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June 24, 2014

Mr. Samuel Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
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Los Angeles, CA 90013

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CALIFORNIA REGIONAL WATER
QUALITY CONTROL BOARD
LOS ANGELES REGION

Dear Mr. Unger:

SUBMITTAL OF WORK PLAN FOR ENHANCED WATERSHED MANAGEMENT PROGRAM FOR THE DOMINGUEZ CHANNEL WATERSHED AREA GROUP

Please find attached the Work Plan for the Enhanced Watershed Management Program (EWMP) for the Dominguez Channel Watershed Area Group. The City of Los Angeles, as lead agency for the Dominguez Channel Watershed Area Group, has prepared this Work Plan on behalf of itself - the City of Los Angeles, the City of El Segundo, the City of Hawthorne, the City of Inglewood, the City of Lomita, the Los Angeles County, the Los Angeles County Flood Control District (LACFCD). All agencies have reviewed and approved this Work Plan for submission to the Regional Water Board, and we appreciate the collaboration by all MS4 co-permittees in the preparation of the document.

The Work Plan for the Dominguez Channel Watershed Area Group EWMP provides the following: a summary of the water quality priorities per section VI.C.5.a of the new MS4 Permit (Order No. R4-2012-0175); processes for identifying and selecting regional BMPs and potential customization of institutional measures; the approach to the Reasonable Assurance Analysis based on the guidance document provided by the Regional Water Board; and the schedule EWMP development and stakeholder involvement.

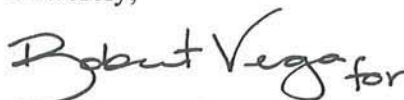
The Dominguez Channel Watershed Area Group looks forward to proceed with the development of the EWMP in collaboration with Technical Advisory Committee, the Regional Water Board,



Mr. Samuel Unger, Executive Officer
June 24, 2014
Page 2

and other watershed stakeholders. Should you have any questions about this submittal, please contact Shahram Kharaghani at Shahram.Kharaghani@lacity.org or phone (213) 485-0587, or your staff may contact Alfredo Magallanes at Alfredo.Magallanes@lacity.org or phone (213) 485-3984.

Sincerely,



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ENHANCED WATERSHED MANAGEMENT PROGRAM WORK PLAN FOR THE DOMINGUEZ CHANNEL WATERSHED MANAGEMENT AREA GROUP

June 2014

DRAFT

Submitted to: California Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
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Prepared by: Dominguez Channel Watershed Management Area Group
City of Los Angeles
County of Los Angeles
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Acronyms

ARS	Automatic Retractable Screen
ASCE	American Society of Civil Engineers
BMP	Best Management Practice
BOE	Bureau of Engineering
CASQA	California Stormwater Quality Association
CEQA	California Environmental Quality Act
CIMIS	California Irrigation Management Information System
CO	Current Organics
CPI	Catchment Priority Index
CPS	Connector Pipe Screen
CTR	California Toxics Rule
CWA	Clean Water Act
DC WMA	Dominguez Channel Watershed Management Area
DC WMG	Dominguez Channel Watershed Management Group
DWMMP	Dominguez Watershed Management Master Plan
EMC	Event Mean Concentration
ERL	Effect Range Low
ERM	Effect Range Median
ETo	Evapotranspiration
EWMP	Enhanced Watershed Management Program
GIS	Geographic Information System
GLAC	Greater Los Angeles County
GPS	Global Positioning System
HHWC	Household Hazardous Waste Collection
HO	Historical Organics
HRU	Hydrologic Response Units
HSPF	Hydrologic Simulation Program - FORTRAN
IC/ID	Illicit Connection/Illicit Discharge
IGP	Industrial General Permit
IRWMP	Integrated Regional Watershed Management Plan
LABOS	Los Angeles Bureau of Sanitation
LACDPW	Los Angeles County Department of Public Works
LACFCD	Los Angeles County Flood Control District
LARWQCB	Los Angeles Regional Water Quality Control Board
LB	Long Beach
LID	Low Impact Development
LSPC	Loading Simulation Program in C++
LWQMP	Lake Water Quality Management Plan
MCM	Minimum Control Measure
MEP	Maximum Extent Practicable
MFAC	Minimum Frequency of Assessment and Collection
MOA	Memorandum of Agreement

MS4	Municipal Separate Storm and Sewer System
NCDC	National Climatic Data Center
NEXGEN	Next Generation Radar
NIMS	Nonlinearity-Interval Mapping Scheme
NOI	Notice of Intent
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
PIPP	Public Information and Participation Program
POLA	Port of Los Angeles
POLB	Port of Long Beach
PPP	Pollution Prevention Plan
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 Water Research Project
SIC	Standard Industrial Classification
SQO	Sediment Quality Objectives
SRP	Spill Response Plan
SUSMP	Standard Urban Stormwater Mitigation Plan
SUSTAIN	System for Urban Stormwater Treatment and Analysis INtegration
SWAMP	Surface Water Ambient Monitoring Program
SWMM	Storm Water Management Model
SWPPP	Stormwater Pollution Prevention Plan
TAC	Technical Advisory Committee
TBD	To Be Determined
TIWRP	Terminal Island Water Reclamation Plant
TMDL	Total Maximum Daily Load
TSO	Time Schedule Order
USEPA	United States Environmental Protection Agency
WBPC	Water Body-Pollutant Combination
WDR	Waste Discharge Requirement
WLA	Waste Load Allocation
WMA	Watershed Management Area
WMMS	Watershed Management Modeling System
WMP	Watershed Management Program
WQBEL	Water Quality Based Effluent Limitation
WQO	Water Quality Objective

Units

µg/kg	Microgram per kilogram
µg/L	Microgram per liter
cfu	Colony Forming Unit
g/day	Grams per day
g/yr	Grams per year
kg	Kilogram
kg/yr	Kilograms per year
mg/L	Milligram per liter
mg/kg	Milligram per kilogram
mL	Milliliter
MPN	Most Probable Number
TUc	Toxic Unit Chronic

DRAFT

1 Introduction

This Work Plan outlines how the Dominguez Channel Watershed Management Area Group (DC WMG) intends to develop an Enhanced Watershed Management Program (EWMP) pursuant to the requirements set forth by Order No. R4-2012-0175, Los Angeles County Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) Permit (MS4 Permit). The subsequent DC WMG EWMP will build on the information gathered during the development of this Work Plan. This section describes the applicability of the Work Plan, watershed background and geographical characteristics, regulatory requirements set forth by the MS4 Permit, the EWMP development process, and an overview of this Work Plan.

1.1 Applicability of Work Plan

The agencies participating in this EWMP are the Cities of El Segundo, Hawthorne, Inglewood, Lomita and Los Angeles, the unincorporated areas of the County of Los Angeles, and the Los Angeles County Flood Control District (LACFCD). The area break down for the DC WMG is provided in Table 1.1. Attachment A, Figure A.1 provides a map of the Dominguez Channel Watershed Management Area (WMA) boundaries and the delineations of the areas of the DC WMG participating in the development of this EWMP. Additionally other MS4 Permittees in the watershed that are not participating in this EWMP are clearly identified. Attachment A, Figure A.2 provides a map illustrating the boundaries of the jurisdictions within DC WMG area. This EWMP Work Plan is voluntarily submitted to assist the LARWQCB in implementing the DC and LA Harbor Waters Toxics Pollutants TMDL. The DC WMG has entered into an Amended Consent Decree with the United States and the State of California, including the LARWQCB, pursuant to which the LARWQCB has released the DC WMG from responsibility for toxic pollutants in the DC and the harbors. Accordingly, no inference should be drawn from the submission of this EWMP Work Plan or from any action or implementation taken pursuant to it that the DC WMG is obligated to implement the TMDL, including this EWMP (Work Plan) or any of the TMDL's other obligations or plans, or that the DC WMG has waived any rights under the Amended Consent Decree. Additional information regarding the LACFCD is provided in the Attachments.

Table 1.1: DC WMG Area

DC WMG Member	Total Area (acres)	Percent of Group
City of El Segundo	1,252.18	3.33%
City of Hawthorne	3,891.93	10.34%
City of Inglewood	3,884.28	10.32%
City of Lomita	1,227.70	3.26%
City of Los Angeles	19,243.25	51.12%
Los Angeles County	8,140.91	21.63%
LACFCD	N/A	N/A

1.2 Geographic Scope and Characteristics

The physical and hydrologic watershed characteristics of the Dominguez Channel WMA that are unique to the DC WMG and are further discussed. In addition, the extent of the MS4 and receiving waters addressed by this EWMP Work Plan are also discussed.

1.2.1 Watershed Characteristics

As described on the Los Angeles County Department of Public Works (LACDPW) website (LACDPW, Dominguez Watershed), the Dominguez Channel WMA is located within the southern portion of Los Angeles County, California, and encompasses approximately 133 square miles of land and water, including the Upper Dominguez Channel Watershed, the Machado Lake Watershed, and the Los Angeles/Long Beach Harbors Watershed as demonstrated in Attachment A, Figure A.2. The DC WMG accounts for just over 58 square miles, approximately 42 percent of the Dominguez Channel WMA. Table 1.2 and Attachment A, Figure A.3 present the land use break down within the DC WMG.

Land Use Category	Area (square miles)	Percentage
Agriculture	0.2	0.3%
Commercial	10.7	18.4%
Industrial	9.1	15.7%
Multi-Family Residential	8.3	14.2%
Single Family Residential	16.1	27.7%
Open	4.6	7.8%
Other Urban	9.3	15.9%
Total:	58.3	100%

The hydrologic characteristics of the DC WMG include:

- Low relief terrain except in the southwest (Attachment A, Figure A.4);
- Fully built-out area with a high percentage of impervious area except in the southwest (Attachment A, Figure A.4);
- Soil types based on the Los Angeles County Hydrology Manual (2006) (Attachment A, Figure A.5);
- Storm intensity that increases to the northwest, as indicated by the 50-year, 24-hour rainfall intensity distribution (Attachment A, Figure A.6); and
- Storm depth that increases to the north with a local high point over the Palos Verde Hills, as indicated by the 85th percentile, 24-hour rainfall depth distribution (Attachment A, Figure A.7).

1.2.2 Water Body Characteristics

The DC WMG is tributary to the water bodies listed below, which have been assessed by the State Water Resources Control Board (State Board). A figure illustrating these water bodies can be found in Attachment A, Figure A.8 and Figure A.9 and a summary of the major characteristics can be found in Table 1.3.

- Dominguez Channel
 - Dominguez Channel (lined portion above Vermont Avenue)
 - Dominguez Channel Estuary (unlined portion below Vermont Avenue)
 - Torrance Carson Channel (Torrance Lateral)
- Machado Lake
 - Machado Lake
 - Wilmington Drain

- Los Angeles Harbor
 - Inner Cabrillo Beach
 - Consolidated Slip

Dominguez Channel

The lined portion of the Dominguez Channel above Vermont Avenue is 6.7 miles, spanning from Imperial Highway near Interstate 105 to Vermont Avenue near Interstate 110 (USEPA, 2014b). Three miles of the lined portion of the Dominguez Channel are within the DC WMG jurisdiction. The Basin Plan has identified the existing beneficial uses as RARE and REC-2 and potential beneficial uses as WARM, WILD, and REC-1 for the lined portion of the Dominguez Channel. Further downstream, below Vermont Avenue, is the unlined portion of the Dominguez Channel commonly referred to as the Dominguez Channel Estuary. The estuary is approximately 0.22 square miles, 140.8 acres (8.2 miles in length) spanning from the downstream end of the lined portion of the Dominguez Channel to the Los Angeles Harbor, just south of Anaheim Street and west of Interstate 710 (USEPA, 2014b). Approximately 2.2 miles of the Dominguez Channel Estuary is within the DC WMG jurisdiction. The Basin Plan has identified the existing beneficial uses as COMM, EST, MAR, WILD, RARE, MIGR, SPWN, REC-1, and REC-2 and a potential beneficial use as NAV for the Dominguez Channel Estuary. The Torrance Carson Channel, also referred to as Torrance Lateral, is 3.4 miles in length and tributary to the Dominguez Channel Estuary. The Torrance Lateral spans from Western Avenue south of Torrance Boulevard to its confluence with the Dominguez Channel Estuary near Avalon Boulevard and Interstate 405. 1.8 miles of the Torrance Lateral is within the DC WMG jurisdiction. The water quality associated with these water bodies is discussed in Section 2.

Machado Lake

Machado Lake is considered a freshwater reservoir or lake approximately 40 acres in size located adjacent to Vermont Avenue south of its intersection with Pacific Coast Highway (USEPA, 2014b). The Basin Plan has identified the existing beneficial uses as WARM, WILD, RARE, WET, REC-1, and REC-2. Machado Lake is comprised of upper and lower basins separated by a lower earthen dam. The upper basin contains the 40-acre recreational lake created by the impoundment of stormwater runoff while the lower basin is a seasonal freshwater marsh of roughly 63 acres. The Wilmington Drain is a LACFCD facility managed by LACDPW tributary to Machado Lake. The earthen bottom section is characterized as a soft bottom vegetated channel, approximately 3,000 feet long. This portion of Wilmington Drain spans from Pacific Coast Highway to just north of Lomita Boulevard, bordered by mostly residential land uses to the west and the Interstate 110 to the east. Just south of Interstate 110 and upstream, the channel is concrete lined. Beneficial uses for the Wilmington Drain were identified based on the tributary rule, therefore have the same beneficial uses as Machado Lake (LARWQCB, 1994). The water quality associated with these water bodies is discussed in Section 2.

Los Angeles Harbor

There are many components that make up the Los Angeles Harbor as a whole, as illustrated in Attachment A, Figure A.8. The Dominguez Channel WMA empties into the northeast side of the Consolidated Slip, the most upstream portion of the Los Angeles Harbor, located downstream of the Dominguez Channel Estuary near Anaheim Street west of Interstate 710 and spans to Shore Road where it confluences with the Los Angeles Inner Harbor. This portion of the harbor is approximately 0.06 square miles, 13.5 acres (USEPA, 2014b). The Basin Plan designates beneficial uses to "all other inner areas", including the Consolidated Slip. Existing beneficial uses for the inner harbor areas include IND, NAV, REC-2, COMM, MAR, and RARE and potential beneficial uses include REC-1 and SHELL. The Los Angeles Inner Harbor is approximately 3,003

acres and is located downstream of the Consolidated Slip. The Inner Harbor includes portions of both the Los Angeles Harbor and Long Beach Harbor (USEPA, 2014b). The Fish Harbor which is located within the Los Angeles Harbor area, is approximately 0.14 square miles, 91 acres, located east of the harbor near Wharf Street, is also considered part of the Inner Harbor area (USEPA, 2014b) and has the same beneficial uses. The inner and outer portions of Cabrillo Beach are also a part of the Los Angeles Harbor. Inner Cabrillo Beach is considered a bay/harbor and is located to the west of Fish Harbor, adjacent to Shoshonean Road, approximately 0.13 square miles, 82 acres. Outer Cabrillo Beach is considered a coastal shoreline approximately 0.58 miles long on the south side of the peninsula bordering inner and outer Cabrillo Beach (USEPA, 2014). The Basin Plan has identified existing beneficial uses for Cabrillo Beach as NAV, REC-1, REC-2, COMM, MAR, WILD, MIGR, SPWN, and SHELL. The water quality associated with the Los Angeles Harbor water bodies is discussed in Section 2.

Table 1.3: Summary of DC WMG Water Bodies

Water Body		Existing Beneficial Uses	Potential Beneficial Uses
Dominguez Channel	Lined portion above Vermont Avenue (Freshwater)	RARE, REC-2	WARM, WILD, REC-1, MUN ¹
	Unlined portion below Vermont Avenue (Estuary)	COMM, EST, MAR, WILD, RARE, MIGR, SPWN, REC-1, REC-2	NAV
	Torrance Carson Channel ²	RARE, REC-2	WARM, WILD, REC-1, MUN ¹
Machado Lake	Machado Lake	WARM, WILD, WET, REC-1, REC-2	None
	Wilmington Drain ³	WARM, WILD, WET, REC-1, REC-2	None
Los Angeles Harbor	Consolidated Slip	IND, NAV, REC-2, COMM, MAR, RARE	REC-1, SHELL
	Inner Harbor	IND, NAV, REC-2, COMM, MAR, RARE	REC-1, SHELL
	Fish Harbor	IND, NAV, REC-2, COMM, MAR, RARE	REC-1, SHELL
	Inner Cabrillo Beach	NAV, REC-1, REC-2, COMM, MAR, WILD, MIGR, SPWN, SHELL	None
	Outer Cabrillo Beach	NAV, REC-1, REC-2, COMM, MAR, WILD, MIGR, SPWN, SHELL	None

¹ MUN designation is P*. Associated water quality objectives are not applicable until such time as the use is confirmed.

² Beneficial uses based on TMDL Staff Report (LARWQCB, 2011).

³ Beneficial uses based on the tributary rule (LARWQCB, 1994).

1.3 Regulatory Framework

In 1972, provisions of the Federal Water Pollution Control Act, also referred to as the Clean Water Act (CWA), were amended so that the discharge of pollutants to waters of the United States from any point source is effectively prohibited, unless the discharge is in compliance with a NPDES permit. In 1987 the CWA was amended, also called the Water Quality Act of 1987, to require United States Environmental Protection Agency (USEPA) to establish a program to address storm water discharges.

In response, EPA promulgated the NPDES storm water permit application regulations. These regulations required that facilities with storm water discharges "...from a large or medium municipal storm sewer system; or (3) a discharge which EPA or the state/tribe determines to contribute to a violation of a water quality standard or which..." apply for an NPDES permit. On November 16, 1990, the USEPA published final regulations that established application requirements for stormwater permits for MS4s serving a population of over 100,000 (Phase I communities) and certain industrial facilities, including construction sites greater than 5 acres. On December 8, 1999, the USEPA published the final regulations for communities under 100,000 (Phase II MS4s) and operators of construction sites between one and five acres.

The State of California Porter-Cologne Act (Water Code 13000, et seq.) is the principal legislation for controlling stormwater pollutants in California, requiring the development of Basin Plans for drainage basins within California. Each plan serves as a blueprint for protecting water quality within the various watersheds. These basin plans are used in turn to identify more specific controls for discharges (e.g., wastewater treatment plant effluent, urban runoff, and agriculture drainage). Under Porter-Cologne, specific controls are implemented through permits called Waste Discharge Requirements (WDRs) issued by the nine Regional Water Quality Control Boards. For discharges to surface waters, the WDR also serves as an NPDES permit.

The Los Angeles Regional Water Quality Control Board (LARWQCB or Regional Board) adopted WDRs for MS4 discharges within the Coastal Watersheds of Los Angeles County, (Order No. R4-2012-0175; NPDES Permit No. CAS004001) on November 8, 2012. The MS4 Permit became effective on December 28, 2012. The MS4 Permit contains effluent limitations, receiving water limitations (RWLs), Minimum Control Measures (MCMs), Total Maximum Daily Load (TMDL) provisions, and outlines the process for developing watershed management programs (WMPs), including the EWMP. The MS4 Permit incorporates the TMDL Waste Load Allocations (WLAs) applicable to dry- and wet-weather as Water Quality-Based Effluent Limitations (WQBELs) and/or Receiving Water Limitations (RWLs). Part V.A (pages 38-39) of the MS4 Permit requires compliance with the WQBELs as outlined in the respective TMDLs.

1.3.1 MS4 Permit Requirements

Part VI.C.1.g (page 47) of the MS4 Permit states that Permittees may elect to develop an EWMP that comprehensively evaluates opportunities within the participating WMA as a whole for collaboration among Permittees and other partners on multi-benefit regional projects, referred to as regional EWMP projects, that wherever feasible retain non-stormwater runoff and stormwater runoff from the 85th percentile, 24-hour storm event for drainage areas tributary to the project. These regional EWMP projects should also incorporate other benefits including flood control and water supply. In the drainage areas where regional EWMP projects are not feasible, a Reasonable Assurance Analysis (RAA) should be included to demonstrate that applicable WQBELs and RWLs will be achieved through implementation of other watershed control measures. According to Parts VI.C.1.g.i-ix (pages 48-49) of the MS4 Permit the EWMP must:

- i. Be consistent with the provisions in Part VI.C.1.a.-f (pages 46-47) and VI.C.5-C.8 (pages 58-66);
- ii. Incorporate applicable State agency input on priority setting and other key implementation issues;
- iii. Provide for meeting water quality standards and other CWA obligations by utilizing provisions in the CWA and its implementing regulations, policies, and guidance;
- iv. Include multi-benefit regional projects to ensure that MS4 discharges achieve compliance with final WQBELs set forth in Part VI.E (page 141) of the MS4 Permit and do not cause or contribute to exceedances of receiving water limitations in Part V.A (page 38) of the MS4 Permit by retaining through infiltration or capture and reuse the stormwater volume

- from the 85th percentile, 24-hour storm for the drainage areas tributary to the multi-benefit regional projects;
- v. In drainage areas where retention of the stormwater volume from the 85th percentile, 24-hour storm event is not technically feasible, include other watershed control measures to ensure that MS4 discharges achieve compliance with interim and final WQBELs set forth in Part VI.E (page 141) of the MS4 Permit with compliance deadlines occurring after approval of an EWMP and to ensure that MS4 discharges do not cause or contribute to exceedances of receiving water limitations in Part V.A (page 38) of the MS4 Permit;
 - vi. Maximize the effectiveness of funds through analysis of alternatives and the selection and sequencing of actions needed to address human health and water quality related challenges and non-compliance;
 - vii. Incorporate effective innovative technologies, approaches and practices including green infrastructure;
 - viii. Ensure that existing requirements to comply with technology-based effluent limitations and core requirements (e.g., including elimination of non-stormwater discharges of pollutants through the MS4, and controls to reduce the discharge of pollutants in stormwater to the maximum extent practicable) are not delayed; and
 - ix. Ensure that a financial strategy is in place.

Part VI.C.4.c.iv (page 53-58) of the MS4 Permit states that Permittees that elect to collaborate and develop an EWMP, such as the DC WMG, shall submit the Work Plan for development of the EWMP no later than June 28, 2014. The draft EWMP shall be submitted no later than June 28, 2015. These deadlines stand true if the conditions described in Parts VI.C.4.c.iv.(1)-(3) (page 57) of the MS4 Permit are met in greater than fifty percent of the land area in the watershed. The conditions of Parts VI.C.4.c.iv.(1)-(3) (page 57) are required within six months of the MS4 Permit effective date and are as follows:

1. Demonstrate there are Low Impact Development (LID) ordinances in place that meet the requirements of the Planning and Land Development Program as described by Part VI.D.7 (pages 94-113) of the MS4 Permit;
2. Demonstrate that green streets policies are in place; and
3. Submit a Notice of Intent (NOI) to develop an EWMP.

The DC WMG has met these conditions. The requirements of the EWMP Work Plan are specified in the MS4 Permit Part VI.C.5 (pages 58-65) as the EWMP Program Development and focuses on the following tasks which are expanded on in this Work Plan.

- a. Identification of water quality priorities;
- b. Selection of watershed control measures; and
- c. Compliance schedules.

1.3.2 Relevant TMDLs

A TMDL is a regulatory term used to describe a value of the maximum amount of a pollutant that a water body can receive while still meeting water quality standards. Attachment N of the MS4 Permit, titled "TMDLs in Dominguez Channel and Greater Harbor Waters Watershed Management Area" lists information on TMDLs and incorporates WQBELs and RWLs relevant to the DC WMG including the TMDLs identified in Table 1.4.

Table 1.4: DC WMG TMDLs and Effective Dates

TMDL	LARWQCB Resolution Number	Effective Date and/or Approval Date
Los Angeles Harbor Bacteria TMDL	R12-007 ¹	November 7, 2013
	2004-011	March 10, 2005
Machado Lake Trash TMDL	2007-006	March 6, 2008
Machado Lake Nutrient TMDL	2008-006	March 11, 2009
Machado Lake Pesticides and PCBs TMDL ²	R10-008	March 20, 2012
DC and LA Harbor Waters Toxic Pollutants TMDL	R11-008	March 23, 2012

¹ Reconsideration of Certain Technical Matters of the Los Angeles Harbor Inner Cabrillo Beach and Main Ship Channel Bacteria TMDL

² Also referred to as the Machado Lake Toxics TMDL

Table 1.5 demonstrates which DC WMG members are affected by each of the TMDLs per Attachment K, Table K.4, of the MS4 Permit. The Water Quality Objectives (WQOs) associated with each of the TMDLs are included in Attachment B.

Table 1.5: Applicability of DC WMG TMDLs

DC WMG Participating Agency	Los Angeles Harbor Bacteria TMDL	Machado Lake Trash TMDL	Machado Lake Nutrient TMDL	Machado Lake Pesticides and PCBs TMDL	DC and LA Harbor Waters Toxic Pollutants TMDL ¹
City of El Segundo					X
City of Hawthorne					X
City of Inglewood					X
City of Los Angeles	X	X	X	X	X
City of Lomita		X	X	X	
County of Los Angeles	X	X	X	X	X
LACFCD	X	X	X	X	X

¹ The requirements of the MS4 Permit to implement the obligations of this TMDL do not apply to a Permittee to the extent that it is determined that the Permittee has been released from that obligation pursuant to the Amended Consent decree entered in *United States v. Montrose Chemical Corp.*, Case No. 90-3122 AAH (JRx).

1.4 EWMP Development Process

According to Part VI.C.1.f.v (page 48) of the MS4 Permit, each watershed management program (WMPs and EWMPs) must provide appropriate opportunity for meaningful stakeholder input, including, but not limited to, a permit-wide watershed management program Technical Advisory Committee (TAC) that will advise and participate in the development of the WMP or EWMP at month six through the date of approval. The MS4 Permit requires that the TAC include at least one Permittee representative from each WMA for which a WMP or EWMP is being developed and must include a minimum of one public representative from a non-governmental organization with public membership and staff from the Regional Board and USEPA Region IX. The DC WMG has been part of

the TAC and has provided input on the various topics discussed. Additionally the DC WMG is working with local and regional stakeholders to receive input for the EWMP process.

The DC WMG has developed a list of stakeholders in order to establish the stakeholder participants, as well as provide guidance on how to engage the identified key stakeholders. The stakeholders include:

- Key administrators, stormwater program managers, council districts, etc.;
- Environmental and community organizations; and
- Collaborating governmental agencies such as the Regional Board, USEPA Region IX, United States Army Corps of Engineers, water districts, and other WMP or EWMP agencies.

A series of three EWMP stakeholder workshops are anticipated, the first two workshops having two sessions each, one for the entire region and the other being watershed-specific. The third workshop will be watershed-specific. DC WMG may hold additional workshops if needed. The first workshop was completed on April 10, 2014 at the Witherbee Auditorium at LA Zoo. This workshop was conducted in concert with three other WMGs and approximately 500 invitations were sent out to the above types of stakeholders. Workshop No. 1 was intended to initiate the process for receiving input from a broad stakeholder group. This workshop initiated the stakeholder process and addressed the EWMP watersheds of the Los Angeles River, Ballona Creek, Marina del Rey, Santa Monica Bay Jurisdictions 2 and 3, and the DC WMG. The agenda consisted of introducing the planned EWMP stakeholder process, explaining the relevance and context of the EWMP process, and solicit input from stakeholders for the Draft EWMP Work Plan and ideas on potential projects.

The following preparation was conducted and is anticipated for each of the remaining workshops:

- Meeting notices (one page flier) distributed via email to identified stakeholders and posted on the City of Los Angeles a website for EWMP materials and activities at least one month prior to the workshop;
- Material for each workshop distributed and posted to the www.lastormwater.org website;
- A draft workshop summary, including presentation materials, distributed no later than two weeks after each workshop to solicit additional stakeholder feedback;
- Locations of the workshops that are reasonably accessible and accommodates up to 250 attendees;

In addition to distributing workshop material through the Los Angeles Stormwater website, the DC WMG also posted workshop information on their community outreach websites and on social media.

The DC WMG anticipates the following workshops in the future in response to the EWMP development:

- **Workshop No. 2 - Presenting Draft EWMP Work Plans**
Target date: August or September 2014

This workshop will recap the first workshop and focus on a presentation of the Draft EWMP Work Plans, explaining how the input received at the first workshop was addressed. Modeling results from the RAA will be presented. During the second half of the workshop, breakout sessions will allow for watershed-specific discussions.

- **Workshop No. 3 - Input into the Draft EWMP Plan**

- **Target date: Late 2014/Early 2015**

- This workshop will be specific to each watershed in order to provide a summary of activities and work products to date and to present the outline and key elements of the Draft EWMP to solicit input. The primary objective of this workshop is to present the draft list of proposed regional projects in order to receive feedback.

The DC WMG anticipates additional one-on-one meetings or participation in other stakeholder forums when appropriate and on a case-by-case basis. The stakeholder process is important to the EWMP development process so that communication is occurring, and ideas are being discussed in an appropriate timeframe so that conflicts can be resolved early on.

1.5 EWMP Work Plan Overview

This EWMP Work Plan is required as part of the DC WMG EWMP development process per Part VI.C.4.c.iv (page 57) of the MS4 Permit.

The EWMP Work Plan documents the progress thus far in the development of the EWMP by detailing the water quality priorities within the DC WMG, identifying the existing and potential control measures, as well as the approach to identifying additional projects, and outlining the approach to the RAA, as required by the MS4 Permit. The purpose of identifying significant watershed characteristics and presenting an approach is so that stakeholders can become involved, and feedback can be solicited and incorporated into the EWMP. The EWMP Work Plan will be used as the frame of the EWMP and includes the following sections:

- **Section Water Quality Priorities**

- The receiving waters are identified and characterized based on the available water quality data. Water body Pollutant Classifications are developed so that each water body-pollutant combination can be classified into an appropriate category in order to develop an approach to prioritizing the identified water quality priorities.

- **Section Watershed Control Measures**

- This section outlines the existing and potential control measures. Watershed control measures consist of both structural and non-structural Best Management Practices (BMPs). Existing structural BMPs are identified and planning documents are reviewed in order to identify potential regional projects. In addition, an approach to identifying and selecting additional regional and distributed BMPs is included. The current minimum control measures are described and an approach to modifying the programs, as well as potential modifications, is presented.

- **Section Reasonable Assurance Analysis Approach**

- The modeling system and approach to conducting the RAA is presented in this section. The modeling system being used by the DC WMG is highlighted along with the process and modeling approach. The spatial domain, time period, water quality, and BMP model integration are described. Lastly, the output anticipated from the RAA is detailed and examples are provided.

- **Section EWMP Development Process**

- This section outlines the process and approach for implementing the Work Plan and completing the EWMP, including the process for incorporating comments from the Regional Board and other interested parties. The schedule for EWMP completion and associated milestones, including alternative milestones, will be presented. Lastly, the adaptive nature of the EWMP development is discussed.

2 Water Quality Priorities

Identification of the water quality priorities in the DC WMG is a key component of the EWMP process. Part VI.C.5.a (page 58-60) of the MS4 Permit outlines the pertinent elements of the prioritization process as follows:

1. Water quality characterization (VI.C.5.a.i, page 58) based on available monitoring data, TMDLs, 303(d) lists, storm water annual reports, etc.;
2. Water body-pollutant classification (VI.C.5.a.ii, page 59) to identify water body-pollutant combinations that fall into three MS4 Permit-defined categories;
3. Source assessment (VI.C.5.a.iii, page 59) for the water body-pollutant combinations in the three categories; and
4. Prioritization of the water body-pollutant combinations (VI.C.5.a.iv, page 60).

The three MS4 Permit defined categories are:

- Category 1 (Highest Priority): Water body-pollutant combinations for which WQBELs and/or RWLs are established in Part VI.E (page 141) and Attachment N of the MS4 Permit.
- Category 2 (High Priority): 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 CWA Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment.
- Category 3 (Medium Priority): Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in the MS4 Permit and for which MS4 discharges may be causing or contributing to the exceedance.

The following sections presented below describe the characterization and prioritization of those water body-pollutant combinations (WBPCs) found to be issues in DC WMG.

2.1 Water Quality Characterization

Water quality monitoring data and reports were gathered for the Dominguez Channel water body segments (including the lined portion above Vermont Avenue, the unlined Dominguez Channel Estuary, and the Torrance Lateral), the Machado Lake water body segments (including the Wilmington Drain), and the Los Angeles Harbor (including the Consolidated Slip and Cabrillo Beach). The raw data available was assessed for quality and compiled into a database by wet-weather and dry-weather conditions and locations. Sources for this data included:

- LACDPW Dominguez Channel MS4 NPDES Mass Emission Monitoring;
- AMEC's Port of Los Angeles (POLA) Artesia Pollutograph Study;
- City of Los Angeles Bureau of Sanitation (LABOS) Special Ammonia Sampling and Status and Trends Monitoring Programs in the Dominguez Channel; and
- LABOS Machado Lake Water Quality Monitoring Program and Nutrient TMDL Monitoring Program.

The sampling locations for the data are shown in Attachment C (Figures C.1 and C.2) and additional details regarding the available data, including which sampling effort was conducted at each site, are presented in Attachment D.

In addition to the sampling data, water and sediment quality monitoring reports were collected and reviewed as part of the characterization. These reports are summarized in Table 2.1.

Table 2.1: Monitoring Reports Reviewed for Water Quality Characterization		
Source	Water Body(ies)	Date Range
LACDPW NPDES MS4 Stormwater Monitoring Reports	Dominguez Channel Mass Emission Station	2002-2012
	Dominguez Channel Tributary Monitoring	2008-2011
Surface Water Ambient Monitoring Program (SWAMP)	Dominguez Channel, Machado Lake and LA/LB Harbor	2003
Dominguez Channel/Consolidated Slip Erosion Study	Dominguez Channel Estuary and Consolidated Slip	2011
Southern California Bight Regional Monitoring Program	LA/LB Harbor	2003 2008
POLA water data	Inner, Fish, and Outer Harbor	2005
Port of Long Beach (POLB) water data	Inner Harbor	2006
POLA/POLB Sediment Survey	Inner and Outer Harbor	2006
City of LA Terminal Island Water Reclamation Plant Biennial Assessment Report	Outer Harbor	2002/2003 2008/2009 2010/2011
Southern California Coastal Water Research Project (SCCWRP) DDE Inventory	Inner and Outer Harbor	2003
Consolidated Slip Restoration Project Concept Plan Supplemental Report	Dominguez Channel, Dominguez Channel Estuary, Torrance Lateral, and Consolidated Slip	2002
SCCWRP Atmospheric Deposition in LA/LB Harbor study	Consolidated Slip	2006
Wilmington Drain Sediment Characterization Study - LACDPW and City of Los Angeles Bureau of Engineering (BOE)	Wilmington Drain	2007
City of LA Machado Lake Nutrients and Toxics TMDL Lake Water Quality Management Plan	Machado Lake and Wilmington Drain	2001-2009

Basin Plan; the TMDLs for Dominguez Channel, Machado Lake, and the Los Angeles Harbor adopted as Basin Plan Amendments; other amendments to the Basin Plan Water Quality Standards; and the CTR (USEPA, 2000) were used to evaluate whether data exceeded RWLs. Applicable WQOs were established based on existing and potential beneficial uses for each water body segment and the weather conditions the samples were collected under.

The data analysis applied criteria for potential beneficial uses in addition to existing uses as a conservative measure. In doing so, water quality monitoring samples from the lined portion of the Dominguez Channel were screened against criteria applicable for the protection of REC-1 beneficial uses. Criteria for the protection of human health for the consumption of organisms only were applied to segments with either existing or potential REC-1 beneficial uses under both dry- and wet-weather conditions. Where human health criteria were not applicable or established, chronic water quality criteria for the protection of aquatic life were applied to dry-weather samples and acute water quality criteria were applied to wet-weather samples to account for the shorter exposure period consistent with TMDLs in the region.

Water body segments were classified as either freshwater or saltwater to apply the correct WQOs. The lined portion of the Dominguez Channel, as well as tributaries (i.e., the Torrance Lateral), were classified as freshwater, while portions of the Los Angeles Harbor were classified as marine (saltwater). Due to tidal influence in the estuarine portion of the WMA and a lack of salinity data at the sampling locations in the Estuary, water quality samples from the Estuary were screened against both salt and freshwater criteria and the more stringent of the two criteria under the physical conditions at the time of sampling was used. Future confirmation of the salinity level at these monitoring locations can further refine these assumptions.

Hardness measurements at the time of sampling were used to calculate hardness-dependent dissolved metals WQOs. When hardness was not recorded, the median hardness for dry-weather samples at each sample site was used for dry-weather conditions and a value of 50 mg/L was used for wet-weather based on the hardness used in the TMDL for Toxic Pollutants in the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters.

2.1.1 Characterization of Receiving Water Quality

Statistical summaries of the water quality monitoring (raw) data are presented in Attachment D. Tables of the observed exceedances over the monitoring period and exceedances over the past five years (starting in January 2008) are summarized in Table 2.2 to Table 2.4 below. The last ten years of data was identified and evaluated based on the requirements specified in the RAA Guidelines and the most recent five years of data was focused on, as it is the most relevant. Note that metals were evaluated in dissolved form. For details on the WQOs utilized to measure exceedances, refer to the Attachment D.

Table 2.2: Summary of Exceedances for the Dominguez Channel Monitoring Locations

Constituent	Weather	Date Range		Mainstream of Dominguez Channel												Tributaries			
				El Segundo Blvd			Mass Emission Station, S-28 (Artesia Blvd)			Western Ave		Vermont Ave		Yukon Ave		Carson Plaza Dr			
				Overall	Past 5 Years	Past 5 Years	Overall	Past 5 Years	Overall	Past 5 Years	Overall	Past 5 Years	Overall	Past 5 Years	Overall	Past 5 Years			
				E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N			
Copper ^A	Wet	7/25/02	2/22/07	5/11	-	21/39	12/20	4/11	-	1/4	-	3/4	-	1/4	-	1/4	-		
	Dry	4/26/01	5/26/09	35/83	2/16	7/33	5/22	16/82	0/16	7/47	0/16	14/45	3/15	9/36	0/8	0/8	0/8		
Lead ^A	Wet	7/25/02	2/22/07	2/11	-	5/34	5/20	3/11	-	1/3	-	1/4	-	1/4	-	1/4	-		
	Dry	4/26/01	5/26/09	8/81	1/16	1/30	1/22	2/81	1/16	1/47	1/16	2/46	1/15	0/36	0/8	0/8	0/8		
Zinc ^A	Wet	7/25/02	2/22/07	3/11	-	18/39	11/20	2/11	-	0/4	-	1/4	-	0/4	-	0/4	-		
	Dry	4/26/01	5/26/09	0/82	0/16	2/33	2/22	0/82	0/16	0/47	0/16	1/42	0/15	0/36	0/8	0/8	0/8		
Cadmium	Wet	7/25/02	2/22/07	1/11	-	-	-	0/11	-	0/4	-	0/4	-	0/4	-	0/4	-		
	Dry	4/26/01	5/26/09	0/82	0/16	-	-	1/82	0/16	0/47	0/16	0/46	0/15	0/36	0/8	0/8	0/8		
Chromium	Dry	4/26/01	5/26/09	1/83	0/16	-	-	0/83	0/16	1/47	1/16	2/46	0/15	0/36	0/8	0/8	0/8		
	Wet	7/25/02	8/25/05	2/10	-	0/37	0/20	2/10	-	0/3	-	0/3	-	0/3	-	0/3	-		
Mercury	Dry	4/26/01	2/24/06	8/46	-	1/65	0/22	7/46	-	0/11	-	0/11	-	0/9	-	0/9	-		
	Dry	3/31/05	2/24/06	2/47	-	-	-	1/47	-	0/11	-	0/11	-	0/9	-	0/9	-		
Selenium	Dry	5/31/01	5/26/09	0/82	0/17	-	-	0/82	0/17	0/48	0/17	0/47	0/16	7/37	7/9	7/9	7/9		
	Wet	11/29/01	12/23/08	24/38	22/34	4/4	4/4	29/38	6/6	19/38	5/6	10/12	1/2	9/12	1/2	1/2	1/2		
<i>E. coli</i> ^B	Dry	4/3/01	5/26/09	120/250	5/6	5/5	5/5	194/250	27/34	113/250	30/34	41/71	9/15	48/77	6/15	6/15	6/15		
	Wet	11/8/02	1/24/13	-	-	44/46	21/21	-	-	-	-	-	-	-	-	-	-		
Coliform	Dry	10/10/02	4/9/13	-	-	19/27	12/18	-	-	-	-	-	-	-	-	-	-		
	Dry	7/1/09	8/13/09	1/7	1/7	-	-	0/7	0/7	0/7	0/7	-	-	-	-	-	-		
Diazinon	Wet	10/31/06	6/12/13	-	-	3/31	0/20	-	-	-	-	-	-	-	-	-	-		
	Dry	2/11/03	1/24/13	-	-	0/28	0/22	-	-	-	-	-	-	-	-	-	-		
Bis(2-Ethylhexyl) phthalate	Wet	10/28/03	6/12/13	-	-	3/31	0/21	-	-	-	-	-	-	-	-	-	-		
	Dry	10/31/03	1/24/13	-	-	1/30	0/23	-	-	-	-	-	-	-	-	-	-		

Table 2.2: Summary of Exceedances for the Dominguez Channel Monitoring Locations

Constituent	Weather	Mainstream of Dominguez Channel												Tributaries					
		El Segundo Blvd				Mass Emission Station, S-28 (Artesia Blvd)				Western Ave				Vermont Ave		Yukon Ave		Carson Plaza Dr	
		Date Range		Past 5 Years		Overall		Past 5 Years		Overall		Past 5 Years		Overall		Past 5 Years		Overall	
		From	To	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N
pH	Wet	11/8/02	1/24/13	-	5/39	3/20	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dry	10/10/02	6/12/13	-	9/33	8/22	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	Wet	11/8/2002	1/24/2013	-	1/42	0/18	-	-	-	-	-	-	-	-	-	-	-	-	-

E/N = Number of Exceedances/Number of Samples

- = No Data

^A Copper, Lead, and Zinc measurements for Sampling Station S-28 were taken on the following dates: 2/27/2006 - 1/24/2013 (wet) and 5/16/2005-6/12/2013 (dry)

^B E. Coli at Sampling Station S-28 was taken on the following dates: 10/11/2012 - 1/24/2013 (wet) and 10/10/2012-4/9/2013 (dry)

Table 2.3: Summary of Exceedances at the Torrance Lateral Monitoring Location

Constituent	Weather	Date Range		Overall	Past 5 Years
		From	To		
		E/N	E/N		
Copper	Wet	4/28/2005	2/22/2007	1/4	-
	Dry	1/27/2005	5/26/2009	7/47	1/16
Lead	Wet	4/28/2005	2/22/2007	1/3	-
	Dry	1/27/2005	5/26/2009	1/47	1/16
Zinc	Wet	4/28/2005	2/22/2007	1/4	-
	Wet	4/28/2005	2/22/2007	1/4	-
Cadmium	Dry	1/27/2005	5/26/2009	1/47	0/16
	Wet	2/27/2003	12/23/2008	7/12	2/2
<i>E. coli</i>	Dry	1/17/2002	5/26/2009	42/77	13/15

E/N = Number of Exceedances/Number of Samples

- = No Data

Table 2.4: Summary of Exceedances for the Dominguez Channel Estuary Monitoring Locations

Constituent	Weather	Date Range		Wilmington Avenue		Henry Ford Avenue	
		From	To	Overall	Past 5 Years	Overall	Past 5 Years
		E/N	E/N	E/N	E/N	E/N	E/N
Copper	Wet	7/25/2002	2/22/2007	10/11	-	5/10	-
	Dry	4/26/2001	5/26/2009	44/72	10/10	43/73	9/10
Lead	Wet	7/25/2002	2/22/2007	0/11	-	2/11	-
	Dry	4/26/2001	5/26/2009	12/72	1/9	14/75	1/10
Zinc	Wet	7/25/2002	2/22/2007	2/10	-	1/11	-
	Dry	4/26/2001	5/26/2009	4/75	2/10	0/74	0/10
Silver	Dry	4/26/2001	5/26/2009	1/75	0/9	3/74	0/9
	Wet	7/25/2002	2/22/2007	1/11	-	1/11	-
Nickel	Dry	4/26/2001	5/26/2009	16/75	6/10	16/75	6/10
	Dry	4/26/2001	5/26/2009	10/46	-	8/45	-
Mercury	Wet	7/25/2002	8/25/2005	1/10	-	1/9	-
	Dry	4/26/2001	1/26/2006	4/47	-	4/46	-
Enterococcus	Wet	11/29/2001	12/23/2008	28/38	5/6	21/38	3/6
	Dry	4/3/2001	5/26/2009	31/250	4/34	12/250	0/34
Total Coliform	Wet	11/29/2001	12/23/2008	33/38	5/6	26/38	4/6
	Dry	4/3/2001	5/26/2009	57/250	5/34	11/250	2/34

E/N = Number of Exceedances/Number of Samples

- = No Data

Table 2.5: Summary of Exceedances for the Machado Lake Monitoring Locations

Constituent	Weather	Date Range		Machado Lake, ML-1		Machado Lake, ML-2		Machado Lake, ML-3		Machado Lake, ML-4		Project 77 Drain		Project 510 Drain	
		From	To	Overall	Past 5 Years	Overall	Past 5 Years	Overall	Past 5 Years	Overall	Past 5 Years	Overall	Past 5 Years	Overall	Past 5 Years
		E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N	E/N
<i>E. Coli</i>	Wet	12/20/07	12/20/07	1/1	-	1/1	-	1/1	-	-	-	-	-	-	-
	Dry	12/26/07	9/29/08	24/54	18/55	17/54	43/55	43/54	8/47	2/4	1/3	0/1	-	-	
Total Phosphorus	Wet	5/23/08	2/17/09	1/2	1/1	1/1	-	-	-	-	-	-	-	-	
	Dry	5/19/08	2/7/11	43/52	45/45	45/45	45/45	-	-	-	-	-	-	-	
Total Nitrogen	Wet	4/17/07	2/17/09	5/6	3/4	3/4	1/1	1/1	1/1	1/1	1/1	6/6	3/3	1/1	
	Dry	6/16/06	2/7/11	89/106	92/106	74/87	45/47	45/47	44/47	40/41	31/32	29/31	22/22	-	
Chlorophyll-a	Wet	5/23/08	2/17/09	1/2	1/2	1/2	1/1	1/1	1/1	1/1	1/1	-	-	-	
	Dry	5/19/08	2/7/11	43/55	46/55	46/55	20/20	20/20	19/19	19/19	-	-	-	-	
Dissolved Oxygen	Wet	12/26/12	12/26/12	1/1	1/1	1/1	-	-	-	-	-	-	-	-	
	Dry	4/4/11	12/10/12	37/45	41/45	41/45	-	-	-	-	-	-	-	-	

E/N = Number of Exceedances/Number of Samples
- = No Data

Table 2.6: Summary of Exceedances at the Wilmington Drain Monitoring Location

Constituent	Weather	Date Range		Wilmington Drain	
		From	To	Overall	Past 5 Years
		E/N	E/N	E/N	E/N
<i>E. Coli</i>	Dry	12/26/2007	2/27/2008	1/4	0/3
Total Nitrogen	Wet	11/30/2007	2/17/2009	6/6	3/3
	Dry	10/19/2007	2/2/2009	30/30	21/21

E/N = Number of Exceedances/Number of Samples
- = No Data

The monitoring reports reviewed during the water quality characterization were for the Dominguez Channel, Machado Lake and Los Angeles Harbor areas. For those programs that investigated sediment quality, exceedances of the Effect Range Low (ERL) sediment quality thresholds were used to assess water body impairment. It was also noted if chemical concentrations exceeded the higher Effect Range Median (ERM) threshold. Significant findings from these reports are summarized in Table 2.7, Table 2.8, and Table 2.9 for the Dominguez Channel water body segments, Machado Lake water body segments, and the Los Angeles Harbor water body segments respectively.

Table 2.7: Summary of Exceedances for Monitoring Programs for the Dominguez Channel			
Water Body	Program	Date Range	Exceedances
Dominguez Channel	LACDPW NPDES MS4 Stormwater Monitoring	2008-2013	<u>Wet-weather</u> : Copper (diss.), Lead (diss.), and Zinc (diss.), Cyanide, Fecal coliforms, pH <u>Dry-weather</u> : Cyanide, Fecal coliforms, E. coli, pH
	LACDPW NPDES MS4 Stormwater Monitoring	2002-2008	<u>Wet weather</u> : Copper (diss.), Lead (diss.), and Zinc (diss.)
	LACDPW NPDES MS4 Stormwater Monitoring	2002, 2003, 2005	Water column toxicity
	LACDPW NPDES MS4 Stormwater Monitoring	Pre- 2005	Diazinon
	SWAMP	2003	pH
	Consolidated Slip Restoration Project Concept Plan Supplemental Report	2002	<u>Sediment (ERM)</u> : Zinc
Torrance Lateral	LACDPW NPDES MS4 Stormwater Monitoring	2008-2012	<u>Wet-Weather</u> : Copper (diss.), Lead (diss.), and Zinc (diss.), Cyanide, Fecal coliforms, pH <u>Dry-Weather</u> : Fecal coliforms, pH, ammonia
	Consolidated Slip Restoration Project Concept Plan Supplemental Report	2002	<u>Sediment (ERM)</u> : Lead, Zinc, DDT, PCBs, and PAHs
Dominguez Channel Estuary	Consolidated Slip Erosion Study	2011	<u>Sediment (ERM)</u> : Chromium, Copper, Lead, Zinc, Mercury, Silver, DDT, PCBs, Chlordane, Dieldrin <u>Sediment (ERL)</u> : Arsenic, Cadmium, Chromium, Copper, Lead, Zinc, Mercury, Nickel, Silver, Total PCBs, DDT, PAHs, Chlordane, and Dieldrin
	SWAP Report	2003	Benthic community effects
	Consolidated Slip Restoration Project Concept Plan Supplemental Report	2002	<u>ERM</u> : Copper, Lead, Zinc, DDT, and PCBs

Table 2.8: Summary of Exceedances for Monitoring Programs for Machado Lake			
Water Body	Program	Date Range	Exceedances
Machado Lake	Machado Lake Nutrients and Toxics TMDL Lake Water Quality Management Plan (Regional Board sediment data set)	2009	<u>Sediment</u> : Chlordane, Total DDT, Total PCBs
	SWAP Report	2003	Dissolved Oxygen
Wilmington Drain	Regional Board Sediment Data	2008	<u>Sediment</u> : Chlordane, Total DDT, Dieldrin
	Wilmington Drain Sediment Characterization Study	2007	<u>Sediment</u> : Chlordane, Total DDT, Total PCBs

Table 2.9: Summary of Exceedances for Monitoring Programs for the Los Angeles Harbor			
Water Body	Program	Date Range	Exceedances
LA Harbor	Southern California Bight Regional Monitoring Program	2008	<u>Sediment (ERL)</u> : DDT, Copper
	Southern California Bight Regional Monitoring Program	2003	<u>Sediment (ERL)</u> : DDT, Copper, Nickel, Mercury, Sediment Toxicity
Inner Harbor	POLA/POLB Sediment Survey	2006	Copper (diss.), DDT (diss.)
	SWAP Report	2003	Silver (diss.)
	Southern California Bight Regional Monitoring Program	2003	PCBs
Outer Harbor	City of LA Terminal Island Water Reclamation Plant (TIWRP) Biennial Assessment Report	2010-2011	<u>Sediment (ERL)</u> : Cadmium, Copper, Nickel, DDT, Total PCBs
	TIRP Biennial Assessment Report	2008-2011	Total PCBs (tissue), Total DDT (tissue)
	POLA/POLB sediment survey	2006	Copper (diss.), DDT (diss.)
	SWAP Report	2003	Silver (diss.)
Consolidated Slip	Consolidated Slip Erosion Study	2011	<u>Sediment (ERM)</u> : PCBs, DDT, Chlordane, Dieldrin <u>Sediment (ERL)</u> : Arsenic, Cadmium, Chromium, Copper, Lead, Zinc, Mercury, Nickel, Silver, Total PCBs, DDT, PAHs, Chlordane, Dieldrin
	SCCWRP Atmospheric Deposition in LA/LB Harbor study	2006	Total DDT (diss.) and Total PCBs (diss.)
	Consolidated Slip Restoration Project Concept Plan Supplemental Report	2002	<u>Sediment (ERM)</u> : Copper, Lead, Zinc, Mercury, Total PCBs, DDT, PAHs, Chlordane and Dieldrin

2.1.2 Characterization of Discharge Quality

Stormwater and non-stormwater discharges will be characterized based on available data. The necessary data may be limited due to the typical lack of data for MS4 discharges within the DC WMG. Regional studies, modeling data, and/or land use data will be further evaluated in order to characterize discharge quality in the EWMP. In addition, data will become available through the future CIMP Outfall Monitoring which will be utilized.

2.2 Water Body Pollutant Classification

Using the data analysis and results from additional monitoring reports, WBPCs were classified into one of the three MS4 Permit categories (Category 1-3). Those WBPCs with a TMDL were classified as Category 1, those WBPCs listed on the State's 303(d) list as impairing a particular water body segment were classified as Category 2, and those remaining WBPCs without an associated TMDL or on the State's 303(d) list, but showing exceedances of water quality criteria were classified as Category 3. A summary of these categorizations is presented in Table 2.10.

Water Body	Category 1 (TMDL)	Category 2 (303(d) List)	Category 3 (Other)
Dominguez Channel (lined portion above Vermont Ave)	Copper (diss.), Lead (diss.), Zinc (diss.), Toxicity	Indicator Bacteria, Ammonia, Diazinon	Cadmium(diss.), Chromium (diss.), Mercury (diss.), Thallium (diss.), Bis(2-Ethylhexl) phthalate, pH, Dissolved Oxygen
Torrance Lateral	Copper (diss.), Lead (diss.), Zinc (diss.)	Coliform Bacteria	Cadmium (diss.), Cyanide, pH, Ammonia, PCBs (sed.), DDT (sed.)
Dominguez Estuary (unlined portion below Vermont Ave)	Cadmium (sed.), Copper (diss. and sed.), Lead (diss., sed., & tissue), Zinc (diss. & sed.), DDT (tissue & sed.), PCBs (sed.), Chlordane (tissue & sed.), Dieldrin (tissue & sed.), PAHs (sed.), Benthic Community Effects, Sediment Toxicity	Ammonia, Coliform Bacteria	Arsenic (sed.), Chromium (sed.), Silver (diss. & sed.), Nickel (diss.), Mercury (sed.), Thallium (diss.)
Machado Lake	Trash, Total Phosphorus, Total Nitrogen, Ammonia, Chlorophyll-a, PCBs (sed.), DDT (sed.), Chlordane (sed.), Dieldrin (sed.), Dissolved Oxygen	<i>None</i>	<i>E. coli</i> , pH
Wilmington Drain	<i>None</i>	Coliform Bacteria, Copper (diss.), Lead (diss.)	Total Nitrogen, DDT (sed.), PCBs (sed.), Chlordane, Dieldrin (sed.)
LA Harbor¹ - Cabrillo Marina	DDT (tissue & sed.), PCBs (tissue & sed.), PAHs	<i>None</i>	<i>None</i>

Table 2.10: Categorized Water Body-Pollutant Combinations

Water Body	Category 1 (TMDL)	Category 2 (303(d) List)	Category 3 (Other)
LA Harbor¹ - Consolidated Slip	Cadmium, Chromium, Copper, Lead, Mercury, Zinc, DDT (tissue & sed.), PCBs (tissue & sed.), PAHs (sed.), Chlordane (tissue & sed.), Dieldrin, Toxaphene (tissue), Benthic Community Effects, Sediment Toxicity	<i>None</i>	Arsenic, Silver, Nickel
LA Harbor¹ - Fish Harbor	Copper, Lead, Mercury, Zinc, DDT (tissue & sed.), PCBs (tissue & sed.), Chlordane, PAHs, Sediment Toxicity	<i>None</i>	<i>None</i>
LA/LB Inner Harbor¹	Copper, Zinc, DDT (tissue & sed.), PCBs (tissue & sed.), PAHs, Benthic Community Effects, Sediment Toxicity, Indicator Bacteria	<i>None</i>	Copper (diss.), Silver (diss.)
LA/LB Outer Harbor¹	DDT (tissue & sed.), PCBs (tissue & sed.), Sediment Toxicity	<i>None</i>	Cadmium, Nickel, Silver (diss.), Copper (diss. & sed.), Mercury
LA Harbor¹ - Inner Cabrillo Beach	Indicator Bacteria, DDT (sed. & tissue), PCBs (tissue & sed.)	<i>None</i>	<i>None</i>

¹ Los Angeles Harbor metals and organic pollutants issues are for sediment unless otherwise noted.

To assist with future prioritization efforts, the categorized WBPCs were divided into the subcategories described in Table 2.11.

Table 2.1.1: Categorized Water Body-Pollutant Combinations

Category	Water Body-Pollutant Combinations	Description
1	<p>Category 1A: WBPCs with past due or current Permit term TMDL deadlines with exceedances in the past 5 years.</p> <p>Category 1B: WBPCs with TMDL deadlines beyond the Permit term with exceedances in the past 5 years.</p> <p>Category 1C: WBPCs addressed in USEPA TMDL without a Regional Board adopted Implementation Plan.</p> <p>Category 1D: WBPCs with past due or current Permit term TMDL deadlines but have there have been no exceedances in the past 5 years.</p> <p>Category 2A: 303(d) Listed WBPCs or WBPCs that meet 303(d) Listing requirements with exceedances in the past 5 years.</p> <p>Category 2B: 303(d) Listed WBPCs or WBPCs that meet 303(d) Listing requirements that are not a "pollutant"² (e.g., toxicity).</p> <p>Category 2C: 303(d) Listed WBPCs or WBPCs that meet 303(d) Listing requirements but there have been no exceedances in the past 5 years.</p> <p>Category 3A: Other WBPCs that have exceeded in the past 5 years.</p> <p>Category 3B: Other WBPCs that are not a "pollutant"² (e.g., toxicity).</p> <p>Category 3C: Other WBPCs that have exceeded in the past 10 years, but not in past 5 years.</p> <p>Category 3D: WBPCs identified by the DC WMG.</p>	<p>WBPCs with TMDLs with past due or current MS4 Permit term interim and/or final limits. These pollutants are the highest priority for the current MS4 Permit term.</p> <p>The MS4 Permit does not require the prioritization of TMDL interim and/or final deadlines outside of the Permit term or USEPA TMDLs, which do not have implementation schedules. To ensure EWMPs consider long term planning requirements and utilize the available compliance mechanisms, these WBPCs should be considered during BMP planning and scheduling, and during CIMP development.</p> <p>WBPCs where specific actions may end up not being identified because recent exceedances have not been observed and specific actions may not be necessary. The CIMP should address these WBPCs to support future re-prioritization.</p> <p>WBPCs with confirmed impairment or exceedances of RWLs. WBPCs in a similar class¹ as those with TMDLs are identified. WBPCs currently on the 303(d) List are differentiated from those that are not to support utilization of EWMP compliance mechanisms.</p> <p>WBPCs where specific actions may not be identifiable because the cause of the impairment or exceedances is not resolved. Either routine monitoring or special studies identified in the CIMP should support identification of a "pollutant" linked to the impairment and re-prioritization in the future.</p> <p>WBPCs where specific actions for implementation may end up not being identified because recent exceedances have not been observed (and thus specific BMPs may not be necessary). Pollutants that are in a similar class¹ as those with TMDLs are identified. Either routine monitoring or special studies identified in the CIMP should ensure these WBPCs are addressed to support re-prioritization in the future.</p> <p>Pollutants that are in a similar class¹ as those with TMDLs are identified.</p> <p>WBPCs where specific actions may not be identifiable because the cause of the impairment or exceedances is not resolved. Either routine monitoring or special studies identified in the CIMP should support identification of a "pollutant" linked to the impairment and re-prioritization in the future.</p> <p>Pollutants that are in a similar class¹ as those with TMDLs are identified.</p> <p>The DC WMG may identify other WBPCs for consideration in EWMP planning.</p>
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Those pollutants with similar fate and transport mechanisms that can be addressed with the same types of control measures were also grouped into classes. These classes include:

- Bacteria
- Metals
- Nutrients
- Trash
- Historical Organics (HO) – organic compounds including pesticides that are no longer in use such as PCBs and DDT
- Current Organics (CO) – organic Compounds such as pesticides and PAHs that are still in use
- To be determined (TBD) – conditions such as pH, dissolved oxygen, and toxicity that are not classified as pollutants and will need further investigation before grouping into other classes

The tables below list the subcategorized WBPCs for DC WMG (Table 2.12), Torrance Lateral (Table 2.13), Dominguez Channel Estuary (Table 2.14), Machado Lake (Table 2.15), Wilmington Drain (Table 2.16), the Consolidated Slip (Table 2.17), and the rest of the Los Angeles Harbor areas (Table 2.18). Those designations that only apply to a specific weather condition (wet or dry) were marked as such. Exceedances of CTR WQOs for dissolved copper, lead, and zinc were observed within the past five years in both dry- and wet-weather in the Dominguez Channel, yet these constituents have been categorized separately due to the TMDL for Toxic Pollutants in Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters only addressing wet-weather exceedances for these metals in the Channel. Refer to Table 2.11 for a description of the subcategories. Subcategorizations may change as more recent monitoring data becomes available for evaluation.

Table 2.12: Summary of Dominguez Channel Subcategorized WBPCs

Class	Constituents¹	Subcategory
Metal	Dissolved Copper (Wet)	1A
Metal	Dissolved Lead (Wet)	1A
Metal	Dissolved Zinc (Wet)	1A
TBD	Toxicity	1D
Bacteria	Indicator Bacteria	2A
Nutrients	Ammonia (Dry)	2A
HO	Diazinon	2C
Metals	Dissolved Copper (Dry)	3A
Metals	Dissolved Lead (Dry)	3A
Metals	Dissolved Zinc (Dry)	3A
Metals	Dissolved Chromium (Dry)	3A
TBD	Cyanide	3A
TBD	pH	3B
Metals	Dissolved Cadmium	3C
Metals	Dissolved Mercury	3C
Metals	Dissolved Thallium (Dry)	3C
CO	Bis (2-Ethylhexyl) phthalate	3C
TBD	Dissolved Oxygen	3C

¹ If the constituent is noted as wet or dry, then the priority is only based on wet- or dry-weather.

TBD = To Be Determined

HO = Historical Organics

CO = Current Organics

Table 2.13: Summary of Torrance Lateral Subcategorized WBPCs

Class	Constituents¹	Subcategory
Metal	Dissolved Copper (Wet)	1A
Metal	Dissolved Lead (Wet)	1A
Metal	Dissolved Zinc (Wet)	1A
Bacteria	Coliform Bacteria	2A
Metals	Dissolved Copper (Dry)	3A
Metals	Dissolved Lead (Dry)	3A
TBD	Cyanide	3A
TBD	pH	3A
Nutrients	Ammonia (Dry)	3A
Metals	Dissolved Zinc (Dry)	3C
Metals	Dissolved Cadmium	3C
HO	DDT	3C
HO	PCBs	3C

¹ If the constituent is noted as wet or dry, then the priority is only based on wet- or dry-weather.

TBD = To Be Determined

HO = Historical Organics

Table 2.14: Summary of Dominguez Channel Estuary Subcategorized WBPCs		
Class	Constituents¹	Subcategory
Metals	Cadmium (Sediment)	1A
Metals	Copper (Dissolved and Sediment)	1A
Metals	Lead (Dissolved and Sediment)	1A
Metals	Zinc (Dissolved and Sediment)	1A
HO	DDT (Sediment)	1A
HO	PCBs (Sediment)	1A
HO	Chlordane (Sediment)	1A
HO	Dieldrin (Sediment)	1A
CO	PAHs (Sediment)	1A
TBD	Benthic Community Effects	1D
TBD	Sediment Toxicity	1D
Bacteria	Coliform Bacteria	2A
Nutrients	Ammonia (Dry)	2C
Metals	Arsenic (Sediment)	3A
Metals	Chromium (Sediment)	3A
Metals	Mercury (Sediment)	3A
Metals	Silver (Sediment)	3A
Metals	Dissolved Silver (Dry)	3C
Metals	Dissolved Nickel	3C
Metals	Dissolved Mercury (Dry)	3C
Metals	Thallium (Dissolved)	3C

¹ If the constituent is noted as wet or dry, then the priority is only based on wet- or dry-weather.

TBD = To Be Determined

HO = Historical Organics

CO = Current Organics

Table 2.15: Summary of Machado Lake Subcategorized WBPCs

Class	Constituents¹	Subcategory
Trash	Trash	1A
Nutrients	Total Phosphorus	1A
Nutrients	Total Nitrogen	1A
TBD	Dissolved Oxygen	1A
Nutrients	Chlorophyll-a	1A
HO	PCBs (Sediment)	1B
HO	DDT (Sediment)	1B
HO	Chlordane (Sediment)	1B
HO	Dieldrin (Sediment)	1D
Nutrients	Ammonia	1D
Bacteria	E. coli (Dry)	3A
TBD	pH	3C

¹ If the constituent is noted as wet or dry, then the priority is only based on wet- or dry-weather.

TBD = To Be Determined

HO = Historical Organics

Table 2.16: Summary of Wilmington Drain Subcategorized WBPCs

Class	Constituents	Subcategory
Bacteria	Coliform Bacteria	2C
Metals	Dissolved Copper	2C
Metals	Dissolved Lead	2C
Nutrients	Total Nitrogen	3A
HO	DDT (Sediment)	3A
HO	Chlordane (Sediment)	3A
HO	Dieldrin (Sediment)	3A
HO	PCBs (Sediment)	3C

HO = Historical Organics

Table 2.17: Summary of Consolidated Slip Subcategorized WBPCs

Class	Constituents	Subcategory
Metals	Cadmium (Sediment)	1A
Metals	Chromium (Sediment)	1A
Metals	Copper (Sediment)	1A
Metals	Lead (Sediment)	1A
Metals	Mercury (Sediment)	1A
Metals	Zinc (Sediment)	1A
HO	DDT (Sediment)	1A
HO	PCBs (Sediment)	1A
CO	PAHs (Sediment)	1A
HO	Chlordane (Sediment)	1A
HO	Dieldrin (Sediment)	1A
HO	Toxaphene (Sediment)	1D
TBD	Benthic Community Effects	1D
TBD	Sediment Toxicity	1D
Metals	Silver (Sediment)	3A
Metals	Arsenic (Sediment)	3A
Metals	Nickel (Sediment)	3A

TBD = To Be Determined

HO = Historical Organics

CO = Current Organics

Table 2.18: Summary of Other Los Angeles Harbor Subcategorized WBPCs

Class	Constituents	Subcategory
Fish Harbor		
Metals	Copper (Sediment)	1D
Metals	Lead (Sediment)	1D
Metals	Mercury (Sediment)	1D
Metals	Zinc (Sediment)	1D
HO	DDT (Sediment & Tissue)	1D
HO	PCBs (Sediment & Tissue)	1D
HO	Chlordane (Sediment)	1D
CO	PAHs (Sediment)	1D
TBD	Sediment Toxicity	1D
Inner Cabrillo Beach		
Bacteria	Indicator Bacteria	1A
HO	DDT (Sediment & Tissue)	1D
HO	PCBs (Sediment & Tissue)	1D
Cabrillo Marina		
HO	DDT (Sediment & Tissue)	1D
HO	PCBs (Sediment & Tissue)	1D
CO	PAHs (Sediment)	1D

Table 2.18: Summary of Other Los Angeles Harbor Subcategorized WBPCs

Class	Constituents	Subcategory
Los Angeles/Long Beach Inner Harbor		
Bacteria	Indicator Bacteria	1D
Metals	Copper (Sediment)	1D
Metals	Zinc (Sediment)	1D
HO	DDT (Sediment & Tissue)	1D
HO	PCBs (Sediment & Tissue)	1D
CO	PAHs (Sediment)	1D
TBD	Benthic Community Effects	1D
TBD	Sediment Toxicity	1D
Metals	Dissolved Copper	3C
Metals	Dissolved Silver	3C
Los Angeles/Long Beach Outer Harbor		
HO	DDT (Sediment & Tissue)	1A
HO	PCBs (Sediment & Tissue)	1A
TBD	Sediment Toxicity	1D
Metals	Cadmium (Sediment)	3A
Metals	Copper (Sediment)	3A
Metals	Nickel (Sediment)	3A
Metals	Mercury (Sediment)	3C
Metals	Dissolved Copper	3C
Metals	Dissolved Silver	3C

TBD = To Be Determined

HO = Historical Organics

CO = Current Organics

Due to a lack of recent monitoring data in the Harbor and Estuary some WBPCs such as sediment toxicity and benthic community effects are classified as not showing exceedances in the past five years. The POLA and POLB are currently conducting bioaccumulation modeling and studies, fish tissue studies, and additional sediment triad studies to ascertain observed effects associated with elevated sediment concentrations of toxic compounds in the Harbor. These WBPCs can be reclassified when more recent data becomes available.

Per Part VI.C.2.a.iii (pages 51-52), pollutants for which there are exceedances of receiving water limitations, but which the water body is not identified as impaired on the 303(d) List will be addressed in the EWMP process. For most of the watershed, the most critical requirements are associated with the DC and LA Harbor Waters Toxic Pollutants TMDL as well as the Machado Lake Nutrients and Machado Lake Toxics TMDLs.

In order to address the limiting pollutant, various control measures will be implemented. The DC WMG anticipates that other water quality priorities, including those for which exceedances are observed and no impairment exists (Category 3), will be addressed through the programs used to control higher priority pollutants. Further evaluation will be included in the EWMP.

In addition to addressing the priority pollutant, the DC WMG will also comply with the requirements set forth by the MS4 Permit in regards to Category 2 and 3 pollutants. Pursuant to the MS4 Permit, Parts VI.C.2.a.ii.(5) (pages 50-51) and VI.C.2.a.iii.(2).(d) (page 52), interim and final milestones for

WBPCs identified as Category 2 or 3 in Section 2 will be established as part of the EWMP. These milestones may be established as a percent of the MS4 drainage area required to meet WQOs with dates as soon as possible and the time between dates not exceeding one year. If the dates established in the EWMP as the final compliance dates are beyond the term of the MS4 Permit there will be additional requirements as follows:

- Category 2 (WBPCs with a pollutant identified on the 303(d) list):
 - Areas that have regional EWMP projects will continue to implement control measures established in the EWMP.
 - Other areas will initiate development of a stakeholder proposed TMDL.
- Category 3 (WBPCs with a pollutant not identified in a TMDL or listed on the 303(d) list):
 - Areas that have regional EWMP projects will continue to implement control measures established in the EWMP.
 - Other areas will request that the Regional Board approve EWMP modifications to include additional WBPCs.

2.3 Source Assessment

Due to the nature of the DC WMG being fully built out, highly impervious, and highly industrial and the limited resolution of the water quality data available, the source assessment was limited to an initial first look based on land use and watershed areas according to the Los Angeles County-Wide Structural BMP Prioritization Methodology Guidance Manual (2006).

Catchment Priority Index

The catchment priorities index (CPI) is a means of ranking sub-watersheds against one another based on land use to identify the higher priority watersheds as demonstrated in Attachment C, Figure C.3. The method is based on Event Mean Concentrations (EMCs) developed for different land use types and the areal weighting of different land uses within a given subwatershed. The subwatersheds are ranked against one another to develop a CPI score for each subwatershed. The watersheds with the highest score are considered the highest priorities. The analysis was completed using the GIS platform ArcGIS. The GIS analysis was based on data developed by the City of Los Angeles and the County of Los Angeles.

The initial source assessment took into account which sub-watersheds could be contributing to downstream water quality impairments and exceedances. Priority pollutants such as metals and bacteria were weighted heavier than pollutants of less concern in the watershed. Additional weight was given to sub-watersheds potentially contributing to water body segments with TMDLs or 303(d) listed impairments for particular pollutants.

Potential Sources of Contamination

There are several potential point and nonpoint sources of contamination in the DC WMG. Point sources include stormwater and urban runoff flowing through the MS4 as well as other MS4 discharges, such as those from refineries, generating plants, port operations, and the Terminal Island Water Reclamation Plant that discharges into the Outer Harbor. MS4 outfalls are shown in Figure C.4 in Attachment C. Nonpoint sources include contaminated sediments already in receiving waters and atmospheric deposition.

Major sources of metals contamination in the Los Angeles Harbor may be attributed to the large number of vessels that utilize the facility. Copper contamination in the Harbor may be attributed to the copper containing anti-fouling paints used to protect boats and the wood preservatives used on docks and pilings.

The DC WMG also contains two Superfund Sites that are historically large contributors of organic pollutants: the Montrose Chemical Corporation Site, and the Del Amo Facility Site. The Montrose site manufactured DDT from 1947 to 1982 and the compound can still be found in the soils around the site. Stormwater runoff from this site can contain DDT from the soils. The Del Amo Facility was once the center of large-scale industrial activities such as production of synthetic rubber, a styrene plant, and a butadiene plant. Groundwater and soils in the area are contaminated with volatile organic compounds (VOCs), PAHs, and minor amounts of pesticides, PCBs, and heavy metals. The two Superfund Sites are located next to one other near the Torrance Lateral as shown in Figure C.4 in Attachment C.

Future monitoring data and results will refine the location of contamination, which in turn will refine the identification of potential sources of contamination.

2.4 Approach to Prioritization

To complete an initial prioritization of the WBPCs, pollutants were sub-categorized based on TMDL compliance schedules and exceedance frequencies as outlined in Section 2.2. Those WBPCs that have TMDLs with past due interim and/or final deadlines or with interim and/or final deadlines within the MS4 Permit term will be prioritized higher than those pollutants without TMDLs or with TMDL schedules outside the MS4 Permit term. Other receiving water considerations will include pollutants on the 303(d) list and WBPCs that show exceedances within the last 5 years. Additional prioritization and/or reprioritization may occur during development of the EWMP. The requirements for WBPCs categorized as Category 2 or 3 will be addressed through the EWMP as described above.

Future water quality monitoring conducted as part of the CIMP will further characterize and refine the locations of contamination, which will in turn refine the characterization, source identification and, potentially, prioritization.

3 Watershed Control Measures

This section summarizes the existing and potential control measures necessary as part of the Work Plan, prior to the development of the EWMP by identifying existing BMPs and MCMs utilized by the DC WMG and evaluate data regarding the performance of the existing structural (regional and distributed) BMPs, and institutional (non-structural) control measures being implemented. Potential opportunities for customization of MCMs are identified and the information required to support the modifications is also discussed.

In order to comply with EWMP requirements, an evaluation must be performed that considers opportunities within the participating Permittees jurisdictions to utilize multi-benefit regional projects that, when feasible, detain non-stormwater discharge and the flows produced by the 85th percentile, 24-hour storm event. A review of relevant TMDL implementation plans and watershed management plans was performed to identify previously identified regional projects within the DC WMG. These projects are then evaluated to identify if they meet the regional EWMP project criteria. In addition, an approach was developed that may be utilized to evaluate additional potential regional project sites.

3.1 Structural BMPs

In order to address the identified impairment priorities within a watershed, structural BMPs will be utilized. Structural BMPs are constructed control measures which are made up of both Regional and Distributed BMPs. Structural BMPs are used to improve water quality, eliminate impairments and achieve receiving water beneficial uses. Generally, regional BMPs are installed on large public parcels or adjacent storm drain outfalls and receiving waters. Some examples of regional BMPs include the following:

- Infiltration Basins
- Detention Basins
- Constructed Wetlands
- Treatment Facility
- Low Flow Diversion

Generally, distributed BMPs are installed and constructed during the development/redevelopment process or at construction sites as part of the various MCM programs required by the MS4 Permit and discussed in greater detail in Section 3.2. Distributed BMPs are implemented at the street-scale level for parcels typically less than ten acres. The following list includes common distributed BMPs that can be implemented at the parcel level:

- Site Scale Detention (Dry/Wet Detention Ponds, Detention Chambers)
- Biofiltration
- Bioretention
- Porous/Permeable Pavers
- Green Streets
- Bioswales/Buffer Strips
- Rainfall Harvesting (Green Roofs, Rain Barrels & Cisterns)
- Catch Basin Inserts/Screens
- Hydrodynamic Separators
- Gross Solids Removal Devices (GSRDs)
- Media Filters

A variety of potential structural BMPs are discussed in greater detail, however, surface soils within the DC WMG are not conducive to infiltration, therefore some of the identified BMPs may not be feasible, but are included in the discussion in case they become more relevant in the future.

3.1.1 Categories of Structural BMPs

As previously discussed, structural BMPs are constructed control measures that include both regional and distributed. Table 3.1 illustrates the categories and subcategories of structural BMPs, followed by a detailed discussion of commonly implemented structural BMPs. Different types of regional and distributed BMPs are detailed in Attachment F that fall within the categories listed below.

Table 3.1: Categories and Subcategories of Structural BMPs Within DC WMG		
Category	Subcategory	Example BMP Types
Regional	Infiltration	Surface infiltration basin, subsurface infiltration gallery
	Detention	Surface detention basin, subsurface detention gallery
	Constructed Wetland	Constructed wetland, flow-through/linear wetland
	Treatment Facilities	Facilities designed to treat runoff from and return it to the receiving water
	Low Flow Diversions	BMPs that divert runoff to the sanitary sewer (normally dry weather only)
Distributed	Site-Scale Detention	Dry detention pond, wet detention pond, detention chambers, etc.
	Green Infrastructure	Biofiltration includes vegetated BMPs <u>with</u> underdrains
		Bioretention includes vegetated BMPs <u>without</u> underdrains
		Permeable pavement
		Green streets (often an aggregate of bioretention, biofiltration and/or permeable pavement)
		Infiltration BMPs include non-vegetated dry wells, infiltration trenches, etc.
		Bioswales include vegetative filter strip and vegetative swales
	Rainfall harvest (rain barrels, green roofs and cisterns)	
	Flow-through Treatment BMPs	Treatment BMPs with a minor (or non-existent) infiltration component, often modular/vault-type BMPs including cartridge media filters
Source Control Structural BMPs	Catch basin inserts, screens, hydrodynamic separators, trash enclosures, etc.	

3.1.2 Summary of Existing Structural BMPs

To compile information on existing control measures, including MCMs and BMP programs already in effect for each of the participating Permittees in the EWMP, information was extrapolated from the following available sources:

- Los Angeles County Unified Annual Stormwater Report for Fiscal Years 2010-2011 and 2011-2012
 - Summary of MCMs for the Dominguez Channel Watershed
 - Summary of BMPs Installed and Maintained for the Dominguez Channel Watershed
 - Individual Annual Reports for each of the participating Permittees
- Standard Urban Stormwater Mitigation Plans (SUSMP) and LID projects in DC WMG
- City of Los Angeles Green Infrastructure Project List
- Proposition O Project Website (www.lapropo.org)
- Opti Website (<http://irwm.rmcwater.com/la/login.php>)

The Los Angeles County Unified Annual Stormwater Report for Fiscal Years 2010-2011 and 2011-2012 has been used to create tables identifying the existing structural BMPs installed and maintained by the DC WMG and is included as Attachment G. The information provided by the DC WMG has been incorporated into the tables. Information pertaining to the existing MCMs implemented by the DC WMG are discussed in Section 3.2, and tables created based on the Unified Annual Stormwater Reports for Fiscal Years 2010-2011 and 2011-2012 can be found in Attachment I.

The SUSMP and LID project listings provided by the DC WMG have been used to map the existing distributed BMPs located in Attachment E, Figure E.1. The figure only includes the BMPs for which an address or global positioning system (GPS) coordinates was provided. It is assumed that the SUSMP and LID BMPs were also reported as part of the annual reports. A detailed list of the SUSMP and LID BMPs is provided in Attachment G.

BMPs, including regional BMP projects, implemented prior to the baseline pollutant loads being used for the RAA calibration (2012) are considered part of the baseline. BMPs, including regional projects, that were implemented after the baseline pollutant loads, can be modeled in the RAA in order to demonstrate a load reduction. A few regional projects have been implemented in the DC WMG utilizing Proposition O funding. These projects were evaluated to verify if they meet EWMP criteria. If the project does satisfy EWMP criteria, the area tributary to the project would be deemed compliant based on the MS4 Permit. The regional projects that do not satisfy EWMP criteria will be evaluated to quantify the load reduction that would be associated with project implementation so that it could be modeled in the RAA. The Lake Machado Water Quality Improvements Project and the Rosecrans Recreation Center Stormwater Enhancements Project were constructed following the pollutant load baseline determination and are evaluated below based on EWMP project criteria.

Lake Machado Water Quality Improvements, including Wilmington Drain (Phase 1 of 2)

Specific drivers for the Machado Lake Ecosystem Rehabilitation and Wilmington Drain Multi-Use projects are to improve water quality, meet adopted and future TMDLs, enhance riparian, wetland, and upland habitat, improve hydrologic and hydraulic conditions, and create and restore recreational amenities (City of Los Angeles, 2009). The project received its Notice to Proceed in May 2013, broke ground on March 22, 2014, and has an anticipated completion date in April 2016 (Prop O, 2014). The Wilmington Drain is a channelized stream that conveys urban runoff and stormwater flows to Machado Lake. The Wilmington Drain feeds more than half of the water that flows into Machado Lake from its 15,553 acre watershed. A majority of the Machado Lake

and Wilmington Drain improvements involve enhancing the habitat and incorporating BMPs that will help with treatment components. The area will utilize bioswales in the parking areas, incorporate smart irrigation systems, install trash netting systems, include the use of biofilters and similar vegetated BMPs, and improve the pedestrian trail system (Measure O). This project has been jointly funded by the City of Los Angeles and the LACFCD. This project will provide water quality benefits and will be evaluated to verify whether the project will satisfy the EWMP requirements outlined in the Permit. The project incorporates numerous distributed BMPs that will reduce the amount of flow reaching downstream receiving waters, but the main intention of the project is to provide treatment.

Rosecrans Recreation Center Stormwater Enhancements

The Rosecrans Recreation Center Stormwater Enhancement project was completed in October 2013. The project achieved some of the goals outlined in the 2013 IRWMP and included the installation of smart irrigation systems, bioswales in parking lots, permeable parking lots, vegetated retention basins, infiltration cisterns/irrigation cisterns, a synthetic soccer field, landscaped areas, and decomposed granite pathways. The project treats a tributary watershed of 12.73 acres made up of mostly the park and some surrounding residential areas (CDM Rosecrans Recreation Center, 2006). This project incorporates water capture and use of stormwater. Further investigation will be needed to establish if the project meets the EWMP criteria of retaining flows from the 85th percentile, 24-hour storm event.

3.1.3 Planned Structural BMPs

To identify regional projects, the following existing implementation plans and watershed management plans were reviewed that may satisfy the EWMP criteria, as specified in Part VI.C.1.g (pages 48-49) of the MS4 Permit:

- 2013 Public Draft Update for the Greater Los Angeles County (GLAC) Integrated Regional Water Management Plan (IRWMP);
- 2013 Proposition O (Clean Water Bond Program) October Monthly Report;
- 2012 GLAC IRWMP Update, the Greater Los Angeles County Open Space for Habitat and Recreation;
- 2012 GLAC IRWM South Bay Subregional Plan;
- 2011 Multi-pollutant TMDL Implementation Plan for the County of Los Angeles Unincorporated Area of Machado Lake Watershed;
- 2004 Dominguez Watershed Management Master Plan (DWMMP);
- 2003 Dry-Weather Discharge Treatment Feasibility Study submitted by the County of Los Angeles Department of Public Works Watershed Management Division;
- Opti, part of the GLAC IRWMP online project database; and
- Los Angeles County Clean Water, Clean Beaches online project database.

The TMDL Implementation Plans developed by DC WMG were also reviewed in an effort to identify planned projects, and may be assessed during the EWMP development process to evaluate if they satisfy EWMP criteria for regional projects and represent feasible implementation options. These projects are included in Attachment E, Figure E.2. Some of the references include broad plans outlining the steps necessary towards improving water quality and recommending different BMPs under different conditions. These documents provided conceptual scenarios without going into great detail. Some of the potential regional BMP projects identified in older references have since been built or are in construction. In addition, valuable information was obtained from Opti and the Los Angeles Clean Water, Clean Beaches online project databases. The data reviewed included no information regarding planned distributed BMP projects. A majority of distributed projects are in response to LID/SUSMP requirements, therefore executed by private developers and not included in public agency planning documents.

TMDL Implementation Plans

Implementation plans often detail activities, costs, anticipated outcomes, and schedules that are required to achieve the objectives of strategic plans such as TMDLs. There are two types of implementation plans, one that is produced by the regulator during the TMDL development process and one that is produced by the parties responsible for TMDL implementation. In more recently approved TMDLs, responsible parties are required to develop implementation plans. The existing implementation plans developed by DC WMG members were reviewed and summarized below. Moving forward the EWMP will provide an implementation plan that addresses the various TMDLs.

Los Angeles Harbor Bacteria TMDL

In a letter dated December 24, 2012, the City of Los Angeles Submitted a request to the Regional Board for a Time Schedule Order (TSO) for CB01, the compliance monitoring site at Inner Cabrillo Beach, as described in Attachment B. Pursuant to the TSO, POLA and the City of Los Angeles Department of Public Works Bureau of Sanitation Watershed Protection Division developed a Pollution Prevention Plan (PPP) Work Plan focused on addressing exceedances at CB01 and submitted it to the Regional Board on April 7, 2014.

The PPP includes a source assessment and details other investigations that were performed in order to better understand the bacteria problem in the Harbor. A list of pollution prevention activities, including remedial actions, BMPs, and special studies, was provided in the plan with estimated dates of implementation. Some of the future activities include, but are not limited to, additional observations, evaluating the effectiveness of existing pet waste bag stations near the harbor, repairing fence breaches along Cabrillo Marsh, evaluating the potential for animal screens at the MS4 outfalls and catch basins near the boat ramp, provide additional education and training to people working near the harbor, minimize over-irrigation, and evaluate the feasibility of a low flow diversion system.

Machado Lake Nutrient TMDL

The Machado Lake Nutrient TMDL implements load allocations through Memorandum of Agreements (MOAs) or cleanup and abatement orders. The responsible parties for the load allocations were required to enter into a MOA within six months of the TMDL effective date. The MOA was to include the development of a Lake Water Quality Management Plan (LWQMP). If the MOA and LWQMP do not result in attainment of load allocations, the MOA will be revoked and load allocations must be implemented through a cleanup and abatement order.

The City of Los Angeles entered into an MOA with the Regional Board on April 7, 2010, and a LWQMP was submitted on September 10, 2010 and approved on February 14, 2011. The LWQMP includes an Implementation Plan section which discusses the specific BMPs that will be constructed by the City of Los Angeles within the Wilmington Drain and in Machado Lake that will help meet Machado Lake Nutrient TMDL loads. The Lake Machado Water Quality Improvements project was discussed in detail, some of which is also described above. A variety of strategies for meeting load allocations are identified in the LWQMP, including strategies that would be implemented both in-lake and adjacent to it. The strategies include, but are not limited to, construction of an off-line treatment wetland, implementation of aquatic plant management, re-grading of the Wilmington Drain, installation of trash nets, modifications to the dam operation, and the construction of a park on the west side of Wilmington Drain.

The Multipollutant TMDL Implementation Plan for the County of Los Angeles Unincorporated Area of the Machado Lake Watershed was submitted to the Regional Board September 12, 2011 and covers the implementation for both the Machado Lake Nutrient TMDL and Pesticides and PCBs TMDL. This implementation plan is very detailed and identifies the existing structural and non-

structural BMPs and describes new or enhanced opportunities. Specific project concepts were identified and described in detail.

The Machado Lake Nutrient TMDL Implementation Plan for the LACFCD (LACFCD, 2013) was submitted to the Regional Board in October 2013 and documents the LACFCD effort to address the Machado Lake Nutrient and Pesticides and PCBs TMDL. The implementation plan identifies the Wilmington Drain project that is currently in construction and has an anticipated completion date of 2016.

Machado Lake Pesticides and PCBs TMDL

Compliance with the Machado Lake Pesticides and PCBs TMDL is assessed the same way the Machado Lake Trash TMDL is assessed. The City of Los Angeles amended their MOA that was previously approved for the Machado Lake Nutrients TMDL on March 20, 2013. The LWQMP associated with the MOA has been previously summarized in the Machado Lake Nutrients TMDL section above. The Multi-Pollutant TMDL Implementation Plan for the County of Los Angeles Unincorporated County covers the implementation for Machado Lake Nutrient TMDL and Pesticides and PCBs TMDL as previously discussed. The LACFCD's Implementation Plan covers the implementation of for the Nutrients TMDL and the Pesticides and PCBs TMDL.

3.1.4 Approach to Identifying and Selecting Multi-Benefit Regional Projects (EWMP Projects)

The below approach will be utilized to identify, screen, and evaluate potential regional projects. This approach includes a watershed based assessment of publicly-owned and private properties containing sufficient open space (e.g. large parking lots) and other conditions that would be suitable to support a regional stormwater enhancement project. The approach also evaluates opportunities for incorporation of multi-use features at candidate locations. The approach can be utilized to identify potential projects that could either be classified as regional BMP or EWMP projects. Regional EWMP projects are regional BMP projects that satisfy the EWMP project criteria, whereas regional BMPs are those stormwater enhancement projects that do not meet EWMP criteria based on a project specific analyses, but still contribute to water quality benefits.

The approach to identifying potential regional projects is illustrated in Figure 3.1. Watershed based GIS maps will be used in conjunction with imagery and field analysis to support the process through the collection and management of spatial data.

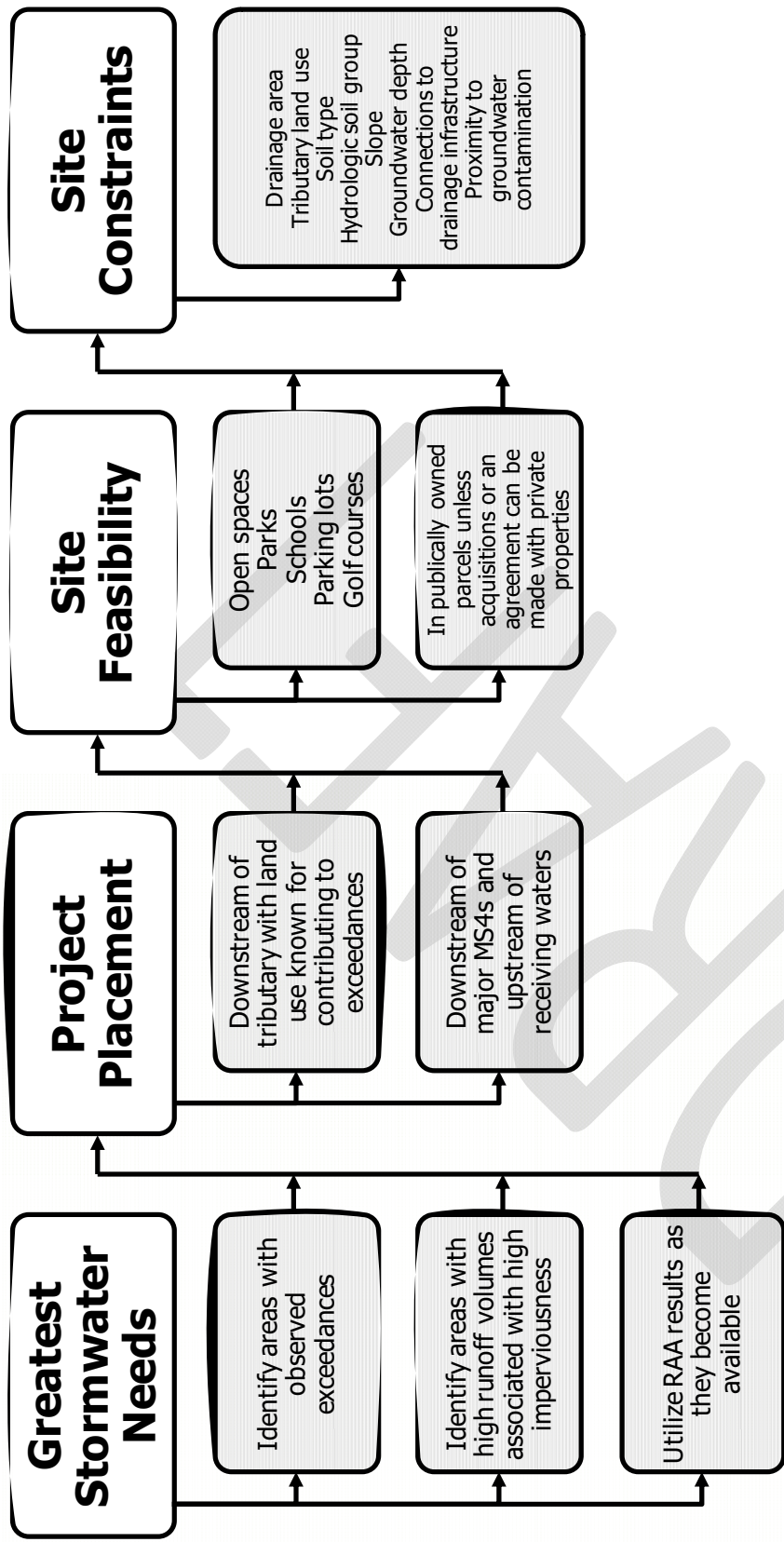


Figure 3.1. Approach to Identifying Potential Regional Projects

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A centralized GIS data integration and communication system will be used to encourage stakeholder participation and support planning efforts. This system can be used as a precursor to analytical modeling. Key drivers behind the development of a GIS decision support tool are to enable stakeholders to identify potential sites for specific BMPs suitable for a particular location, and to support the integration of multi-criteria analysis approach to support wider considerations such as potential multi-use benefits involved in urban planning and decision processes.

The last step before finalizing a regional BMP project site would be to perform a feasibility study to evaluate whether the proposed project site would be effective. In most cases, a project site can be modified to accommodate poor site conditions, but in some cases the costs outweigh the benefits and the feasibility study should identify these sites. Feasibility reports will also provide an initial cost estimate and the cost per volume of flows mitigated could be used as a basis to compare different regional BMP projects.

Once a project site is established as feasible, the potential projects will be evaluated to prioritize projects. Based on the process outlined in Figure 3.1, an initial long list of potential projects will be narrowed down. Next, the projects will be evaluated based on a smaller list of criteria, as summarized in Table 3.2.

A generic worksheet was developed and is provided in Attachment J, which may be utilized throughout the process. A scoring system for each of the identified criteria will be developed prior to using this process. Each potential project can be evaluated based on these criteria, and a score can be assigned to each subcategory. The summation of the subcategory scores can then be used as a basis to compare various regional projects. This approach may easily be modified by the DC WMG by developing a weight for each of the ranking criteria, allowing specific criteria to play a more significant role in determining regional BMP projects. Using this method, the score developed will be multiplied by the respective ranking criteria weight and then the scores will be summed to establish the most beneficial projects.

Table 3.2: Potential Regional Projects Ranking Criteria	
Ranking Criteria	
General Criteria	
	Proximity to receiving water/MS4 infrastructure
	Ownership
	Size of opportunity site
	Size of catchment area
	Catchment area land use and likely pollutants
	Multi-use opportunities and connectivity
Underlying Soil Conditions	
	Seasonal high groundwater table depth
	Proximity to groundwater production wells
	Pollutants in soil or groundwater
	Geotechnical hazards
	Soil type
	Infiltration rates

3.1.5 Approach to Identifying Additional Distributed BMPs

Opportunities for additional distributed BMPs may exist at sites that do not fall under SUSMP, LID, or green streets policies. These sites should be further evaluated in order to evaluate if water quality improvements could be incorporated at a relatively low cost. For example, road

resurfacing often includes a grind and overlay back to existing grade, therefore SUSMP/LID and green streets may not be applicable. Since construction is occurring, the site could potentially be retrofitted to include distributed BMPs if feasible and if the location is in a high priority area. Distributed BMPs also may be incorporated through the stakeholder process, allowing the stakeholders to provide input on additional distributed BMP locations and types.

3.2 MCMs/Institutional BMPs

MS4 Permit Part VI.C.5.b.iv.(1) (pages 61-62) directs that the MCMs identified in Parts VI.D.4 to VI.D.10 (pages 70-141) be incorporated as part of the EWMP. The placement of this reference section within the EWMP portion of the permit (Part VI.C, pages 47-67) allows the MCMs in the subsequent section (VI.D, pages 67-141) to be assessed for potential effectiveness and even modified to emphasize the pollution control priorities identified within the EWMP Plan. Part VI.C.5.b.iv.(1).(c) (page 62) explicitly allows some MCM sections to be deleted, and wholly replaced, when accompanied by appropriate justification. The Planning and Land Development Program, is not identified as an MCM that must be evaluated for potential modifications or elimination. The general MCMs categories identified in Part VI.D (pages 67-141) of the MS4 Permit are listed below. Some of the MCM categories are also applicable to the LACFCD, as identified indicated with an asterisk (*).

1. Public Information and Participation Program (PIPP) (Part VI.D.5, pages 86-88)*
2. Industrial/Commercial Facilities Program (Part VI.D.6, pages 88-94)*
3. Planning and Land Development Program (Part VI.D.7, pages 94-113)
4. Development and Construction Program (Part VI.D.8, pages 113-130)
5. Public Agency Activities Program (Part VI.D.9, pages 130-137)*
6. Illicit Connections and Illicit Discharges (IC/ID) Detection and Elimination Program (Part VI.D.10, pages 137-141)*

The 2012 MS4 Permit (VI.D.1.b.ii, page 68) requires that the MCM programs, as specified in the 2001 MS4 Permit, continue to be implemented until the EWMP is approved by the Regional Board. The same six categories listed above were to be implemented under the 2001 MS4 Permit, with the 2012 MS4 Permit having more stringent requirements, some of which are listed below. Attachment H provides a detailed comparison of the program requirements of the 2001 MS4 Permit and the current 2012 MS4 Permit.

- New requirements for erosion and sediment control procedures, especially for sites less than one acre, and for Erosion and Sediment Control Plans;
- Additional tracking requirements as part of the Industrial/Commercial Facilities Program; and
- Extensive new requirements for LID and hydromodification controls as part of the Planning and Land Development Program.

MCMs are considered a subset of institutional BMPs (City of Los Angeles, 2013). Institutional BMPs are non-constructed control measures that prevent the release of flow/pollutants or transport of pollutants within the MS4 area (City of Los Angeles, 2013). Institutional BMPs include:

- Irrigation control
- Brake pad replacement
- Replacement of lead in wheel weights
- Street sweeping
- Catch basin cleaning
- Downspout disconnect program

3.2.1 Summary of Existing MCMs/Institutional BMPs

The existing MCMs/institutional BMPs within the DC WMG were evaluated and summarized based on the Los Angeles County Unified Annual Stormwater Reports for the Fiscal Years 2010-2011 and 2011-2012. Tables summarizing the existing MCMs/Institutional BMPs by DC WMG are presented in Attachment I.

3.2.2 Potential Approaches to Modifying MCMs/Institutional BMPs

In order for the DC WMG to identify potential MCM/institutional BMP modifications, it is essential to first evaluate the effectiveness of the existing programs. Once the baseline effectiveness is established, it can be used as a basis to compare with the potential MCM modification. A response to a comment made by the Los Angeles Permit Group regarding the MS4 Permit MCM program stated that "the criterion to allow customization is based on showing equivalent effectiveness" (LARWQCB, 2012). Once the effectiveness is assessed, customization alternatives may be evaluated to assess if they would be equally effective. Potential modifications to MCM programs are being considered, as they may provide load reductions and bring the DC WMG closer to the achievement of WQOs. Alternatively, if MCMs are not modified, implementation of structural controls will be required. This section identifies a program effectiveness assessment strategy, assessment measures, and assesses the effectiveness of the existing MCMs in order to identify potential MCM/institutional BMP modifications.

Program Effectiveness Assessment Strategy

The stormwater management program is comprised of the MCMs discussed in Section 3.2.1 which are implemented with the intent of reducing pollutants in urban and stormwater discharges. MCM implementation programs are an iterative process and the MS4 Permit has recognized this. Part VI.D.1.a (page 67) of the MS4 Permit states that Permittees may implement the programs described in the MS4 Permit, or may customize them as set forth in an approved EWMP or WMP. Assessing the existing MCM implementation, as well as the MS4 Permit requirements, will assist in identifying potential additional or modified actions that might further the MCMs objectives and water quality protection outcomes.



Figure 3.2. CASQA Classification of Outcome Levels

Water quality protection outcomes are the result of an activity, program element, or the overall program and have been characterized by the California Stormwater Quality Association (CASQA) in terms of six levels. Figure 3.2 shows these levels as a progression from activity-based to water quality based outcomes and illustrates the successive steps toward the ultimate goal of achieving and protecting receiving water quality. Levels 1 to 3 are considered to be implementation based outcomes, level 4 marks a transition from implementation to water quality based outcomes, and levels 5 and 6 emphasize water quality outcomes. Each level has a different value and emphasis in informing the regional management process and levels, or activities, are not always equally important, necessary, or even possible in every instance (CASQA, 2007).

Assessment Measures

Assessment measures can be categorized many different ways. In this EWMP Work Plan, two categories are recognized, one related to the short term confirmation of BMP implementation and the other to long term verification of environmental improvement. In essence, the categorization of measures reflects two basic assessment questions:

- Are program elements being implemented correctly?
- Are environmental improvements being realized?

Programmatic and environmental indicators are categorized by the USEPA as having a hierarchical relationship as shown in Figure 3.3. This relationship further illustrates the fact that environmental outcomes rest on, or follow from, jurisdictional program implementation. Moreover, it recognizes that scientifically robust evidence of change in water quality indicators will follow ongoing program implementation and should not be attempted concurrently.

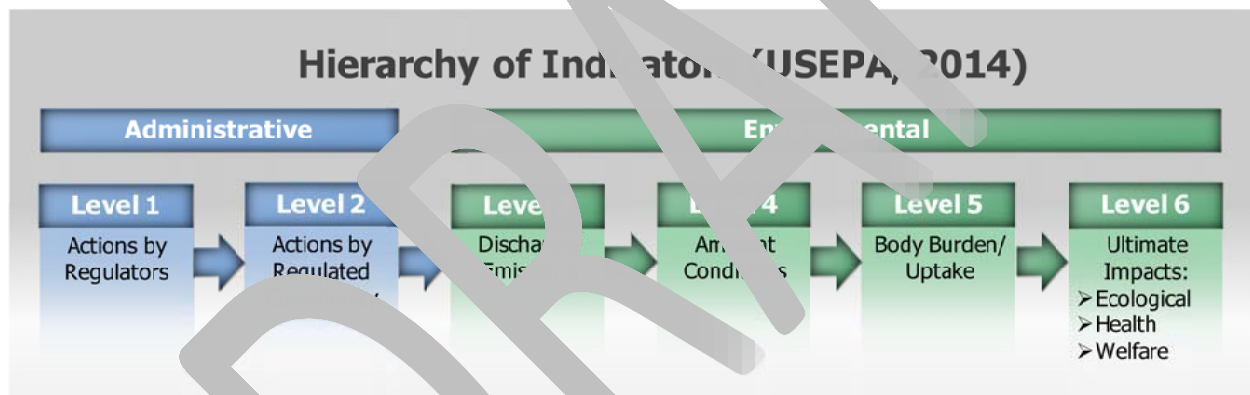


Figure 3.3. Hierarchy of Indicators

Key attributes of BMP and water quality assessment include:

- Measurability (statistically and repetitively measurable);
- Relevance (significant, demonstrable relationship to strategy and objectives);
- Reliability (easily documented and reproducible);
- Availability (based upon data obtainable at reasonable cost);
- Scientific validity (based on sound science); and
- Replicability (capable of being regularly assessed to develop trends).

Effectiveness Assessment

Assessing program effectiveness is a challenge for MS4 program managers across California, and the DC WMG appreciate and acknowledge the effort of CASQA to develop and publish the Municipal Stormwater Program Effectiveness Assessment Guidance (CASQA, 2007). During the

EWMP development process, DC WMG will attempt to follow these guidelines in assessing the MCMs in order to satisfy the requirements of the MS4 Permit and reduce the discharge of pollutants from the MS4. While program effectiveness assessment is a key step in the iterative adaptive process of program implementation, it is also part of the evolving management process. Section 3.2.2.1 provides potential MCM modifications that will require further evaluation during the EWMP development process.

3.2.2.1 Potential MCM/Institutional BMP Modifications

The approach described in this section will be utilized during the EWMP development process to evaluate if modifications to MCMs/institutional BMPs would be beneficial. Table 3.3 identifies potential modifications that may be considered by DC WMG. If modifications are desirable, special studies, analyses, and literature reviews will be conducted to establish the associated load reduction so it can be incorporated into the RAA.

Table 3.3: Summary of Potential Non-Structural BMP Enhancements	
Potential Modification or Enhancement	Justification
Public Information and Participation Program (PIPP)	
Develop a Grassroots Committee. ¹	Community leaders may have stronger community connections, thus a better platform to provide educational and outreach materials.
Industrial/Commercial Facilities Program	
Evaluate operations of industrial facilities inspected to verify whether their operations are subject to Industrial General Permit (IGP). ¹	Identifying activities at industrial/commercial facilities where the SIC code does not require coverage under IGP will require facilities to get coverage and comply with requirements in IGP.
Development and Construction Program	
Recommend monitoring and sampling as part of the Erosion and Sediment Control Plan requirements.	Conducting monitoring, sampling, and inspections will give the DC WMG more presence at construction sites which will most likely result in more thorough BMP implementation by developers and contractors.
Inspect construction sites where Erosion and Sediment Control Plans have been approved.	
Public Agency Activities Program	
More frequent street sweeping, especially in areas that lack full capture certified trash control devices.	Implementing a more vigorous street sweeping schedule will allow debris to be captured before they can be transported downstream.
Utilize street sweeping using the regenerative air vacuum equipment in land use areas that generate high metals loads. ²	Vacuum street cleaners would be more effective at removing metals compared to sweepers.
Set maximum street sweeper speeds to optimize effectiveness in removing trash, debris, and sediments. ²	Traveling at speeds recommended by street sweeping manufacturers will improve the sweeping effectiveness at removing pollutants.
Sweeping center median gutters, and "pork chop" islands at street intersections.	Sweeping areas that are not normally swept may capture additional pollutants.
Revise curb miles cleaned as an indicator to volume of trash collected.	Volume of trash collected provides a better indication of the program effectiveness.
Enhanced maintenance of catch basins, especially those with connector pipe screens. ¹	Enhanced maintenance will prevent sediments and debris from accumulating and traveling downstream.

Table 3.3: Summary of Potential Non-Structural BMP Enhancements	
Potential Modification or Enhancement	Justification
Illicit Discharge/Illicit Connection (IC/ID) Program	
Municipal Codes that include enforcement action such as the issuance of Notice of Violations (NOVs) for illicit connections. ¹	Utilizing violations will give the DC WMG a greater presence and the threat of a penalty may have a greater influence over developers and others.
Municipal Codes that require follow up inspections within ten days for illicit connections. ¹	Implementing a time schedule for follow up inspections will ensure that the cleanup is completed in a timely manner.
Abatement and cleanup required within one day of discovery.	Current procedures allow for up to 72 hours, therefore a quicker response will positively correlate to a lower load contribution.
Other Institutional BMPs	
Enhanced Irrigation Control	
Promote replacement of grass with xeriscape vegetation.	Installing artificial turf and/or drought tolerant plants, or installing weather based irrigation controllers, will conserve water and reduce runoff associated with irrigation which is often the source of dry-weather flows, which are often the most concentrated with pollutants.
Promote replacement of grass with drought tolerant native plant species.	
Outreach the focuses on the installation of weather based irrigation controllers.	
Perform landscape irrigation audits.	
Implement water budgets.	
Inform residents on other types of BMPs or irrigation equipment that may be utilized.	Actions that require residents to become aware of their water usage as well as limiting it may reduce the amount of irrigation occurring, thus reducing runoff due to excess irrigation.
Downspout Disconnection Program	
Implement a second phase of the downspout disconnect program.	Implementing a downspout disconnect program will promote water conservation and reuse, by capturing stormwater runoff for irrigation use, thus reducing the volume of water reaching the storm drain system.
Expand the downspout disconnect program to include additional area within DC WMG.	

¹ Potential modification applicable to LACFCD.

² Applicable to LACFCD's parking lot sweeping.

3.2.3 Potential Approaches to Additional Non-Stormwater Discharge Control Measures

Non-stormwater discharge is often the most polluted, as it is highly concentrated from an activity that generally consists of washing down something or over irrigating. In an attempt to capture what is referred to as the "first flush", water quality requirements often include the mitigation of the 85th percentile, 24-hour storm event or the 0.75-inch storm event, such as regional EWMP projects and SUSMP/LID projects. MCMs and other institutional BMPs are in place in an attempt to reduce non-stormwater discharges as well. One source of non-stormwater discharge that is not addressed through the MCMs and other institutional BMPs are exempt non-stormwater discharges as specified in Part III of the MS4 Permit.

In order to evaluate effective non-stormwater discharge control measures, in addition to those already required and proposed, research and analysis will be performed. The DC WMG may want to implement additional non-stormwater discharge control measures if a load reduction is anticipated at a relatively low cost. In order to identify these control measures, the DC WMG will compile a list of exempt non-stormwater discharges that occur in their jurisdiction or impact the

receiving waters relevant to the group. Exempt non-stormwater discharges often include non-emergency firefighting activities, discharges from drinking water supplies, dewatering of lakes, landscape irrigation, swimming pool discharges, decorative fountain dewatering, car washes, and street/sidewalk washing per Part III.2 of the MS4 Permit.

Through a literature review, it may be possible to identify the anticipated pollutant loads due to the typical exempt non-stormwater discharge activity. Through analysis, possible connections between exempt non-stormwater discharge activities and downstream water quality priorities will be identified. If connections are made, then potential control measures may help reduce pollutant loading. Based on the water quality priorities identified in Section 2 locations affected by exempt non-stormwater discharges can be prioritized.

Based on the developed prioritization, additional research and literature reviews can be used to estimate the anticipated pollutant reductions due to different control measure scenarios. The MS4 Permit requires specific BMPs be in place depending on the exempt activities, as well as specifying other conditions that must be met, thus the additional control measures will be in addition to those required. Ideas for additional control measures to control exempt non-stormwater discharges can be discussed with the stakeholders through the stakeholder process. Further evaluation will be completed and incorporated into the EWMP.

3.3 Summary of BMP Performance Data

To summarize performance data of structural (regional and distributed), and institutional (non-structural) control measures for reducing stormwater and non-stormwater flows and priority pollutants, the following sources were reviewed and performance data was compiled:

- CASQA Development and Municipal BMP Handbooks
- California Department of Transportation (Caltrans) BMP Retrofit Pilot Program Report
- Center for Watershed Protection's National Pollutant Removal Performance Database Vers. 3
- Priority A and B Catch Basin Cleanout Data

Tables summarizing the BMP performance data can be found in Attachment K. The table associated with the CASQA Development and Municipal BMPs handbook provides a general summary of BMP performance within Southern California, while the tables associated with the other sources provides site specific performance data based on site specific testing.

4 Reasonable Assurance Analysis Approach

The RAA is a required under the MS4 Permit, Part VI.C.5.b.iv.(5) (pages 63-64).

The purpose of the RAA is to demonstrate that the implementation scenarios proposed in the EWMP will meet the MS4 Permit effluent and receiving water limits for the priority pollutants of concern identified in Section 2. The WQOs are specified in the TMDLs and included in Attachment B, along with other MS4 Permit limitations for each WBPC addressed in the EWMP. The identification and numeric expression of these other limitations are not addressed explicitly in this section but will be included in the EWMP and evaluated as part of the final RAA. The limiting pollutant used to control the implementation efforts of the DC WMG will meet the following criteria:

- Relatively high priority with respect to meeting TMDL WLAs and/or other WQOs;
- Conservative with respect to attenuation during fate and transport modeling; and
- Require the greatest amount of volumetric control to achieve TMDL WLAs and other objectives.

The approach below will be used to evaluate proposed enhancements to MCMs and structural BMPs, as identified in Section 3. The output from the RAA will provide guidance on the types of MCMs and BMPs to be implemented. It will also provide guidance on the location, types, and sizing needs of the required BMPs, as well as the estimated cost and schedule for BMP implementation. Areas tributary to a regional EWMP project, will not be included in the RAA, as they will be considered compliant based on the MS4 Permit. The following sections discuss the modeling software to be used, provide an overview of the RAA process, include details on the modeling approach, and discuss the RAA output format.

The RAA approach was developed with the intent of being in accordance with the MS4 Permit requirements, expectations expressed by the Regional Board MS4 Permit and TMDL modeling staff via the Regional Board developed RAA guidelines, and previously approved TMDL Implementation Plans.

4.1 Modeling System

The Regional Board has developed guidelines for conducting the RAA throughout Los Angeles County. The models approved for developing a BMP stormwater management system are listed in Table 3-1 of the RAA Guidelines (LARWQCB, 2014) and were selected based on the following model capabilities:

1. Provides dynamic continuous long-term simulation for modeling pollutant loadings, flows, and concentrations in receiving water from land uses within a watershed system;
2. Represents rainfall, runoff, and groundwater processes in urban and natural watershed systems;
3. Demonstrate variability in pollutant loadings based on land use, soil hydrologic group, and watershed slope;
4. Includes a BMP process based approach or empirically based BMP approach; and
5. Provides decision support to evaluate BMP performance.

The RAA guidelines indicate that Permittees are allowed to select a combination of the models for land/watershed, receiving water, and BMP performance, or select one of the modeling systems from integrated BMP modeling systems. The RAA for the DC WMG will be conducted using the two integrated BMP modeling systems, Watershed Management Modeling System (WMMS) and Structural BMP Prioritization and Analysis Tool (SBPAT). Both models will be used to take advantage of different analytical strengths to provide an effective analysis.

The modeling capabilities of both regional models are provided in Table 4.1 and model details are illustrated in Figure 4.1.

Table 4.1: Summary of Model Capabilities		
Model Capability	WMMS	SBPAT
Continuous Hydrologic Model	Y	Y
Models Pollutant Loading in the Watershed	Y	Y
Models Distributed BMPs	Y	Y
Models Regional BMPs	Y	Y
Provides Water Quality Benefit from BMP Implementation	Y	Y
Provides Cost Estimate for Management Plan	Y	Y
Ease of Use	Easy	Moderate
Provides Specific Locations for BMP Siting	N	Y
Automatically Determines BMP Needs Estimate	Y	N
Allows User to Modify Input Data Sets	Minimal	Y

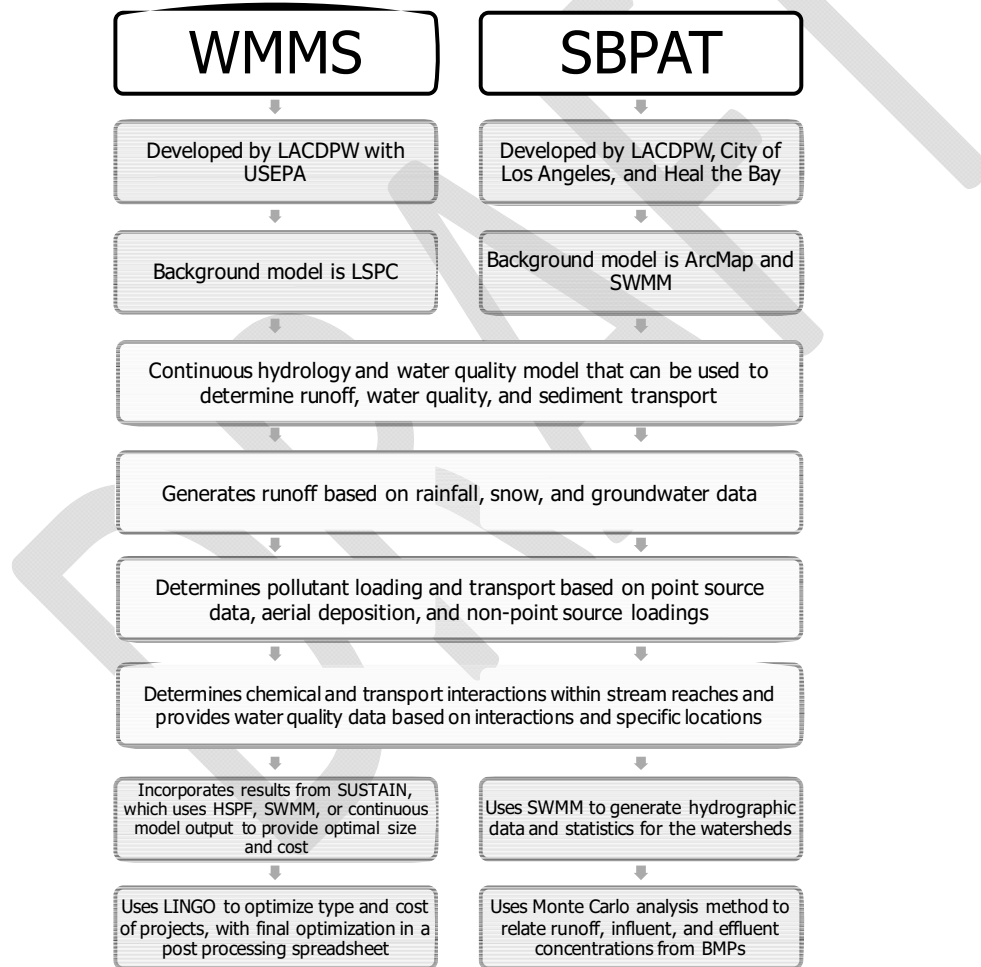


Figure 4.1. Overview of WMMS and SBPAT

LSPC = Loading Simulation Program in C++; SWMM = Storm Water Management Model; SUSTAIN = System for Urban Stormwater Treatment and Analysis INtegration; and HSPF = Hydrologic Simulation Program - FORTRAN.

4.2 RAA Process Overview

The RAA for the DC WMG EWMP will evaluate wet-weather pollutant loads using WMMS and SBPAT, and conduct analyses for dry-weather and legacy pollutants. Meeting MS4 Permit WLAs will require achieving control of the limiting pollutant. For most of the watershed, the most critical requirements are associated with the DC and LA Harbor Waters Toxic Pollutants TMDL as well as the Machado Lake Nutrients and Machado Lake Toxics TMDLs, therefore toxics such as metals, pesticides, and organics will likely be used as the limiting pollutant. The MS4 Permit requirements regarding various categories of WBPCs, in addition to the limiting pollutant, will be addressed through the EWMP as described in Section 2.2.

One limiting pollutant for the first years of planning may be the preferred modeling method, with a change in the limiting pollutant for later planning years due to the differing deadlines associated with TMDLs and other WQOs. The iterative modeling process allows identification of the pollutant that gives the best results in terms of achieving WQOs for objectives within stated and desired timeframes rather than a-priority assignment of the limiting pollutant.

The WMMS model efficiently provides optimized load reduction targets, recommended distributed BMPs, and cost estimates. It provides limited guidance on actual BMP placement. SBPAT recommends locations for regional BMPs and provides assumptions regarding the extent of distributed BMPs within smaller subwatersheds, which allows for a better feasibility analysis. The recommendations are based on a CPI score based on which pollutants, land uses, and BMPs are most appropriate for the watersheds. The score ranges from five to one, with the higher CPI scores indicating higher priority subareas. SBPAT also provides expected load reductions, implementation cost estimates for specified BMPs, and provides a bacteria TMDL compliance analysis.

The process summarized in Figure 4.2 is flexible and responsive the DC WMG preferences and shows how each model will be utilized for the analysis. Pollutant loads and target load reductions as a percentage of the total load will be established utilizing WMMS. The model will also provide suggested volumes of treatment and specify the type of treatment system that can be used. In WMMS, the candidate BMPs are established based on land use. Residential areas are treated using rain barrels and bioretention BMPs. Commercial, industrial, and institutional land use areas are treated using porous pavement and bioretention BMPs. Transportation facilities are treated using bioretention BMPs.

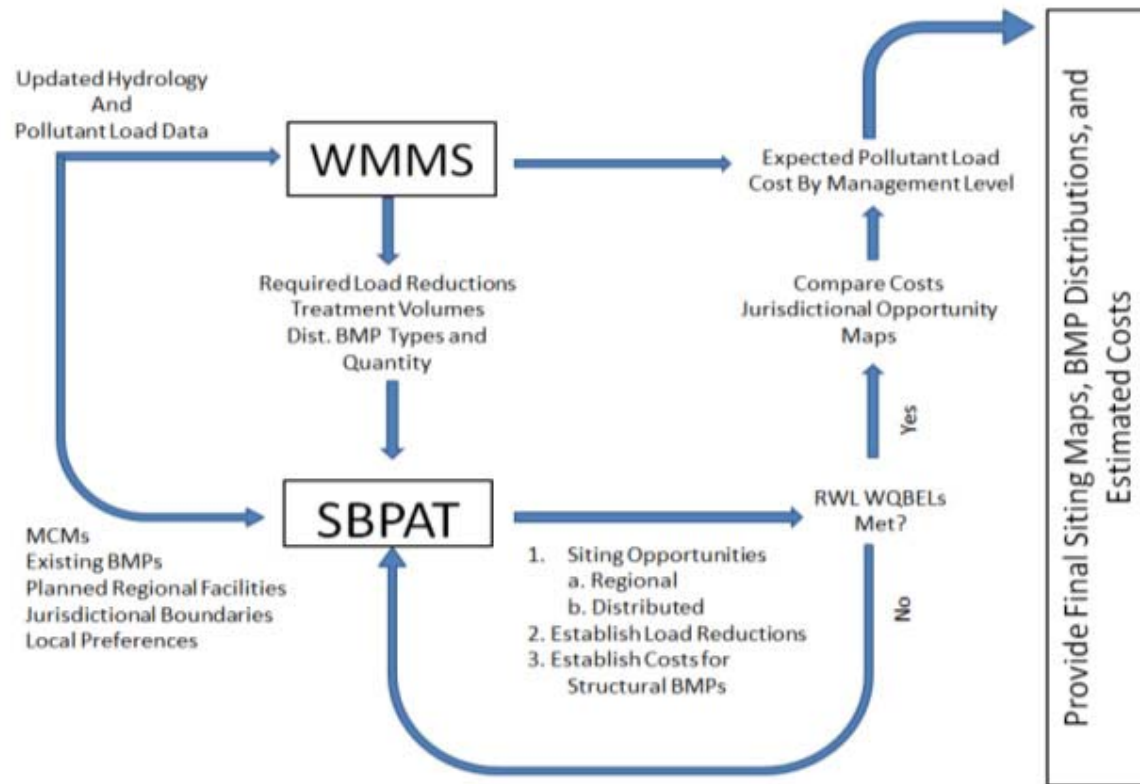


Figure 4.2. Overview of RAA Process

Using WMMS output along with DC WMG specific preferences for control measures, SBPAT will be run to prioritize smaller subwatershed areas within the DC WMG jurisdictions. The SBPAT model input will include jurisdictional preferences for MCMs, BMPs, and planned regional BMPs to analyze the impacts of the various control measures. Distributed BMPs will be assigned based on the initial findings from WMMS. The number and size of regional and distributed BMPs will be modified as necessary to meet load reduction targets. The existing dates established in TMDLs are as follows:

- July 9, 2009 (Final WQBELs for Los Angeles Harbor Bacteria TMDL)
- March 6, 2016 (Final WQBELs for Machado Lake Trash TMDL)
- December 28, 2017 (Final WQBELs and RWLs for Los Angeles Harbor Bacteria TMDL at Station CB1 based on the Time Schedule Order (see Attachment B))
- September 11, 2018 (Final RWLs and WQBELs for Machado Lake Nutrients TMDL)
- September 19, 2019 (Final WQBELs for Machado Lake Pesticides and PCBs TMDL)
- March 23, 2032 (Wet-Weather Final Freshwater WQBELs for DC and LA Harbor Waters Toxic Pollutants TMDL)

The required milestones will be established through the EWMP development process as the RAA is conducted and modified through the adaptive management process. The milestones will be based on the MS4 Permit requirements and will consider the implementation needs and a feasible timeline.

The non-stormwater and dry-weather impacts will be evaluated based on the expected impacts from MCMs and other control measures and by using volume reduction for runoff that is captured and used, diverted, or infiltrated. This approach will evaluate volume and sediment reduction potential. The types of non-stormwater structural BMPs would include low-flow diversion and treatment in a sanitary sewer system, extended detention times in subsurface wetlands, park reuse where plants and microbes would break down or absorb contaminants, and infiltration BMPs. Estimated daily

yields will be derived from local dry-weather flow monitoring data within the region (Stein and Ackerman, 2007) and available measured flow rates. The data collected through the CIMP efforts will become available in the future and may include information regarding non-stormwater flow rates, which may be utilized through the adaptive management process. Captured flows will be subtracted from total non-storm flow estimates. Pollutant load reductions will be evaluated based on the ratio of total flow reduction.

Legacy pollutants (toxics) are a concern in the Dominguez Channel WMA. Toxics include heavy metals (cadmium, chromium, copper, mercury, lead, and zinc), chlordane, dieldrin, DDT, PCBs, and certain PAH compounds (LARWQCB, 2010b). Toxics other than metals are not modeled in the pollutant load models due to the limited information on point and non-point sources tied to land use. In order to model these pollutants, the relationships explained below will need to be developed.

Pollutants such as heavy metals, toxics, phosphorous and organic compounds are partially adsorbed onto the TSS particles. The concentrations of these pollutants are often correlated to the concentration of sediment in the water bodies. Relationships between compounds and TSS are location and pollutant type dependent. Presently, an analysis of the correlation between TSS and various toxics is required before effectiveness of sediment removal processes for toxics removal can be estimated. Existing data pertaining to these relationships will be evaluated to assess if a linkage does exist and findings will be documented in the EWMP.

The relationships between compounds and TSS may be more clearly defined using data gathered during the CIMP. These findings would be used with future RAA reviews through the adaptive management process to establish a relationship between toxics and TSS or land uses. Once relationships are developed, reductions in TSS or land use based EMCs can be correlated to reductions in toxics. Limiting transport of toxics from contaminated sites into the storm drains during wet- and dry-weather has to be a component of current and future site remediation. Detailed steps for the RAA are further discussed below.

4.2.1 Selecting Potential MCM and BMP Opportunities

Selection of appropriate MCMs, distributed, and regional BMPs begins with identifying the current MCM and BMP practices utilized by the DC WMG as described in Section 3. The DC WMG preferences will be incorporated into the model in order to evaluate implementation strategies.

As described in Section 3, MCMs may be modified to achieve greater load reductions, which will be quantified in terms of percentage removal from the DC WMG. During the EWMP development process, DC WMG will evaluate if modified MCMs are desirable. The process for demonstrating the effects of the MCMs and BMPs on water quality is discussed in the following subsection.

4.2.2 Demonstrating Effects of BMPs

Prior to evaluating the watershed control measures, a load reduction analysis will be completed to understand which types of controls will be most effective. Target load reductions will be established using the WMMS optimization algorithm for metals, nutrients, and TSS based on catchment-scale optimized treatment volumes, or alternatively, TMDL-based required load reductions may be used. Target pollutant load reductions for remaining TMDL and 303(d) pollutants that are not optimized in the version of WMMS available from LACDPW, including bacteria and oil, will be established for specific monitoring locations based on receiving water monitoring data. For bacteria in particular, target pollutant load reductions will be based on the TMDL compliance metrics reduced for high flow recreational use suspension. Target load reductions will account for receiving water conditions and processes, but will be established to represent contributions from only DC WMG agencies. The areas within each WMMS

subwatershed will be divided into smaller subareas for SBPAT. The smaller subareas will be broken along jurisdictional boundaries to establish jurisdiction-specific target load reductions for distributed BMP analysis. Regional contributions can be evaluated based on the land use type and acreage within the watershed tributary to regional projects.

The benefits of the MCMs and structural controls to receiving water loadings will be evaluated based on the load to load reduction ratio for the subareas managed by the DC WMG. The Dominguez Channel WMA encompasses several cities and unincorporated areas within the County of Los Angeles. Many of the cities have decided to pursue other watershed plans separately from the DC WMG. This decision limits the ability of the RAA in predicting the receiving water limits where DC WMG and non-participating agencies are both tributary. In this case, the loads generated by the participating agencies will be evaluated as the baseline load. The baseline load will then be compared to load reductions achieved through the implementation of MCMs and institutional BMPs to demonstrate that the total load reductions meet WQBELs and RWLs.

Figure 4.3 provides a graphical representation of the prioritization of BMPs that will be included in the EWMP process and RAA analysis. In order to be considered a regional EWMP project as discussed in Section 3.1.4, the projects must retain dry-weather flows and flows produced by the 85th percentile, 24-hour storm event.

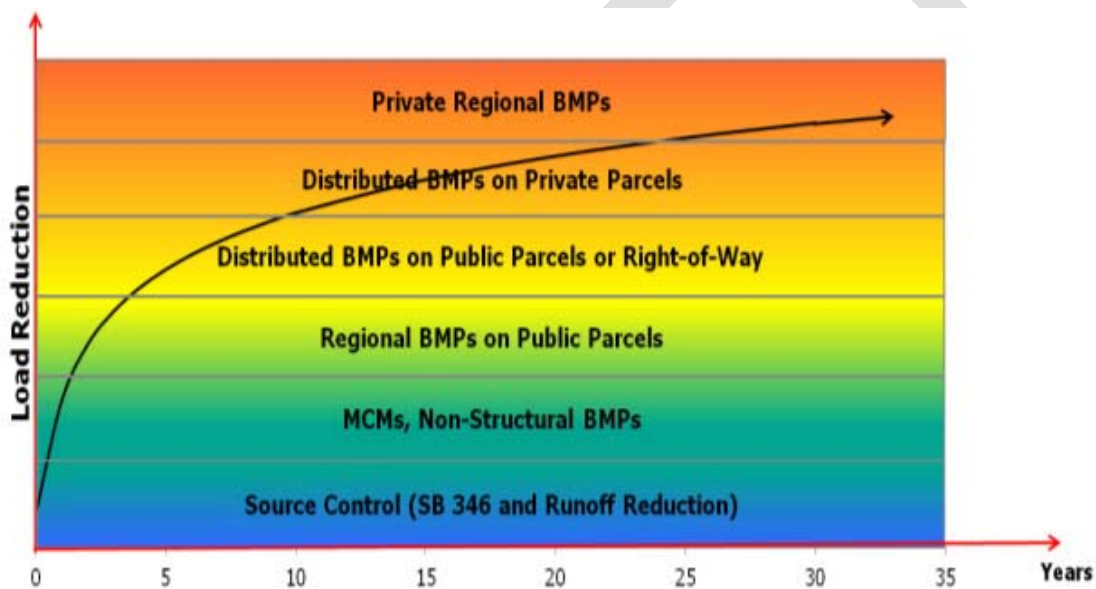


Figure 4.3. Prioritization of Water Quality Improvement Tools

The process for representing watershed control measures in the modeling system and quantifying their effectiveness in reducing stormwater pollutant reduction is described in the step-by-step approach found below.

MCMs and Institutional BMP Pollutant Load Reductions

Existing control measures such as MCMs and institutional BMPs initiated in response to various TMDLs, as identified in Section 3, will be evaluated in terms of associated pollutant load reductions at relevant monitoring locations where data is available. The stormwater and non-stormwater water quality benefit of planned and implemented non-structural BMPs will be evaluated for TMDL and 303(d) pollutants based on available data and identified non-structural opportunities. These measures include true source control programs such as the phase-out of copper in brake pads and of zinc in rubber tires. The load reductions from copper in brake pads

and zinc in tires will be based on recent quantitative mass balance estimates identified in relevant literature (Moran, 2011). To allow for an efficient and high value/low cost evaluation, non-structural quantification methodologies will be developed based on methods used in existing TMDL implementation plans where appropriate.

WMMS and SBPAT require land use based load estimates to identify pollutant loads generated by rainfall events. To implement non-structural control in the analysis, land use based loadings will be modified based on the estimated load reductions. Once the reductions to loading factors are established, the model can be run to evaluate the effectiveness of the MCM and/or institutional BMP.

Regional Structural BMP Load Reductions

DC WMG preferences on potential regional projects and additional input from the DC WMG and stakeholders will be sought and included in the analysis of structural BMPs in the EWMP. The SBPAT model will also be run to evaluate other potential regional BMP project siting locations. Selected sites will be evaluated for potential pollutant reduction capacity. The steps in the evaluation process include:

1. A discussion of existing and planned structural BMPs and potential retrofit opportunities. Input will be gleaned on structural BMP preferences, regional projects, potential retrofit opportunities, infiltration versus flow-through options, ownership, maintenance, catchment location, land use, multiple objective features, etc. This information will then be used to guide structural BMP plan development;
2. If potential retrofit opportunities exist, retrofit feasibility will be estimated based on the proposed facility design and location;
3. The effectiveness of the regional BMPs will be evaluated by comparing load reductions estimated by WMMS and SBPAT against loads estimated for the watersheds without BMPs; and
4. The SBPAT model will be used to evaluate regional BMP load reductions throughout the watershed utilizing the criteria desired by the DC WMG.

Distributed Structural BMP Load Reductions

With the storage and infiltration volumes from WMMS and input on preferred distributed BMP types from DC WMG, SBPAT will be used to evaluate distributed BMP placement throughout the watershed to meet WQOs.

The approach for developing additional structural retrofit BMPs for inclusion in the EWMP Plan and quantification in the RAA is to report and compare both of the following:

1. WMMS default output, if applicable (i.e. built-in generalized distributed BMP assumptions evaluated for feasibility at a regional level based on land use); and
2. BMPs identified by SBPAT using site-specific land use-based evaluation of water quality needs and implementation opportunities to identify specific distributed BMP implementation opportunities. Agencies will be provided with Draft Structural BMP Opportunity Maps that will identify land use zones and/or specific parcels for structural BMP implementation depending on the preferred approach.

The effectiveness of the distributed BMPs will be evaluated by comparing load reductions estimated by WMMS and SBPAT against loads estimated for the watersheds without BMPs.

4.2.3 Address Water Quality Priorities

The RAA will demonstrate the effects of proposed watershed control measures on stormwater quality, non-stormwater quality, and receiving water quality as appropriate. The DC WMG is responsible for addressing the following TMDLs discussed in Section 1.3.2, as well as Section 2:

- Los Angeles Harbor Bacteria TMDL (Inner Cabrillo Beach and Main Ship Channel);
- Machado Lake Trash TMDL;
- Machado Lake Nutrient TMDL;
- Machado Lake Pesticides and PCBs TMDL; and
- DC and LA Harbor Waters Toxic Pollutants TMDL.

Compliance analysis will first emphasize implementation of MCMs, institutional BMPs, and existing structural BMPs. The final level of analysis will evaluate new structural project opportunities.

Stormwater quality will be analyzed based on estimated load reductions from SBPAT. The load reductions from SBPAT will be compared with the target pollutant load reductions from WMMS to compare against both load-based and exceedance day-based TMDL compliance metrics. Expected pollutant reduction ranges will be provided, thereby capturing the variability of BMP performance. Non-stormwater structural BMP performance estimates will be based on static volume and load reduction calculations. A staged implementation strategy will be developed for each milestone. Milestones will be developed pursuant to the MS4 Permit Parts VI.C.2.a.ii.(5) (pages 50-51) and VI.C.2.a.iii.(2).(d) (page 52) for pollutants that are not in the same class as an existing TMDL and for which a water quality priority was established. These milestones will be evaluated through the EWMP development process as the RAA is conducted and will be re-evaluated through the adaptive management process.

BMP performance and load reductions will be compared to receiving water limitations, TMDL waste load allocations, WQBELs and other applicable targets at the watershed and jurisdictional scale through determining the improvements in the watershed due to BMP implementation. The RAA will provide a breakdown of BMP implementation in each DC WMG agency jurisdiction to show where implementation efforts are most effective.

4.2.4 Schedule for Implementation

As discussed, existing TMDLs have compliance dates that must be considered in the RAA process. A few of the TMDLs identified have interim target load reductions that became effective in 2012 when the MS4 Permit was adopted. The interim and final compliance dates identified in the EWMP for WBPCs categorized as Categories 2 or 3, as required by the MS4 Permit, will also represent significant milestones in determining the schedule for implementation.

Due to the wide range of pollutants within the DC WMG, including sediments, metals, bacteria, and dissolved pollutants such as nutrients, addressing TMDLs through the RAA is expected to address the non-TMDL pollutants on the 303(d) list and receiving water limitation exceedances.

The total load reduction required by the MS4 Permit for target years will be evaluated and the impacts of MCMs and BMPs will be considered based on implementation time frames. BMPs will be added to the system until interim load reductions are met. At this point, the details of the proposed BMPs will be documented in order to develop a construction schedule that will meet the requirements of the MS4 Permit. The model will then be ran again, incorporating modifications to MCMs, land uses, and additional BMPs to achieve the next load reduction at the milestones. The details of BMPs and MCM combinations will be documented. The process will be repeated until target dates are modeled and the final results provide the required target load reductions.

4.2.5 Characterizing Uncertainty

The strength of the proposed RAA approach is that it utilizes the tools of developed regional models effectively in the analysis of water quality benefits. The resulting output from SBPAT provides an expected load reduction with statistics for evaluating the uncertainty of the predictions inherent to the process. The uncertainties are tied to uncertainties in expected rainfall events, land use EMC based loads, and BMP effectiveness. The output from the model will provide the expected range of possible load reductions to effectively communicate the uncertainty within the analysis framework.

4.3 Modeling Approach

As discussed in Section 4.1, the WMMS and SBPAT regional models will be used for the DC WMG RAA.

4.3.1 Spatial Domain

The analysis of BMPs and MCMs through the RAA process will be performed only for the areas covered by the participating agencies in the DC WMG. The other areas will be modeled with the assumption the jurisdictions are meeting the requirements of the MS4 Permit (e.g., meeting WQBELs and RWLs on schedule). Figure L.1 in Attachment L provides an overview of the Dominguez Channel WMA areas of interest for the EWMP, including the POLA.

The modeling approach will evaluate land uses based on the Hydrologic Response Units (HRUs) in WMMS and the seven land use classifications in SBPAT, along with data provided by the DC WMG to identify non-MS4 dischargers such as Caltrans and industrial sources.

The models will be calibrated using the watershed subareas and land uses. Once the model is calibrated, the HUC loading rates will be reduced until the TMDL loading rates are achieved. The model will then be modified so that it only models the land use within the DC WMG to evaluate loads and required load reductions. Agency jurisdictions not included in the DC WMG and Industrial Permittees will be modified to generate pollutants at the MS4 Permit required levels prior to the analysis of pollutant load reduction requirements within the DC WMG. SBPAT will then be used to evaluate BMP placement to achieve the required load reductions. A similar procedure will be followed when assessing the water quality within a jurisdiction when a subarea incorporates multiple jurisdictions.

The exclusion of non-participating agencies is justified since each of these entities either has a separate permit with regulations that they are required to meet or is required by the MS4 Permit to meet compliance within their jurisdiction. These permits normally require that the responsible parties test and verify that discharges meet the CTR and TMDL requirements for the downstream water bodies where the discharge occurs.

The industrial facilities covered under the IGP within the DC WMG have been identified based on their WDID number and mapped based on their parcel, as illustrated in Figure L.2 in Attachment L. A detailed list of the facilities covered under the IGP within DC WMG is presented in Attachment M. These parcels will be modified in the model to meet the new IGP requirements prior to the analysis of pollutant load reduction requirements within the DC WMG.

WMMS and SBPAT are integrated into GIS software packages. WMMS utilizes the MapWindows software, while SBPAT uses ArcGIS. Various GIS layers will be used for each model and the model also utilizes several shapefiles stored within the models database. The data sets contain

land use information, soil types, imperviousness, and stream segment connectivity. Rain gage location is also a spatial variable that has already been assigned to the subwatersheds.

4.3.2 Hydrology

Hydrologic modeling will be incorporated through the use of WMMS and SBPAT.

WMMS

The LSPC model developed for use in the WMMS system relies on many parameters and can be calibrated for both water quantity and quality. The model hydrology was calibrated based on rainfall records from 148 gaging stations with short interval records (5-minute) for the time period from 1997 through 2012. Figure N.1 in Attachment N shows the rain gage locations and the estimated rain gage data set quality used for the WMMS LSPC model development.

Evaporation data was also utilized to evaluate evapotranspiration effects in the model. Three evapotranspiration zones were developed for the area of the DC WMG (LACDPW, 2010a). Figure N.2 in Attachment N shows the evaporation zones for Los Angeles County. Land use is based on HRUs, which incorporate imperviousness and slope. Soil types are based on SSURGO data for the region.

Figure N.3 in Attachment N shows no runoff stations are located within DC WMG. Data from historic runoff stations exist within the watershed and will be utilized for flow calibrations. The data is most likely to be available in daily flow rather than short interval data, requiring use of daily precipitation gage data for analysis and comparison. The time period for the runoff gages will be evaluated to assess whether they represent current watershed conditions adequately or are not representative due to changes in land use over time. Calibration of the watershed will require utilizing relevant subareas tributary to the runoff stations along with the runoff data associated with the mass emissions station in Dominguez Channel. The rainfall data and corresponding water quality data from monitoring events at S-28 will be used to calibrate the model.

SBPAT

The SBPAT model subarea breakups will be tied to the extensive LACFCD and City drainage systems. Larger subareas outside of the jurisdictional boundaries will be used to model the tributary watersheds to possible regional facilities.

The precision of the SBPAT results is heavily dependent on how well the hydrologic, water quality and BMP effectiveness data describe the actual site characteristics. Local and regional data are used to the fullest extent possible to help minimize errors in predictions, but such data is limited and traditional calibration and verification of the model is not feasible (LACDPW, 2008b).

SBPAT utilizes EPA SWMM 4.4 to evaluate runoff. The modified SWMM engine tracks volumes in the Runoff and Storage-Treatment Blocks on a storm event basis using a volume-accounting approach. Such tracking is required as the SWMM simulation is conducted continuously, but must be summarized by storm event to facilitate the SBPAT Monte Carlo routines (Geosyntec, 2008b).

The SBPAT model utilizes approximately 18 rainfall gages with long-term hourly data that have been obtained from National Climatic Data Center (NCDC) monitoring stations throughout Los Angeles County. The data sets were evaluated on the completeness, the periods of record, and the relative spatial distribution of gages.

SWMM in SBPAT accounts for losses due to infiltration based on the Green and Ampt method utilizing a saturated hydraulic conductivity and suction head. Evapotranspiration rates in the SBPAT are based on published California Irrigation Management Information System (CIMIS) reference evapotranspiration (ET_o) data for Los Angeles County (Zone 4), adjusted for imperviousness, and typical urban landscaping. Table 4.2 summarizes the ET_o values published by CIMIS (Geosyntec, 2008b).

Table 4.2: Evapotranspiration by Month (inches)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.86	2.24	3.72	4.80	5.27	5.70	5.89	5.58	4.50	3.41	2.40	1.86

No runoff stations are used for evaluation of modeled versus measured runoff in SBPAT.

4.3.3 Time Period

The time period for running the WMMS LSPC model encompasses the time period from 1996 through 2012, which is the period of available short-interval data that matches rain gages selected for the model. The time period for the Los Angeles County rain gages in SBPAT run until 2008 and haven't been updated since that time period in the data sets. These sets will be updated to add the last five years of data. The data sets will be collected from the LACDPW and the NCDC. Both of these agencies perform quality control procedures on the data sets prior to making them official record. The rainfall data for the added time periods will be evaluated to assess whether the event volumes are reasonable and consistent with the remainder of the record. Anomalies will be investigated utilizing the archived Next Generation Radar (NEXGEN) data sets. If total daily rainfall volumes are consistent with NEXRAD data, the gage set will be considered valid and data will be used. If differences in volume are large, the data will be evaluated for correction or removal from the record.

4.3.4 Water Quality

The RAA Guidelines suggest that Permittees provide an initial assessment of current/baseline pollutant loading for WBPCs based on data collected within the last ten years, including land use and pollutant loading data. At a minimum, baseline pollutants loadings shall be provided for each subwatershed identified in the TMDLs. Pollutant loadings shall be calculated based on EMCs available for different land use sites as referenced in sources as listed in Table 4.3.

Table 4.3: Median Statistics of BMP Effluent Concentration (95% Conf. Interval)

Source No.	Reference
1	<u>Sources, patterns and mechanisms of storm water pollutant loading from watersheds and land uses of the greater Los Angeles area, California, USA.</u> 2007. ED Stein, LL Tiefenthaler, KC Schiff. Technical Report 510. Southern California Coastal Water Research Project. Costa Mesa.
2	Levels and patterns of fecal indicator bacteria in stormwater runoff from homogenous land use sites and urban watersheds. Request Only. 2011. LLTiefenthaler, ED Stein, KC Schiff. Journal of Water and Health 9:279-290.
3	Los Angeles County 2006 EMC Report.

The pollutant loads generated in LSPC are based on natural loading from native sources, point and non-point pollutant sources, and aerial deposition. The model utilizes a build-up/wash-off methodology common to continuous simulation models that requires rates of build-up and

evaluates how quickly the pollutants wash off the HRUs. The LSPC model is currently calibrated for the most recent data sets available. The details of the calibration are provided in the WMMS documentation (LACDPW, 2010b). If further data sets become available for pollutant loading calibration, a similar process will be followed to evaluate pollutant loadings that can be related to the EMCs in Table 4.3.

QA/QC checks will be performed for prediction of water quality variables at milestone points within the watershed based on the criteria provided in the RAA Guidelines. The RAA Guidelines provide estimated ranges of the variables that are used in both the WMMS and SBPAT models. The water quality input ranges will be evaluated based on a comparison to the values in the guidelines to evaluate whether data is consistent with regional standards. Deviations will be noted or corrected as appropriate.

The bacteria loads will be calibrated against the mass emission station data. When more data is available through the CIMP, the data will be used to refine the model calibration.

The water quality calibration was developed on the basis of building and testing a parameter set for land use-specific pollutant load predictions. The calibration approach includes calibration by varying parameters to develop best fit HRU/EMC responses for individual land use sites and then adding in-stream point source load contributions and hydromodification. Validation requires evaluating responses at downstream mass emission locations for a combined model using a fixed parameter set. The calibration steps were applied first for sediment, followed by water- and sediment-associated pollutants.

SBPAT has the ability to model pollutants that can be tied to a land use using EMCs and that have been evaluated in the American Society of Civil Engineers (ASCE) BMP Database. In general, hydrophobic pollutants, such as DDT, PAHs, and PCBs have correlations to TSS. For those toxics that are rarely monitored both in time and space for DC WMG, the empirical approach for loading and load reductions is to create a TSS-toxic relationship from measured data to develop an EMC and estimate pollutant load reductions.

Establishing pollutant reductions goals for addressing water quality priorities was discussed in Section 4.1. WMMS will be used to evaluate pollutant loads and evaluate required pollutant load reductions to meet WQOs. Load reductions due to MCMs, source control, and non-structural BMPs will be evaluated using the simplified TMDL reduction tool in LSPC based on expected reductions. SBPAT will then be used to evaluate placement of preferred BMPs and the load reductions calculated will be compared to required load reductions. An iterative process will begin where the number of BMPs is increased throughout the watershed until constituents are addressed for the milestone date. Then the next milestone date model will be developed and the iterations will begin again.

SBPAT has the ability to evaluate the number of days where water quality parameters are exceeded. This tool will be used to evaluate exceedance criteria and how often exceedances may be expected. If water effect ratios are established for the DC WMG, the evaluation of the increase in allowable metals will be considered in future evaluations in the spirit of adaptive management.

4.3.5 Representation of Individual BMPs

As discussed in Section 4.1, the preferences of the DC WMG will be used to dictate BMP selection, which may require that different BMPs be utilized within different jurisdictions. This is possible in the SBPAT model, due to the flexibility of specifying distributed structural BMPs by land use type or by subwatershed. Regional BMPs that control runoff and water quality from more than one DC WMG agency will require coordination among the agencies for preferences and funding related issues.

MCMs and other institutional BMP strategies are often the most cost effective approach to load reductions. These types of water quality improvement strategies and programs will be evaluated to assess the volume of water or percentage of load they can reasonably expect to remove from the system. This will be done through studies of literature and reductions experienced by other jurisdictions as discussed in Section 3.2.2.1. The load reductions can then be made through the LSPC TMDL model interface, which allows reductions of loads by a percentage in each subwatershed for each of the MCMs discussed in Section 3.2

Other load reductions that will be evaluated include source control programs such as the phase-out of copper in brake pads and of zinc in rubber tires, and water conservation programs to reduce over-irrigation and dry-weather runoff. Load reductions for copper will be calculated based on the study by Dr. Moran detailing expected load reductions based on SB 346. The model land use loadings will be adjusted to decrease metal loadings by specific percentages to simulate reductions related to this non-structural BMP.

Second to MCMs, regional BMPs provide the best source control for the money spent. The types of regional BMPs that may be modeled include infiltration basins, detention basins, detention basins with subsurface wetlands, constructed wetlands, treatment facilities, hydrodynamic devices, and channel naturalization. A storage volume is specified based on depth, width, and length of the BMP within the model. Losses to infiltration are specified based on soil classifications. SBPAT simulates the runoff volume, BMP storage and treatment, and effluent volume is evaluated. Load reductions based on statistical probabilities are assessed and a load reduction is produced.

Distributed BMPs which may be modeled include cisterns, bioretention, vegetated swales, green roofs, porous/permeable pavements, gross solids removal devices, media filters, and catch basin inserts.

Once the load reductions are established for each milestone model, QA/QC checks will be performed on the results to verify that they make sense and provide a solid basis for the development of construction schedules and budgets. Table 4.4 provides a summary of median statistics for BMP effluents. This range can be checked against output from SBPAT to evaluate whether the model is providing sound results.

Once modeled, the range of influent and effluent concentrations is available as output. The output values can be compared to the values in Table 4.4. If the results do not compare well with the values, an evaluation of the data sets used to specify effluent concentration probabilities is warranted. Outliers will be justified or modified to demonstrate that QA/QC has occurred and that the model is performing as expected.

Table 4.4: Median Statistics of BMP Effluent Concentrations (95% Conf. Interval)

Pollutant	Units	Bioretention	Bioswale	Detention Basin	Filter Strip	Manufactured Device	Media Filter	Porous Pavement	Retention Pond	Wetland Basin	Wetland Channel
Fecal Coliform	/100 mL	NA	2852-18572	196-3647	NA	1438-3431	101-464	NA	35-411	NA	NA
TSS	mg/L	6.0-13.0	7.0-11.0	19.0-27.0	14.0-20.0	19.0-25.0	6.0-8.0	10.0-17.0	10.0-12.0	6.0-9.0	8.0-16.0
Total Phosphorus	mg/L	0.1-0.16	0.17-0.20	0.18-0.23	0.16-0.23	0.11-0.14	0.08-0.11	0.07-0.11	0.08-0.11	0.06-0.08	0.11-0.15
Dissolved Phosphorus	mg/L	NA	0.21-0.35	0.06-0.11	0.16-0.26	0.05-0.08	0.08-0.11	NA	0.04-0.06	0.03-0.04	0.07-0.10
Total Nitrogen	mg/L	0.98-1.24	0.54-0.66	1.77-2.75	NA	1.85-2.34	0.67-0.91	NA	1.16-1.35	1.06-1.21	1.40-2.00
Total Kjeldahl Nitrogen	mg/L	0.84-1.30	0.43-0.62	1.20-1.80	1.10-1.40	1.40-1.60	0.61-0.80	0.91-1.35	1.00-1.15	0.95-1.13	0.90-1.30
NO _x (NO ₂ +NO ₃ , and NO ₃)	mg/L	0.17-0.27	0.23-0.30	0.22-0.47	0.33-0.51	0.38-0.45	0.45-0.63	0.83-1.23	0.11-0.16	0.05-0.10	0.33-0.96
Total Copper	µg/L	5.8-10.5	6.5-8.5	4.5-9.0	6.4-7.9	9.4-12.0	5.1-7.5	8.8-11.1	5.0-6.0	3.0-4.0	5.0-10.0
Total Lead	µg/L	NA	2.0-2.0	2.5-7.9	1.3-2.2	5.0-5.0	1.1-1.5	2.5-2.5	2.0-3.0	1.0-1.0	3.6-10.0
Total Zinc	µg/L	10.0-26.0	30.0-30.0	15.0-34.5	16.9-27.0	52.5-64.5	15.0-20.0	14.6-20.0	17.0-20.0	16.1-24.0	11.0-20.0
Total Arsenic	µg/L	NA	1.0-1.3	1.2-1.8	0.5-1.0	1.3-2.4	0.7-1.0	2.5-2.5	0.5-1.0	NA	NA
Total Cadmium	µg/L	NA	0.3-0.3	0.5-0.5	0.2-0.2	0.6-1.0	0.1-0.2	0.3-0.3	0.3-0.5	0.1-0.5	0.5-0.5
Total Nickel	µg/L	NA	2.4-4.3	2.4-4.5	2.4-3.2	4.0-5.0	2.0-2.8	1.55-2.1	2.1-5.0	NA	2.0-3.0

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4.3.6 Representation of BMP Selection and Cumulative Effect

The BMP selection using SBPAT features that evaluate some of the potential BMP siting fatal flaws, such as slopes, limited infiltration capacity, and incompatible land uses to suggest potential BMPs. BMPs will be utilized in the modeling process to meet the required load reductions from within the boundaries. Smaller watershed subareas from SBPAT modeling will be used to evaluate the spatial location for siting BMPs within high priority catchments. Catchments with CPI scores of 4 and 5 will be considered for BMP siting prior to those with lower prioritization scores.

Uncertainty for reduction of pollutant loads will be characterized on the output from SBPAT. One of the strengths of the model is that the stochastic approach provides an expected treatment value, with a range of possible outcomes identified.

4.4 RAA Output

The RAA output will be provided in tables and graphics for both the WMMS and SBPAT modeling per recommendations provided in the RAA Guidelines. The spatial resolution for displaying BMPs to be included in the EWMP for implementation varies for the different types of BMPs. Institutional BMPs will not be displayed spatially, but will be displayed within a table showing the BMPs and the expected load reductions by percent at each milestone.

Output from WMMS will include a catchment prioritization map, as demonstrated in Figure 4.4, along with tables indicating the percentage reduction required for each subwatershed to bring the compliance points into alignment with TMDL requirements. Current pollutant loadings will be provided as an appendix and will include a table of subwatershed loads by land use. The baseline load output will also include the optimized percent load reductions needed to achieve stormwater compliance with 95 percent confidence.

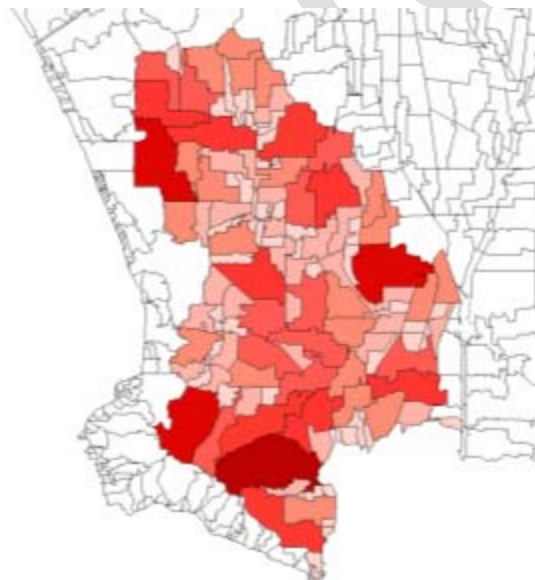


Figure 4.4. WMMS Optimized Catchment Prioritization Example

The BMP Selection Tool developed for use with the WMMS model provides recommendations for BMPs and design parameters to be used in the watershed based on required flow reduction. Based on the 40 percent reduction in load recommended by the Nonlinearity-Interval Mapping Scheme (NIMS) optimization, Management Level III is the recommended treatment level for the

subwatershed. The recommended BMPs and total volume of runoff reduction are included in the output.

Based on the recommended treatment capacity in WMMS, regional and distributed BMP scenarios will be developed in SBPAT. Prioritization for distributed and regional structural BMPs will be displayed on CPI maps and tables showing the size and number of the BMPs to be implemented. Examples of the regional and distributed BMP CPI maps are provided in Figures L.3 and L.4 of Attachment L, respectively. The figures shows the nodal CPI used for determining regional BMP placement and the catchment CPI map used for distributed BMP placement. These maps utilize the WMMS subareas currently, but these subwatersheds will be divided into smaller subwatersheds for the DC WMG RAA.

Regional BMP opportunities will be evaluated based on criteria specified in Section 3.1.4. Output regarding regional BMPs will include the location by address and geographic coordinates, the footprint size of the BMP, the depth, and the total storage volume. Each regional BMP will be plotted on a watershed map. BMPs that are to be implemented will be listed by year of anticipated construction.

Distributed BMPs will be listed by SBPAT subarea and the details include the type of BMPs, an average BMP size in length, depth, and width, and the total volume to be treated in the subwatershed. BMPs that are to be implemented will be listed by year of anticipated construction. In addition, design intensity will be calculated using the model output and provided.

SBPAT output provides a storm event summary that includes the baseline loading and the average loads with distributed and regional BMPs. The percent reduction based on the BMPs utilized in the analysis is also included. Storm event exceedances are provided if threshold levels are set in the model.

In addition, the SBPAT output provides a summary of average annual loads by pollutant type before and after BMP implementation as well as the percent removed. These numbers will be evaluated against the WMMS numbers to assess whether targets were met during the specific time period of interest as specified in Section 4.1.

The final summary table provided by SBPAT is the cost summary for capital costs, maintenance costs, and land costs. These numbers are based on input to the SBPAT model that will be established by the DC WMG. The default values and DC WMG input can then be compared to the output costs from WMMS. These estimates will provide a range of possibilities to encompass the uncertainties in the planning process.

5 EWMP Development Process

The EWMP Work Plan is the first major step towards completing the development of the EWMP. The Work Plan identifies major watershed characteristics in order to evaluate water quality priorities, as well as develops several approaches for addressing those water quality priorities that will be further evaluated prior to EWMP development. The following major events can be concluded from the Work Plan and will be required prior to the development of the EWMP:

- Ongoing stakeholder efforts will be implemented throughout the development of the EWMP in order to receive input on structural BMP projects and programmatic implementation through MCMs and other institutional BMPs.
- Multi-benefit regional projects, that preferably satisfy the EWMP criteria for regional projects, will be selected by utilizing the approach developed in Section 3.1.4 and through the stakeholder process. This may include additional feasibility studies in order to evaluate anticipated load reductions.
- Distributed BMP projects will be identified and selected by utilizing the approach developed in Section 3.1.5 and through the stakeholder process. Whenever feasible, additional information will be obtained in order to evaluate anticipated load reductions.
- The potential MCM/institutional BMP control measures will be further evaluated in order to evaluate if the potential modifications identified in Section 3.2.2.1, or other modifications, would be justifiable due to anticipated pollutant load reductions.
- Existing data will be evaluated to assess if a relationship can be made between various toxic pollutants and TSS so that the toxic pollutants may be modeled in the RAA, as they represent the priority pollutant for DC WMG.
- The RAA will be further developed and structural and non-structural BMPs identified through the processes listed above will be incorporated into the SBPAT model in order to evaluate the quantity of BMPs required and the implementation cost and schedule.
- The EWMP will be developed, submitted, and reviewed before it can be approved. The schedule outlined in Table 9 or Part VI.C.4 (pages 53-58) of the MS4 Permit will be followed and is summarized in Table 5.1.

Table 5.1: EWMP Implementation Requirements

MS4 Permit Part	Provision	Due Date
VI.C.4.b (pages 55-56)	Notify Regional Board of intent to develop an EWMP and request submittal date for draft program.	6 months after MS4 Permit effective date (June 2013)
VI.C.4.c.iv (page 57)	For Permittees who elect to collaborate in an EWMP, submit draft plan to Regional Board.	18 months after MS4 effective date (June 2014) provide final Work Plan for EWMP development.
		30 months after MS4 Permit effective date (June 2015) submit draft plan.
VI.C.4.c (pages 56-57)	Comments provided to Permittees by Regional Board.	4 months after submittal of draft plan.
VI.C.4.c (pages 56-57)	Submit final plan to Regional Board.	3 months after receipt of Regional Board comments on draft.
VI.C.4.c (pages 56-57)	Approval or denial of final plan by Regional Board or by Executive officer.	3 months after submittal of the final plan.
VI.C.6 (page 65)	Begin implementation of the EWMP.	Upon approval of the plan.
VI.C.8 (pages 66-67)	Comprehensive evaluation of EWMP and submittal of modifications to plan.	Every two years from date of approval.

In addition to the schedule provided in the MS4 Permit, DC WMG included a schedule with completion dates and associated milestones for EWMP development in their NOI. Currently the DC WMG is on schedule and will continue to work towards achieving the schedule outlined in the NOI and reiterated in Table 5.2. The milestones and due dates identified in the NOI appear to continue to be appropriate; therefore no alternative milestones are presented at this time.

Table 5.2: EWMP Schedule from DC WMG NOI

Milestone	Due Date
Draft Technical Memorandums <ul style="list-style-type: none"> • Approach to USEPA, TMDL, 303(d) listings, other exceedances of RWLs • Final selection of regional projects • Feasibility analyses of regional projects, customization of MCMs, identification of other BMPs • Project schedules and cost estimates 	April 2015
Draft EWMP	May 2015
Final Draft EWMP submitted to Regional Board	June 2015

The Work Plan will be used as a guide for EWMP development and provides the framework required. As noted in Table 5.1, a comprehensive evaluation of the EWMP and modifications are required every two years following the EWMP approval. The EWMP is part of an adaptive management process as described in Part VI.C.8 (pages 66-67) of the MS4 Permit. Part VI.C.8 (page 66-67) states that every two years the EWMP will adapt to become more effective, based on, but not limited to, the following:

- Progress towards achieving interim and/or final WQBELs/RWLs according to TMDL schedules;
- Progress towards achieving improved water quality in MS4 discharges and achieving receiving water limitations through implementation of watershed control measures based on an evaluation of outfall-based and receiving water monitoring data;
- Achievement of interim milestones;
- Re-evaluation of the water quality priorities identified for the DC WMG based on more recent water quality data for discharges from the MS4 and receiving waters(s) and a reassessment of sources of pollutants;
- Availability of new information and data from sources other than the Permittees monitoring programs within the DC WMG that informs the effectiveness of the actions implemented;
- Regional Board recommendations; and
- Recommendations for modifications to the EWMP through a public participation process.

The adaptive nature of the EWMP allows the process to be iterative, allowing the DC WMG and other groups to identify a plan that is successful in improving water quality in their region.

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