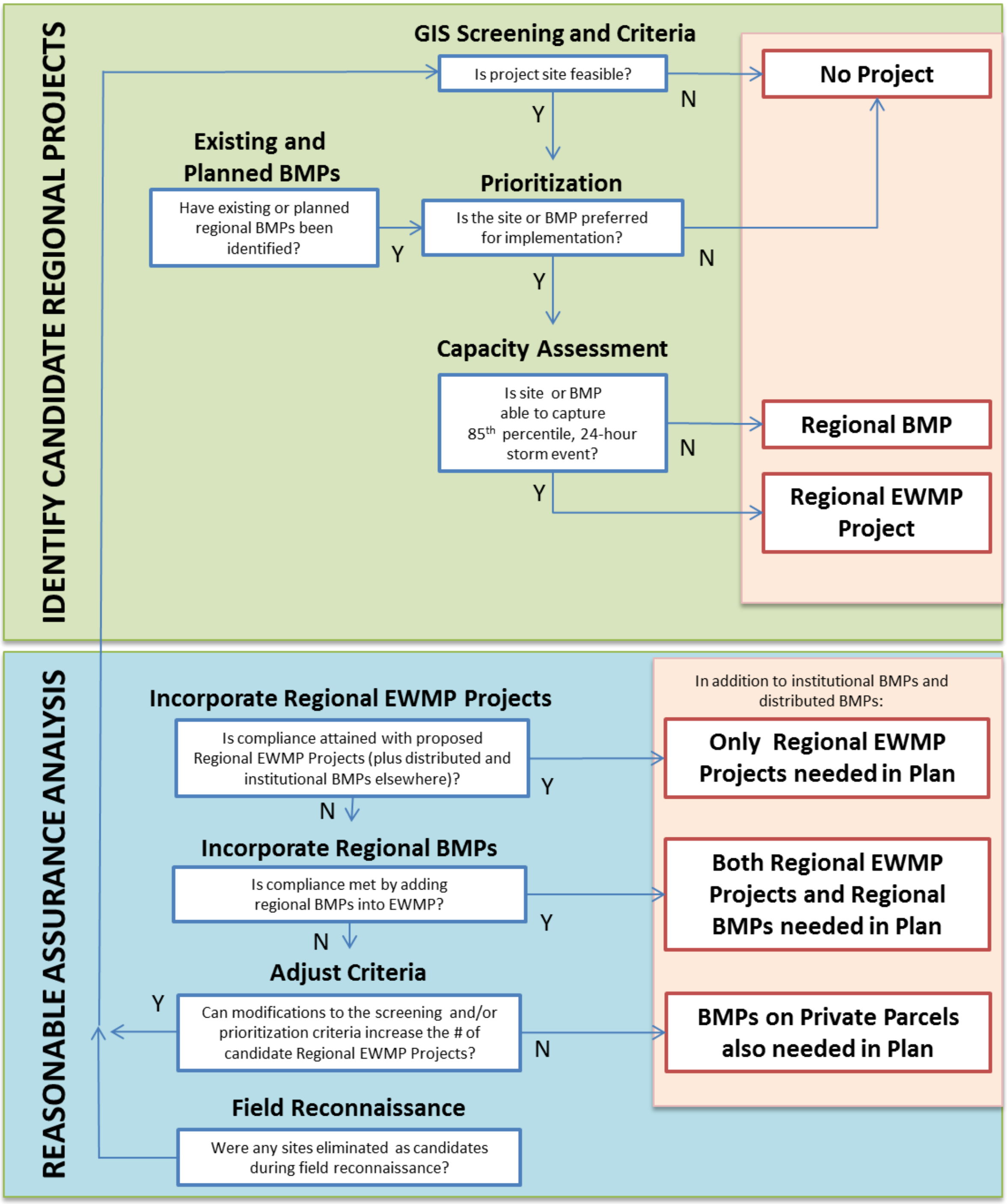
Additional potential regional BMPs, including regional EWMP projects, will first be identified using SBPAT's catchment prioritization process. SBPAT prioritizes catchments based on water quality needs and identifies parcels which provide opportunities for structural BMP implementation. After first evaluating 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 85th 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."

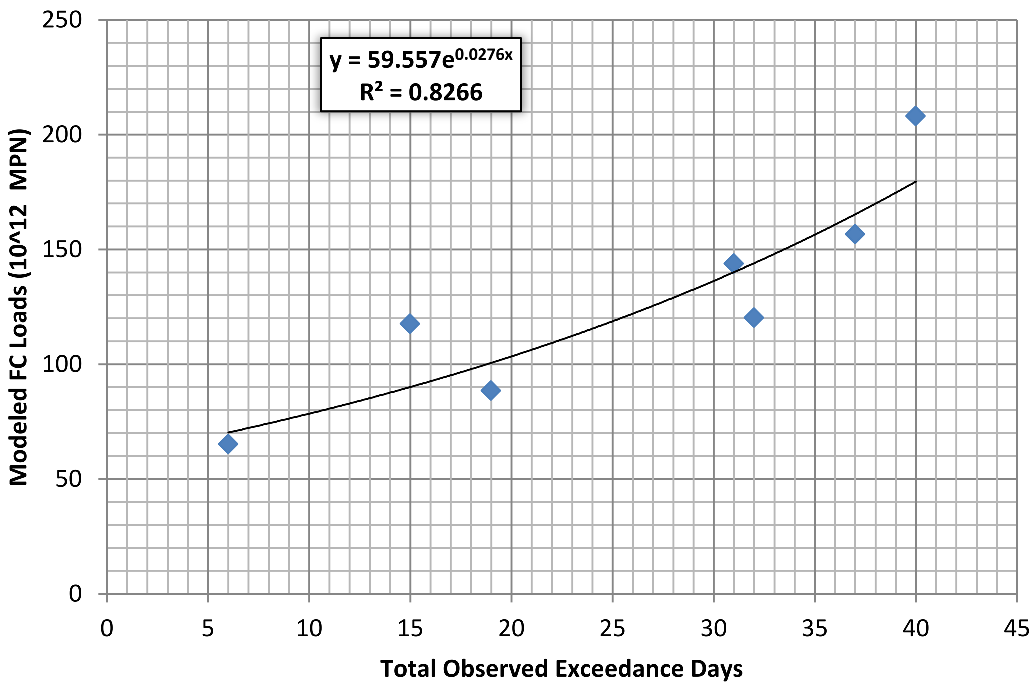
[c] Multi Family Residential EMC used since educational land use site not available in the SCCWRP fecal coliform dataset.

[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 10th 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 90th 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.

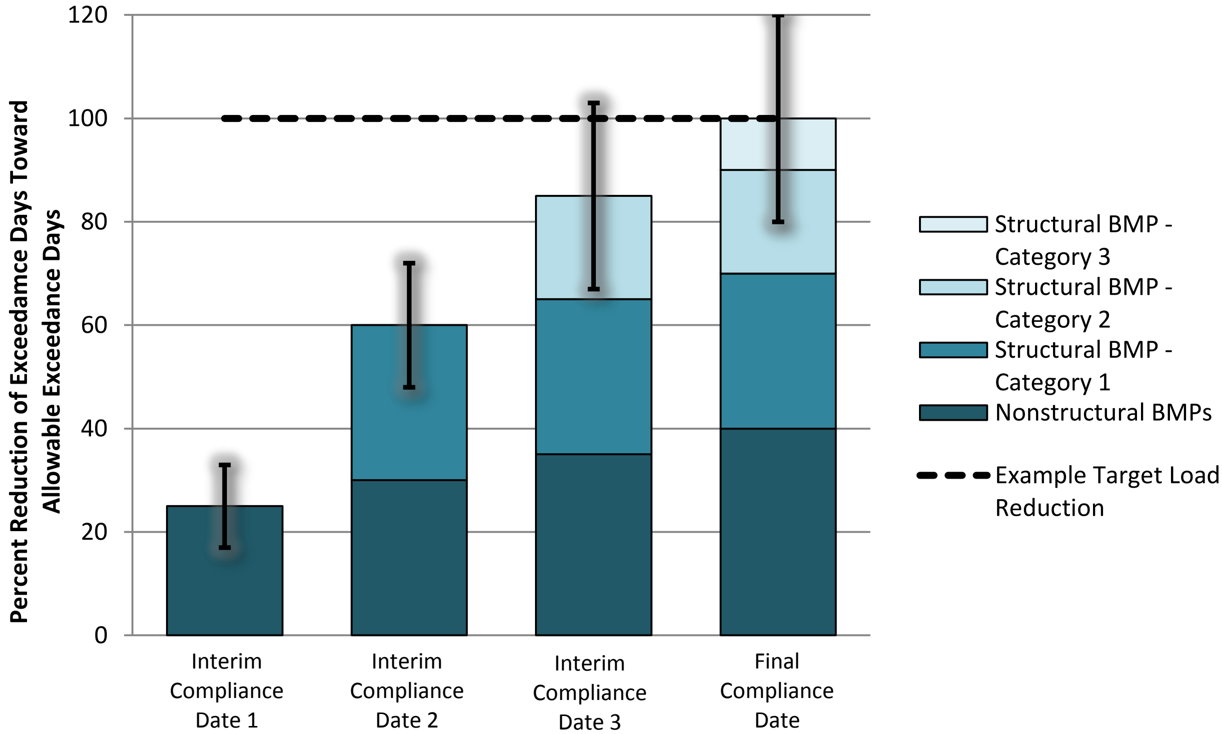
6.3.6 *Representation of Cumulative Effect of all BMPs and New BMP Selection Support*

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 90th percentile wet year) are met by the predicted average or 75th 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*

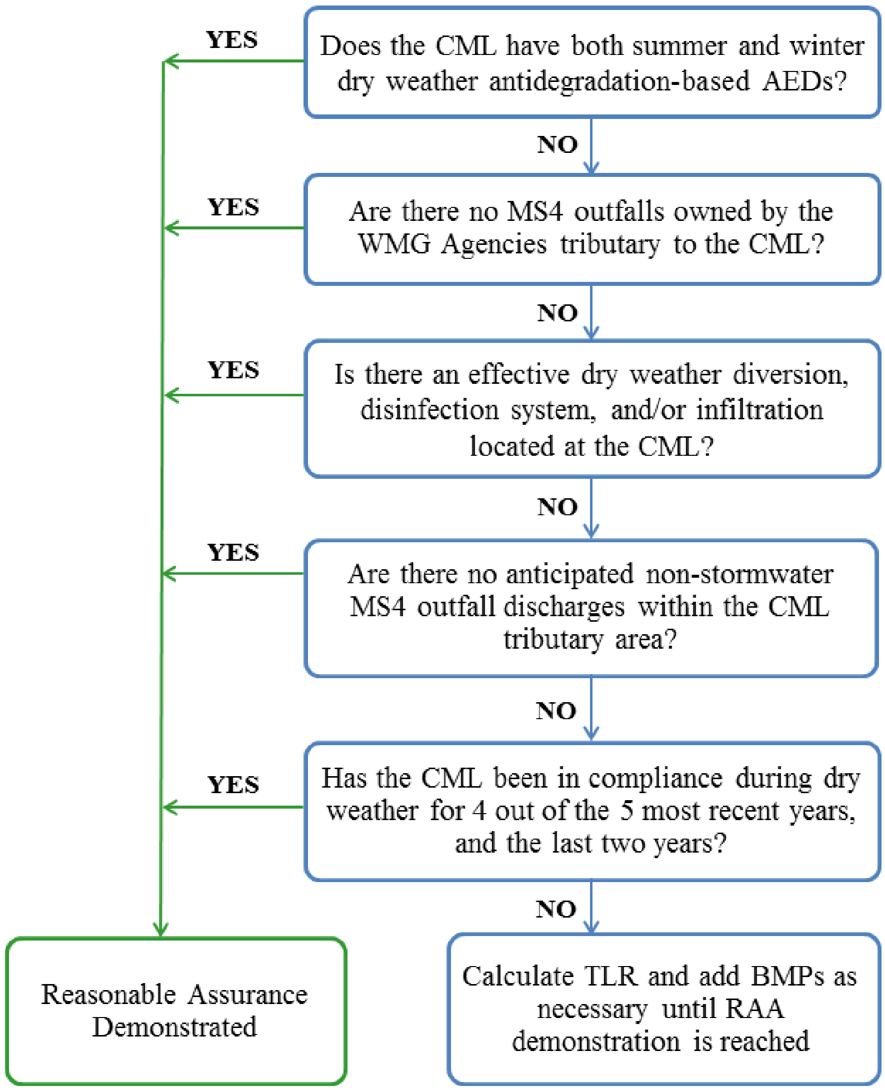
Regional EWMP projects meeting the 85th percentile design basis negate the need for RAA on their drainage areas. This design criterion can be met in a variety of ways. The simplest approach would be to design a single structural BMP to retain the 85th percentile, 24-hour design volume, which may be computed 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.

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[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

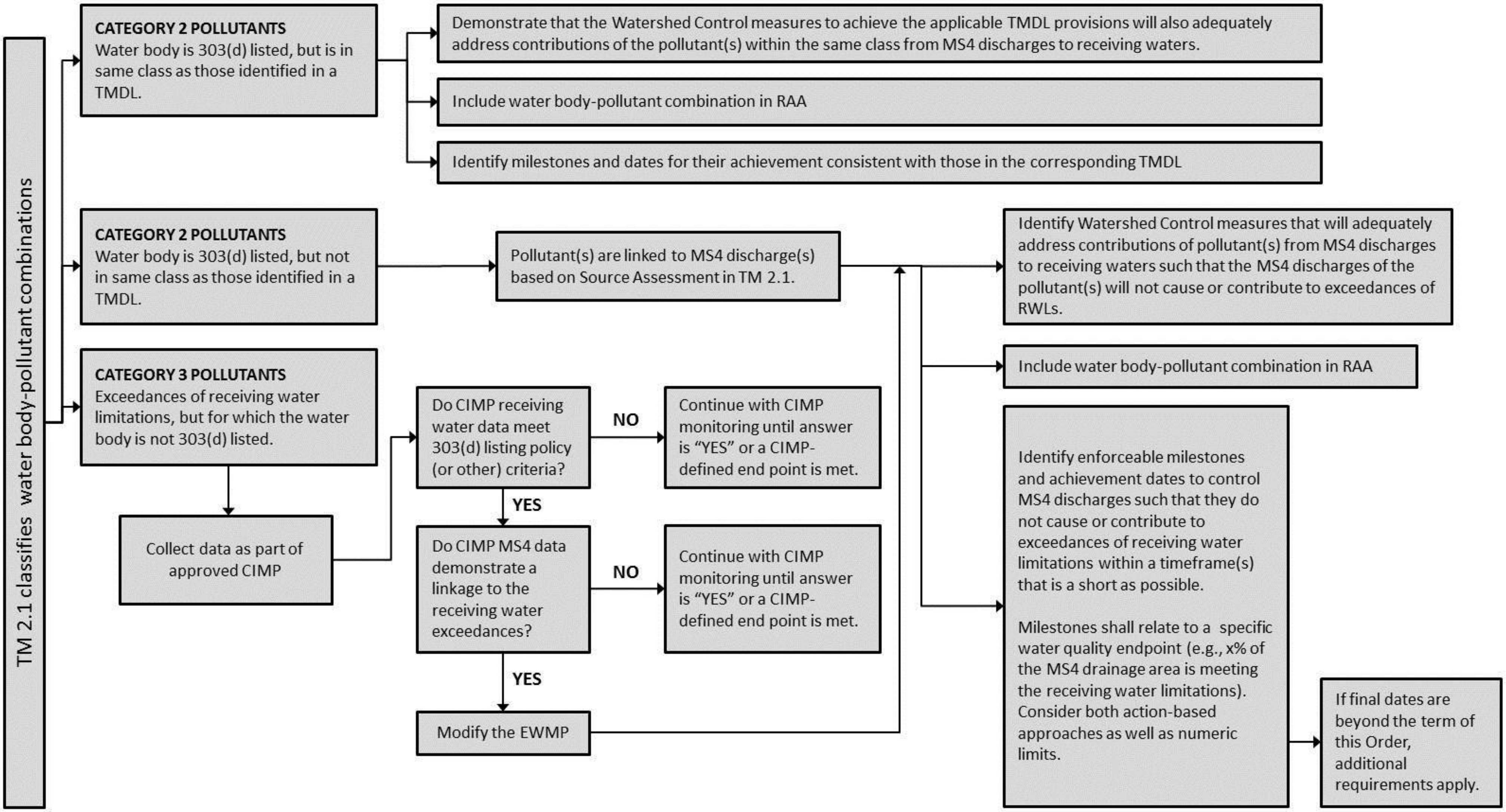
[2] Where CIMP monitoring data demonstrate that MS4 discharges may have caused or contributed to the exceedance of receiving water limitations, it should be noted that this does not constitute any admission of known contributions, but reflects uncertainty in linking datasets.

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.

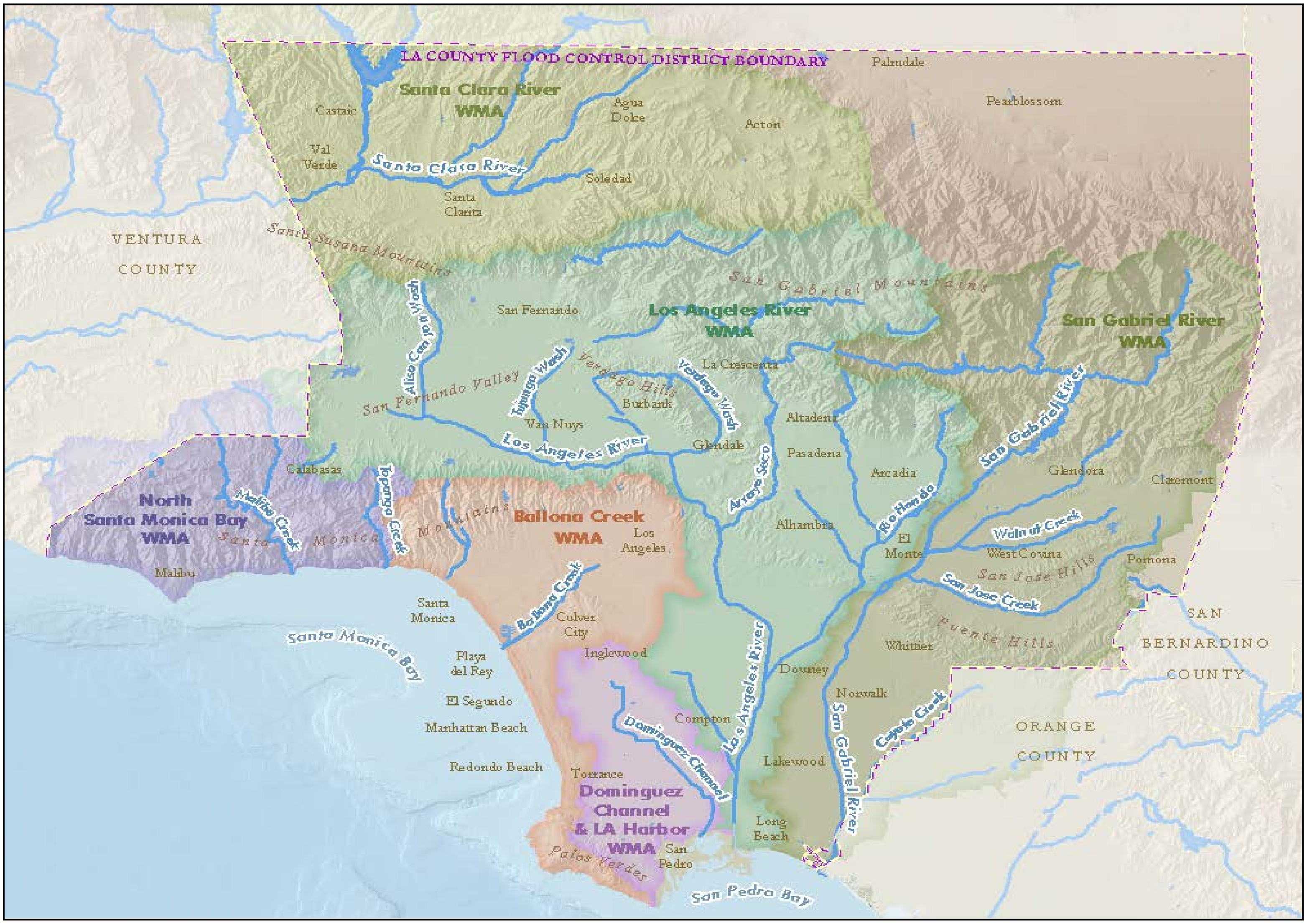


Figure D-1 Los Angeles County Flood Control District Service Area