Rio Hondo / San Gabriel River Water Quality Group

Enhanced Watershed Management Program Work Plan

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Acronyms

AIN	Assessor's Identification Number
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
BMP	Best Management Practice
BPP	Brake Pad Partnership
CASQA	California Stormwater Quality Association
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
CGP	Construction General Permit
CIMP	Coordinated Integrated Monitoring Program
CWA	Clean Water Act
EMC	Event Mean Concentration
ESCP	Erosion and Sediment Control Plan
ET	Evapotranspiration
EWMP	Enhanced Watershed Management Program
EWRI	Environmental and Water Resources Institute
FHWA	Federal Highway Administration
FWC	Flow-Weighted Composite
GI	Green Infrastructure
HHWC	Household Hazardous Waste Collection
HSG	Hydrologic Soil Group
HSPF	Hydrologic Simulation Program-FORTRAN
IBD	International BMP Database
IC/ID	Illicit Connection/Illicit Discharge
IGP	Industrial General Permit
IPM	Integrated Pest Management
IRWMP	Integrated Regional Water Management Plan
GIS	Geographic Information System
GLAC	Greater Los Angeles County
HFS	High Flow Suspension
LACSD	Los Angeles County Sanitation Districts
LACDPW	Los Angeles County Department of Public Works
LACFCD	Los Angeles County Flood Control District
LAR	Los Angeles River
LARWQCB	Los Angeles Regional Water Quality Control Board
LID	Low Impact Development
LRS	Load Reduction Strategy
LSPC	Loading Simulation Program in C++
MCM	Minimum Control Measure
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NDMA	N-Nitrosodimethylamine

NIMS	Nonlinearity-Interval Mapping Scheme
NOI	Notice of Intent
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
OWTS	Onsite Wastewater Treatment System
PAH	Polycyclic Aromatic Hydrocarbons
PIPP	Public Information and Participation Program
POC	Pollutant of Concern
QA/QC	Quality Assurance/Quality Control
RAA	Reasonable Assurance Analysis
RH/SGRWQG	Rio Hondo/San Gabriel River Water Quality Group
ROS	Regression-on-Order Statistics
RWL	Receiving Water Limitation
SGR	San Gabriel River
SIC	Standard Industrial Classification
SLOD	Sample Limits of Detection
SQMP	Stormwater Quality Management Program
SUSMP	Standard Urban Stormwater Mitigation Plan
SUSTAIN	System for Urban Stormwater Treatment and Analysis INtegration
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
WBPC	Water Body-Pollutant Combination
WDR	Waste Discharge Requirement
WER	Water Effects Ratios
WERF	Water Environment Research Foundation
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

Executive Summary

In response to the Phase I Los Angeles County Municipal Separate Storm Sewer System (MS4) Permit, Order No. R4-2012-0175, the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) decided to collaborate in the development of an Enhanced Watershed Management Program (EWMP) for which this is the Work Plan. The EWMP will describe the path Permittees will utilize to complete the EWMP process required in the MS4 Permit. This Work Plan describes the efforts and analyses that have been and will be conducted to develop an EWMP that addresses the MS4 Permit requirements.

The RH/SGRWQG agencies participating in this EWMP are the County of Los Angeles, Los Angeles County Flood Control District (LACFCD), and the Cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, and Sierra Madre, several of which are in both the Los Angeles and San Gabriel River Watersheds. The RH/SGRWQG is located in the eastern portion of the Los Angeles River (LAR) Watershed Management Area (WMA) and the upper portion of the urban San Gabriel River (SGR) WMA. The area included in the RH/SGRWQG EWMP encompass approximately 41 square miles of predominately residential and open space land use. Of the total LAR and SGR Watershed areas, the RH/SGRWQG members have jurisdiction over four and three percent of the total watersheds, respectively.

The EWMP Work Plan identifies the water quality priorities relevant to the RH/SGRWQG based on available water quality data and establishes Water Body-Pollutant Combinations (WBPCs) which will be the focus of various implementation efforts required to be in compliance with interim and final Water Quality Objectives (WQOs) from the Basin Plan or amendments to the Basin Plan through Total Maximum Daily Loads (TMDLs). Additionally, the Work Plan identifies the existing structural and non-structural Best Management Practices (BMPs) implemented by the RH/SGRWQG, as well as the planned structural BMPs so that they can be assessed as part of the overall Reasonable Assurance Analysis (RAA). To achieve greater load reductions additional regional and distributed BMP projects will be implemented and modifications to the Minimum Control Measures (MCMs) may be considered. An approach to identify additional projects as well as potential MCM modifications is developed and presented in this Work Plan.

In addition, the Work Plan outlines the approach to be used for the RAA, detailing the modeling system that will be used, and the process overview, which is defined as a six step process that includes identifying numeric goals, identifying opportunities for BMP implementation, evaluating the effectiveness of potential implementation, determining the combination of BMPs, and using the RAA to support both the implementation schedule and adaptive management strategies. The modeling approach for the RAA is outlined, detailing the spatial domain, modeling software, and BMP optimization. Lastly, the Work Plan identifies the EWMP development process and the schedule necessary to ensure all deadlines are upheld. The major components of the EWMP development process include the following:

- **Water Quality Priorities**
  To identify the water quality priorities the water bodies were characterized based on available data and WBPCs were developed. Different categories of WBPCs have been established and are expected to be addressed through the implementation of various control measures determined through the EWMP development process. In addition, a source assessment was undertaken and a prioritization will be developed based on TMDLs and other receiving water considerations. The identification of water quality priorities directs the selection of water quality control measures and future implementation efforts to be included in the EWMP.

- **Watershed Control Measures**
  This Work Plan identifies the various control measures that exist within the RH/SGRWQG area and identifies the MS4 Permit requirements associated with the six MCMs that are to be implemented. Various structural control measures (distributed and regional) are presented and serve as a toolbox which will be used to determine implementation strategies that ensure

compliance with Water Quality-Based Effluent Limitations (WQBELs) and Receiving Water Limitations (RWLs). For areas that do not have structural BMPs retaining the flows from the 85th percentile, 24-hour storm event, the RAA will be used to demonstrate compliance. Planning documents, including TMDL implementation plans, regional watershed management plans, and regional BMP databases, were reviewed to identify planned regional or distributed BMP projects, which may assist in demonstrating compliance.

- **Reasonable Assurance Analysis**
  The objective of the RAA is to demonstrate the ability of the control measures identified in the EWMP to ensure that MS4 discharges from the RH/SGRWQG area achieve applicable WQBELs and do not cause or contribute to exceedances of RWLs. This Work Plan identifies an approach to conducting the RAA by identifying the modeling system, process, and approach. The RH/SGRWQG will use the Watershed Management Modeling System (WMMS) to support the RAA.

- **Development Process**
  This Work Plan will be used as a guide for EWMP development and provides the framework required to develop an effective EWMP. A major component of the Development Process includes stakeholder outreach meetings. Preliminary stakeholder outreach was incorporated into the early development of the EWMP that included Council for Watershed Health involvement and participation in a San Gabriel River Workshop. At a minimum, two workshops will be held to bring together interested parties to provide input and insight into the approach and findings of this EWMP Work Plan. These workshops will solicit input and ideas from stakeholders, specifically in regards to potential multi-benefit regional projects. Additionally, the RH/SGRWQG members have held internal bi-monthly meetings since the project's initiation and will continue to do so throughout the EWMP development process.

The major present and future milestones associated with the EWMP development process based on the MS4 Permit are summarized below.

- Submit the EWMP Work Plan to the Regional Board - June 2014
- Submit the draft EWMP to the Regional Board - June 2015
- Comments provided to the RH/SGRWQG from the Regional Board - four months after draft submittal
- Submit the final EWMP to the Regional Board - three months after comments provided
- Approval or denial of the final plan by the Regional Board - three months after final submittal
- Begin implementation of the EWMP - upon approval
- Complete a comprehensive evaluation of the EWMP and submit plan modifications - every two years from date of approval

1. Introduction

This Work Plan describes how the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) intends to develop an Enhanced Watershed Management Program (EWMP) per the requirements set forth in the Los Angeles County National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit (Permit), Order No. R4-2012-0175. The EWMP Work Plan will describe the path Permittees will utilize to complete the EWMP process required in the MS4 Permit. This Work Plan describes the efforts and analyses that have been and will be conducted to develop an EWMP that addresses the MS4 Permit requirements. The EWMP being developed will address water quality priorities in the Rio Hondo and San Gabriel River, and their respective tributaries. A comprehensive stormwater management plan that optimizes stormwater and financial resources will be produced through the EWMP development process. The EWMP will integrate existing planning efforts and identify additional opportunities for water quality enhancement through both programmatic and structural controls. In addition, the EWMP will incorporate multi-benefit projects that will not only improve water quality, but also provide aesthetic, recreational, water supply, and/or community enhancements.

1.1 Applicability of Work Plan

Permittees participating in the RH/SGRWQG EWMP include the County of Los Angeles, Los Angeles County Flood Control District (LACFCD), and the Cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, and Sierra Madre, several of which are in both the Los Angeles and San Gabriel River Watersheds. **Figure 1-1** provides a map illustrating the Los Angeles and San Gabriel River Watersheds and the jurisdictional boundaries of the RH/SGRWQG members participating in the development of this EWMP. **Table 1-1** describes the size and percentage of each participating member's jurisdiction within the group and the percent contribution to the Los Angeles River and/or San Gabriel River Watersheds.

Table 1-1 Jurisdictions within RH/SGRWQG

RH/SGRWQG Member	Area Inside RH/SGRWQG (square miles)	Percent of RH/SGRWQG	Percent in Los Angeles River Watershed	Percent in San Gabriel River Watershed
Arcadia	11	27	99	1
Azusa	9	22	0	100
Bradbury	2	5	41	59
Duarte	4	10	37	63
Monrovia	8	19	99	1
Sierra Madre	3	7	100	0
Los Angeles County	4	10	54	46

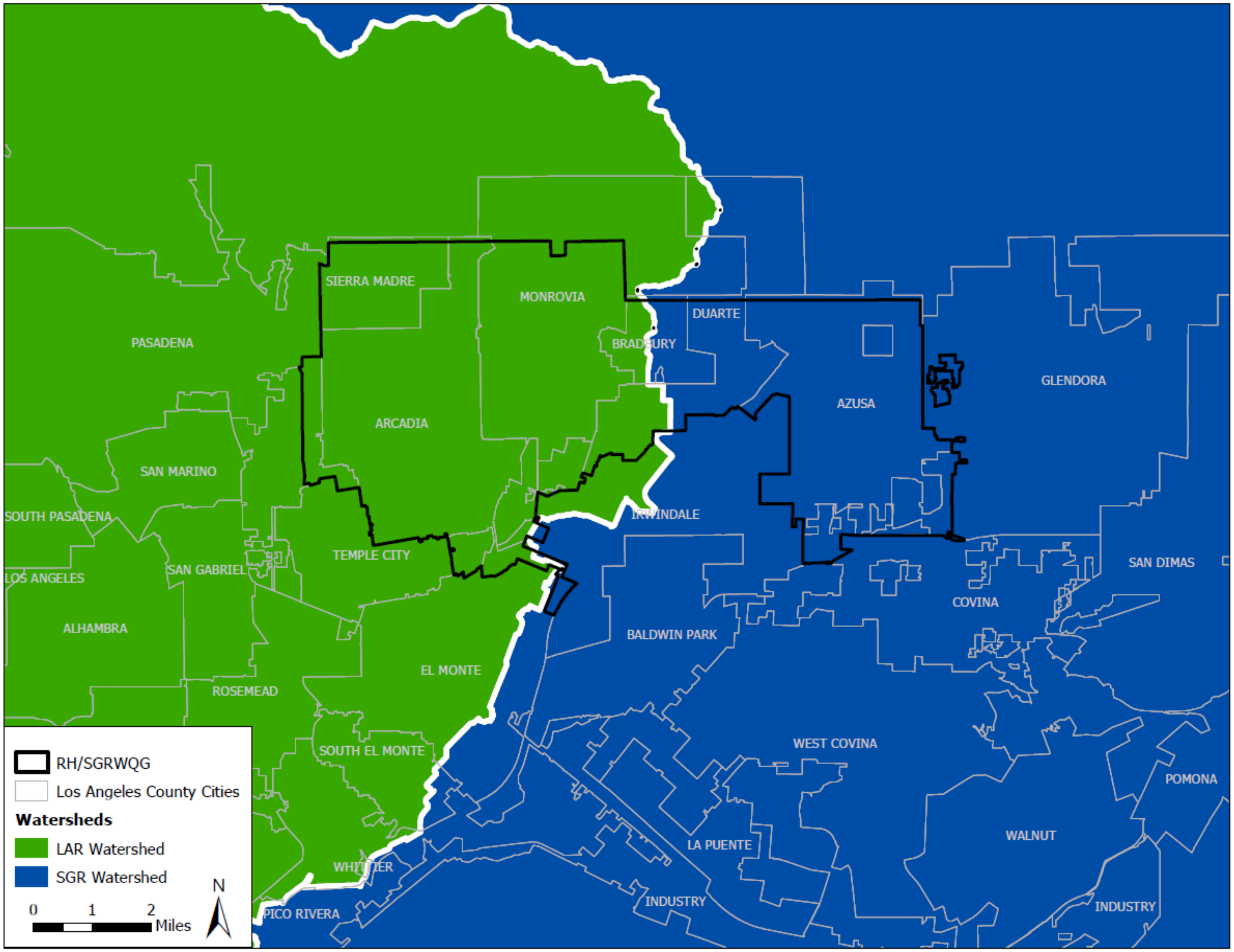

Figure 1-1 RH/SGRWQG and Major Watersheds

1.2 Geographic Scope and Characteristics

The RH/SGRWQG watershed characteristics, including the physical and hydrologic conditions, are unique to the area and presented below, including the extent of the MS4 and receiving waters addressed by this EWMP Work Plan.

1.2.1 Watershed Characteristics

The RH/SGRWQG is located in the eastern portion of the Los Angeles River (LAR) Watershed Management Area (WMA) and the upper portion of the urban San Gabriel River (SGR) WMA. The area included in the RH/SGRWQG EWMP encompass approximately 41 square miles of predominately residential and open space land use and excludes areas in the Angeles National Forest. Of the total LAR and SGR Watershed areas, the RH/SGRWQG members have jurisdiction over four and three percent of the total watersheds, respectively. **Table 1-2** depicts the watershed land use categories within the RH/SGRWQG area, corresponding with **Figure 1-2**.

Table 1-2 RH/SGRWQG Land Use Summary

Land Use Category	Area (square miles)	Percentage
Agriculture	1.1	3
Commercial	3.5	8
Education	1.1	3
Industrial	2.8	7
Multi-Family (MF) Residential	2.8	7
Single Family (SF) Residential	19.3	47
Transportation	0.7	1
Vacant	9.9	24
Total	**41.2**	**100**

The hydrologic characteristics of the WMAs include:

- Soil types based on the Los Angeles County Hydrology Manual (2006), (**Figure 1-3**);
- Storm depth that increase from south to north and has higher depths in the center of the RH/SGRWQG area with a peak in the City of Bradbury, as indicated by the 85th percentile, 24-hour rainfall depth distribution (**Figure 1-4**); and
- Storm intensity that increases from south to north, as indicated by the 50-year, 24-hour rainfall intensity distribution (**Figure 1-5**).

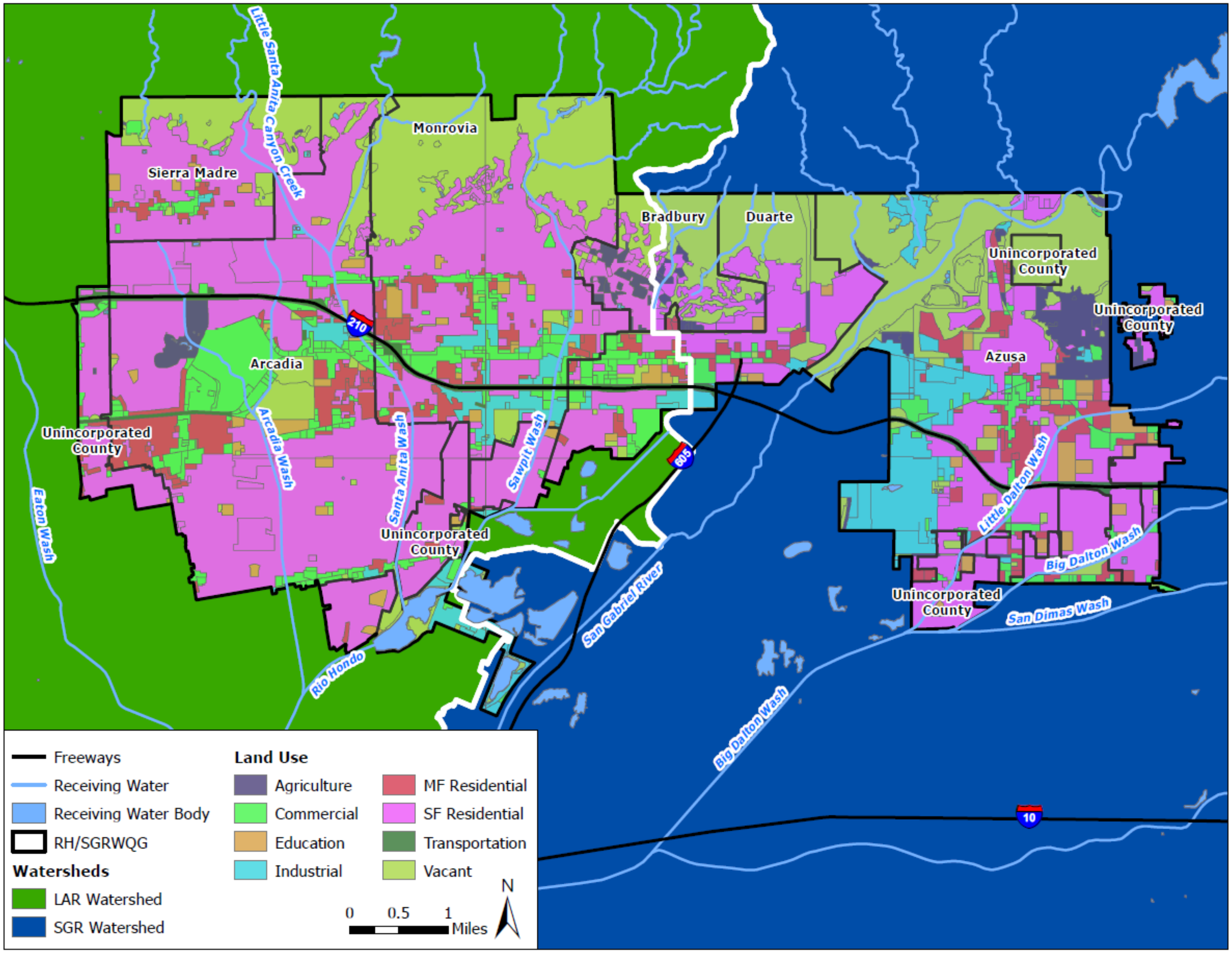

Figure 1-2 RH / SGRWQG Land Use

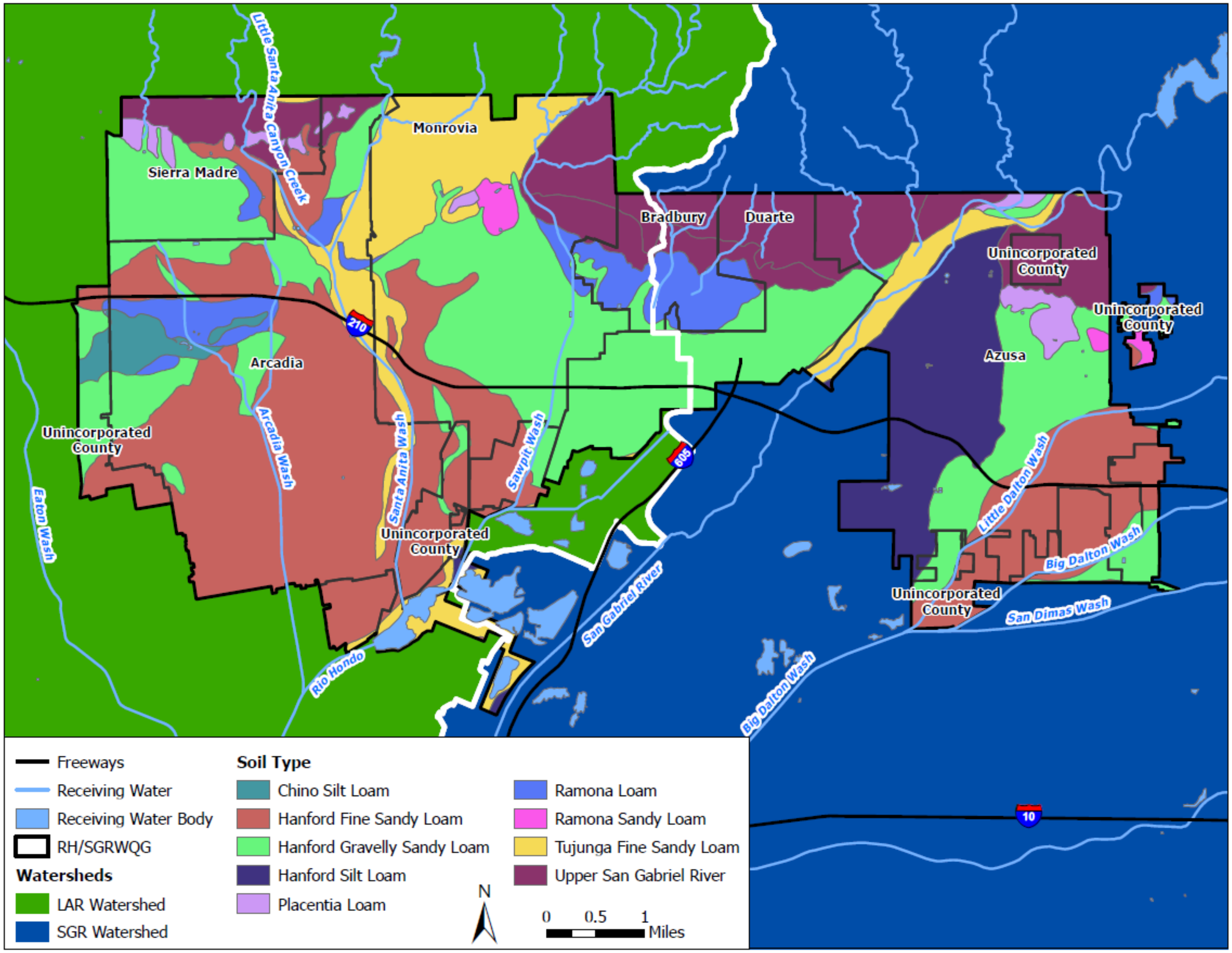

Figure 1-3 RH / SGRWQG Soil Types

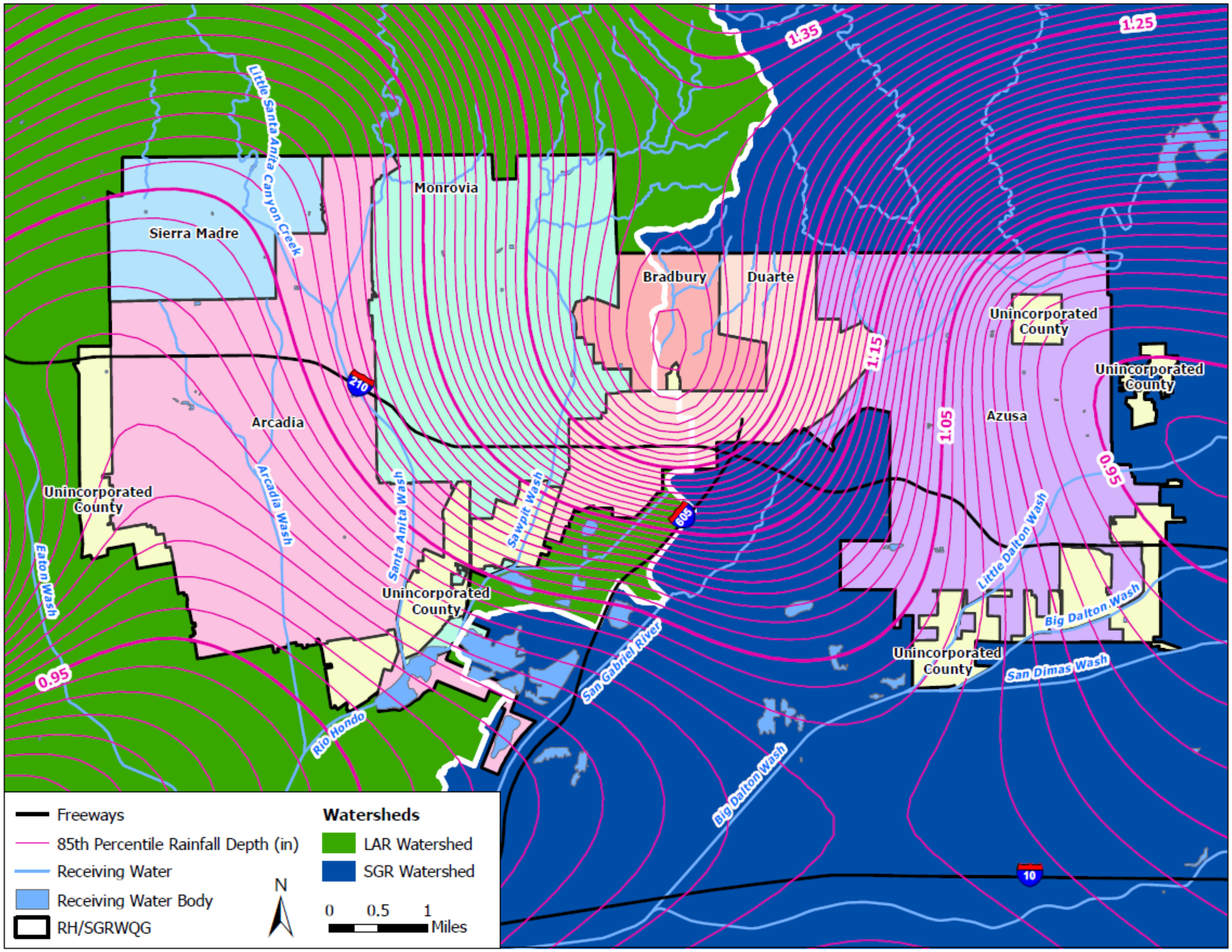

Figure 1-4 85th Percentile, 24-Hour Rainfall Depths

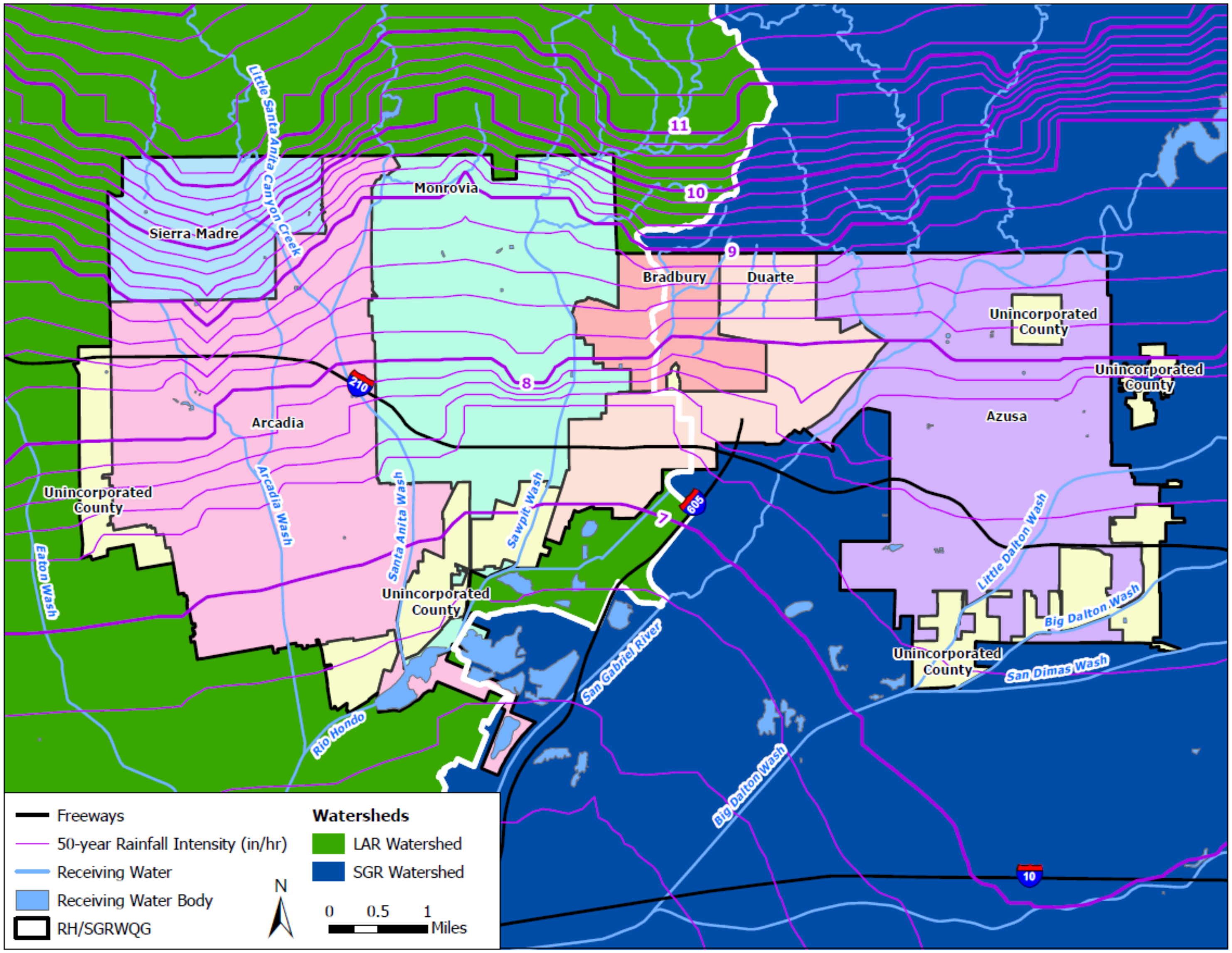

Figure 1-5 50-Year, 24-Hour Rainfall Intensity

1.2.2 Water Body Characteristics

The RH/SGRWQG area is in both the Los Angeles River and San Gabriel River WMAs. Major receiving water bodies located in the RH/SGRWQG area are identified in **Figure 1-6**. The RH/SGRWQG area is hydraulically connected to the downstream reaches in wet-weather, but disconnected in dry-weather as a result of water conservation efforts by the LACFCD at various groundwater recharge facilities and natural infiltration in the soft bottom reaches of the San Gabriel River. Future monitoring will provide additional evidence as to the level of connection between the RH/SGRWQG area and downstream reaches. Receiving waters within the RH/SGRWQG area include:

- Los Angeles River Watershed Water Bodies (tributary to Rio Hondo)
    - Arcadia Wash
    - Little Santa Anita Canyon Creek
    - Santa Anita Wash
    - Monrovia Canyon Wash
    - Sawpit Wash
    - Rio Hondo Reach 3
- San Gabriel River Water Bodies
    - San Gabriel River Reach 5
    - Little Dalton Wash
    - Big Dalton Wash
    - San Dimas Wash

Lakes and reservoirs in the EWMP area include:

- Los Angeles River Watershed Lake
    - Peck Road Park Lake
- San Gabriel River Watershed Lake
    - Santa Fe Dam Park Lake

The Santa Fe Dam Park Lake is included in the list of major water bodies in the RH/SGRWQG area; however, there are no MS4 discharges to the lake, thus it will not be included in the EWMP. The water quality associated with these water bodies is discussed in **Section 2**.

The beneficial uses for the applicable water bodies are summarized in **Table 1-3**. The Basin Plan for Los Angeles County identifies the following applicable beneficial uses:

- **Municipal and Domestic Supply (MUN)** – Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- **Industrial Service Supply (IND)** – Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
- **Industrial Process Supply (PROC) –** Uses of water for industrial activities that depend primarily on water quality.
- **Agricultural Supply (AGR) –** Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
- **Groundwater Recharge (GWR)** – Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
- **Water Contact Recreation (REC-1)** – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

- **Non-contact Water Recreation (REC-2)** – Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
- **Warm Freshwater Habitat (WARM) –** Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- **Wildlife Habitat (WILD) –** Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
- **Rare, Threatened, or Endangered Species (RARE) –** Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.
- **Wetland Habitat (WET) –** Uses of water that support wetland ecosystems including, but not limited to, preservation or enhancement of wetland habitats, vegetation, fish, shellfish, or wildlife and other unique wetland functions which enhance water quality.

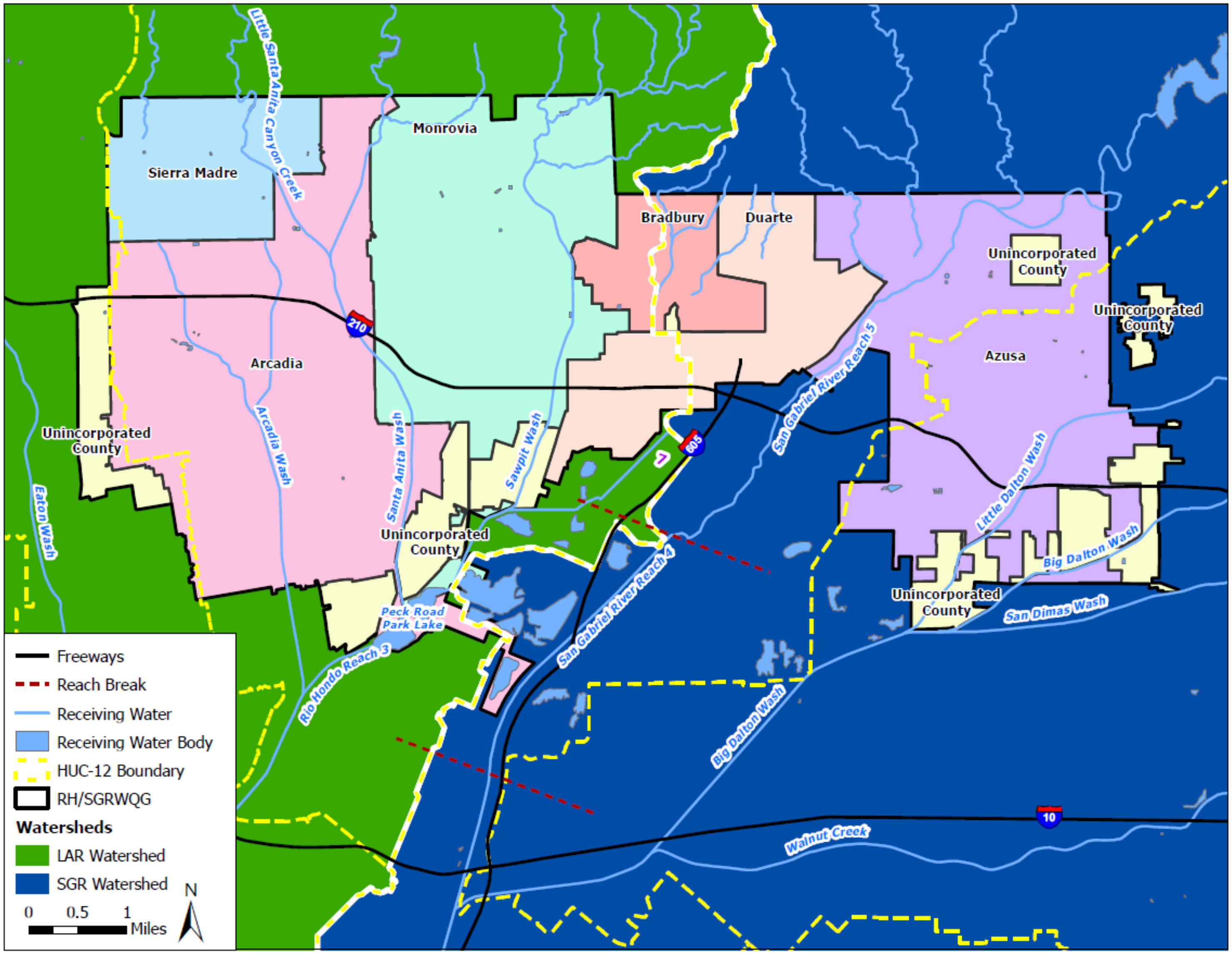

Figure 1-6 RH / SGRWQG Nearby Water Bodies and Regional Board Reaches

Table 1-3 Beneficial Use Summary of RH/SGRWQG Water Bodies

Water Body		Existing Beneficial Uses	Intermittent Beneficial Uses	Potential Beneficial Uses
Los Angeles River Watershed Water Bodies	Arcadia Wash	---	GWR, REC-2	MUN*, REC-1, WARM, WILD
	Little Santa Anita Canyon Creek	WILD	GWR, WARM	MUN*
	Santa Anita Wash	GWR[1], REC-1[1], REC-2, WARM[1], WILD[1], RARE	GWR[2]	MUN*, REC-1[2], WARM[2], WILD[2]
	Monrovia Canyon Wash	WILD, WET	MUN, GWR, REC-1, REC-2, WARM	---
	Sawpit Wash	WILD	MUN, GWR, REC-1, REC-2, WARM	---
	Rio Hondo Reach 3	REC-2, RARE, WET	GWR, REC-1, WILD	MUN*, WARM
Los Angeles River Watershed Lake	Peck Road Park Lake[4]	REC-2	GWR, WILD	MUN*, REC-1[3], WARM
San Gabriel River Watershed Water Bodies	San Gabriel River Reach 5	MUN, IND, PROC, AGR, GWR, REC-1, REC-2, WILD, WARM, COLD	---	---
	Little Dalton Wash	---	GWR, REC-2	MUN*, REC-1[3], WARM, WILD
	Big Dalton Wash	---	GWR, REC-2	MUN*, REC-1[3], WARM, WILD
	San Dimas Wash	GWR[1], WILD, RARE[2]	GWR[2], REC-1[3], REC-2, WARM	MUN*
San Gabriel River Watershed Lake	Santa Fe Dam Park Lake	WILD, WET	GWR, REC-2, WARM	REC-1, MUN*

*MUN designations are designated under SB 88-63 and RB 89-03. Some designations maybe considered for exemptions at a later date.

1 Only applies to upper portion of the corresponding water body.

2 Only applies to lower portion of the corresponding water body.

3 Access prohibited by Los Angeles County Department of Public Works in concrete-channelized areas.

4 Beneficial uses were not identified in the Basin Plan for Peck Road Park Lake. Therefore the downstream segment's uses (Rio Hondo Reach 1) apply based on Regional Board input (USEPA, 2012b).

1.3 Regulatory Framework

In 1972, provisions of the Federal Water Pollution Control Act, 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 an NPDES permit. In 1987, the CWA was amended, also called the Water Quality Act of 1987, to require the United States Environmental Protection Agency (USEPA) to establish a program to address stormwater discharges. In response, USEPA promulgated the NPDES stormwater permit application regulations. These regulations required that facilities with stormwater discharges "…from a large or medium municipal storm sewer system; or (3) a discharge which USEPA or the state/tribe determines to contribute to a violation of a water quality standard…" 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 five 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 Water Quality Control 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 the state. 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 WDRs also serve 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, except those discharges originating from the City of Long Beach MS4 (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, minimum control measures (MCMs), Total Maximum Daily Load (TMDL) provisions, and outlines the process for developing watershed management programs, 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 of the MS4 Permit requires compliance with the WQBELs as outlined by the respective TMDLs.

1.3.1 MS4 Permit Requirements

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

i. Be consistent with the provisions in Part VI.C.1.a.-f and VI.C.5-C.8;
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 all final WQBELs set forth in Part VI.E of the MS4 Permit and do not cause or contribute to exceedances of RWLs in Part V.A of the MS4 Permit by retaining through infiltration or capture and reuse the stormwater volume from the 85^{th} 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 85^{th} percentile, 24-hour storm event is not technically feasible, include other watershed control measures to ensure that MS4 discharges achieve compliance with all interim and final WQBELs set forth in Part VI.E 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 RWLs in Part V.A 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 of the MS4 Permit states that Permittees that elect to collaborate and develop an EWMP, shall submit the Work Plan for development of the EWMP no later than June 28, 2014, 18 months from the effective date of the MS4 Permit. The draft EWMP is to be submitted no later than June 28, 2015, 30 months from the effective date of the MS4 Permit. These deadlines stand true if the conditions described in Parts VI.C.4.c.iv.(1)-(3) of the MS4 Permit are met in greater than 50 percent of the land area in the watershed. In summary, the conditions require demonstrating there are Low Impact Development (LID) ordinances in place and/or commence development of LID ordinances that meet the requirements of the Planning and Land Development Program as described by Part VI.D.7 of the MS4 Permit, demonstrating that green streets policies are in place and/or commence development of a policy, and a Notice of Intent (NOI) to develop an EWMP is submitted, all within six months of the MS4 Permit's effective date. The RH/SGRWQG NOI is provided in **Attachment A**.

EWMP Work Plan Program Development requirements are specified in MS4 Permit Part VI.C.5 and focus on the:

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

1.3.2 Relevant TMDLs

TMDLs applicable to the EWMP area are listed in **Table 1-4**. The resolutions and effective dates reflect the most recent amendments to the Los Angeles River nitrogen and metals TMDLs. Revised WQBELs and RWLs are incorporated into the MS4 Permit by the Regional Board after adoption and approval of the TMDL amendment. TMDL impacted reaches are highlighted in **Figure 1-7** and a detailed summary of the numeric WLAs specified in the MS4 Permit is in **Attachment B**.

Table 1-4 TMDLs Applicable to the RH/SGRWQG and Downstream Areas

TMDL	LARWQCB Resolution Number	Effective Date and/or USEPA Approval Date
Los Angeles River Nitrogen Compounds and Related Effects TMDL	2003-009	March 23, 2004
	2012-010	Not Yet Effective
Los Angeles River Trash	2007-012	September 23, 2008
Los Angeles River Metals TMDL	2007-014	October 29, 2008
	2010-003	November 3, 2011
Los Angeles River Bacteria TMDL	2010-007	March 23, 2012
Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL	2011-008	March 23, 2012
Los Angeles Area Lakes TMDLs for Peck Road Park Lake	N/A (USEPA TMDL)	March 26, 2012
San Gabriel River Metals and Impaired Tributaries Metals and Selenium TMDL		March 26, 2007

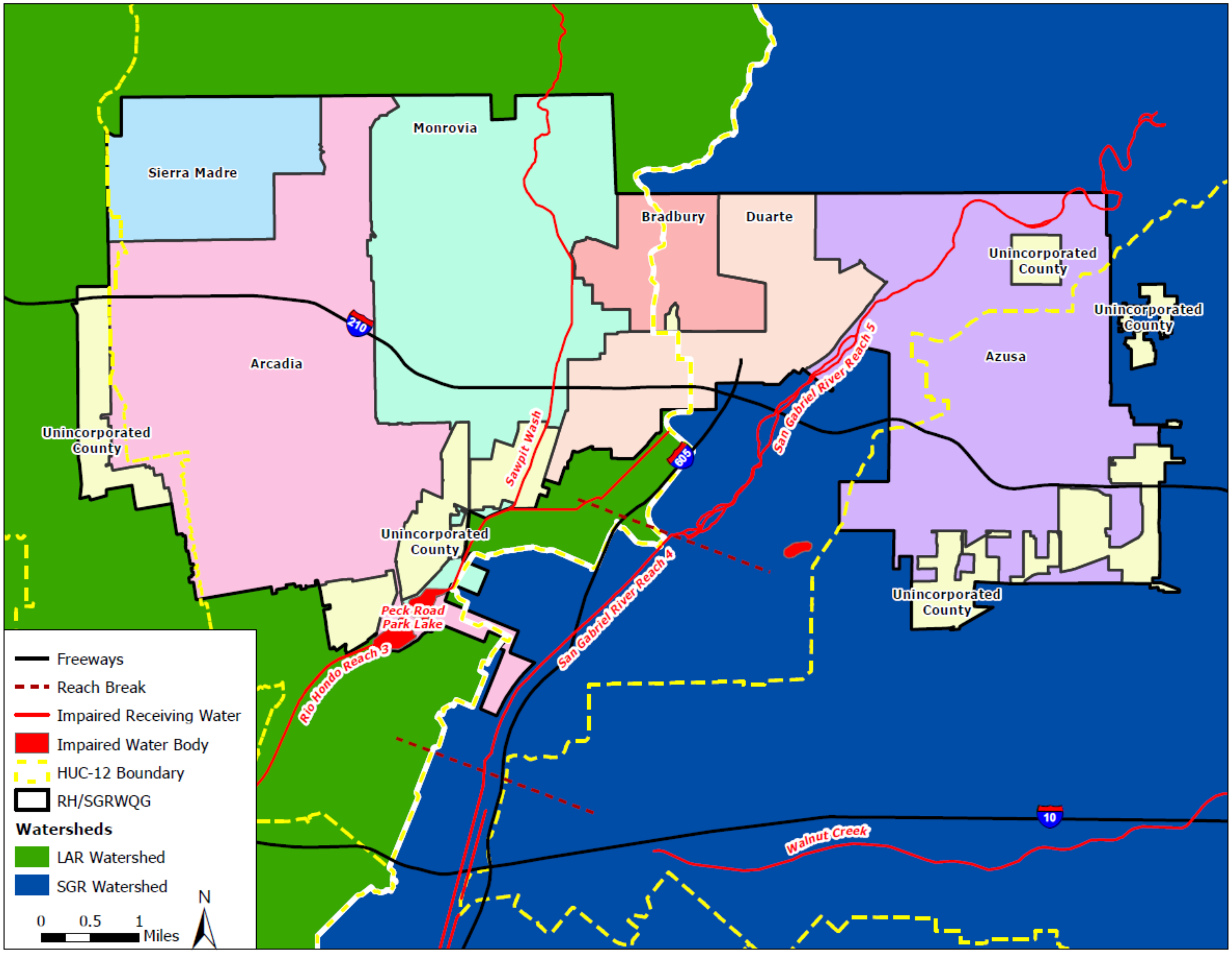

Figure 1-7 RH/SGRWQG Nearby Impaired Water Bodies

Table 1-5 demonstrates which RH/SGRWQG members are affected by each of the TMDLs per Attachment K, Tables K-5, K-6, K-9, and K-10, of the MS4 Permit.

Table 1-5 RH/SGRWQG TMDLs and Applicability

RH/SGRWQG Member	LAR Watershed Trash TMDL	LAR Nitrogen Compounds and Related Effects TMDL	LAR and Tributaries Metals TMDL	LAR Watershed Bacteria TMDL	Los Angeles Area Lakes TMDLs for Peck Road Park Lake	Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxics TMDL[1]	SGR and Impaired Tributaries Metals and Selenium TMDL
Arcadia	X	X	X	X	X		X
Azusa							X
Bradbury	X	X	X	X	X		X
Duarte	X	X	X	X	X		X
Monrovia	X	X	X	X	X		X
Sierra Madre	X	X	X	X	X		
County of Los Angeles	X	X	X	X	X	X	X
LACFCD		X	X	X	X	X	X

[1] The Cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, and Sierra Madre have a TMDL obligation to monitor at the mouth of the Los Angeles River and San Gabriel River Estuaries for the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxics TMDL.

Regional Board adopted TMDLs include implementation plans providing interim and final compliance dates. **Table 1-6** lists the interim and final compliance dates relevant to the RH/SGRWQG. There are two compliance paths for the dry-weather bacteria TMDL, based on whether or not each jurisdiction develops and implements a Load Reduction Strategy (LRS). The LRS must quantitatively demonstrate that outfall specific actions are sufficient to result in attainment of the final WLAs. Additionally, there are required dry-weather “snapshot” monitoring events where, for each event, every flowing outfall is sampled for bacterial indicators. Six snapshot monitoring events are required prior to LRS implementation and three after to assess effectiveness. Completing the LRS process provides regulatory relief by providing seven additional years before final effluent limitations become effective. The LRS due date and corresponding interim and final compliance milestones for the dry-weather bacteria TMDL for the Los Angeles River side of the RH/SGRWQG are included in **Table 1-6**.

The Harbor Toxics TMDL has an implementation plan with effective interim and final compliance milestones. The Regional Board approved an implementation plan for the San Gabriel River Metals TMDL on March 4, 2014. For Peck Road Park Lake there is no established implementation plan; therefore, the milestones and ultimate compliance dates for Peck Road Park Lake will be established through the EWMP process. The compliance dates and milestones for the TMDLs applicable to the RH/SGRWQG are listed in **Table 1-6**, including those for Peck Road Park Lake. **Table 1-7** identifies the WQBELs and WLAs for discharges to Peck Road Park Lake.

Table 1-6 Schedule of TMDL Compliance Milestones Applicable to the RH/SGRWQG

TMDL	Water Bodies	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Milestones (Bolded **numbers** indicate milestone deadlines within the current MS4 Permit term)[1]													
					2012	2013	2014	2015	2016	2017	2020	2023	2024	2026	2028	2030	2032	2037
LAR Nitrogen	All	Ammonia, Nitrate, Nitrite, Nitrate+Nitrite	Meet WQBELs	All	**Pre 2012**													
					Final													
LAR Trash	All	Trash	% Reduction	All	**9/30**	**9/30**	**9/30**	**9/30**	**9/30**									
					70%	**80%**	**90%**	**96.7%**	**100%**									
LAR Metals	All	Copper, Lead, Zinc	% of MS4 area Meets WQBELs	Dry	**1/11**						1/11		1/11					
					50%						75%		100%					
	All	Copper, Lead, Zinc, Cadmium		Wet	**1/11**								1/11		1/11			
					25%								50%		100%			
SGR Metals	All	Copper, Selenium	% of MS4 area Meets WQBELs[2]	Dry						9/30	9/30	9/30						
										30%	70%	100%						
		Copper, Lead, Zinc		Wet						9/30	9/30	9/30		9/30				
										10%	35%	65%		100%				
LAR Bacteria	All	*E. Coli*	Meet WQBELs	Dry w/o LRS								Final						
				Dry w/ LRS					**LRS Due[3]**			Interim				Final		
				Wet														Final
Harbors Toxics	Estuary	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	**12/28**												3/23	
					Interim												Final	
LA Area Lakes	Peck Road Park Lake	Total-P, Total-N, Trash Water and Sediment: PCBs, Chlordane, DDT, Dieldrin	Meet WLAs	All	USEPA TMDLs, which do not contain interim milestones or implementation schedule. The MS4 Permit (Part VI.E.3.c, page 145) allows MS4 Permittees to propose a schedule in an EWMP.													

Notes: LAR = Los Angeles River; SGR = San Gabriel River

1 The MS4 Permit term is assumed to be five years from the MS4 Permit effective date or December 27, 2017.

2 Alternatively may be demonstrated as percent of required reduction.

3 LRS requires coordinated effort by all MS4 Permittees within a segment or tributary. An LRS must quantitatively demonstrate that the actions for specific outfalls are sufficient to result in attainment of the *final* WLAs. Requires six snapshot sampling events prior to LRS and three post-LRS snapshot sampling events.

Table 1-7 Applicability of WQBELs and WLAs for Peck Road Park Lake			
Constituent	**Water Column**	**Suspended Sediment**	**Fish Tissue**
Total Nitrogen	W		
Total Phosphorus	W		
Trash	W		
Total PCB	W	W	Alt
Total Chlordane	W	W	Alt
Dieldrin	W	W	Alt
Total DDT*	W	W	Alt

W = Waste Load Allocation established by TMDL.
Alt = Alternate compliance options if fish tissue targets are met.
*Total DDT measured in suspended sediment, 4-4' DDT measured in water column.

1.4 EWMP Development Process

According to Part VI.C.1.f.v of the MS4 Permit, each EWMP 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 EWMP from 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 an EWMP is being developed and one public representative from a non-governmental organization with public membership, and staff from the Regional Board and USEPA Region IX. The RH/SGRWQG has been part of the TAC and provided input on the various topics discussed. Additionally, the RH/SGRWQG is working with local and regional stakeholders to receive input on the EWMP process.

The RH/SGRWQG members have held bi-monthly meetings since the project's initiation and will continue to do so throughout the EWMP development process. A minimum of two workshops will be held to bring together interested parties to provide input and insight into the approach and findings of this EWMP Work Plan. These workshops will solicit input and ideas from stakeholders, specifically in regards to potential multi-benefit regional projects.

The RH/SGRWQG conducted its first stakeholder outreach meeting on May 5, 2014, in collaboration with the Upper San Gabriel River Group. Thirty-nine participants attended the outreach event, including non-governmental organizations, an assembly member representative, Regional Board staff, and other interested stakeholders. Additional meetings and workshops are being developed and will be conducted throughout the EWMP development process.

1.5 EWMP Work Plan Overview

The EWMP Work Plan documents the progress thus far in the development of the EWMP by detailing the water quality priorities within the RH/SGRWQG area, identifying existing and potential control measures, as well as the approach to identifying additional projects, and outlining an approach to the RAA. 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 framework of the EWMP and includes the following sections:

- **Section 2 - Water Quality Priorities**
  Receiving water bodies are identified and characterized based on available water quality data records. Water Body-Pollutant Classifications are developed so that categories can be assigned

to each water body-pollutant combination to develop an approach to prioritizing the identified water quality priorities. The water quality priorities will be the primary "driver" of the EWMP.

- **Section 3 - Watershed Control Measures**
This section outlines the existing and potential control measures implemented by the RH/SGRWQG. Existing structural BMPs are identified and planning documents were reviewed to identify potential regional projects. In addition, an approach to identifying and selecting additional regional and distributed BMPs is included. The current MCMs are described and an approach to modifying the programs, as well as potential modifications, is presented for review prior to EWMP development. Watershed control measures will be implemented to address the water quality priorities.

- **Section 4 - Reasonable Assurance Analysis Approach**
The approach to the RAA is presented in this section. The modeling system being used by the RH/SGRWQG is highlighted along with the process and modeling approach. The modeling approach is described in a six step process that establishes numeric water quality goals and provides a roadmap describing how to get to final WLAs. The spatial domain, pollutant load reduction goals, and BMP model integration are described. The RAA will model combinations of watershed control measures and BMPs to demonstrate their effectiveness in addressing the water quality priorities.

- **Section 5 - EWMP Development**
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, is presented. Lastly, the adaptive nature of the EWMP development is discussed.

1.6 2012 MS4 Permit Process and EWMP Implementation

Following Regional Board adoption of the 2012 MS4 Permit as Order R4-2012-0175 on November 8, 2012, thirty-seven cities and three non-governmental organizations filed petitions for review with the State Water Resources Control Board (SWRCB), which were acknowledged in a January 30, 2013 letter, and deemed complete on July 8, 2013. Five of the filing Cities also simultaneously filed Request for Stays, which were denied on June 14, 2013. On April 1, 2014, the SWRCB adopted an Own Motion Review and thirty-five of the petitioners agreed to have their petitions for review placed in abeyance. The following reservation is included as a contingency in the EWMP Work Plan, while the review processes proceed.

> *On December 10, 2012 the Cities of Arcadia, Bradbury, Duarte, Monrovia, and Sierra Madre (hereinafter "the Cities") submitted Administrative Petitions (Petitions) to the California State Water Resources Control Board (SWRCB) pursuant to section 13320(a) of the California Water Code requesting that the SWRCB review various terms and requirements set forth in the 2012 MS4 Permit, Order No. R4-2012-0175 (2012 Permit) adopted by the California Regional Water Quality Control Board, Los Angeles Region (Regional Board). The Petitions were subsequently referred to as SWRCB/OCC File Nos. A 2236. For example Monrovia's petition for review is designated as A2236(v). The Cities petitions requested that the State Board review certain terms/requirements contained in the 2012 Permit, including a review of all numeric limits, both interim and final, and whether derived from a TMDL or provided from the application of an adopted water quality standard, or through a discharge prohibition set forth in the Permit. The challenges to the various numeric limits set forth in the Permit, includes a challenge to all such numeric limits that may be complied with through the implementation of an approved Enhanced*

Watershed Management Plan (EWMP) and Coordinated Integrated Monitoring Plan (CIMP). On July 8, 2013 the SWRCB advised the Cities that the respective Petitions were complete and all such Petitions remain pending at this time.

In spite of the pending Petitions, the Cities are acting in good faith and moving forward to attempt to comply with all of the applicable terms of the Permit, and look forward to working with the Regional Board to assess and implement the strategies and requirements necessary for compliance, including the development of an acceptable EWMP and CIMP. Nevertheless, because, through their Petitions, the Cities believe that many of the terms of the 2012 Permit are invalid, including the terms involving compliance with numeric limits. The Cities hereby expressly reserve and are not waiving, with this submission or otherwise, any of their rights to challenge the need for any EWMP and CIMP, including their rights to seek to void or otherwise compel modifications to the Permit terms involving the EWMP and CIMP, or to void or compel revisions to any other part or portion of the Permit. In addition, the Cities are not waving, and hereby expressly reserve, any and all rights they have or may have to seek to recover the costs from the State to develop and implement any EWMP and CIMP, on the grounds that such requirements are unfunded State mandates, and if funds are not provided by the State, to reimburse the Cities for such programs, to invalidate all such requirements.

2. Water Quality Priorities

The identification of water quality priorities is an important first step in the EWMP process. Water quality priorities provide the basis for implementation and monitoring activities within the EWMP, Coordinated Integrated Monitoring Program (CIMP), and the selection and scheduling of BMPs during the RAA. Part VI.C.5.a of the MS4 Permit outlines the pertinent elements of the prioritization process as follows:

1. Water quality characterization based on available monitoring data, TMDLs, 303(d) lists, stormwater annual reports, etc.
2. Water body-pollutant classification to identify water body-pollutant combinations (WBPCs) that fall into three MS4 Permit defined categories.
3. Source assessment for the WBPCs in the three categories.
4. Prioritization of the WBPCs.

Based on available information and data analysis, WBPCs are classified into one of the three MS4 Permit categories: Category 1 if WBPCs are subject to established TMDLs; Category 2 if they are on the 303(d) list, or have sufficient measured exceedances of objectives to be listed; and Category 3 if observed exceedances are too infrequent to be listed. The categories are further described in **Table 2-1**. To support development of the Work Plan and EWMP scheduling, subcategories were developed for each of the WBPCs in Category 1, 2, and 3, and are discussed in **Section 2.2**.

Table 2-1 Water Body-Pollutant Combination Categories

Category	Priority	Water Body-Pollutant Combinations (WBPCs)
1	Highest Priority	WBPCs for which TMDL WQBELs and/or RWLs are established in Part VI.E and Attachments O and P of the MS4 Permit.
2	High Priority	WBPCs for which data indicate water quality impairment in the receiving water according to the State's Listing Policy, regardless of whether the pollutant is currently on the 303(d) list and for which the MS4 discharges may be causing or contributing.
3	Medium Priority	WBPCs for which there are insufficient data to indicate impairment in the receiving water according to the State's Listing Policy, but which exceed applicable RWLs contained in the MS4 Permit and for which MS4 discharges may be causing or contributing to the exceedance.

The following sections describe the characterization and prioritization of those WBPCs found to be issues in the RH/SGRWQG area.

2.1 Water Quality Characterization

Per Part VI.C.5.a.i of the MS4 Permit, each EWMP shall include an evaluation of existing water quality conditions, including characterization of stormwater and non-stormwater discharges from the MS4 and receiving water quality, to support identification and prioritization/sequencing of management actions. This section provides a summary of the information considered and analyses conducted to support the classification of WBPCs into the three priority categories. The characterization process consisted of the following steps, which are discussed in the following sections:

1. Identifying the water bodies within the EWMP area.
2. Compiling WBPCs with applicable TMDLs listed in the MS4 Permit.
3. Compiling 303(d) listings from the 2010 303(d) list, the most recent approved list.
4. Gathering additional relevant data and information (e.g., water quality data).

5. Conducting data analysis to evaluate attainment of water quality objectives (relevant to TMDL requirements, 303(d) impairment listings, and existing water quality data).

Data was obtained from sources including: established TMDLs, 303(d) listings, WQBELs, RWLs, Surface Water Ambient Monitoring Program (SWAMP), and annual reports. The RH/SGRWQG gathered and used the following information to assess water quality and identify water quality priorities:

- Findings from Illicit Connections and Illicit Discharge Elimination Programs;
- Findings from the Industrial/Commercial Facilities Programs;
- Findings from the Development Construction Programs;
- Findings from the Public Agency Activities Programs;
- TMDL source investigations;
- Findings from monitoring programs, such as TMDL compliance monitoring and receiving water monitoring; and
- Any other pertinent data, information, or studies related to constituent sources and conditions that contribute to the highest water quality priorities.

Monitoring data for sites within the LAR and SGR WMAs was obtained from the following sources:

- Los Angeles County Department of Public Works (LACDPW) provided long-term monitoring data from the San Gabriel River Mass Emission Station (S14) and the tributary monitoring performed on the Rio Hondo (TS06);
- The Council for Watershed Health provided monitoring data from their monitoring activities throughout the watershed;
- The California Environmental Data Exchange Network (CEDEN); and
- Los Angeles County Sanitation Districts (LACSD) provided long-term receiving water monitoring data.

Locations of sites with available water quality data are shown on **Figure 2-1**. Data received from the Council for Watershed Health and CEDEN largely consisted of short term monitoring activities and many sites from these programs were only used for a single sampling event or had a limited number of constituents tested at the sites. All data were screened to identify potential water quality objective exceedances.

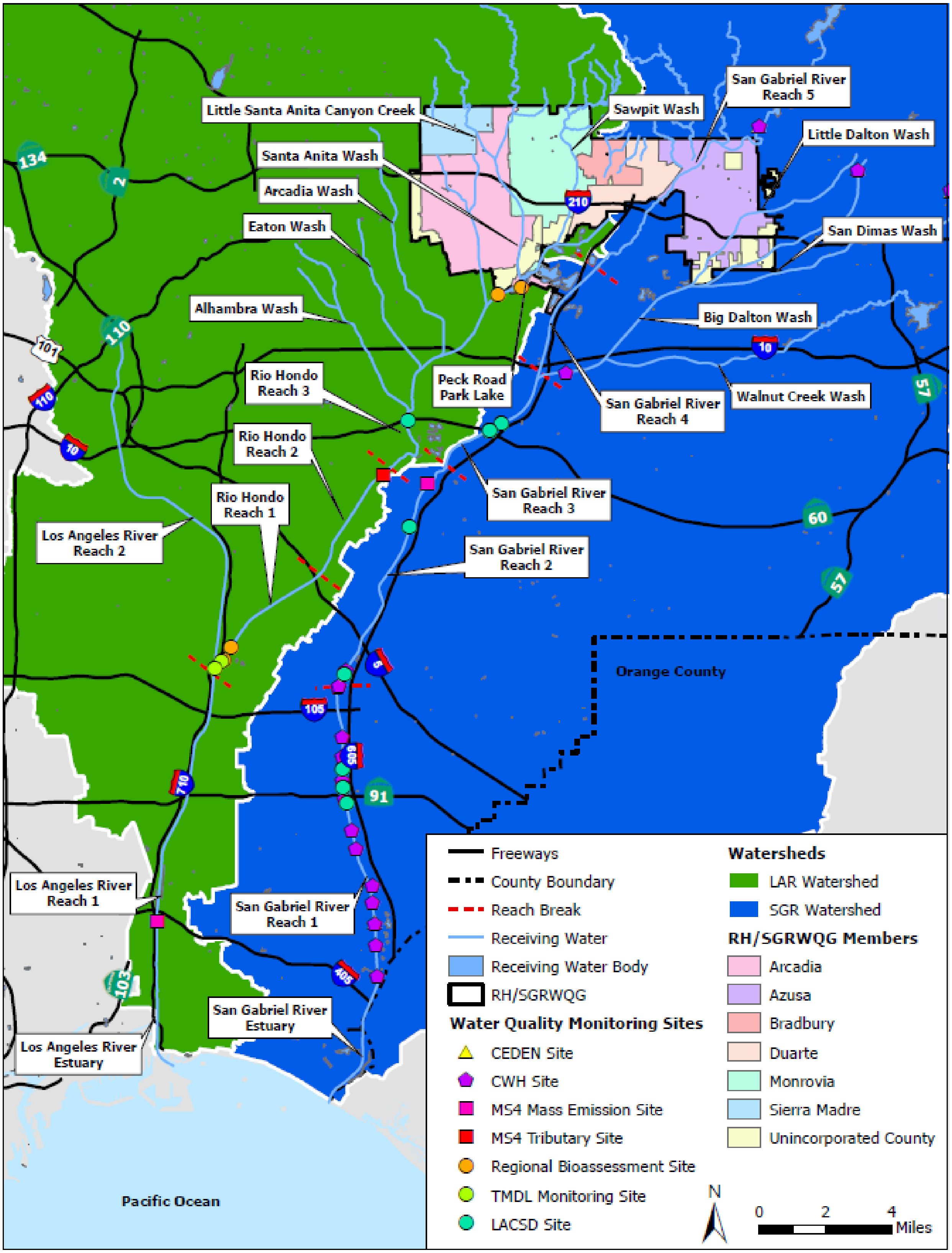

Figure 2-1 RH/SGRWQG Water Bodies, Regional Board Reaches, and Site Locations with Available Water Quality Data

2.1.1 Characterization of Receiving Water Quality

Per Part VI.C.4.a.i of the MS4 Permit, each EWMP must include an evaluation of existing water quality conditions, including a characterization of receiving water quality. **Attachment C** includes additional details on the data analysis and results.

Data were compiled to identify constituents exceeding applicable Water Quality Objectives (WQOs). Applicable WQOs were compiled from the California Toxics Rule (CTR), the Basin Plan, and relevant TMDLs. Applicable WQOs were selected based on the beneficial uses identified in **Table 1-3** and identified in **Attachment C**. These WQOs were used to assess exceedance frequency and determine the WBPC categorization.

Reported monitoring data was analyzed to determine constituents exceeding water quality objectives. The data was screened to ensure each record contained at a minimum the following information: water body identification, an identifiable site location (i.e., GPS coordinates), date of sampling, name of constituent, minimum detection level, reporting level, the result (or in cases where the level was below detection level for the analysis, a flag indicating not detected), units of measurement, sample matrix, sample collection, and an indication of dissolved or total where appropriate. **Table 2-2** quantifies the amount of water quality monitoring data that was obtained and used for water quality prioritization. The data summary is provided for all available data collected within the past 10 years, and for recent data collected within the past 5 years.

Table 2-2 Summary of Available Data

Water Body	All Data (2002-2012)			Previous 5 Years (2007-2012)		
	Total Analyses	Number Detected[1]	Number of Constituents[2]	Total Analyses	Number Detected[1]	Number of Constituents[2]
Rio Hondo Reach 3	12,985	5,796	311	3,658	1,690	218
San Gabriel River Reach 5	146	146	53	37	37	37
Big Dalton Wash	20	18	18	0	0	0
San Dimas Wash	17	15	17	0	0	0
Peck Road Park Lake[3]	28	28	17	0	0	0
Totals:	**13,196**	**6,003**	**---**	**3,695**	**1,727**	**---**

1 Number of analyses where the constituent was present in the sample above the minimum detection level.
2 Number of distinct constituents. Total copper and dissolved copper are counted as distinct constituents.
3 Including tributaries to the named water body.

Impaired water bodies and constituents identified in the initial screening were individually evaluated based on the frequency, timing, and magnitude of exceedances within the data based on the category. Constituents subject to a TMDL underwent data review to determine the status of compliance. Constituents on the 303(d) list for a watershed were reviewed to identify the basis for the listing and the current status of exceedances. Constituents potentially exceeding receiving water limits but not already accounted for in a TMDL or the 303(d) list were analyzed based on applicable water quality objectives.

Based on the data review, constituents that had no observed exceedances in the past five years or would not meet the 303(d) listing criteria for impairment could potentially be delisted. The exceedance frequency over the past five years for the identified constituents is presented in **Table 2-3**. The water quality data are compared to the WQBELs where available or the water quality objectives to calculate the percent exceeding the limitations. For each WBPC, the number of exceedances and total number of samples analyzed are presented.

Attachment C includes a summary of the key findings from the receiving water data analysis. The key findings highlight outcomes of the data analysis that may affect the constituents addressed by the EWMP and/or the way the EWMP will approach addressing the constituent.

Table 2-3 Exceedances Based on Water Quality Data Analysis

Constituent	Data Range	Number of Exceedances / Number of Samples			
		Rio Hondo Reach 3	San Gabriel River Reach 5	San Dimas Wash	Big Dalton Wash
Aluminum	All	0/32	---	---	0/1
	5-yrs	---	---	---	---
Ammonia	All	1/187	0/2	0/1	0/1
	5-yrs	0/13	---	---	---
2,3,7,8-TCDD	All	0/6	---	---	---
	5-yrs	0/6	---	---	---
Benzo(a)Pyrene	All	1/54	---	---	---
	5-yrs	1/11	---	---	---
Benzo(b)Fluoranthene	All	2/30	---	---	---
	5-yrs	1/11	---	---	---
Benzo(k)Fluoranthene	All	3/54	---	---	---
	5-yrs	2/11	---	---	---
Bis(2-Ethylhexyl) Phthalate	All	5/11	---	---	---
	5-yrs	---	---	---	---
Chloride	All	3/123	0/1	0/1	0/2
	5-yrs	1/58	0/1	---	
Chrysene	All	1/54	---	---	---
	5-yrs	1/11	---	---	---
Diazinon	All	6/72	---	---	---
	5-yrs	2/19	---	---	---
Dibenzo(a,h)Anthracene	All	3/54	---	---	---
	5-yrs	2/11	---	---	---
Copper	All	11/117	1/4	---	---
	5-yrs	3/52	0/1	---	---
Total Dissolved Solids	All	0/117	0/3	---	---
	5-yrs	0/52	0/1	---	---
Dissolved Oxygen	All	82/220	---	0/1	0/1
	5-yrs	23/59	---	---	---
pH	All	47/222	0/3	0/1	0/1
	5-yrs	5/52	---	---	---
E. coli	All	43/59	---	---	---
	5-yrs	36/52	---	---	---
Fecal Coliform	All	158/220	---	---	---
	5-yrs	35/52	---	---	---

Table 2-3 Exceedances Based on Water Quality Data Analysis						
Constituent	**Data Range**	**Number of Exceedances/Number of Samples**				
		Rio Hondo Reach 3	**San Gabriel River Reach 5**	**San Dimas Wash**	**Big Dalton Wash**
Total Coliform	All	220/220	---	---	---
	5-yrs	52/52	---	---	---
Indeno(1,2,3-cd)Pyrene	All	3/47	---	---	---
	5-yrs	3/9	---	---	---
Mercury	All	2/74	---	---	---
	5-yrs	1/43	---	---	---
N-Nitrosodimethylamine	All	4/51	---	---	---
	5-yrs	0/9	---	---	---
Lead	All	4/117	0/3	---	---
	5-yrs	0/52	0/1	---	---
Nitrate	All	0/192	0/5	0/1	---
	5-yrs	0/24	0/1	---	---
Nitrite	All	0/192	0/1	0/1	---
	5-yrs	0/24	---	---	---
Total Nitrogen	All	1/246	---	---	---
	5-yrs	0/90	---	---	---
Selenium	All	---	0/2	---	---
	5-yrs	---	---	---	---
Cyanide	All	6/92	---	---	---
	5-yrs	0/27	---	---	---
Zinc	All	1/117	0/3	---	---
	5-yrs	0/52	---	---	---

2.1.2 Characterization of Discharge Quality

Per Part VI.C.5.a.i of the MS4 Permit, each EWMP must include a characterization of stormwater and non-stormwater discharges from the MS4. Data is very limited for MS4 discharges within the RH/SGRWQG area. Regional studies, monitoring data, and/or land use data will be further evaluated in the future to characterize discharge quality. In addition, data will become available through the future implementation of the CIMP, which will be utilized through the adaptive management process.

2.2 Water Body-Pollutant Classification

Based on available information and data analysis, WBPCs were classified in one of the three MS4 Permit categories described in **Table 2-1**. To reflect the sub-categorization outlined in the Regional Board's RAA Guidelines, subcategories are defined to facilitate scheduling decision support for watershed actions determined as part of the RAA and EWMP process. The subcategories are defined in **Table 2-4** and the categorization is summarized in **Table 2-5**.

As monitoring progresses, source investigations will occur, and BMP implementation will begin, thus it is possible the sub categorization of constituents may change. Constituents for which exceedances decrease over time will be removed from the priority list. If the frequency of constituent exceedances increases to a consistent level, for a constituent that is currently not a priority, then the constituent would be reevaluated using the prioritization procedure, likely increasing the priority of the constituent.

Due to the natural rate of infiltration, the Rio Hondo and San Gabriel River are generally dry with the exception of storm flows. Future monitoring data will be assessed to establish the disconnect between the upper and lower watershed during dry and minor storm events. Once the extent of the disconnection is established, the corresponding WBPCs flagged due to downstream water quality issues will be adjusted or removed from the categorization.

Table 2-4 Water Body-Pollutant Combination Subcategory Definitions

Category	Water Body-Pollutant Combinations (WBPCs)	Description
1	**Category 1A:** WBPCs with past due or current MS4 Permit term TMDL deadlines.	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.
	Category 1B: WBPCs with TMDL deadlines beyond the MS4 Permit term.	The MS4 Permit does not require the prioritization of TMDL interim and/or final deadlines outside of the MS4 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.
	Category 1C: WBPCs addressed in USEPA TMDL without a Regional Board Adopted Implementation Plan.	
2	**Category 2A:** 303(d) listed WBPCs or WBPCs that meet 303(d) listing requirements.	WBPCs with confirmed impairment or exceedances of receiving water limitations. WBPCs in a similar class[1] 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.
	Category 2B: 303(d) listed WBPCs or WBPCs that meet 303(d) listing requirements that are not a "pollutant"[2] (i.e., toxicity).	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.
3	**Category 3A:** All other WBPCs with exceedances identified through CIMP implementation.	Pollutants that are in a similar class[1] as those with TMDLs are identified.
	Category 3B: All other WBPCs that are not a "pollutant"[2] (i.e., toxicity).	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.
	Category 3C: WBPCs identified by the RH/SGRWQG members.	The RH/SGRWQG members may identify other WBPCs for consideration in EWMP planning.

1 Pollutants are considered in a similar class if they have similar fate and transport mechanisms, can be addressed via the same types of control measures, and within the same timeline already contemplated as part of the EWMP for the TMDL. (MS4 Permit Part VI.C.2.a.i).

2 While pollutants may be contributing to the impairment, it currently is not possible to identify the *specific* pollutant/stressor.

Table 2-5 Summary of RH/SGRWQG WBPC Categories								
Class[1]	**Constituents**	**Rio Hondo Reach 3**	**Monrovia Wash**	**Sawpit Wash**	**San Gabriel River Reach 5**	**San Dimas Wash**	**Big Dalton Wash**	**Peck Road Park Lake**
Category 1A: WBPCs with past due or current term TMDL deadlines.								
Nutrients	Ammonia	F	F	F				
	Nitrate	F	F	F				
	Nitrite	F	F	F				
Metals	Copper (Dry)	I	I	I				
	Lead (Dry)	I	I	I				
	Zinc (Dry)	I	I	I				
	Copper (Wet)	I	I	I				
	Lead (Wet)	I	I	I	I[3]	I[3]	I[3]	
	Zinc (Wet)	I	I	I				
	Cadmium (Wet)	I	I	I				
Trash	Trash	I/F	I/F	I/F				
Category 1B: WBPCs with TMDL deadlines beyond the current MS4 Permit term.								
Metals	Copper (Dry)	F	F	F				
	Lead (Dry)	F	F	F				
	Zinc (Dry)	F	F	F				
	Copper (Wet)	F	F	F				
	Lead (Wet)	F	F	F	F[3]	F[3]	F[3]	
	Zinc (Wet)	F	F	F				
	Cadmium (Wet)	F	F	F				
Bacteria	Fecal Coliform and *E. coli*	I/F	I/F	I/F				
Category 1C: WBPCs addressed in USEPA TMDL without an Implementation Plan.								
Nutrients	Total Nitrogen							X
	Total Phosphorus							X
Legacy	PCB (Sediment)							X
	PCB (Water)							X
	Chlordane (Sediment)							X
	Chlordane (Water)							X

Table 2-5 Summary of RH / SGRWQG WBPC Categories

Class[1]	Constituents	Rio Hondo Reach 3	Monrovia Wash	Sawpit Wash	San Gabriel River Reach 5	San Dimas Wash	Big Dalton Wash	Peck Road Park Lake
Legacy	Dieldrin (Sediment)							X
	Dieldrin (Water)							X
	DDT (Sediment)							X
	DDT (Water)							X
Category 2C: 303(d) listed WBPCs.								
Metals	Lead		303(d)					
Bacteria	Indicator Organisms	303(d)		303(d)	303(d)			
Other	Bis(2-ethylhexyl) phthalate			303(d)				
Category 3: All other WBPCs with exceedances identified through CIMP implementation.[4]								

1 Pollutants are considered in a similar class if they have similar fate and transport mechanisms, can be addressed via the same types of control measures, and within the same timeline already contemplated as part of the EWMP for the TMDL (MS4 Permit, Part VI.C.2.a.i).
2 While pollutants may be contributing to the impairment, it currently is not possible to identify the *specific* pollutant/stressor.
3 Grouped wet-weather waste load allocation, expressed as total recoverable metals discharged to all upstream reaches and tributaries of the San Gabriel River Reach 2.
4 Monitoring of Monitoring and Reporting Plan Table E-2 constituents in the first year at Long Term Assessment sites will identify the Category 3 WBPCs.

Note that unless explicitly stated as sediment, constituents are associated with the water column.
I/F = Denotes where the MS4 Permit includes interim (I) and/or final (F) effluent and/or receiving water limitations.
X = Identification of a WBPC, but no corresponding MS4 Permit implementation.
303(d) = WBPC on the 2010 303(d) list where the listing was confirmed during data analysis.

2.3 Source Assessment

After the WBPCs are categorized, the next step in the prioritization process is to conduct a source assessment. The MS4 Permit requires that a source assessment be conducted to identify potential sources within the RH/SGRWQG area for the WBPCs in Categories 1 - 3, utilizing existing information. An initial source assessment, contained herein, draws on readily available information to characterize potential sources of pollutants classified as Category 2 and Category 3 WBPCs and assesses whether MS4 discharges are likely to be significant sources of these constituents. Utilizing existing information, the constituents in **Table 2-5** were evaluated to determine if MS4 discharges could be a potential source. Many constituents are typically associated with MS4 discharges and additional investigations are not required. However, for some constituents, MS4 discharges are either not known as significant sources of the constituent or other potential sources are more likely. Potential sources for Category 1 WBPCs have been identified through TMDL development.

The initial source assessment for Category 1 - 3 WBPCs was conducted based on currently available information. The documents that were reviewed to identify potential pollutant sources are summarized in **Table 2-6**.

Table 2-6 Documents Reviewed for Initial Source Assessment

Documents	Date
Los Angeles River Nitrogen Compounds and Related Effects TMDLs	July 10, 2003
Los Angeles River Watershed Trash TMDL	September 19, 2001
Los Angeles River and Tributaries Metals TMDL	June 2, 2005
Los Angeles River Watershed Bacteria TMDL	July 15, 2010
Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL	May 5, 2011
San Gabriel River and Impaired Tributaries Metals and Selenium TMDL	July 13, 2006
Los Angeles Area Lakes TMDLs for Peck Road Park Lake	March 26, 2012
2010 Integrated Report (303(d) List/305(b) Report)	April 19, 2010

2.3.1 Potential Point Sources

Point sources are defined as discrete sources or conveyances that may carry pollutants to surface waters. Point sources are also a primary way pollutants are introduced into the environment. In California, point source discharges are regulated under Federal Clean Water Act NPDES Permits and California's Porter-Cologne Water Quality Control Act WDRs. The NPDES Permits in the RH/SGRWQG area include an MS4 Permit, California Department of Transportation (Caltrans) MS4 Permit, Construction General Permit (CGP), Industrial General Permit (IGP), major and minor NPDES Permits, and other general NPDES Permits. Combined NPDES/WDR Permits are issued by the Regional Board for discharges to surface waters. The NPDES Permit types for the Los Angeles River and San Gabriel River Watersheds are presented in **Table 2-7**.

The significance of these permitted discharges with respect to their potential contributions of pollutants to the watershed is a function of flow volumes and associated water quality discharge characteristics. The contribution of discharges from dry-weather runoff or wet-weather runoff also varies. For example, Caltrans, Construction and Industrial General stormwater Permittee discharges can deliver contaminated storm runoff directly into the watershed rivers and tributaries, as well as through the MS4. However, during dry-weather, their pollutant contribution potential is generally low. A broad assessment of the relative potential for pollutant contribution and runoff condition (wet-weather or dry-weather) of the discharges typically associated with each of the permit types is also presented in **Table 2-7**.

Table 2-7 NPDES Permits for Watersheds within the RH/SGRWQG

Type of NPDES Permit	LAR Watershed Number of Permits[1]	SGR Watershed Number of Permits[2]	Potential for Pollutant Contribution
Publicly Owned Treatment Works	6	5	High (dry-weather)
Municipal Stormwater	3	2	High (wet/dry-weather)
Caltrans Stormwater	-	1	High (wet/dry-weather)
Industrial Stormwater	1,307	599	High (wet-weather)
Construction Stormwater	204	344	High (wet-weather)
Other Major Industrial NPDES Discharges	3	2	High (wet-weather)
Minor NPDES Discharges	15	11	Medium (wet/dry-weather)
General NPDES Permits:			
Construction and Project Dewatering	35	16	Medium (wet-weather)
Petroleum Fuel Cleanup Sites	7	5	Medium (dry-weather)
VOC Cleanup Sites	6	4	Medium (dry-weather)
Hydrostatic Test Water	8	4	Low (wet/dry-weather)
Non-Process Wastewater	9	3	Medium (dry-weather)
Potable Water	25	24	Low (wet/dry-weather)

1 (USEPA, 2005)
2 (RWQCB, 2013)

2.3.2 Potential Non-Point Sources

Nearly all discharges to the Los Angeles and San Gabriel Rivers, and their tributaries, are regulated as point sources and are predominantly comprised of discharges from water reclamation plants and storm drains. Pollutants from non-point sources are conveyed to surface waters in a diffused manner (i.e., not directly from point source conveyances). However, when contaminants from such non-point sources reach the MS4, they become regulated through the MS4 Permit.

Non-point sources in the RH/SGRWQG area include:

- Atmospheric deposition
- Natural background loading (i.e., metals)
- Onsite Wastewater Treatment Systems (OWTS, a.k.a. septic systems)
- Runoff from the National and State forests in the headwaters of many tributaries
- Sources that occur within the channels of the Los Angeles River, San Gabriel River, and tributaries ("in-channel sources") such as:
  - Groundwater discharges
  - Transient population
  - Pet waste
  - Sanitary sewer leaks/spills
  - Illicit/illegal discharges
  - Wildlife and birds
  - Suspension and/or re-growth of sediment-associated pollutants

2.3.3 Specific Constituents

Nutrients, metals, indicator bacteria, and trash are commonly measured in MS4 discharges. While there are no specific measurements for outfalls in the RH/SGRWQG area, it is reasonable to assume the MS4 may contain these constituents. Additionally, where historic contamination exists, legacy pollutants such as PCBs and chlorinated pesticides may be found in MS4 discharges. These classes of compounds represent the Category 1 pollutants, where TMDLs have identified the MS4 as potential sources.

Two constituents identified in the receiving water assessment, cyanide and bis(2-ethylhexyl) phthalate have been associated with potential laboratory Quality Assurance/Quality Control (QA/QC) issues, as it is a known laboratory contaminant. While clear evidence of laboratory contamination is not available, the fact that no exceedances have been observed in the last 5 years suggests that MS4 discharges are unlikely to be a significant source of bis(2-ethylhexyl) phthalate. As a result, bis(2-ethylhexyl) phthalate is not considered to be a water quality priority based on the initial source assessment.

The LACSD and other laboratories have identified concerns with the preservation of cyanide samples for analysis. Analysis of different preservation and analytical methods for cyanide has indicated that artificial increases in cyanide concentrations can be introduced through the preservation and analytical process for cyanide (Stanley, 2012). As a result, LACSD has modified their sampling collection and cyanide analysis procedures to reduce the potential for artificially increasing cyanide concentrations. A review of the cyanide data used in the analysis determined that all samples with exceedances were from the MS4 mass emission station using sample processing methods that could potentially exacerbate cyanide concentrations. As a result, it is possible that some or all of the cyanide exceedances result from the analytical process. However, cyanide is also released from some industrial and commercial activities that could be present in the watershed.

Chloride and total dissolved solids (TDS) are salts that naturally occur in the watershed and are also discharged from water reclamation facilities. During storm events, salts are significantly diluted by stormwater runoff, therefore exceedances are generally observed during dry-weather. Further investigation pertaining to the source of exceedances is warranted to assess if non-stormwater discharges from MS4s are a potential source and may be conducted through a special study or addressed in the RAA.

Diazinon was used as an insecticide for agriculture and also as an all-purpose indoor and outdoor commercial pet control product. The majority land use designation within the RH/SGRWQG is residential. In addition, agricultural land use designation within the RH/SGRWQG is located within the City of Bradbury. With these two land use designations, MS4 discharges cannot be excluded as a potential source of diazinon. With the ban on diazinon for commercial use, diazinon receiving water concentrations and exceedances may decrease through the years.

PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, brushfires, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot. Some PAHs are manufactured. The pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides. PAHs have also historically been linked to diesel vehicle traffic, although improved filter systems now trap most of the particulates to which they bind. Based on the data review and timing of the exceedance, results indicate that the large 2009 Station Fire may have been a significant source of the observed PAH exceedances within the RH/SGRWQG area.

N-Nitrosodimethylamine (NDMA) is typically not identified as an MS4 pollutant. Generation of NDMA is possible in wastewater treatment where chlorination is used to disinfect water containing ammonia. After the LACSD employed nitrification to remove ammonia prior to chlorination, there have been no measured exceedances for the last 5 years. Based on these observations, it is assumed that MS4 discharges are not a significant source of NDMA.

Based on the source assessment and pollutant linkages to the MS4, the water quality priorities were generated and summarized in **Table 2-8**. The table also indicates the potential linkage to the MS4, defined as follows:

- **High** – where TMDLs exist (Category 1 pollutants) that have identified WLAs for the MS4;
- **Medium** – not a clear determination of positive or negative attribution to the MS4; and
- **Low** – where it is likely a source other than the MS4 that contributes to the water quality exceedances.

The EWMP will need to identify control measures to address the water quality priorities, unless the source of the pollutant is attributed to a non-MS4 source, such as water reclamation plants.

Table 2-8 Water Quality Priorities for the RH/SGRWQG

Category	Class	Pollutant	Water Body	MS4 Linkage
Category 1	Bacteria	Fecal Coliform and *E. Coli*	Rio Hondo Reach 3, Monrovia Wash, Sawpit Wash, and Peck Road Park Lake	High
	Legacy	PCBs, Chlordane, Dieldrin, DDT	Peck Road Park Lake	High
	Metals	Cadmium, Copper, Zinc	Rio Hondo Reach 3, Monrovia Wash, and Sawpit Wash	High
		Lead	Rio Hondo Reach 3, Monrovia Wash, Sawpit Wash, and SGR Reach 5	High
	Nutrients	Ammonia, Nitrate, Nitrite	Rio Hondo Reach 3, Monrovia Wash, and Sawpit Wash	Low
		Total Nitrogen, Total Phosphorus	Peck Road Park Lake	Low
	Trash	Trash	Rio Hondo Reach 3, Monrovia Wash, and Sawpit Wash	High
Category 2	Bacteria	Indicator Organisms	Rio Hondo Reach 3, Sawpit Wash, and SGR Reach 5	High
	Metals	Lead	Monrovia Wash	High
	Other	Bis(2-ethylhexyl) phthalate	Sawpit Wash	Low

2.4 Approach to Prioritization

The MS4 Permit outlines a prioritization process that defines how pollutants in the various categories will be considered in scheduling during the EWMP development process. Based on compliance pathways outlined in the MS4 Permit, the scheduling factors to consider include the following:

- TMDLs with past due interim and/or final limits and those with interim and/or final limits within the MS4 Permit term (schedule according to TMDL schedule)
- TMDLs with interim and/or final limits outside the MS4 Permit term (schedule according to TMDL schedule)
- Other receiving water exceedances
    - Pollutants in the same class as those addressed in a TMDL (evaluate ability to consider on same timeframe as TMDL)
    - Pollutants on the 303(d) list or in the same class as those on the 303(d) listings (develop schedule to address as soon as possible with milestones)
    - Pollutants with exceedances that are not in the same class as 303(d) listing (conduct monitoring under CIMP to confirm exceedances and if confirmed develop schedule with milestones)
    - Pollutants without exceedances in last 5 years (not prioritized for BMPs, but included in monitoring)

Evaluating whether or not a pollutant is in the same class as either a TMDL or a 303(d) listed pollutant is a critical decision for prioritization and scheduling. The MS4 Permit definition of class is as follows:

> "Pollutants are considered in a similar class if they have similar fate and transport mechanisms, can be addressed via the same types of control measures, and within the same timeline already contemplated as part of the EWMP for the TMDL."

As part of EWMP development and the RAA, prioritizing and sequencing of BMPs will consider the aforementioned factors, including linking pollutants within the same class.

3. Watershed Control Measures

The EWMP provides the opportunity for Permittees to customize their stormwater programs to address water quality priorities through the implementation of stormwater BMPs, referred to in the MS4 Permit as watershed control measures. The overarching goal of BMPs in the EWMP is to reduce the impact of stormwater and non-stormwater on receiving water quality and address the water quality priorities. The development of the EWMP will involve the evaluation and selection of multiple BMP types. This section describes the different types of BMPs that may be considered for inclusion in the EWMP, with an emphasis on regional BMPs which are critical to the EWMP development process.

The three main categories of BMPs include structural, both regional or distributed, and institutional as defined below. The term "regional BMP" is different than "regional EWMP project" in that regional BMP projects are not necessarily able to capture the 85th percentile, 24-hour storm event.

Regional BMPs: Constructed structural practices intended to treat runoff from a contributing area of multiple parcels (normally on the order of 10s or 100s of acres or larger) (**Figure 3-1**)

Distributed BMPs: Constructed structural practices intended to treat runoff relatively close to the source and typically implemented at a single- or few-parcel level (normally less than one acre) (**Figure 3-2**)

Institutional BMPs: Policies, actions and activities intended to prevent pollutants from entering stormwater runoff thus eliminating the source of the pollutants. These BMPs are not constructed.

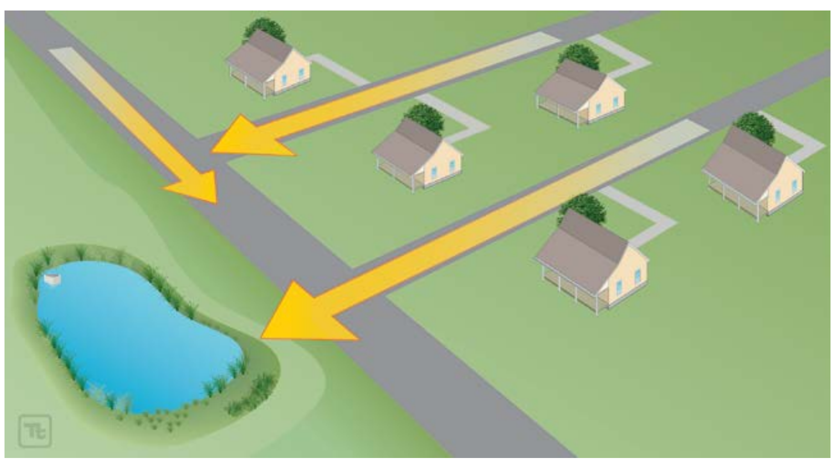

Figure 3-1 Conceptual Schematic of Regional BMP Implementation Approach

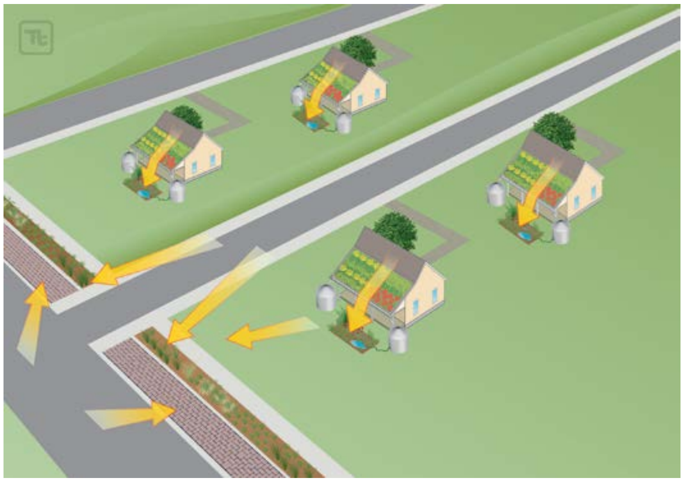

Figure 3-2 Conceptual Schematic of Distributed BMP Implementation Approach

This section summarizes existing and potential control measures by identifying existing BMPs and MCMs utilized by the RH/SGRWQG and evaluating performance data of the 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.

To comply with the MS4 Permit requirements, an evaluation must be performed that considers opportunities within the participating Permittees jurisdictions to utilize multi-benefit regional projects that, when feasible, detain all non-stormwater discharge and the flows produced by the 85th percentile, 24-hour storm event. A review of all relevant TMDL implementation plans and watershed management plans was performed to identify previously identified regional projects within the RH/SGRWQG EWMP area. These projects will be evaluated as part of the EWMP development process to determine if they meet the regional EWMP project criteria. In addition, an approach was developed to determine additional potential regional EWMP project sites.

3.1 Structural BMPs

As part of the EWMP development process, BMPs that will be considered sufficient in addressing water quality priorities and achieving compliance with MS4 Permit water quality objectives are identified. Structural BMPs vary in function and type, with each BMP providing unique design characteristics and benefits from implementation. The overarching goal of BMP implementation as part of the EWMP process is to reduce the impact of stormwater and non-stormwater flows on receiving water quality.

3.1.1 Categories of Structural BMPs

Regional and distributed BMPs are separated into subcategories as shown in **Table 3-1**. These categories are used to compile and describe information on existing, planned, and potential BMPs. The nomenclature will be important for engaging stakeholders as the EWMP is developed.

Table 3-1 Summary of Structural BMP Categories and Major Functions

Category	Subcategory	Example BMP Types
Regional[1]	Infiltration	Surface infiltration basin, subsurface infiltration gallery
	Detention	Surface detention basin, subsurface detention gallery
	Constructed Wetland	Constructed wetland, flow-through/linear wetland
	Treatment Facility	Facilities designed to treat runoff from and return it to the receiving water
	Low Flow Diversion	Facilities designed to divert dry-weather flows to the sanitary sewer, or in some cases, to spreading grounds
Distributed	Site-Scale Detention	Dry detention basin, wet detention pond, detention chambers, etc.
	Green Infrastructure	**Bioretention** and **biofiltration** (vegetated practices with a soil filter media, and the latter with an underdrain)
		Permeable pavement
		Green streets (often an aggregate of bioretention/biofiltration and/or permeable pavement)
		Infiltration BMPs (non-vegetated infiltration trenches, dry wells, rock wells, etc.)
		Bioswales (vegetative filter strips or vegetated swales)
		Rainfall harvest (green roofs, cisterns, rain barrels)
	Flow-Through Treatment BMP	Media/cartridge filters, high-flow biotreatment filters, etc.
	Source Control Treatment BMPs	Catch basin inserts, screens, hydrodynamic separators, trash enclosures, etc.

1 The term "Regional BMP" does not necessarily indicate the project can capture the 85th percentile storm, as used in the MS4 Permit. The term "Regional EWMP Projects" indicates those regional BMPs that are able (or expected to be able) to capture the 85th percentile storm.

The BMP performance functions that drive BMP performance are presented in each BMP Fact Sheet in **Attachment D**. The three major BMP functions for structural BMPs are infiltration, water quality treatment, and storage, as follows:

Infiltration: Runoff is directed to percolate into the underlying soils. Volume reduction and groundwater recharge occur in infiltration practices.

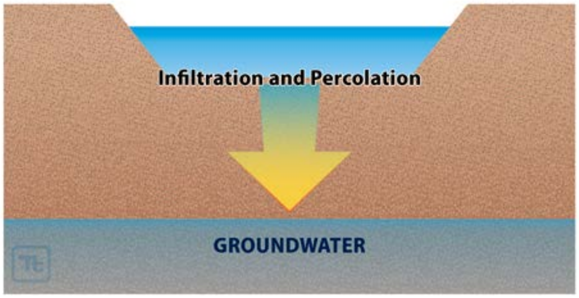

Figure 3-3 Conceptual Diagram Illustrating Infiltration

Storage: Runoff is captured, stored (detained), and slowly released into downstream waters. Storage can reduce the peak flow rate from a site but does not directly reduce runoff volume.

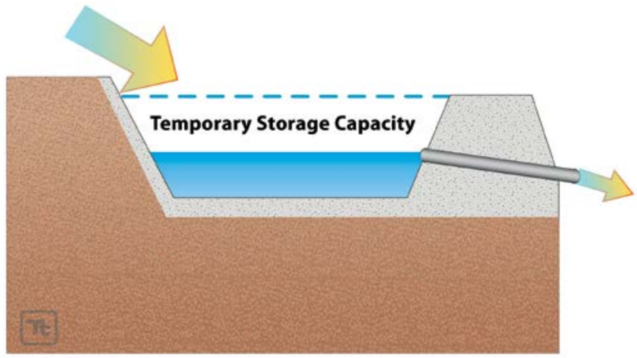

Figure 3-4 Conceptual Diagram Illustrating Storage

Water Quality (WQ) Treatment: Pollutants are removed through various unit processes, including filtration, settling, sedimentation, sorption, straining, and biological or chemical transformations.

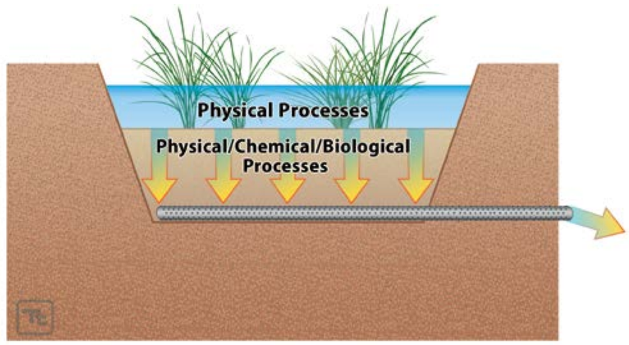

Figure 3-5 Conceptual Diagram Illustrating Water Quality Treatment

The preceding BMP functions were incorporated into relative performance gauges (**Figure 3-6**) to graphically represent the functions achieved by each BMP subcategory. Relative performance gauges are used in the BMP Fact Sheets, which are found in **Attachment D**. The circles represent the relative magnitude and range of each performance function for the particular BMP, in order to allow for comparison among different BMP types.

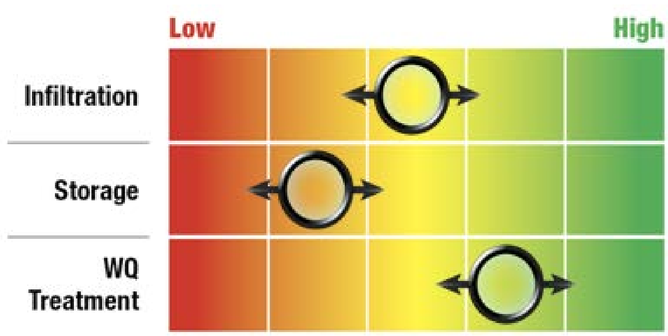

Figure 3-6 Example Relative Performance Gauge for Structural BMPs

Regional BMPs are constructed structural practices intended to treat runoff from a contributing area of multiple parcels (normally on the order of 10s or 100s of acres or larger). Regional practices include infiltration facilities that promote groundwater recharge and detention facilities that encourage settling. Infiltration and detention regional BMPs can be either constructed as open-surface basins or subsurface galleries. Regional practices also include constructed wetlands, which use engineered wetland environments to encourage pollutant removal, treatment facilities, which use conventional wastewater treatment processes to target pollutants of concern, or low flow diversions, which divert flows to the sanitary sewer. Regional BMP Fact Sheets are found in **Attachment D**, and include the following BMPs:

- Infiltration facilities
- Detention facilities
- Constructed wetlands
- Treatment facilities

Distributed BMPs are constructed structural practices intended to treat runoff relatively close to the source and typically implemented at a single- or few-parcel level (normally less than one acre). As described in the BMP Fact Sheets, found in **Attachment D**, distributed BMPs include the following subcategories:

- Site-scale detention facilities
- Green infrastructure
- Flow-through treatment BMPs
- Source control structural BMPs

A major subcategory of distributed BMPs is green infrastructure. The MS4 Permit specifies that EWMPs should "incorporate effective technologies, approaches and practices, including green infrastructure." The primary goal of distributed green infrastructure BMPs is to intercept and treat runoff near its source using resilient natural systems. As opposed to traditional gray infrastructure, green infrastructure relies on contact between runoff, soils, and vegetation to accomplish volume and pollutant reduction. Green infrastructure has been shown to cost-effectively reduce the impacts of wet-weather flows while also reducing BMP maintenance requirements (Kloss et al. 2006). In addition, green infrastructure can provide multiple benefits to the surrounding community, including increased property values, increased enjoyment of surroundings and sense of well-being, increased safety, and reduced crime rate (Ward et al. 2008; Shultz and Schmitz 2008; Wolf 2008; Northeastern Illinois Planning Commission 2004; Hastie 2003; Kuo 2003; Kuo et al. 2001a; Kuo et al. 2001b; Wolf 1998).

Structural BMPs incorporated into the green infrastructure subcategory include the following, as described in the BMP Fact Sheets:

- Bioretention and biofiltration
- Permeable pavement
- Green streets
- Bioswales
- Infiltration BMPs
- Rainfall harvest (green roofs, cisterns, and rain barrels)

3.1.2 Summary of Existing Structural BMPs

The following sources were used to compile information on existing control measures, including MCMs and BMP programs already in effect for each of the participating RH/SGRWQG members:

- SUSMP plan check records
- 2011-2012 Unified Annual Stormwater Report

- Integrated Regional Watershed Management Plan (IRWMP) documents
- Amigos de los Rios website
- RH/SGRWQG NOI for development of an EWMP

Three existing regional BMP projects were identified within the RH/SGRWQG EWMP area and are discussed below. The three projects are illustrated in **Figure 3-7** and a detailed summary is included in **Attachment E**. A total of 74 existing distributed BMP projects were identified and are summarized in **Table 3-2** and illustrated in **Figure 3-8**. A detailed list of distributed BMPs is provided in **Attachment F**. In addition, the 2011-2012 Unified Annual Stormwater Report was reviewed and a summary of the reported BMPs, categorized based on the categorization described in **Table 3-1**, is in **Attachment G**. The summary was created based on the following assumption: the number of existing BMPs is the number of BMPs reported as maintained in 2011-2012.

Table 3-2 Summary of Existing Distributed BMPs

Jurisdiction	Number of Existing Distributed BMPs Reported by Jurisdiction									
		Green Infrastructure								
	Site-Scale Detention	Bioretention/ Biofiltration	Permeable Pavement	Green Street	Bioswale	Infiltration BMPs	Rainfall Harvest	Flow-Through Treatment BMP	Source Control Structural BMP	Unknown
LA County	--	4	--	--	--	--	6	--	6	3
Arcadia	--	--	--	--	--	--	2	--	1	1
Azusa	--	2	1	--	--	11	1	--	10	2
Bradbury	--	--	--	--	--	--	--	--	--	--
Duarte	--	--	--	--	--	--	1	--	2	1
Monrovia	--	--	--	--	--	8	--	--	2	10
Sierra Madre	--	--	--	--	--	--	--	--	--	--
Total:	**0**	**6**	**1**	**0**	**0**	**19**	**10**	**0**	**21**[1]	**17**[1]

Sources: City of Arcadia Plan Check Approvals, City of Monrovia SUSMP Records, Los Angeles County LID Developments GIS data, IRWMP, and RH/SGRWQG NOI

[1] Total does not match total illustrated in **Figure 3-8** because geographical information is not available.

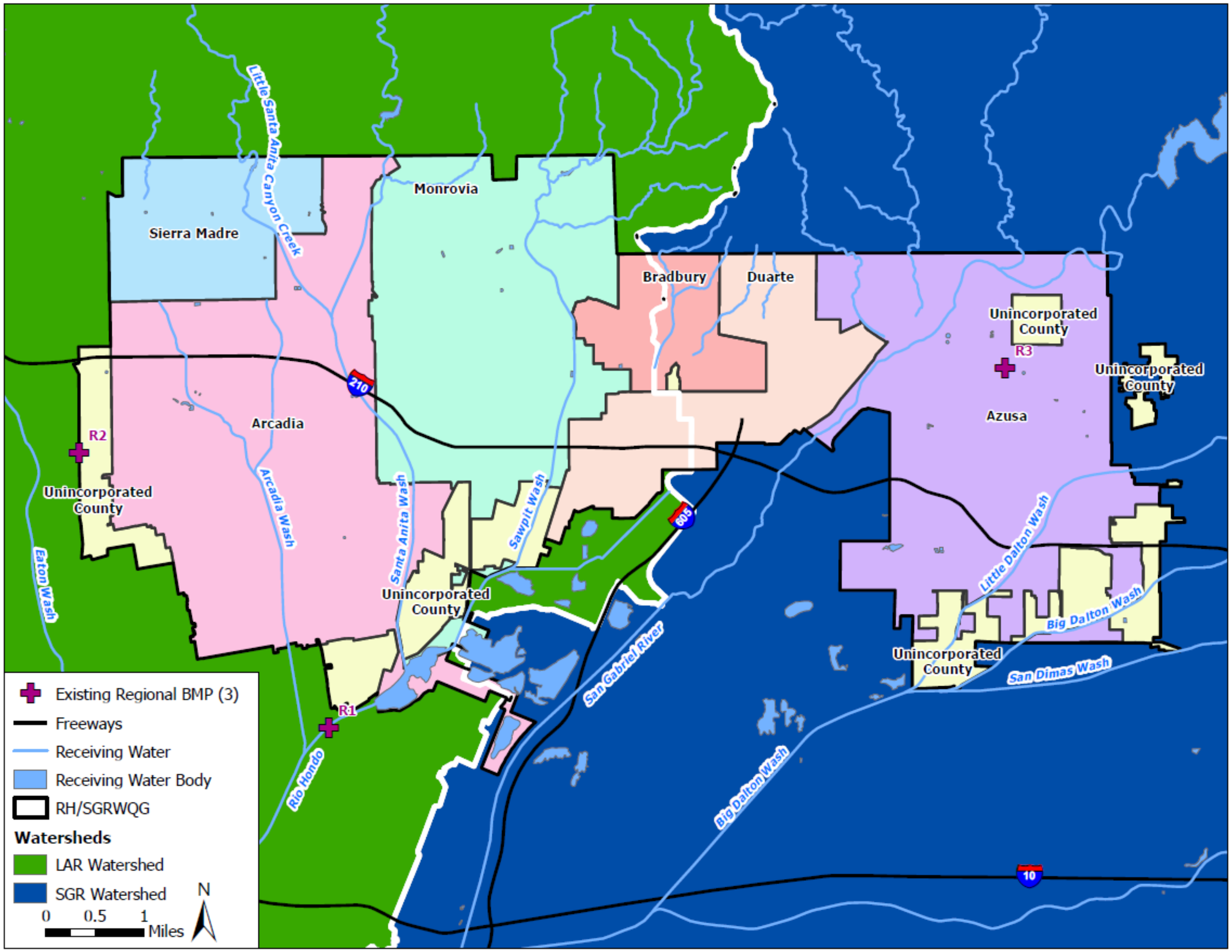

Figure 3-7 Existing Regional BMPs

Notes: BMPs with no spatial data are not shown. Numbering corresponds with project ID numbers listed in **Attachment E**.

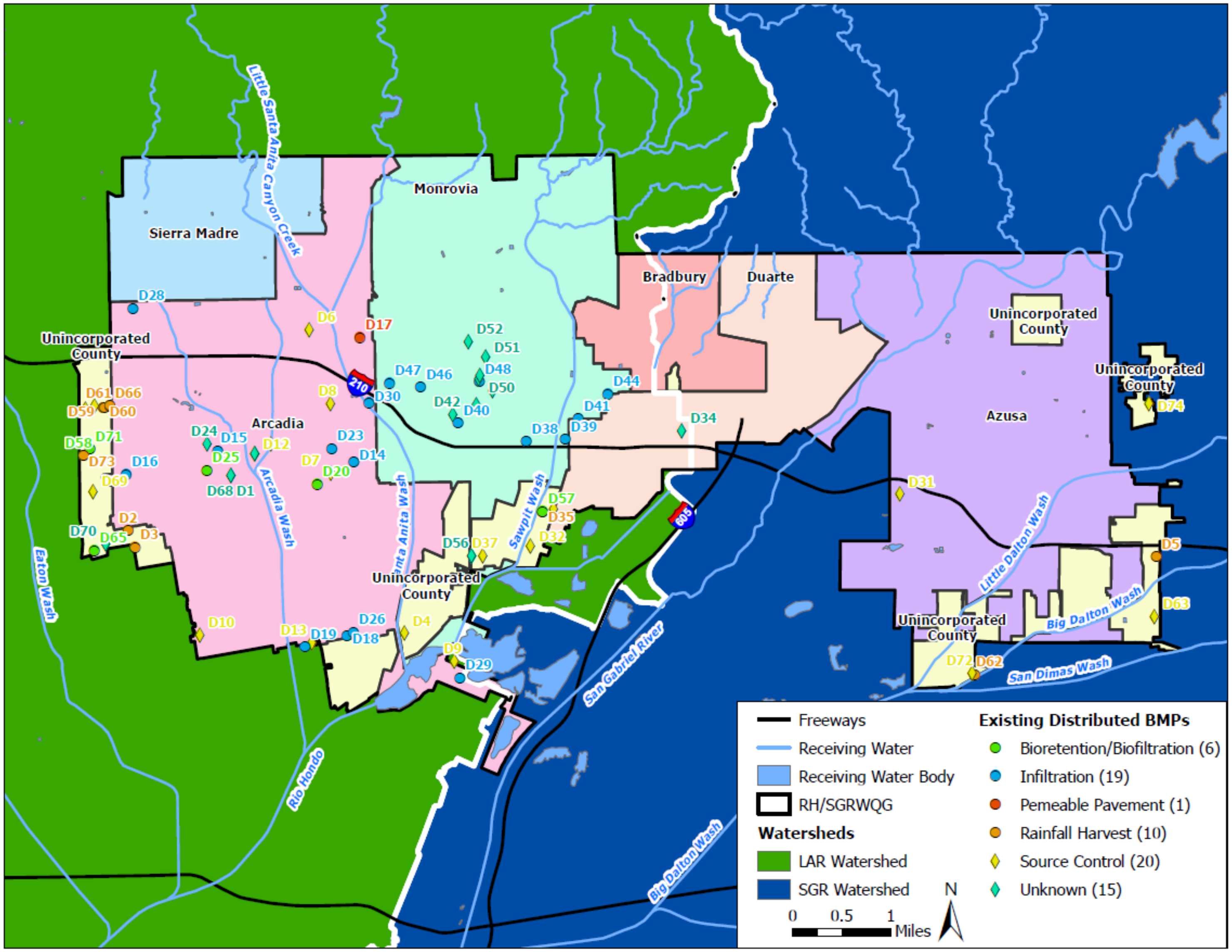

Figure 3-8 Existing Distributed BMPs

Notes: BMPs with no spatial data are not shown. Numbering corresponds with project ID numbers listed in **Attachment F**.

BMPs, including regional BMP projects, implemented prior to the baseline pollutant loads being used for the RAA calibration are considered part of the baseline, while those that were implemented after the baseline pollutant loads were established can be modeled in the RAA to demonstrate a load reduction. Three regional projects have been implemented by the RH/SGRWQG. To conclude if credit can be taken for these projects in the RAA, they must be evaluated to determine if they meet EWMP criteria. Part VI.C.1.g of the MS4 Permit states that wherever feasible, EWMP groups, such as the RH/SGRWQG, should identify and implement regional multi-benefit projects that retain (i) all non-stormwater runoff and (ii) all stormwater runoff from the 85th percentile, 24-hour storm event for the drainage area tributary to the project. The Rio Hondo Trail Enhancements Project, Rosemead Boulevard Improvement Project, and San Gabriel Forest Gateway Interpretive Center Project were constructed following the pollutant load baseline determination and are evaluated below based on regional EWMP project criteria. These projects were identified in planning documents as described in **Section 3.1.3** and were identified as already being constructed or in the construction phase. Each of the projects provide some form of water quality benefits, but further investigation and additional information regarding project details will be required to quantify those benefits and determine if regional EWMP criteria are satisfied.

Rio Hondo Trail Enhancements

According to the Amigos de los Rios website, the Rio Hondo Trail Enhancement project was completed in 2013. The project included the greening and installation of new gates and signage along 2.1 miles of trail located on the east bank of the Rio Hondo, from Lower Azusa Road to Peck Water Conservation Park. The project incorporated the use of native plants and shrubs, permeable paving, and bioswales. These distributed BMPs enhance runoff water quality in the project area vicinity, but the overall water quality benefits of the project could not be assessed with the limited information available.

Rosemead Boulevard Improvement Project

The Rosemead Boulevard Improvement Project was proposed in late 2007 and completed in February 2012, prior to the issuance of the 2012 MS4 Permit. The project represents the first Los Angeles County road to incorporate water quality enhancements. The project incorporated 2.5 miles of roadway improvements along Rosemead Boulevard between Foothill Boulevard and the Temple City boundary. Improvements included, but were not limited to, median landscaping, decorative street lights, tree planting, utility undergrounding, and bioswales. The project installed 1,712 feet of bioswales, contributing to the capture and retention of runoff generated within the project's drainage area (Green Street, 2013).

San Gabriel Forest Gateway Interpretive Center

In 2008, the Forest Gateway Interpretive Center was constructed in coordination with Amigos de los Rios. The San Gabriel Canyon Forest Gateway is a 2.5-acre pocket park and interpretive center in Azusa that provides a unique interface between urban and Angeles National Forest environments marking the entrance to the National Forest. The project is part of Amigos de los Rios efforts to support the Emerald Necklace of East Los Angeles County and to make a greener Los Angeles. The project incorporated various bioswales and utilized native plants and trees. Bioswales remove sediment-associated pollutants by settling and straining and improve water quality. The project received funding from Proposition A.

3.1.3 Planned Structural BMPs

Part VI.C.1.g of the MS4 Permit states that wherever feasible, EWMP groups, such as the RH/SGRWQG, should identify and implement regional multi-benefit projects that retain (i) all non-stormwater runoff and (ii) all stormwater runoff from the 85th percentile, 24-hour storm event for the drainage area tributary to the project. In drainage areas within the EWMP area where retention of the 85th percentile, 24-hour storm event is not feasible, the EWMP must include an RAA to demonstrate that applicable WQBELs and RWLs will be achieved through the implementation of other watershed control measures including enhanced MCMs and distributed BMPs. Identifying previously suggested regional projects may save the RH/SGRWQG time and money. Once the projects were identified, they were evaluated to determine if they would meet the above criteria. Documents were also reviewed to identify planned distributed BMPs.

The following documents and websites were reviewed to find previously identified structural BMP projects that address water quality:

- 2006 San Gabriel River Corridor Master Plan
- 2010 Multi-Pollutant TMDL Implementation Plan for the Unincorporated County Area of the Los Angeles River Watershed
- Amigos de los Rios website
- OPTI, part of the Greater Los Angeles County (GLAC) Integrated Regional Water Management Plan (IRWMP) online project database
- Los Angeles County Clean Water, Clean Beaches online project database
- Council for Watershed Health website
- Other local news articles

These reference documents include broad concepts, outlining the steps necessary to improve water quality. Recommendations include various BMP types for a range of different conditions; however, some documents do not provide specific BMP details to determine if they will meet EWMP project criteria as presented. Other references identify specific projects and locations, although insufficient detail is provided to evaluate if the project will retain all non-stormwater runoff and stormwater runoff from the 85th percentile, 24-hour storm event. Potential regional BMP projects introduced in the above references are in varying stages of planning, design, construction, or in some instances have already been constructed as identified in **Section 3.1.2**. In addition, valuable information was obtained from OPTI and the Los Angeles Clean Water, Clean Beaches online project databases.

The Implementation Plans relevant to the RH/SGRWQG TMDLs were reviewed in an effort to identify planned projects The planned regional projects identified were evaluated to determine if they satisfy regional EWMP project criteria. If implemented, the drainage areas tributary to projects that satisfy the regional EWMP project criteria will be in compliance with water quality objectives and those that do not will be modeled in the RAA to incorporate load reductions. Identified projects are listed in **Attachment H** and illustrated in **Figure 3-9**. The list of planned regional projects includes projects that are located downstream of the RH/SGRWQG EWMP area and adjacent to the Rio Hondo or San Gabriel River, as the group may be able to benefit from these projects.

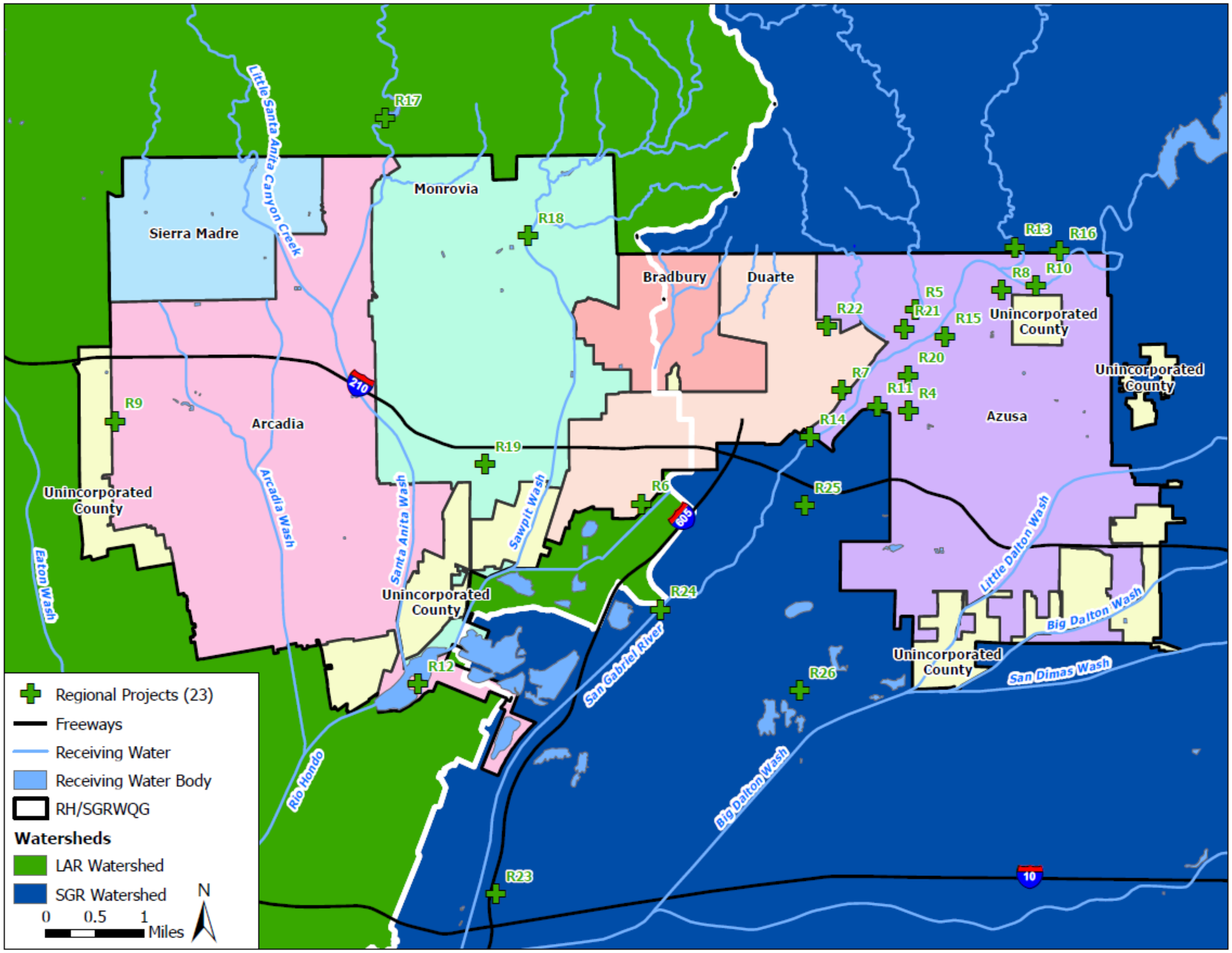

Figure 3-9 Regional BMPs Identified in Planning Documents

Notes: BMPs with no spatial data are not shown. Numbering corresponds with project ID numbers listed in **Attachment H**.

A total of four planned distributed BMP projects were identified and include:

- Azusa River Wilderness Park (City of Azusa)
- Metro Gold Line Infiltration Project (City of Azusa)
- Monrovia Station Square/Transit Village Multi-Benefit Park and Greenway Project (City of Monrovia)
- Santa Anita Park and Shopping Mall Parking Lot BMP (City of Arcadia)

Additionally, the Cities of Arcadia, Bradbury, Duarte, and Monrovia plan to implement full capture trash source control structural BMPs in all areas tributary to the Rio Hondo in order to ensure compliance with the Los Angeles River Trash TMDL. The City of Azusa also plans on implementing full capture trash source control structural BMPs throughout the City.

The planned distributed BMPs are illustrated in **Figure 3-10** and listed in **Attachment I**. In addition to the identified planned distributed BMP projects, the SUSMP requires post-construction structural or treatment control BMPs for new development and redevelopment. In addition, the Planning and Land Development Program in Part VI.D.7 of the MS4 Permit requires implementation of LID and Hydromodification Control BMPs, such as green streets, which are designed to minimize the percentage of impervious surfaces through infiltration, evapotranspiration and rainfall harvest and use. As development and redevelopment occur, additional structural BMPs will be constructed in accordance with the SUSMP and Planning and Land Development Program to treat or retain the runoff from public and private parcels.

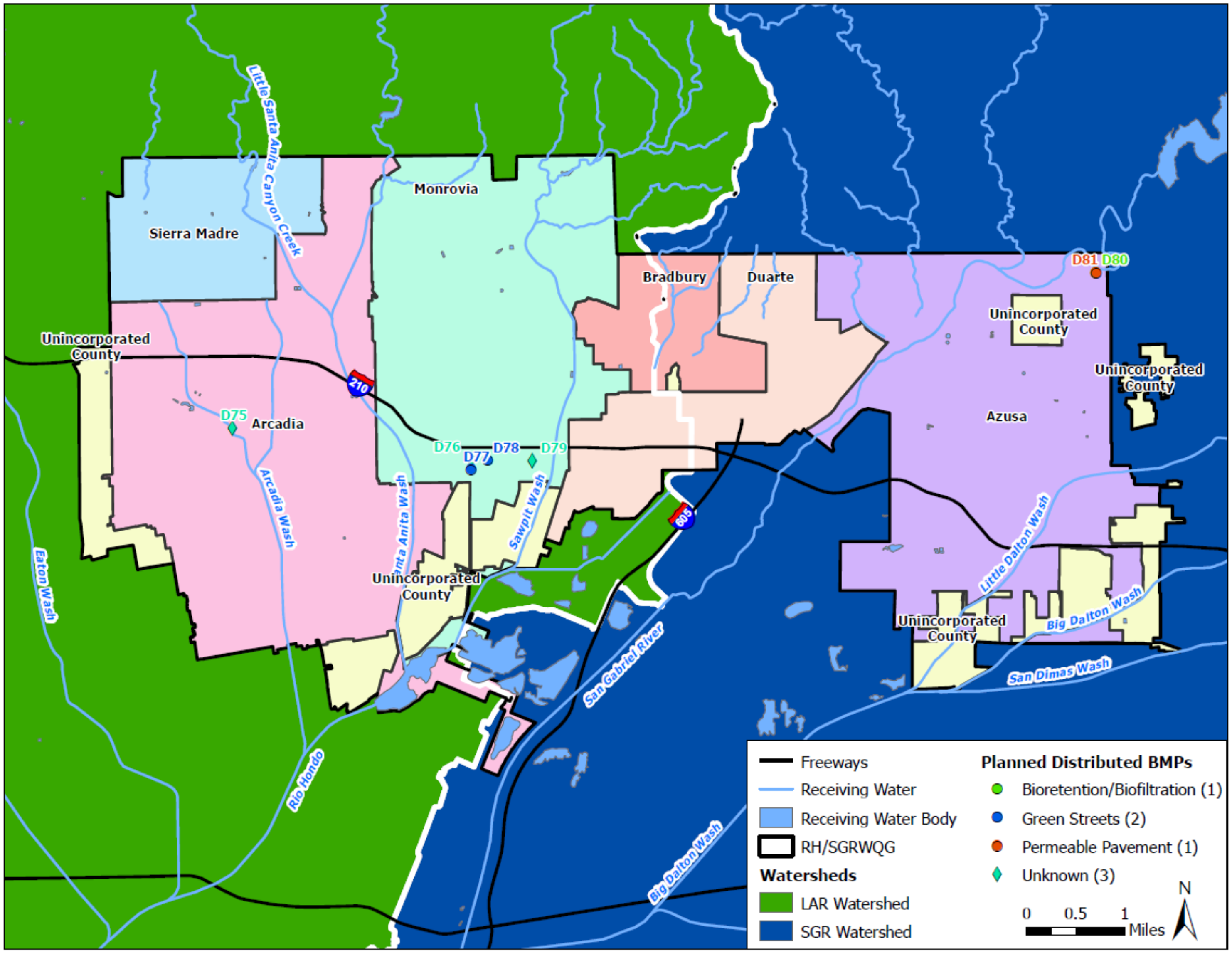

Figure 3-10 Planned Distributed BMPs

Notes: BMPs with no spatial data are not shown. Numbering corresponds with project ID numbers listed in **Attachment I**.

Preliminary Evaluation of Planned Regional BMP Projects

Projects identified in **Attachment H** were evaluated to determine if they satisfy the regional EWMP project criteria specified in Part VI.C.1.g of the MS4 Permit. Each of the projects has the potential to be designed in a manner which incorporates water quality benefits. However, there is not enough information available to determine if these projects will satisfy EWMP criteria as presented. While regional projects are still in the planning phase, it is possible to modify concepts and designs to incorporate water quality and multi-use benefits to meet the EWMP criteria. If the RH/SGRWQG decides to pursue these projects, the concepts will be further investigated to determine if they satisfy EWMP criteria, and if they do not, a feasibility study will be performed to determine how they could be modified. The following five projects exhibited the greatest potential of the planned regional BMP projects to possibly satisfy the regional EWMP project criteria.

Buena Vista Wetlands

The 2006 San Gabriel River Corridor Master Plan identified the Buena Vista Wetlands as a potential project. The project will create bio-engineered wetlands for habitat restoration in a LACFCD spreading basin west of the Santa Fe Dam. A conveyor line, operated by United Rock Products, runs across the westerly part of this property. The line has been in operation since 1983 and is scheduled to be in use until circa 2035. The design and implementation of the wetlands will need to ensure the continued safe operation of this conveyor. Generally, wetlands are good BMPs for both treatment and retention. It is unclear as to whether the project concept has been further pursued outside of the San Gabriel River Corridor Master Plan. Further project examination will be required before being committed as a regional EWMP project.

Peck Water Conservation Improvement Project

Peck Road Spreading Basin is a large water conservation facility located in the City of Arcadia that serves as a major flood control facility. It has a storage capacity of 3,300 acre-feet and outlets to the Los Angeles River through the Rio Hondo Channel. The LACFCD will install a pump station and pipeline that will connect the Peck Road Spreading Basin to the San Gabriel River. The design of the project is in progress with an anticipated construction date in early 2015. The pump station will only be operational when water is not flowing in the San Gabriel River to ensure water is impounded and conserved, as opposed to being discharged downstream. The pipeline path will go through the Cities of Arcadia, Bradbury, Duarte, El Monte, Irwindale, and Monrovia and improve groundwater recharge in the area. In addition, this project will remove approximately 101,000 cubic yards of sediment to improve the operation, water quality, and percolation of the spreading basin (San Gabriel Valley Council of Governments, 2013). The project will require further investigation before being committed as a regional EWMP project.

Hugo Reid Park – Infiltration Basin

The Hugo Reid Park project was identified in the 2010 Multi-Pollutant TMDL Implementation Plan for the Unincorporated County Area of the Los Angeles River Watershed. The park will treat a 187-acre drainage area comprised of 55 percent imperviousness, mostly made up of residential with some commercial land uses. The drainage area for the project is in the community of East Pasadena - East San Gabriel (Arcadia and Unincorporated County) and is the fifth largest area and ranked 8 out of 30 for wet-weather loads and one of eight communities ranked 1 out of 30 for dry-weather loads (Multi-Pollutant TMDL Implementation Plan, 2010). The park has 2.8 acres available for stormwater treatment and is underlain by soils with decent infiltration rates. Hugo Reid Park is a great location for a centralized BMP that will provide a dual purpose of stormwater treatment and recreational facilities. The park currently houses athletic fields, including one baseball diamond, as well as tennis courts. The proposed project concept suggests using aboveground treatment within the athletic fields and underground treatment within the tennis courts and parking lot area (Multi-Pollutant TMDL Implementation Plan, 2010).

Station Square
The City of Monrovia highlights the Station Square project on its website as a future project. With the planned 2015 opening of a Metro Gold Line Transit Station, adjacent to the Historic Santa Fe Depot, the City of Monrovia has been planning and pursuing funding for the installation of public improvements in the Station Square planning area. Some of the on-site improvements include, but are not limited to, the establishment of a flexible and user-friendly transportation operations, creation of a seamless pedestrian and trail connectivity with the existing regional bicycle trail network, and the promotion of environmental education through exposed stormwater management facilities and the use of vegetation. Planned infrastructure off-site improvements include, but are not limited to, the creation of identifiable and user friendly way finding and signage and the establishment of connectivity patterns and corridors, creating access into the community (City of Monrovia).

Whittier Narrows Park
Little information is available pertaining to the proposed Whittier Narrows Park project. The Los Angeles County Clean Water, Clean Beaches Measure website provides a very brief description stating that the project will divert stormwater flows into a constructed infiltration basin at a County Park facility. The project site is not located within the RH/SGRWQG area, but is located directly downstream of the group, adjacent to the San Gabriel River (Clean Water, Clean Beaches). This project has the potential to divert large quantities of flows, from a drainage area encompassing more than just the RH/SGRWQG area.

All Other Projects
The remaining project concepts appear to not consider water quality benefits; therefore it is unlikely these projects satisfy EWMP project criteria as presented. Most of the remaining projects are considered regional projects, as they serve a region comprised of a relatively large land area. There is no indication that these projects are currently in the design or construction phase, or have been constructed, as no design documents were found. Each of these projects has the potential to meet the EWMP project criteria and if not constructed, the concepts or designs could be modified to incorporate measures which retain all non-stormwater runoff and stormwater runoff generated by an 85th percentile, 24-hour rain event.

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

This section presents the approach and process for identifying and selecting regional projects to be included in the EWMP. The approach will be utilized to identify and screen preferred regional stormwater enhancement projects and support the evaluation of projects that will meet the objectives of the MS4 Permit and be included in the final EWMP. The process includes:

1. Compilation and evaluation of regional BMPs from existing planning documents;
2. Identifying additional regional BMPs;
3. An approach for evaluation of all regional BMPs; and
4. Recommended projects for implementation.

This approach includes a Geographic Information System (GIS)-based assessment of publicly and privately-owned properties containing sufficient open space (e.g., large parking lots) and other conditions suitable to support a regional stormwater enhancement project. A ranking system developed below, will be used to evaluate and screen each potential project using the same criteria. The approach will also evaluate opportunities to incorporate multi-use features at candidate locations. Both regional BMP and regional EWMP projects will be identified using this process. Regional EWMP projects are able to retain all non-stormwater runoff and stormwater runoff generated by the 85th percentile, 24-hour storm event, whereas regional BMP projects are those stormwater enhancement projects that do not meet the EWMP criteria, but still provide water quality benefits. Regional BMP projects are constructed structural BMPs intended to collect and treat runoff from a contributing drainage area composed of multiple parcels, normally on the order of 10s or 100s of acres.

The overall approach for identifying regional projects will require determining where existing stormwater enhancement needs are greatest in the watershed study area based on known water quality impairments (e.g., observed water quality exceedances and areas with legacy contaminant issues), as well as locations identified as having high volumes of runoff due to high concentrations of impervious surfaces. It is also critical to identify feasible locations within high priority catchments where stormwater enhancement BMP opportunities are constructible. This process will include the screening of existing site constraints to support the determination of what type of BMP is appropriate and/or feasible for a particular project location and ultimately to support the development of site-specific implementation strategies.

Potential project locations may include open spaces, whether they are within parks, schools, large parking lots, or golf courses. These sites may be identified using available aerial imagery or by utilizing available land use data, which includes these land use classifications. A GIS-based approach is recommended, as it allows users to use both aerial imagery and available map datasets. Once open areas are identified, the potential project sites must be further refined.

First the identified potential project sites will be evaluated for fatal flaws, such as existing superfund sites. If these flaws are identified, the project concepts will not be further pursued. The next attribute that will be identified is the property owner. The best sites are those that are publically owned. When narrowing down the list of potential sites, the land owner and location are the two most important factors to consider. If the location is not publically owned, there will be an accompanying acquisition cost that will significantly increase the cost of the project. To verify the land owner information, the Los Angeles County Office of the Assessor, Assessor's Identification Number (AIN) locator can be utilized (Los Angeles County, Office of the Assessor). This online tool allows users to identify the land owner based on the parcel the land occupies.

A GIS-based analysis will be performed in conjunction with a field investigation to support this process through the collection and management of spatial data for potential project identification and screening. GIS will be utilized to evaluate the many factors that play a role in structural BMP placement within a watershed. Watershed factors will include physical site constraints (e.g., soils, topography, etc.), pollutants of concern, existing regulations, beneficial uses, land availability, proximity to existing stormwater infrastructure, and areas of high pollutant loading. Regional BMP factors also include cost, effectiveness, and the ability to implement the project.

Although some potential projects may not retain the 85th percentile storm event, projects will typically be categorized as structural BMPs that improve water quality through some form of infiltration, treatment, filtration, or storage mechanism. Regional mechanisms could include an infiltration basin or detention basin, a constructed wetland, or a treatment facility; whereas, distributed localized mechanisms could include parking lot bioretention swales, small detention basins, or permeable pavement systems. Potential regional and distributed BMP projects will also require careful evaluation with respect to hydraulic design constraints and consideration of functional integration with existing storm drainage infrastructure.

A GIS model will be used to manage spatial data needed for the identification and screening of potential regional projects within the RH/SGRWQG area. Compiled data will be used to support the prioritization of potential projects based on location specific criteria supporting the need and project implementation feasibility. The GIS analysis will evaluate data critical in identifying high priority catchments, corresponding to those used for the RAA, for regional BMP installation within a watershed, such as land use, pollution generation, hydrology, topography, parcel ownership, existing storm drain flow direction, and infrastructure integration opportunities. The following location specific criteria will be considered: local contributing watershed drainage area, land use, soil type (i.e., clay, silt, loam, sand, gravel, etc.), hydrologic soil group (HSG), slope (%), depth to groundwater, potential connections to existing drainage infrastructure, potential connections to the sanitary sewer, and proximity to potential historic soil and/or groundwater contamination. In the context of a typical urban development and/or infrastructure retrofit scenario involving multiple stakeholders from a wide variety of backgrounds, a centralized communication system and dataset, utilizing GIS, will support planning efforts and can be used as a precursor to analytical modeling. This GIS-based approach will allow the RH/SGRWQG to identify possible sites for the implementation of regional BMP projects on a catchment-scale.

Feasibility for development of stormwater infiltration regional projects is dependent on site-specific conditions that support the operability of infiltration facilities. Various factors affecting the feasibility of stormwater infiltration may create an environmental risk, structural stability risk, or physically restrict infiltration. The presence of certain limiting factors may result in infiltration being infeasible for a potential project site, meaning that infiltration of the 85th percentile storm may not be achievable for a particular project.

The evaluation of potential locations for both regional EWMP projects and regional BMP projects that implement stormwater infiltration will require the consideration of the following project site and feasibility criteria (Bay Area Stormwater Management Agency, 2011):

- **Seasonal High Groundwater Table** – Locations where a seasonal high groundwater table exists within 10 feet of the infiltration BMP invert would be restricted.

- **Groundwater Production Wells** – Infiltration should not be designed within 100 feet of groundwater production wells.

- **Pollutants in Soil or Groundwater** – Locations where pollutant mobilization is a documented concern should not utilize infiltration practices because stormwater infiltration into these areas could cause migration and spreading of contaminants.

- **Geotechnical Hazards** – Infiltration at locations with potential geotechnical hazards such as steep slopes, areas with landslide potential, soils subject to liquefaction, and locations less than a specified setback from building foundations would be restricted.

- **Clay Soils** – Locations with tight clay soils that significantly limit infiltration of stormwater would not be considered for direct infiltration; however, indirect infiltration and the use of engineered soils and underdrain systems could still be applied in these cases.

- **High Infiltration Rates** – Highly infiltrating native soils, such as sand and gravel, may not be protective of groundwater at a project site where infiltration systems are implemented; this would require consideration on a case-by-case basis.

- **Industrial Areas and Areas with High Traffic** – Infiltration systems are not recommended as a stand-alone measure for treating stormwater runoff from land uses that pose a high threat to water quality, including but not limited to industrial and light industrial activities, high vehicular traffic, automotive repair shops, car washes, fleet storage areas, or nurseries.

- **Septic Systems and Underground Tanks** – Infiltration systems should be located at least 200 feet away from septic tanks and underground storage tanks with hazardous materials, as well as any other potential underground sources of pollution; this would require consideration on a case-by-case basis.

- **Protection of Beneficial Uses** – Locations where reduction of stormwater runoff may potentially impair beneficial uses of the receiving water, such as change of seasonality of ephemeral washes, as documented in a site-specific study (e.g., California Environmental Quality Act (CEQA) analysis) or watershed plan.

- **Underground Utilities** – Infiltration systems may conflict with the location of existing or proposed underground utilities or easements. Infiltration systems should not be placed on top of or very near to underground utilities such that they discharge to the utility trench, restrict access, or cause stability concerns.

- **Existing Policies** – Local Water District policies or guidelines may limit locations where infiltration may occur, require greater separation from seasonal high groundwater, or require greater setbacks from potential sources of pollution.

In some cases, it may be best to place a regional BMP downstream of a tributary area with specific land use types. In order to address bacteria loading, it may be beneficial to place a regional BMP downstream of a tributary area with a large residential land use area, as residential land uses are known to contribute to bacteria loading. In addition, regional BMPs placed upstream of tributaries to either the Rio Hondo or San Gabriel River will contribute to compliance with all applicable TMDLs, as the reduction, or elimination, of flows will contribute to overall load reductions.

The last step before finalizing a regional BMP project site will be to perform a feasibility study. A feasibility study is an assessment of a proposed project site's practicality and will be necessary to determine if the site will 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 will identify these sites. The feasibility study will evaluate the existing site conditions, including topography, surrounding drainage systems, tributary areas, and soil characteristics, to determine if a regional BMP can be implemented to satisfy the EWMP criteria specified in the MS4 Permit. Feasibility reports will also provide an initial cost estimate and the cost per volume of runoff mitigated can be used as a basis to compare different regional BMP projects.

The evaluation of regional BMP sites is a multi-phase process that should start with a considerably large list of potential regional BMP sites based on the open space available, as determined through aerial imagery, a GIS-based analysis, or other means. The next phase is to consider the location and ownership of the potential project site. Project sites located downstream of a major stormwater conveyance system and utilizing publically owned land is most desirable and cost-effective. In other instances, it may be necessary to evaluate a less important set of criteria. These criteria may be based on the goals and objectives of the project, which in some cases may be to reduce pollutant loadings of specific pollutants to comply with a TMDL. Lastly, the feasibility study will assess and determine if the site can be utilized efficiently to accomplish the EWMP goals of regional projects, to retain all non-stormwater runoff and stormwater runoff generated from the 85th percentile, 24-hour storm event.

3.1.4.1 Potential Project Ranking System

A uniform ranking system can be used to narrow down a long list of potential projects to a more manageable list that represents the most ideal regional projects. As previously mentioned, projects with fatal flaws will be eliminated prior to the ranking exercise. **Table 3-3** summarizes the ranking criteria and associated scoring system. 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. Regional projects with the highest score will be considered most beneficial, and those with lower scores will most likely not be considered viable. This approach may easily be modified to develop a weight for each of the ranking criteria. If this method is utilized, weights may be assigned to each of the ranking criteria, allowing specific criteria to play a more significant role in determining regional BMP projects. Using this method, the scores developed will be multiplied by the respective ranking criteria weight and then the scores will be summed to determine the most beneficial projects.

Table 3-3 Potential Regional BMP Projects Ranking Criteria

Ranking Criteria	Scoring System	Notes
General Criteria		
Proximity to receiving water/MS4 infrastructure	10 being near; 1 being far	Location must be downstream of stormwater conveyance systems
Ownership	10 being publically owned; 1 being privately owned	This score is either a 10 or a 1
Size of opportunity site	10 being large; 1 being small	Large sites are considered to be greater than one acre
Size of catchment area	10 being large; 1 being small	Large catchment areas are greater than 100 acres and small areas are in the range of 10 acres
Catchment area land use and likely pollutants	10 being land uses that contribute to relevant water quality priorities; 1 being those that do not contribute	Projects that treat areas that contribute to exceedances would be most beneficial
Multi-use opportunities and connectivity	10 being in a location that allows multi-use and connectivity; 1 being a location that does not	Often BMP trains can be utilized to increase capacity
Underlying Soil Conditions		
Seasonal high groundwater table depth	10 being deep; 1 being shallow	High groundwater will inhibit infiltration type BMPs. Less than 50 feet to groundwater is considered shallow
Proximity to groundwater production wells	10 being far; 1 being close	Infiltration infeasible if within 100 feet of production well
Pollutants in soil or groundwater	10 being none; 1 being many	Many is classified as a Superfund type location
Geotechnical hazards	10 being none; 1 being many	Many is classified as having a landslide potential or soils subject to liquefaction
Soil type	10 being sand; 1 being clay	Sandy soils ideal for infiltration
Infiltration rates	10 being high; 1 being low	Infiltration BMPs are generally most cost effective. High is considered A soils (greater than 4 in/hr) and low is D soils (0.5 in/hr or less)

A ranking worksheet was developed and is presented in **Attachment J**. This worksheet can be used to rank potential regional BMP projects and determine which provide the most benefits to the RH/SGRWQG. The row titled assigned weight may be used depending on the RH/SGRWQG's preferences.

3.1.4.2 Preliminary List of Regional Project Locations

A list of potential regional BMP project locations within the RH/SGRWQG area was developed utilizing the approach described above. Using GIS land use layers and aerial imagery, several potential project sites were identified. The project sites were identified based on open space and their proximity to receiving water/MS4 infrastructure. Other criteria have yet to be evaluated, and the potential project sites identified represent the long list of potential locations that will need to be narrowed down by using the ranking system described above. A few of the areas identified as potential project sites for regional BMPs within the RH/SGRWQG area are listed in **Table 3-4** and illustrated in **Figure 3-11**. The identification number within the table corresponds to the label found in the figure. Additional locations are identified on the figure that are not called out in the table.

Table 3-4 Potential Regional BMP Project Sites

ID	Potential Project Sites	Location	Potential Size (ac)
Parks			
1	Bailey Canyon Park	Oak Crest Drive and Carter Avenue	10.11
2	Bonita Park	2nd Avenue and Bonita Street	3.38
3	Camino Grove Park	Camino Grove Avenue and 6th Avenue	8.25
4	Duarte Park	Huntington Drive and Highland Avenue	33.18
5	Eisenhower Memorial Park	2nd Avenue and Haven Avenue	4.64
6	Gladstone Park	Gladstone Street and Pasadena Avenue	4.90
7	Gordon Sports Park	Central Avenue and Mt. Olive Drive	12.97
8	Library Park	Palm Avenue and Myrtle Avenue	4.38
9	Memorial Park	Mariposa Avenue and Sierra Madre Boulevard	2.17
10	Northside Park	12th Street and Orange Avenue	15.96
11	Pamela Park	Maydee Street and Goodall Avenue	3.05
12	Pioneer Park	Sierra Madre Avenue and Dalton Avenue	4.10
13	Recreation Park	Lemon Avenue and Mountain Avenue	18.85
14	Sierra Vista Park	Sierra Madre Boulevard and Rancho Road	35.30
15	Valleydale Park	Lark Ellen Avenue and Gladstone Street	9.13
16	Zacatecas Park	1st Street and Virginia Avenue	3.55
Golf Courses			
17	Arcadia Golf Course	Wildflower Road and Mapletree Avenue	25.87
18	Azusa Green Country Club	Sierra Madre Avenue and Todd Avenue	87.22
19	Rancho Duarte Golf Course	Las Lomas Road and Hacienda Drive	33.57
20	Santa Anita Golf Course	Huntington Drive and Santa Anita Avenue	181.71
Educational Facilities			
21	Citrus Community College	Citrus Avenue and Foothill Boulevard	137.86
22	Foothills Middle School	Sycamore Avenue and Oakhaven Road	16.39
23	Highland Oaks Elementary	Santa Anita Avenue and Virginia Drive	7.41
24	Longley Way Elementary	Las Tunas Drive and Longley Way	5.30
25	Royal Oaks Elementary	Royal Oaks Drive and Mt. Olive Drive	12.83
Other Open Space			
26	Arboretum of LA County	Baldwin Avenue and Colorado Street	110.07

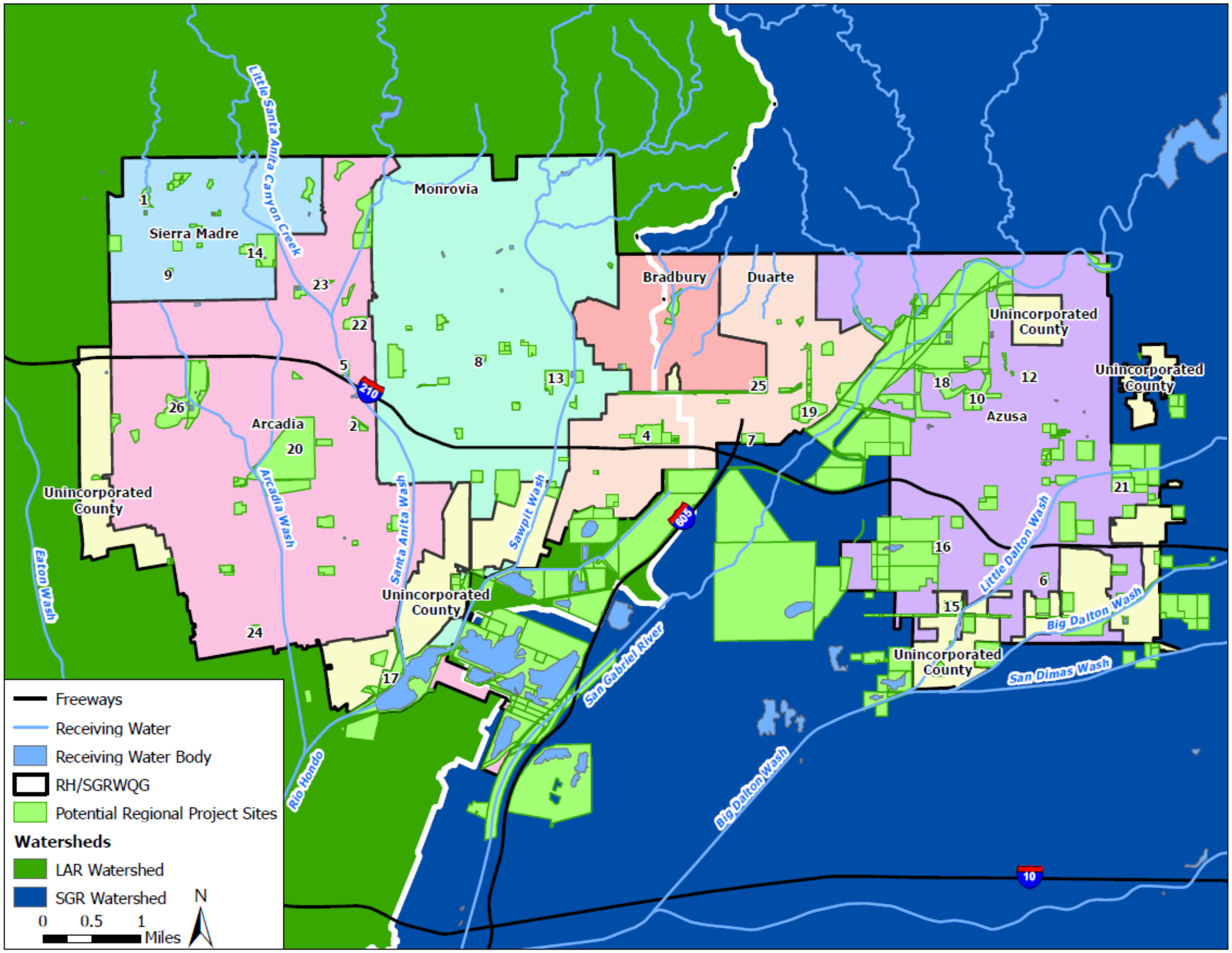

Figure 3-11 Potential Regional Project Sites within the RH/SGRWQG Area

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 determine 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 Summary of BMP Performance Data

An important consideration for EWMP development is the performance of structural BMPs. From BMP preferences to the RAA, data regarding performance of BMPs could influence many EWMP-related decisions. As a component of EWMP work planning, a statistical analysis was performed using available BMP performance data relevant to Southern California. The goal was to review and summarize data regarding performance of BMPs for reducing constituents of concern from stormwater flows. The data was reviewed and summarized based on constituents of concern from both stormwater and non-stormwater flows. The compiled dataset is extensive and can be found in **Attachment K** and **Attachment L**. The following sections provide an overview of the data sources, statistical methods, and results of the statistical analysis.

3.2.1 Data Sources

The BMP performance analysis used data collected from the International BMP Database (IBD), the most extensive effort to collect and distribute BMP performance data in the United States. The IBD is sponsored by the USEPA, Water Environment Research Foundation (WERF), the American Society of Civil Engineers (ASCE), the Environmental and Water Resources Institute (EWRI), the American Public Works Association (APWA), and the Federal Highway Administration (FHWA). The stated purpose of the database is "to provide scientifically sound information to improve the design, selection and performance of BMPs" (IBD, 2014).

Figure 3-12 illustrates the sites with available monitoring data in Southern California as of November 2013. There are 44 sites that have data within the mapped area and the sites have a total of 58 BMPs that were sampled. Each of these BMPs in the IBD was categorized to the categories and subcategories established in **Section 3.1.1** (see **Table 3-1**). Many of the BMPs, particularly bioswales, are owned and operated by the California Department of Transportation (Caltrans) and therefore implemented on roadways, maintenance stations, and park and ride facilities.

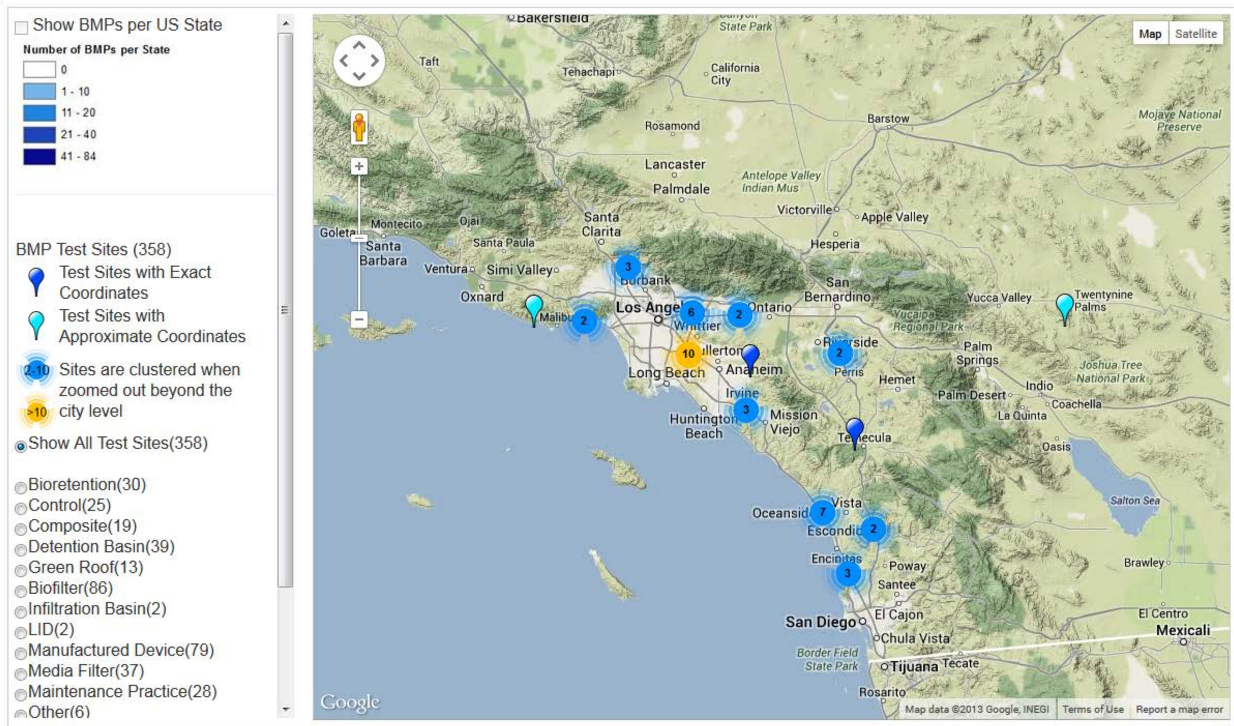

Figure 3-12 Southern California BMPs from the International BMP Database (www.bmpdatabase.org)

3.2.2 Data Analyzed

Analysis of BMP data in the IBD collected from Southern California provides a cross-section of structural BMP results and constituents. The following provides an overview of the data characteristics:

- **BMP types:** the BMPs in the IBD were categorized according to those defined in **Section 3.1.1**, after review of the BMP design details. Five of the BMP subcategories were represented in the IBD within the Southern California region, including:
  - Constructed wetlands
  - Site-scale detention
  - Bioswales
  - Flow-through Treatment BMPs
  - Catch basin inserts

- **Constituents:** the IBD contains sample data for hundreds of constituents ranging from metals to pesticides. The analysis in this Work Plan emphasizes a subset of constituents referred to herein as "common constituents of concern," as follows:
  - Total suspended solids (TSS)
  - Fecal coliform
  - Total copper
  - Total lead
  - Total zinc

  Beyond these five constituents, the database was screened for additional constituents with sufficient data to perform analysis and obtain results. Based on this screening, an additional

18 constituents were identified, for a total of 23 constituents. To assist with organization and presentation of the results, each of the 23 constituents was categorized into four groups as follows (demonstrated in **Table 3-5**):

- Metals
- Bacteria
- Solids
- Nutrients

- **Land uses:** a majority of the BMPs are located within transportation related sites. Other major land use categories such as residential, commercial, and industrial are not heavily represented in the analysis. However, the effluent concentrations and performance metrics are generally considered applicable to non-transportation land uses. Many bioswales were included in the analysis. This allowed for grouping the bioswales into three categories: "all," "Caltrans," and "Non-Caltrans."

- **Monitoring methods:** the majority of the data from the IBD is based on flow-weighted composite (FWC) samples which is the generally preferred practice. FWC samples provide a better measurement of the total load from a storm event and most accurately portray the removal efficiency of BMPs. These types of samples can be used to generate good event mean concentrations (EMCs) that can be used to calibrate water quality models. The analysis emphasizes reduction in concentrations of constituents. Flow reduction is heavily site- and storm-specific (depending on rainfall intensity, soil types, antecedent conditions, etc.) and can be predicted through other means (e.g., modeling during the RAA).

3.2.3 Statistical Analysis

The statistical analysis performed is primarily based on three metrics:

- Tabular summary statistics of inflow and outflow from BMPs (mean, median, percentiles, etc.)
- Graphical presentation of the inflow and outflow using box plots
- Tabular presentation of constituent reductions and tests for statistical significance of differences between inflow and outflow

It is acknowledged that "percent reduction" is a BMP performance metric that deserves caveats (see the article "Voodoo Hydrology" in the July 2006 article of *Stormwater Magazine*). Percent reduction is a readily-understandable BMP performance metric, and it is also convenient for reporting a compact form (as shown in **Table 3-5**). However, BMP performance is ultimately characterized by both the reduction of pollutants from inflow to outflow and the concentration of constituents in the outflow. For this analysis, percent reduction is presented as a simple metric to compare different BMPs across different storm and land use conditions. In addition, inflow and outflow datasets were analyzed separately, in order to characterize the quality of BMP outfalls and allow for future comparison to MS4 Permit limitations.

The approach to handling non-detects can greatly affect estimated summary statistics. For the BMP performance analysis, statistical analyses of measured concentrations were based on regression-on-order statistics (ROS). The primary advantage/purpose of the ROS approach is to account for sample limits of detection (SLODs) in samples that were non-detects (referred to as "censored"). An Excel add-in developed by Caltrans was used to generate ROS, for which the primary references for the statistical procedures are Shumway and Azari (2000) and Helsel (1990).

3.2.4 Results

The analysis performed produced thousands of statistical measures that can be used to evaluate BMPs. These results will support the RAA, by supporting assumptions regarding effluent concentrations from some BMPs. The results are presented in formats that are designed to allow readers to focus on both absolute (inflow and outflow concentrations) and relative performance of BMPs (percent reductions) for individual constituents and groups of constituents. As mentioned previously, extensive datasets were generated and are available in **Attachment K** and **Attachment L**. The results of the analysis are presented as follows:

- **Percent removal:** the results in **Table 3-5** provide mean and median removal percentages for the BMPs and for each of the 23 pollutants of concern (POC) analyzed. The table can be used to evaluate relative performance across constituent and BMP categories.
- **Inflow and outfall concentrations for common POCs:** shown in **Table 3-6** through **Table 3-10** are comparisons of standard statistics for the five available BMP categories across each of the common POCs. The corresponding box plots in **Figure 3-13** through **Figure 3-17** graphically represent the range of inflow versus outflow performance for the BMP categories.
- **Inflow and outflow concentrations for all 23 constituents:** standard statistics, including significance testing of percent reductions, for all constituents are included in **Attachment K**.
- **Performance statistics and box plots for all constituents:** extensive summary statistics and box plots of BMP performance across the BMP categories are included in **Attachment L**.

The presented box plots (**Figure 3-13** through **Figure 3-17**) include whiskers that span from the 10^{th} to 90^{th} percentiles and display outliers, defined as values that are more than 1.5 times the inner quartile range beyond the median. These outliers are included in all the generated summary statistics. This approach is consistent with technical memorandums on the IBD website.

Table 3-5 Mean and Median Percent Removal from Inflow to Outflow for All Pollutants and BMP Categories

Constituent Group	Pollutant	Bioswale (All)		Bioswale (Caltrans)		Bioswale (Non-Caltrans)		Constructed Wetland		Flow-Through Treatment BMP		Site Scale Detention	
		% Change, Mean	% Change, Median	% Change, Mean	% Change, Median	% Change, Mean	% Change, Median	% Change, Mean	% Change, Median	% Change, Mean	% Change, Median	% Change, Mean	% Change, Median
Metals	Total Arsenic	-51.14%	-21.85%	21.19%	29.33%	**-70.90%**	-44.19%	**-64.23%**	-65.00%	-11.57%	-18.52%	-19.56%	-24.00%
	Total Cadmium	**-51.15%**	-58.47%	-15.99%	-49.52%	**-68.14%**	-66.32%	**-74.50%**	-62.40%	1.22%	-48.00%	**-53.72%**	-49.44%
	Total Chromium	-24.85%	-42.03%	-21.11%	-28.38%	-27.37%	-61.06%	**-81.54%**	-88.30%	**-35.10%**	-37.04%	-60.67%	-50.00%
	Total Copper	**-69.02%**	-68.29%	**-59.24%**	-60.98%	**-70.39%**	-60.32%	-98.02%	-85.81%	-55.03%	-38.89%	**-51.83%**	-48.04%
	Total Iron	-57.30%	-61.20%	-48.56%	-47.57%	---	---	---	---	---	---	---	---
	Total Lead	**-75.46%**	-77.05%	**-69.92%**	-75.02%	**-76.11%**	-67.68%	-98.11%	-97.41%	**-63.71%**	-76.15%	**-66.23%**	-59.26%
	Total Nickel	**-59.02%**	-64.38%	-41.24%	-46.58%	**-69.50%**	-72.97%	-48.11%	-36.78%	-21.04%	-28.57%	-62.53%	-45.21%
	Total Zinc	**-74.08%**	-75.66%	**-71.53%**	-76.14%	**-71.42%**	-68.65%	**-84.48%**	-85.56%	**-62.40%**	-74.89%	**-68.98%**	-64.64%
Bacteria	Fecal Coliform	-13.70%	-82.00%	---	---	-13.70%	-82.00%	-94.54%	-92.69%	-26.36%	-91.43%	99.1%	41.7%
	Total Coliform	---	---	---	---	---	---	-0.18%	-62.97%	**-99.91%**	-99.90%	---	---
Solids	Total Suspended Solids	**-50.46%**	-59.21%	-24.21%	-51.28%	-61.37%	**-58.33%**	**-94.55%**	-95.22%	**-65.0%**	-82.28%	**-62.82%**	-62.00%
	Total Dissolved Solids	-3.72%	7.32%	17.58%	12.36%	-17.36%	-2.50%	**+1169%**	1739%	12.12%	16.67%	-0.29%	0.00%
	Turbidity	**-62.65%**	-50.67%	**-62.65%**	-50.67%	---	---	---	---	---	---	---	---
Nutrients	Kjeldahl nitrogen (TKN)	-18.52%	-15.00%	29.02%	16.67%	**-31.74%**	-25.24%	-22.91%	8.33%	-24.22%	-30.97%	-14.86%	-20.21%
	Nitrogen, ammonia as N	15.93%	-25.50%	40.91%	-9.04%	---	---	-61.86%	-57.14%	28.35%	50.00%	---	---
	Nitrogen, Nitrate (NO_3) as N	-12.14%	-21.25%	13.77%	-1.31%	-22.54%	-23.29%	-66.90%	-87.87%	24.13%	41.41%	-13.89%	-10.59%
	Nitrogen, Nitrite (NO_2) as N	89.01%	31.91%	89.01%	31.91%	---	---	**-100%**	-100%	---	---	---	---
	Nitrogen, unionized ammonia (NH_3) as N	---	---	---	---	---	---	---	---	**-56.11%**	-62.50%	---	---
	Organic carbon, Dissolved	-10.96%	7.50%	17.74%	34.02%	-28.27%	-14.14%	-32.54%	-40.91%	-1.43%	-7.14%	6.92%	9.09%
	Organic carbon, Total	-13.17%	0.00%	15.30%	18.18%	-29.70%	-5.56%	-23.90%	-6.67%	-4.78%	-12.79%	0.68%	6.06%
	Phosphorus as P, Dissolved	+263%	+250%	---	---	+263.42%	+250.00%	+186.92%	90.18%	-7.14%	-11.11%	-3.15%	22.22%
	Phosphorus as P, Total	+125%	+100%	+219%	+269%	92.89%	68.18%	-19.33%	-14.29%	**-34.10%**	-25.00%	**-35.61%**	-19.44%
	Phosphorus, orthophosphate as P	+369%	+553%	+531%	+795%	59.09%	31.91%	---	---	---	---	---	---

[1] Bolded, orange values indicate statistically different inflow and outflow concentrations based on 95% confidence intervals.
[2] If insufficient data were available to calculate the % removal, then --- is shown.
[3] Catch basin inserts are not shown because effluent data were insufficient.

Table 3-6 Inflow/Outflow Summary Statistics for TSS (mg/L)

BMP Category	No. of BMP Sampling Locations		No. of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Site Scale Detention	5	5	76	69	75	23	100	38	169	59
Bioswales	31	31	159	103	45.0	18.0	76.0	31.0	130	54
Catch Basin Inserts	0	6	---	88	---	20	---	37.5	---	71
Flow-Through Treatment BMPs	13	13	230	218	8.875	2.875	39.5	7.00	89.25	22.25
Constructed Wetlands	1	1	13	14	140	3.50	230	11.0	255	13.5

IN = inflow; OUT = outflow

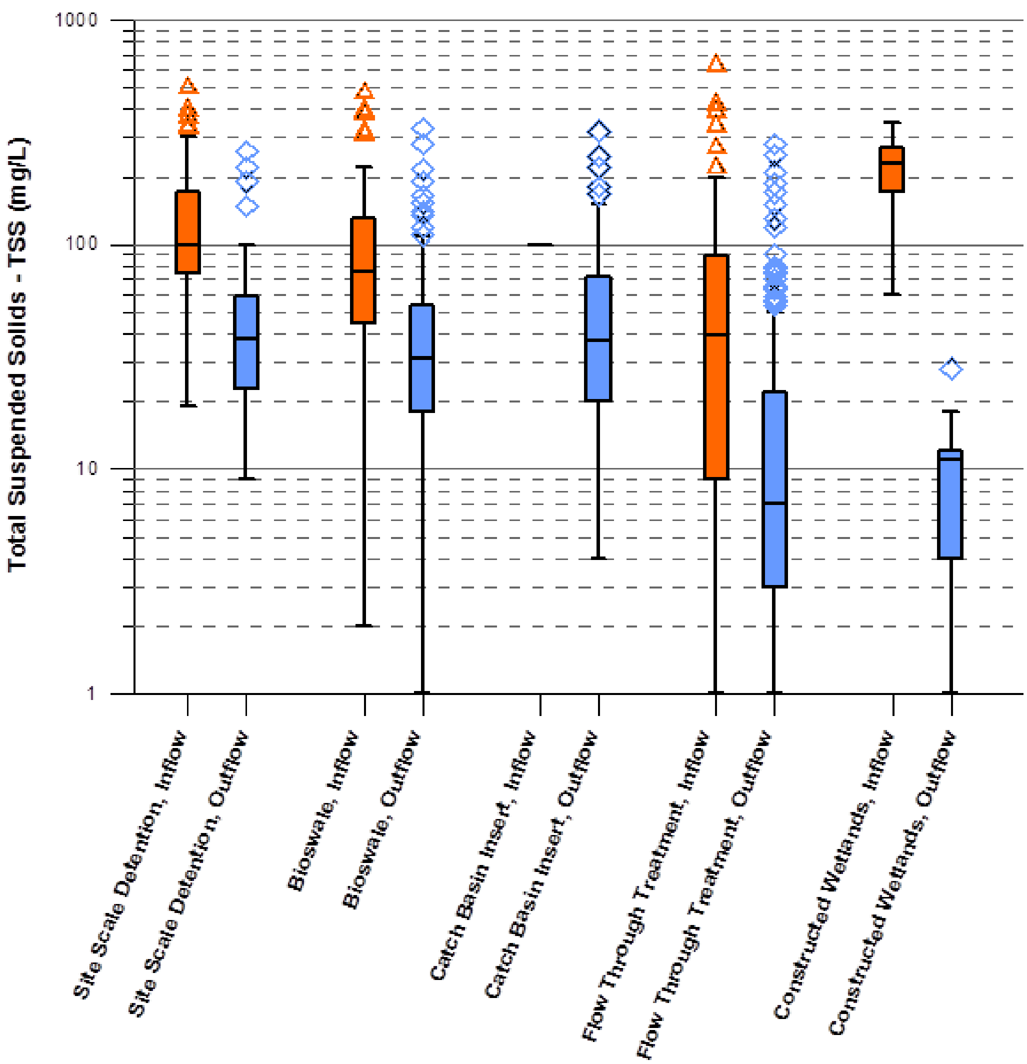

Figure 3-13 Box Plots of Inflow/Outflow TSS Concentrations in Southern California

Table 3-7 Inflow/Outflow Summary Statistics for Fecal Coliform (#/100mL)

BMP Category	No. of BMP Sampling Locations		No. of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Site Scale Detention	9	9	34	30	300	475	600	850	1700	3075
Bioswales	8	8	33	19	500	130	5000	900	16500	5000
Catch Basin Inserts	0	6	---	---	---	---	---	---	---	---
Flow-Through Treatment BMPs	11	11	172	152	300	7.47	900	77.1	3000	797
Constructed Wetlands	2	2	13	14	230	20.0	1300	95.0	3800	255

IN = inflow; OUT = outflow

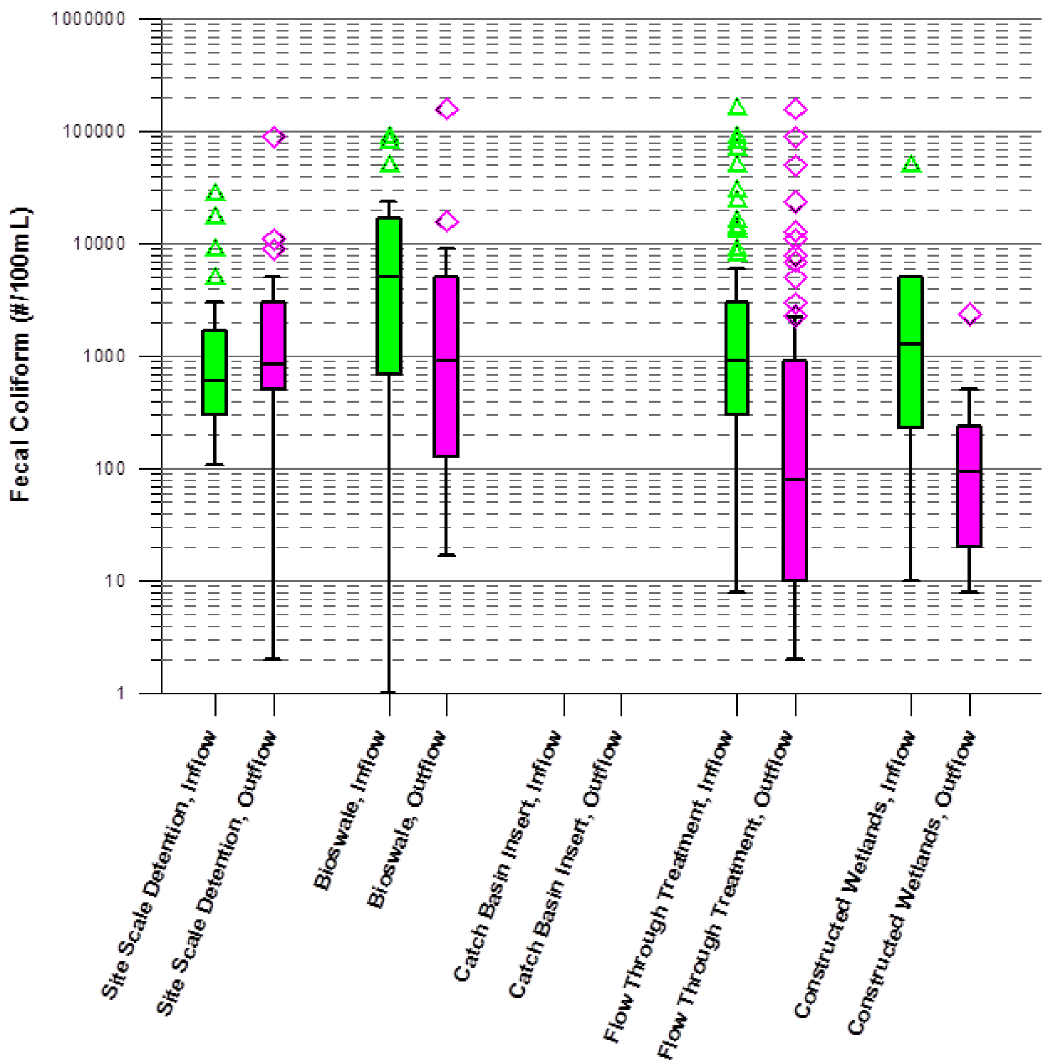

Figure 3-14 Box Plots of Inflow/Outflow Fecal Coliform Concentrations in Southern California

Table 3-8 Inflow/Outflow Summary Statistics for Copper (µg/L)

BMP Category	No. of BMP Sampling Locations		No. of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Site Scale Detention	5	5	76	68	26.25	15.00	39.45	20.50	63.75	28.00
Bioswales	31	31	150	100	22.00	8.23	41.00	13.00	70.50	19.90
Catch Basin Inserts	0	6	---	88	---	5.95	---	13	---	22
Flow-Through Treatment BMPs	11	11	150	146	11.98	6.20	18.00	11.00	33.00	21.25
Constructed Wetlands	2	2	21	22	11.15	5.55	62.00	8.80	110.0	14.75

IN = inflow; OUT = outflow

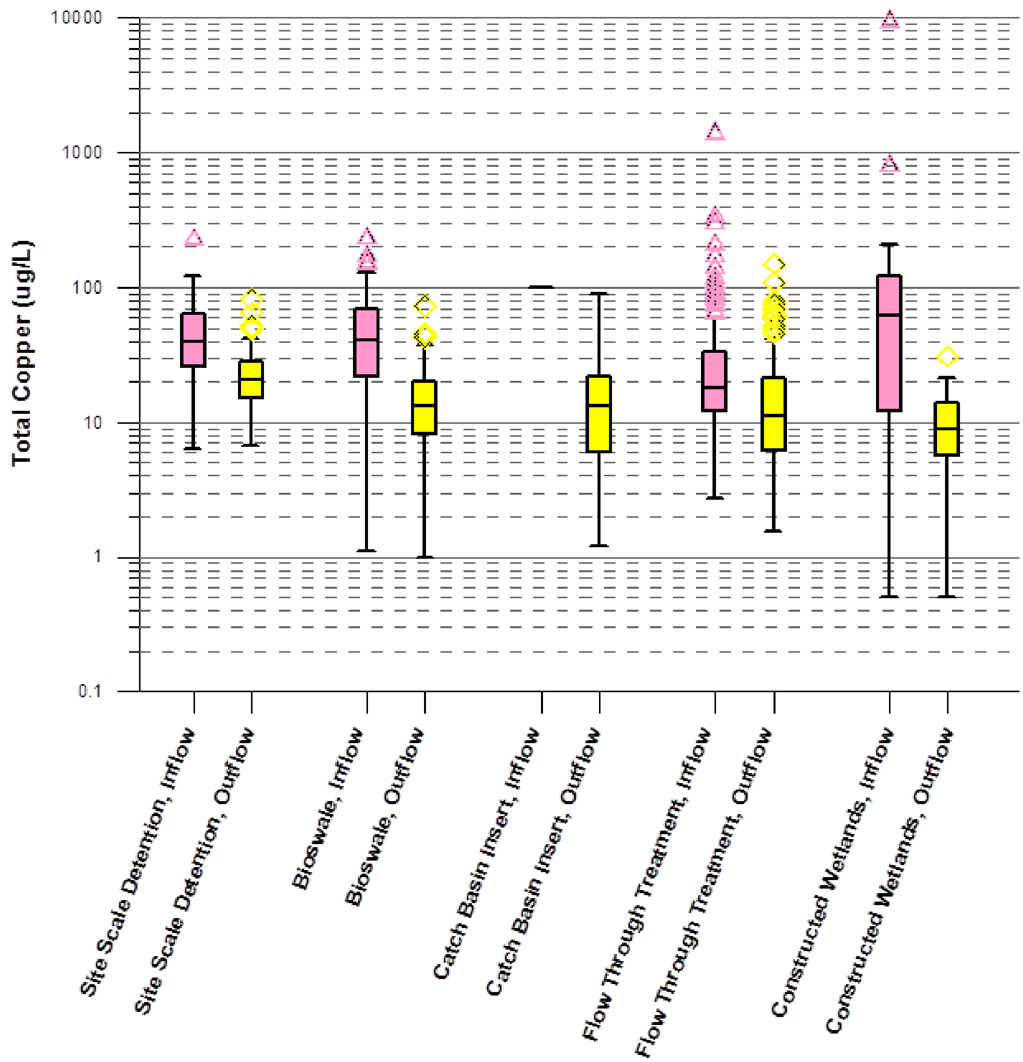

Figure 3-15 Box Plots of Inflow/Outflow Copper Concentrations in Southern California

Table 3-9 Inflow/Outflow Summary Statistics for Lead (µg/L)

BMP Category	No. of BMP Sampling Locations		No. of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Site Scale Detention	5	5	76	69	34.40	13.00	54.00	22.00	108.25	36.50
Bioswales	31	31	150	100	13.92	3.53	32.89	7.55	77.75	21.50
Catch Basin Inserts	0	6	---	88	---	2.3	---	6	---	12.45
Flow-Through Treatment BMPs	11	11	149	146	6.50	1.00	13.00	3.10	25.50	7.10
Constructed Wetlands	2	2	21	22	3.32	2.70	170.0	4.40	315.00	8.32

IN = inflow; OUT = outflow

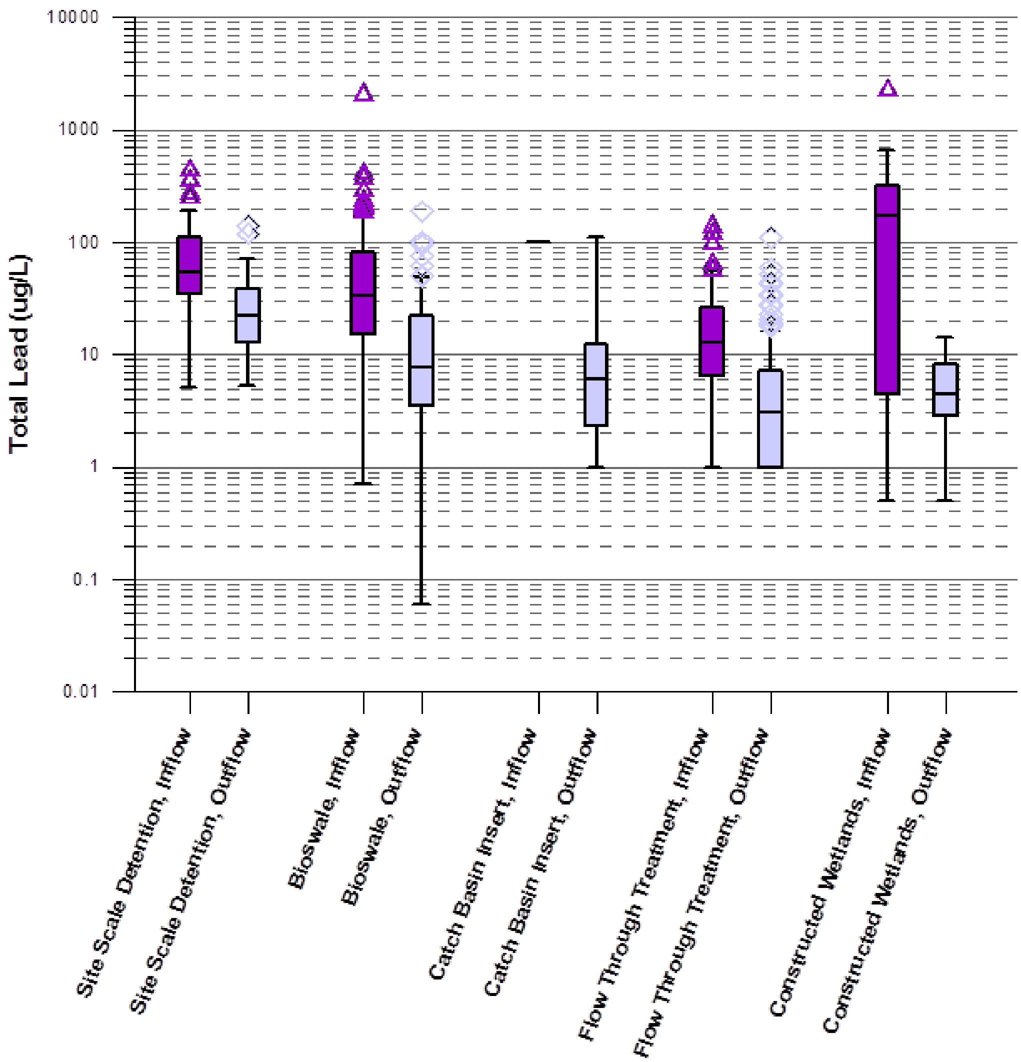

Figure 3-16 Box Plots of Inflow/Outflow Lead Concentrations in Southern California

Table 3-10 Inflow/Outflow Summary Statistics for Zinc (µg/L)

BMP Category	No. of BMP Sampling Locations		No. of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Site Scale Detention	5	5	76	68	152.75	68.25	280.00	99.00	504.75	150.00
Bioswales	31	31	150	100	110	29.5	228	55.5	360	82.5
Catch Basin Inserts	0	6	---	88	---	50.5	---	107	---	220
Flow-Through Treatment BMPs	11	11	150	146	110	23.00	221	55.5	400	131
Constructed Wetlands	2	2	21	22	109.00	28.53	270.00	39.00	450.00	84.35

IN = inflow; OUT = outflow

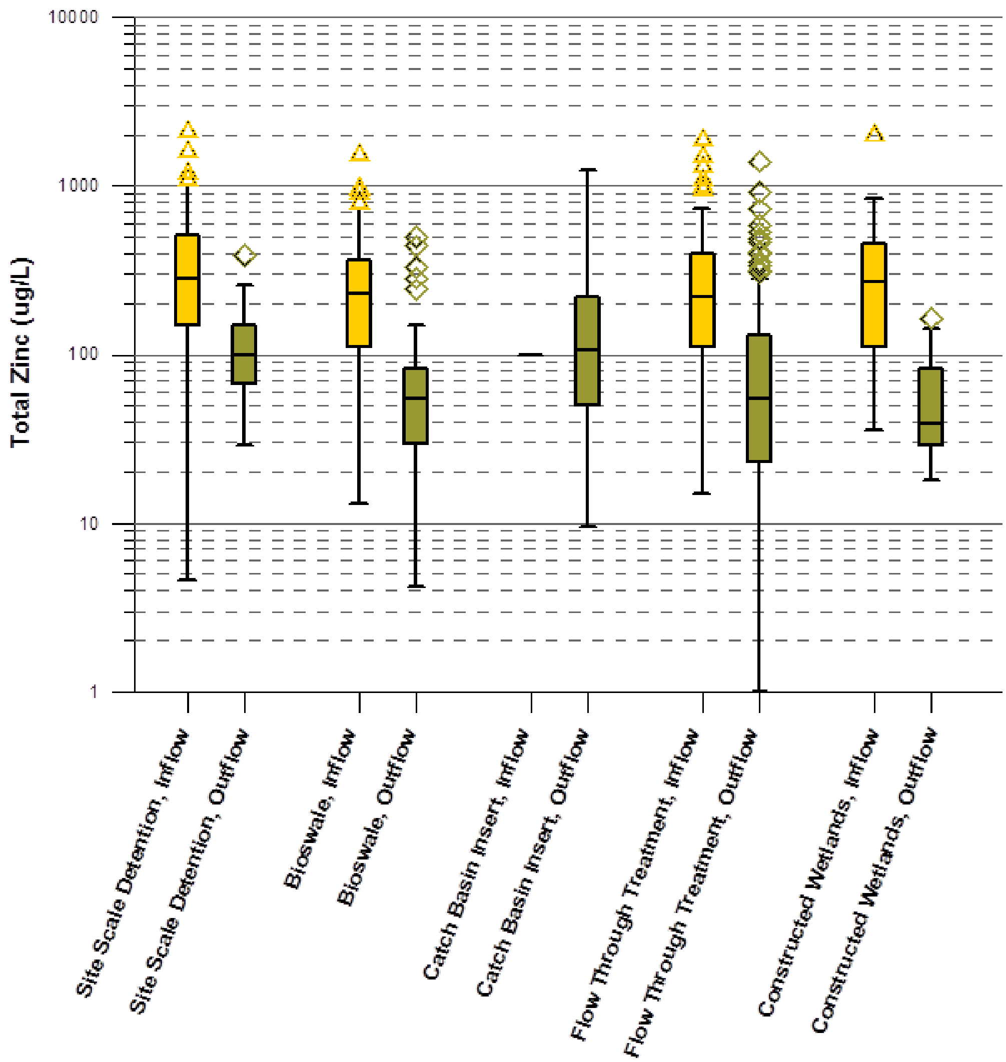

Figure 3-17 Box Plots of Inflow/Outflow Zinc Concentrations in Southern California

3.2.5 Key Observations

The statistical analysis presented in this Work Plan has many applications, which include supporting the RAA for EWMP development. As future applications are undertaken, the results can be analyzed in greater detail. For this Work Plan, the following general observations are highlighted:

- **Comparison of outflow quality among BMPs:** the constructed wetland (n = 2) and flow-through treatment BMPs (n = 31) generally exhibited the highest quality effluent. Reductions of TSS were generally higher compared to other BMPs and concentrations of TSS in outflows were generally lower (see **Table 3-6** and **Figure 3-13**). Elevated performance is also apparent for other constituents. The constructed wetlands exhibited exceptional reductions (>84%) of total copper, lead, and zinc. Constituents were likely reduced in the constructed wetlands by means of sedimentation, chemical and biological conversions, and uptake. The flow-through treatment BMPs in the dataset were mostly Caltrans BMPs including media filters and proprietary cartridge filters with a range of sand/peat and sand/gravel mixes.

- **BMP performance for individual constituents:** among the constituents analyzed, the percent removals were often the highest for total metals, especially lead and zinc (**Table 3-5**). The poorest performance was often for nutrients, with phosphorous concentrations increasing in some cases (likely due to leaching). For bacteria, only the constructed wetlands and flow-through treatment BMPs were able to generate outflows with median fecal coliform concentrations less than 235 MPN per 100mL (which is an applicable MS4 Permit limitation if fecal coliform is assumed equivalent to *E. coli*) (see **Table 3-7** and **Figure 3-14**).

- **Application of the data for the RAA effort:** in general, the majority of pollutant removal associated with potential stormwater BMPs in the RAA will be due to volume reduction (infiltration). The Watershed Management Modeling System (WMMS), which will be used for the RAA, is process-based and thus is able to estimate volume reduction and the proportion of inflow that is infiltrated, treated, and overflowed. Due to the model being dynamic, these proportions change from storm to storm (i.e., overflows are less frequent during small storms than large storms). For the subset of planned BMPs with a treatment component, some assumptions will be needed regarding the quality of treated and discharged outflow (e.g., biofiltration BMPs, which have an underdrain). The analysis herein will support those assumptions. It is noted that only a subset of the potential BMP categories (defined in **Section 3.1.1**) had sufficient data for data analysis. As such, an important consideration will be whether BMP performance statistics of the BMPs analyzed are relevant to some of the other BMPs that may be included in the RAA (but were not analyzed). For example, because biofiltration is vegetated filtration, it is reasonable to assume the performance data for the flow-through treatment (filtration) BMPs (and perhaps constructed wetlands) are applicable to biofiltration. The specific approach for applying the statistics for estimating concentrations of constituents in underdrain outflows (if necessary) will be determined during the RAA effort.

3.3 MCMs/Institutional BMPs

Institutional BMPs are non-constructed control measures that limit the amount of stormwater runoff or pollutants that are transported within the MS4 area. Most institutional BMPs are implemented to meet MCM requirements in the MS4 Permit.

MS4 Permit Part VI.C.5.b.iv.(1) directs that the MCMs identified in Parts VI.D.4 to VI.D.10 be incorporated as part of the EWMP. Permittees can evaluate the MCMs, identify potential modifications that will address water quality priorities, and provide justification for modification and/or elimination of any MCM that is determined to not be applicable, with the exception of MCMs in the Planning and Land

Development Program which may not be eliminated. Customization may include replacement of an MCM for a more effective measure, reduced implementation of an MCM, augmented implementation of the MCM, focusing the MCM on the water quality priority, or elimination of an MCM. The MS4 Permit categorizes institutional BMPs and MCMs into the six program categories listed below. The programs that are applicable to the LACFCD are identified with an asterisk (*).

1. Development Construction Program
2. Industrial/Commercial Facilities Program*
3. Illicit Connection and Illicit Discharges (IC/ID) Detection and Elimination Program*
4. Public Agency Activities Program*
5. Planning and Land Development Program
6. Public Information and Participation Program*

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

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

3.3.1 Summary of Existing MCMs/Institutional BMPs

The following MCMs/institutional BMPs are implemented by the RH/SGRWQG members:

- Concrete Curing
- Dog Parks
- Dewatering Operations
- Dust Control
- Erosion Control
- Enhanced Street Sweeping
- Hardscape Design
- Hazardous Waste Management
- Landscape Design
- Liquid Waste Management
- Material Delivery and Storage
- Material Use
- Paving and Grinding Operations
- Potable Water/Irrigation
- Preserved Existing Vegetation
- Sanitary/Septic Waste Management
- Scheduling
- Solid Waste Management
- Spill Prevention and Control
- Stockpile Management
- Street Sweeping and Vacuuming
- Vehicle and Equipment Fueling
- Vehicle and Equipment Maintenance
- Waste Oil Recycling Center
- Water Conservation Practices
- Water Trucks
- Wind Erosion Control

3.3.2 Potential Approaches to Modifying MCMs/Institutional BMPs

Part VI.C.5.b.iv.(1) of the MS4 Permit directs Permittees to assess MCMs to identify opportunities for focusing resources on the water quality priorities identified in **Section 2**. Each Permittee is encouraged to implement the requirements in Parts VI.D.4 through VI.D.10, or may implement customized actions within each category of control measures as set forth in an approved EWMP. Permittees can evaluate the MCMs, identify potential modifications that will address water quality priorities, and provide justification for modification or elimination of any MCM that is determined to be ineffective (with the exception of the Planning and Land Development Program, which may not be eliminated or modified). MCM customization may include replacement, reduced implementation, augmented implementation, focused implementation or elimination.

An approach was developed for evaluating MCMs and/or institutional BMPs for customization to better address the water quality priorities. The steps associated with this process are as follows:

Step 1. Summarize the Current MCM Implementation

The current MCM implementation as reported in the 2010-2011 and 2011-2012 Los Angeles County Unified Stormwater Annual Reports is summarized in **Attachment M**.

Step 2. Compare Current MCM Implementation to MS4 Permit

The 2001 MS4 Permit MCM requirements are compared to the requirements specified in the 2012 MS4 Permit in **Attachment N**. This comparison, along with the identification of existing MCM elements being implemented, allow for a general assessment of potential gaps in the current programs. In general, the 2001 MS4 Permit and 2012 MS4 Permit requirements are worded differently and contain different specific requirements that cannot easily be compared. Each of the RH/SGRWQG members implement different programs that comply with the same requirements. Each agency will perform more specific assessments to determine if it would benefit from MCM customizations, implemented through the EWMP development process.

As shown in **Attachment N**, gaps between the current program implementation under the 2001 MS4 Permit and the 2012 MS4 Permit MCM requirements are primarily in the Planning and Land Development Program, Construction Program, and Public Agency Activities. For instance:

- *Planning and Land Development Program:* Extensive new requirements for LID and hydromodification control.
- *Construction Program:* New requirements for erosion and sediment control procedures, especially for sites less than 1 acre, and for Erosion and Sediment Control Plans (ESCPs).
- *Public Agency Activities:* MCMs for inventory of Permittee-owned facilities, determine retrofit opportunities, assessment of flood management projects, assessment of flood control facilities, demonstration of Integrated Pest Management (IPM), among others.

For the PIPP, Industrial/Commercial Program, and IC/ID Elimination Program, the 2012 MS4 Permit contains some modifications to existing MCMs and additional detail as compared to the 2001 MS4 Permit. One significant change is the elimination of the Principal Permittee which previously implemented the PIPP on behalf of all Permittees. Now each Permittee is individually responsible for the implementation of the PIPP. For these programs, no other significant new program elements are required as in the MCMs listed above. The MCM requirements and existing implementation serve as the basis for further evaluation of MCMs.

Step 3. Develop a List of MCMs that are Candidates for Customization

The first step is to develop a list of the MCMs that may be evaluated for customization. There are two parallel approaches for developing the list:

- Identify MCMs that do not address or only partially address the water quality priorities; or
- Identify MCMs that the stormwater program staff would like to eliminate or customize based on implementation experience.

Each of the MCM programs that may be customized through the EWMP development process will be evaluated to determine if the MCM addresses the water quality priorities identified in **Section 2**. In addition, the potential effectiveness of the MCM program regarding the water quality priorities will be determined based on program goals, implementation, and experience. The future evaluation will also take into account the RH/SGRWQG preferences to ensure that the customizations proposed in the EWMP will be feasible and effective to implement.

Step 4. Evaluate Existing Information and Data to Develop Justifications for MCM Customization

Based on the list of MCMs that are candidates for modification identified in Step 3, potential general approaches or opportunities for MCM customization will be identified. Based on the general approaches or opportunities, the RH/SGRWQG members can evaluate the customized MCMs to determine if potential modifications will be identified in the EWMP.

Part VI.C.5.b of the 2012 MS4 Permit directs the Permittees to "provide justification for elimination of any MCM that is determined not to be applicable to the Permittee." The goal of the program should be to efficiently and effectively focus efforts on water quality priorities; thus a control measure that is "not applicable" is one that does not promote that goal. The sections below outline procedures that could be followed to determine if there is justification to eliminate an MCM. In addition, the 2012 MS4 Permit specifies that, for each of the MCMs, the Permittees "shall identify potential modifications that will address watershed priorities."

Water Quality Priority-Based Customization

For those MCMs that do not address, at least in part, a high priority water quality issue, potential opportunities to focus the MCM on one or more water quality priorities will be considered and identified as part of the EWMP. If there are no reasonable opportunities to modify MCMs to focus on a water quality priority, the MCM may be considered for reduced implementation or elimination.

It is expected that MCMs that address, at least in part, a water quality priority will continue to be implemented. However, customization may still be desirable to make the MCM more effective. Potential opportunities to modify, expand, and/or reduce the MCMs to improve their effectiveness/efficiency will be identified and evaluated for incorporation in the EWMP. The RH/SGRWQG will document the justification for reduced MCM implementation or elimination, as required by the MS4 Permit, if these modifications are incorporated into the EWMP.

Effectiveness-Based Customization

For those MCMs that are determined not to be an effective or efficient use of program resources, an assessment of the effectiveness of the MCM will be needed to justify reduced implementation or elimination as part of the EWMP. Potential tools for assessing effectiveness are described below. Similar to the water quality priority-based customization discussion, reasonable opportunities will be explored to modify MCMs to make them more effective. Potential opportunities to modify, expand, and/or reduce the MCMs to improve their effectiveness/efficiency will be identified and evaluated for incorporation in the EWMP. The RH/SGRWQG will document the justification for reduced MCM implementation or elimination, as required by the MS4 Permit, if these modifications are incorporated into the EWMP.

Using the RH/SGRWQG's existing stormwater program implementation experience and information regarding existing MCM implementation from the Los Angeles County Unified Stormwater Annual Reports (**Attachment M**), the RH/SGRWQG can evaluate the current MCM program effectiveness to justify modifications or eliminations. The first tool for consideration is the California Stormwater Quality

Association (CASQA) Municipal Stormwater Program Effectiveness Assessment Guidance (May, 2007) which provides a framework for evaluating the effectiveness of a stormwater program and/or the stormwater program elements. It includes multiple outcome levels that reflect a gradient from activity-based to water-quality based outcomes. The Guidance Document identifies the outcome levels illustrated in **Figure 3-18** to help categorize and describe the results of the program implementation.

Figure 3-18 CASQA Classification of Outcome Levels

The outcome levels represent ways in which the effectiveness of the program can be considered. Levels 1 to 3 are considered to be implementation based outcomes, level 4 marks the transition from implementation to water quality-based outcomes, and levels 5 and 6 emphasize water quality outcomes. Program effectiveness assessments have been conducted by assessing how well the Permittees implemented the stormwater program elements, assuming that the implementation will likely lead to improvements in stormwater quality. If correlations can be established between the program efforts (e.g., conducting a survey, assessing BMP implementation) and outfall discharge and/or receiving water quality, it may allow for predictions of water quality improvements resulting from implementation of certain types of programs. Correlating water quality improvements with programmatic results over time may help identify the most expedient and cost-effective program elements.

At this time, water-quality based outcomes will be used which may be tenuous for most control measures or unable to be determined; therefore, it is recommended that the effectiveness is reevaluated to focus on activity-based outcome levels once available. CASQA is expected to release an updated version of its Effectiveness Assessment Guidance Manual in the coming months. The updated guidance is expected to advance the concept and tools of effectiveness assessments for stormwater Program Managers. Once available, the tools from the new guidance can be utilized to support the evaluation of the MCM effectiveness.

Another way to evaluate the effectiveness of MCMs/institutional BMPs is to estimate the potential load reduction associated with the control measure by determining a participation rate for the target audience (e.g., business outreach is performed at 90 percent of facilities) and a loading factor (e.g., 50 percent of the pollutant load is reduced if there is 100 percent participation) (Water Environment, 2000). The participation and loading factors are multiplied to estimate effectiveness with respect to reduction in loading of a pollutant that is released to the environment (e.g., 45 percent effectiveness for the above example). This strategy typically requires several assumptions and is easiest to employ with MCMs that target specific pollutants.

A third tool is to perform a cost analysis to determine if an MCM is an efficient use of program resources. A cost analysis helps evaluate the resources necessary to implement the MCM as compared to its effectiveness. The overall cost should take into account the time requirements of staff and the direct costs of any materials needed.

A review of the MCMs/institutional BMPs described in **Section 3.3.1** will be completed using readily available information and the strategies described in this section. The effectiveness of the control measures will assist in determining if there are justifiable reasons to modify or eliminate the control measure through the EWMP development process.

3.3.3 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 85^{th} 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.

To determine the effectiveness of non-stormwater discharge control measures, in addition to those already required and proposed, research and analysis will be performed. The RH/SGRWQG may want to implement additional non-stormwater discharge control measures if a load reduction is anticipated at a relatively low cost. To identify these control measures, the RH/SGRWQG 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. It may be possible to determine if these types of events contribute to exceedances or negatively impact water quality.

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.

4. Reasonable Assurance Analysis Approach

The RAA is a major component of the EWMP and is used to demonstrate "that the activities and control measures will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term" (Part VI.C.5.b.iv.(5)). This section describes the process that will be used to conduct the RAA for the RH/SGRWQG. The MS4 Permit describes the RAA as a quantitative demonstration that control measures will be effective, but the RAA also provides an opportunity to utilize a model to identify and prioritize potential control measures. The RAA also considers the applicable compliance dates and milestones for attainment of the WQBELs and RWLS, supporting BMP scheduling.

The RAA effort has begun and the methodology described below will likely evolve over the course of the EWMP development process. The approach is generally consistent with the recently finalized "RAA Guidelines" (Nguyen et al., 2014).

4.1 Modeling System

WMMS will be used to support the RH/SGRWQG RAA. WMMS is specified in the MS4 Permit as a potential tool for conducting the RAA. The LACFCD, through a joint effort with the USEPA, developed WMMS specifically to support informed decisions associated with managing stormwater. The ultimate goal of WMMS is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach. WMMS encompasses Los Angeles County's coastal watersheds of approximately 3,100 square miles, representing 2,566 subwatersheds (**Figure 4-1**). As described in the following subsections, WMMS is a modeling system that incorporates three tools: (1) the watershed model for prediction of long-term hydrology and pollutant loading (LSPC – Loading Simulation Program C++); (2) a BMP model (SUSTAIN – System for Urban Stormwater Treatment Analysis and Integration); and (3) a BMP optimization tool to support regional, cost-effective planning efforts (NIMS – Nonlinearity-Interval Mapping Scheme). A total of 133 subwatersheds in the RH/SGRWQG EWMP area are represented by WMMS (**Figure 4-2**). To support evaluation of regional BMPs, these subwatersheds will be further grouped by outlet to receiving waters.

WMMS is available for public download from the LACFCD. The version of WMMS to be used for the RAA has been enhanced/modified in several ways, including the following:

- Updates to meteorological records to represent the last 10 years and allow for simulation of the design storm;
- Calibration adjustments to incorporate the most recent 10 years of water quality data collected at the nearby mass emission station;
- Simulation of non-structural BMPs using LSPC;
- Representation of an expanded/modified BMP network using SUSTAIN;
- Application of a second-tier of BMP optimization using SUSTAIN, which replaces the NIMS component of WMMS;
- BMP effectiveness for removal of bacteria pollutant (rather than only metals); and
- Updates to GIS layers, as available.

4.1.1 Watershed Model – LSPC

The watershed model included within WMMS is LSPC (Tetra Tech and USEPA 2002; USEPA 2003; Shen et al. 2004). LSPC is a watershed modeling system for simulating watershed hydrology, erosion, and water quality processes, as well as in-stream transport processes. LSPC also integrates a GIS, comprehensive data storage and management capabilities, and a data analysis/post-processing system into a convenient computer-based Windows environment. The algorithms of LSPC are identical to a subset of those in the Hydrologic Simulation Program–FORTRAN (HSPF) model with selected additions, such as algorithms to dynamically address land use change over time. Another advantage of LSPC is that there is no inherent limit to the size and resolution of the model that can be developed, making it an attractive option for modeling the Los Angeles region watersheds. USEPA's Office of Research and Development (Athens, Georgia) first made LSPC available as a component of USEPA's National TMDL Toolbox (USEPA, 2013). LSPC has been further enhanced with expanded capabilities since its original public release.

The WMMS development effort culminated in a comprehensive watershed model of the entire Los Angeles County area that includes the unique hydrology and hydraulics of the system and characterization of water quality loading, fate, and transport for all the key TMDL constituents (Tetra Tech 2010a, 2010b). The 133 subwatersheds in the RH/SGRWQG area that are represented by WMMS are shown in **Figure 4-2**. Since the original development of the WMMS LSPC model, Los Angeles County personnel have independently updated the model with meteorological data through 2012, and refined the physical representation of the spreading grounds with higher resolution information.

Figure 4-1 WMMS Model Domain and Represented Land Uses and Slopes by Subwatershed

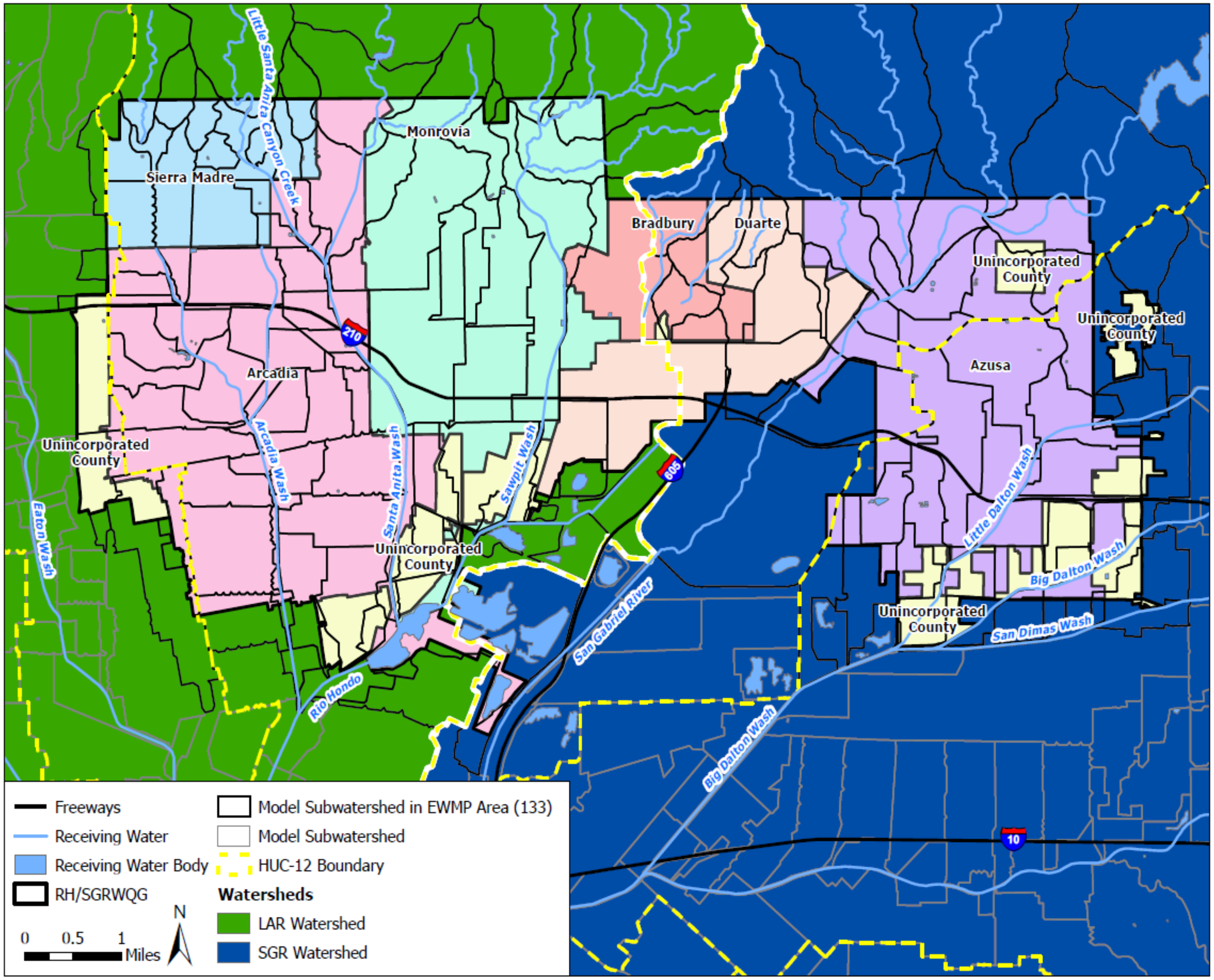

Figure 4-2 RH / SGRWQG EWMP Area and 133 Subwatersheds Represented by WMMS

4.1.2 Small-Scale BMP Model – SUSTAIN

SUSTAIN was developed by the USEPA to support practitioners in developing cost-effective management plans for municipal stormwater programs and evaluating and selecting BMPs to achieve water resource goals (USEPA, 2009). It was specifically developed as a decision-support system for selection and placement of BMPs at strategic locations in urban watersheds. It includes a process-based continuous simulation BMP module for representing flow and pollutant transport routing through various types of structural BMPs. Users are given the option to select from various algorithms for certain processes (e.g., flow routing, infiltration, etc.) depending on available data, consistency with coupled modeling assumptions, and the level of detail required. **Figure 4-3** shows images from the SUSTAIN model user interface and documentation depicting some of the available BMP simulation options in a watershed.

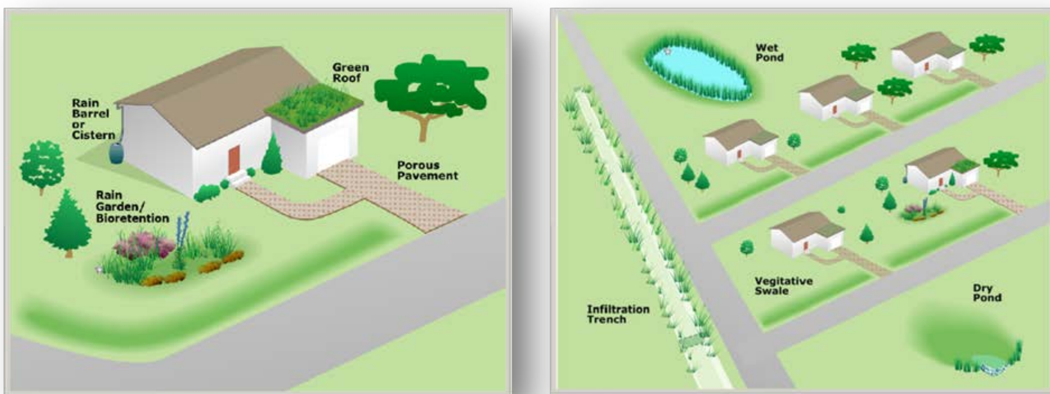

Figure 4-3 SUSTAIN Model Interface Illustrating Available BMPs in Watershed Settings

SUSTAIN extends the capabilities and functionality of traditionally available models by providing integrated analysis of water quantity, quality, and cost factors. The SUSTAIN model in WMMS includes a cost database comprised of typical BMP component cost data from a number of published sources including BMPs constructed and maintained in Los Angeles County. SUSTAIN considers certain BMP properties as "decision variables," meaning that they are permitted to change within a given range during model simulation to support BMP selection and placement optimization. As BMP size changes, cost and performance change as well. SUSTAIN runs iteratively to generate a cost-effectiveness curve comprised of optimized BMP combinations within the modeled study area (e.g., the model evaluates the optimal width and depth of certain BMPs to determine the most cost-effective configurations for planning purposes).

4.1.3 Large-Scale BMP Optimization Tool – NIMS

WMMS was specifically designed to dynamically evaluate effectiveness of BMPs implemented in subwatersheds for meeting downstream RWLs while maximizing cost-benefit. The structural BMP strategies included in WMMS primarily focus on (1) distributed green infrastructure BMPs and (2) large regional BMPs. With the number of alternative combinations of BMPs possible in a watershed, the ability to evaluate and compare the benefits and costs of each scenario (representing a combination of multiple BMPs) is highly desirable. As such, WMMS employs optimization based on an algorithm named NIMS to navigate through the many potential scenarios of BMP strategies and identify the strategies that are the most cost-effective (Zou et al. 2010). While SUSTAIN performs optimization at the subwatershed-scale, NIMS optimizes at the watershed-scale, supporting identification of the subwatersheds that should be targeted to most cost-effectively achieve pollutant reduction goals (see **Figure 4-2** for the subwatersheds applicable to RH/SGRWQG). It should be noted, that optimization at the jurisdictional level (rather than watershed-wide) is not currently achieved with NIMS. As such, a two-tiered optimization approach with SUSTAIN (subwatershed-scale and watershed-scale) may be used instead of NIMS for the RAA.

4.2 RAA Process Overview and Elements

The proposed RAA approach is a predictive quantitative process that includes the following components (see **Figure 4-4**):

1. **Incorporates Water Quality Priorities and identifies numerical goals to address them** (Step 1): Numeric goals, which represent RAA drivers, include TMDL targets, WQBELs, and RWLs. The estimated baseline/existing loading provide a reference point of comparison for measuring BMP performance and cost-effectiveness (i.e., the change between the current loading and predicted loading after BMPs are implemented, and the cost of those BMPs).

2. **Identifies opportunities for BMP implementation in the EWMP area** (Step 2): the RAA inherently includes an exploratory element for evaluating BMP opportunities. The opportunities include BMPs under construction (committed BMPs), BMPs in planning documents (proposed BMPs), and additional BMPs identified through the iterative modeling process (potential BMPs).

3. **Evaluates effectiveness of potential BMPs on receiving water quality and jurisdictional loading** (Step 3): EWMPs are ultimately developed as “recipes for compliance” for each jurisdiction, but compliance is also assessed in the receiving waters. As such, assessment of the effectiveness of BMP scenarios requires consideration of averaging/simulation periods and determination of points where load reductions will be assessed.

4. **Identifies the combination of BMPs expected to attain numeric goals** (Step 4): the RAA will be an iterative process that evaluates different combinations of BMPs and quantifies their effectiveness. It is through the iterative modeling process that certain practices will be prioritized for inclusion in the EWMP.

5. **Supports scheduling to implement the BMPs over a timeline that addresses milestones cost-effectively** (Step 5): BMPs that offer the greatest immediate benefit for the lowest cost would be among those first identified and included in the early implementation phases. Furthermore, the pace at which BMPs are implemented will be dictated by applicable TMDL and EWMP milestones.

6. **Supports the future adaptive management process to incorporate new data and experience gained during BMP implementation** (Step 6): EWMPs will be implemented over decades, and the adaptive management process will take place over two-year cycles that incorporate new monitoring data collected through implementation of the CIMP, experience gained from BMP implementation, and changes to the water quality standards (i.e., beneficial uses or water quality objectives).

An overview of these steps in the proposed RAA process is described in the following subsections. Details on modeling methods are provided in **Section 4.3**.

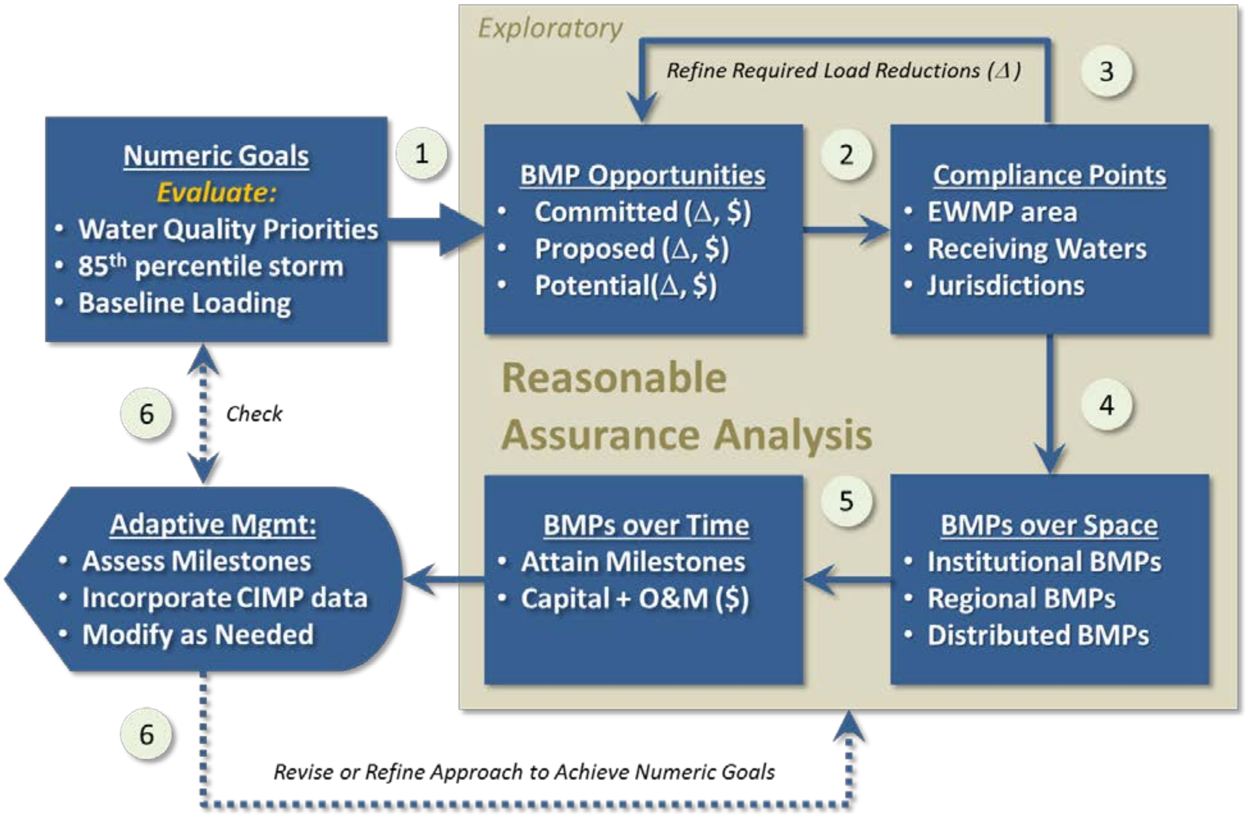

Figure 4-4 Conceptual Diagram of RAA Components

4.2.1 Establish Numeric Goals to Achieve Water Quality Priorities (Step 1)

The water quality priorities are the primary driver of the EWMP and the resulting BMPs. The MS4 Permit provides two types of numeric goals for addressing water quality priorities (see **Figure 4-5**):

- ➢ Retain the standard runoff volume from the 85th percentile, 24-hour storm
- ➢ Achieve the necessary pollutant load reductions to attain RWLs or WQBELs

At this time, the difference in these two compliance paths (in terms of number and types of BMPs) is unknown. As such, early in the RAA process, both types of numeric goals will be evaluated. If the numeric goals based on the 85th percentile, 24-hour storm event are similar to the pollutant-based numeric goals, then the volume-based goal may be selected because it offers increased compliance coverage (also applies to final TMDL limits) and it represents a more comprehensive approach to addressing all water quality priorities while also promoting increased sustainability of local water supplies.

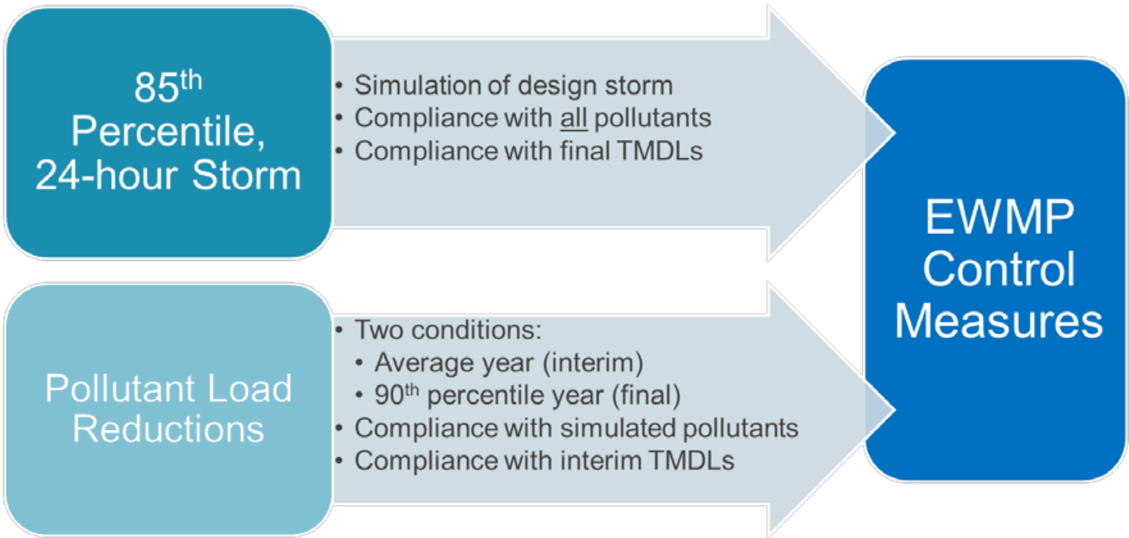

Figure 4-5 Two Types of Numeric Goals and EWMP Compliance Paths

4.2.1.1 Numeric Goals Based on the 85th Percentile, 24-Hour Storm Volume

The volume associated with the 85th percentile, 24-hour storm varies by subwatershed. Each of the 133 subwatersheds in the RH/SGRWQG area will have a unique volume, due to varying rainfall amounts and land characteristics (imperviousness, soils, slope, etc.). Shown in **Figure 4-6** are the rainfall depths associated with the 85th percentile, 24-hour storm. These rainfall amounts will be used as boundary conditions in the LSPC watershed model to predict the associated runoff volumes for each of the 133 subwatersheds in the RH/SGRWQG area. These runoff volumes could potentially be mitigated through the implementation of distributed BMPs, not just regional EWMP projects.

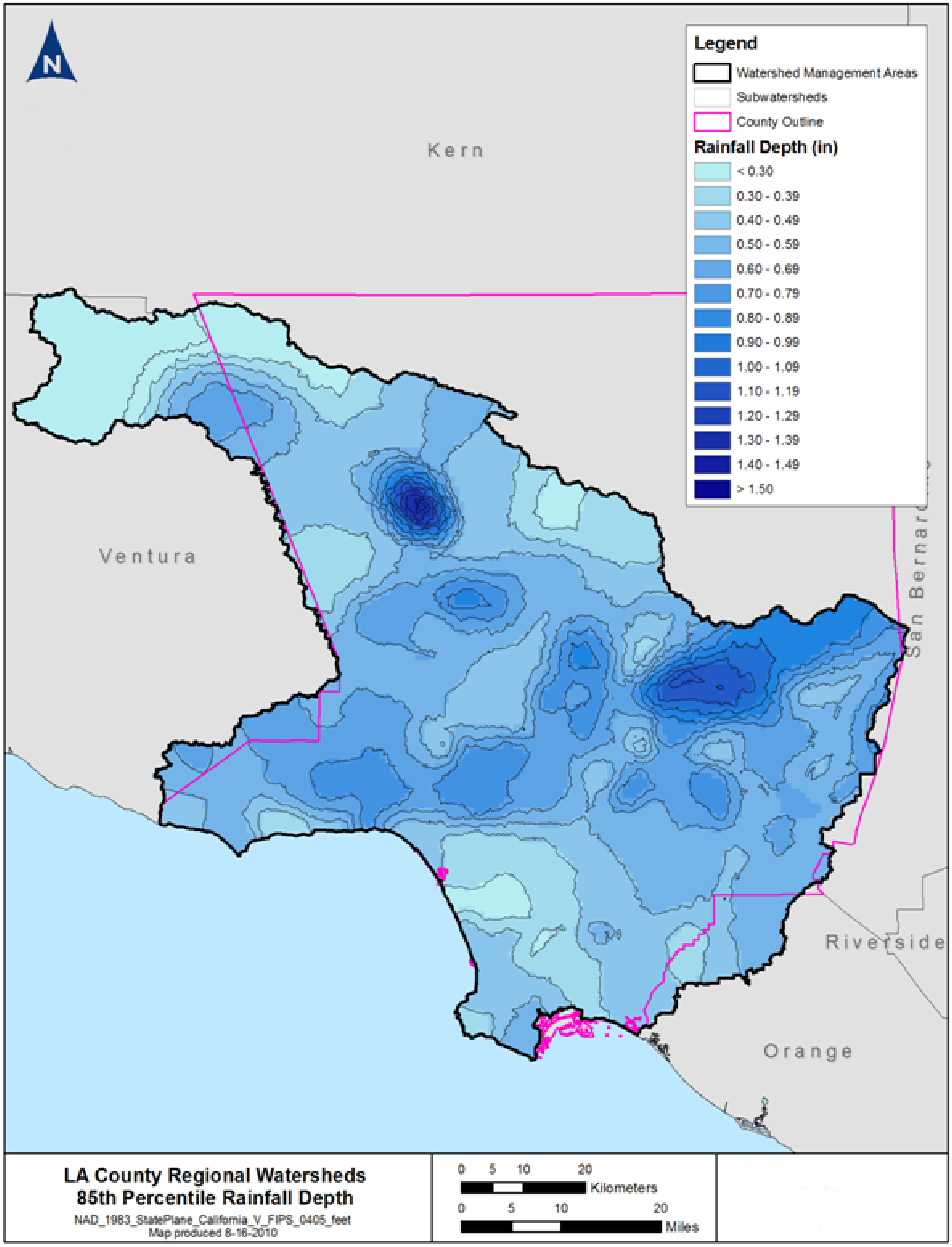

Figure 4-6 Rainfall Depth Associated with the 85th Percentile, 24-Hour Storm Event

4.2.1.2 Numeric Goals Based on Pollutant Load Reductions

The numeric goals based on pollutant load reductions are derived from WQBELs and RWLs. The required pollutant load reduction is the change between current/baseline loading and the loading predicted to attain the WQBELs and RWLs. The baseline loading will be calculated for most water quality priority pollutants, as identified in **Section 2**, by simulating the hydrology and water quality that occurred during average conditions and critical conditions, per the RAA Guidelines from the Regional Board. At this time, it is anticipated the 90th percentile wet year will serve as the critical condition for most pollutants. The simulation will be performed at an hourly time step.

The load-based numeric goals will assume each jurisdiction is held to the same percent load reduction for the critical pollutant associated with the compliance point of concern. With each jurisdiction held equitably to the same load reduction percentage, this ensures (1) the overall net load reduction for the entire watershed is consistent with the required TMDL reduction, and (2) that each contributing jurisdiction does an equal amount of effort to achieve this goal relative to the loads emanating from their jurisdiction. The result is that jurisdictions with higher existing loads also have more loads to reduce to achieve the same percent reduction as jurisdictions with lower existing loads.

The EWMP will prescribe responsibilities for each MS4 Permittee and thus a GIS analysis will be performed to support determination of the EWMP areas within each MS4 jurisdiction. Parcels with facilities subject to general or individual industrial NPDES permits will be extracted prior to determination of baseline MS4 loading. Other parcels outside of the MS4 jurisdiction may also be excluded, including Caltrans facilities, state, and federally-owned land. Modifications to the model spatial domain are described in more detail in **Section 4.3.1**.

The pollutants identified as water quality priorities for the RH/SGRWQG are listed in **Table 4-1**, along with the approach for modeling them in the RAA. The LSPC watershed model in WMMS includes modules for modeling sediment, metals, bacteria, and nutrients. Water quality priority pollutants that do not fall directly in these classes will be indirectly modeled by associating them with a surrogate pollutant to which they are typically associated with in the environment, as illustrated in **Figure 4-4**. For example, certain toxic and legacy pollutants are typically associated with sediment, and therefore sediment reductions will be associated with toxics/legacy pollutant reductions.

The RAA will include many pollutants, yet it is likely that one or two pollutants are "limiting," meaning that achieving the numeric goals applicable to those pollutants (through BMP implementation) will result in other pollutants also meeting their numeric goals. An analysis will be performed to determine which of the pollutants in **Table 4-1** are limiting. If the volume-based design storm compliance path is pursued, then retention of the design storm volume addresses all pollutants.

Table 4-1 Approach for Modeling Water Quality Pollutants

Group	Pollutant	Modeled LSPC Pollutant Category ● Directly modeled ○ Indirectly modeled				
		Sediment[1]	Flow[2]	Metals	Nutrients	Bacteria
Metals	Copper			●		
	Lead			●		
	Zinc			●		
	Selenium[3]			○		
	Mercury[3]			○		
Bacteria	Fecal coliform					●
Legacy Organics	PAH	○				
	PCBs	○				
Trash	Trash	N/A				
Pesticides	Diazinon	○				
	OC Pesticides	○				
Nutrients	Ammonia[4]				○	
Other	Cyanide	○				
	Dissolved Oxygen[4]				○	
	Salts		○			
	Benthic macroinvertibrates	○				

N/A - Trash will not be modeled. The trash capture and quantification approach of the Trash TMDL will be used.
1 For pollutants that are sediment-associated, the reduction in sediment loading will be associated with corresponding reductions in pollutant loading, based on available regional monitoring data and/or literature.
2 For salts, the reduction in non-stormwater and stormwater volume will be associated with corresponding reductions in salts based on available monitoring data, literature, and/or water supply data.
3 Selenium and mercury will either be associated with a modeled metal (copper, zinc, lead) or the reduction will be associated with reductions in sediment or volume.
4 Dissolved oxygen and ammonia will be addressed through modeling of total nitrogen and total phosphorous.

4.2.2 Identify Opportunities for BMP Implementation (Step 2)

Opportunities for BMP implementation are driven by locations where BMPs are more feasible. This step in the RAA process includes the following analyses:

- **Distributed BMPs:** the RAA process will perform a desktop GIS analysis to identify roads, public parcels and rights-of-way (see **Figure 4-7**). Then, screening criteria such as slope and soil contamination are used to exclude areas where BMP implementation is less feasible. The potential capacity available for distributed BMPs will be determined for each of the 133 subwatersheds (one capacity per subwatershed), based on the GIS screening. For example, the capacity available for green streets will be assessed based on the estimated length and width of roads in each subwatershed that met the screening criteria.

- **Regional BMPs:** the process for identifying regional EWMP projects and regional BMPs is described in **Section 3**. The WMMS model will be used iteratively to assess the effect of potential regional EWMP projects, and evaluate which additional BMPs are needed.

Overall, the results of the BMP screening determine the capacity available on public parcels and rights-of-way for BMP deployment, and ultimately the amount of private land acquisition required (if any) to provide additional BMP capacity.

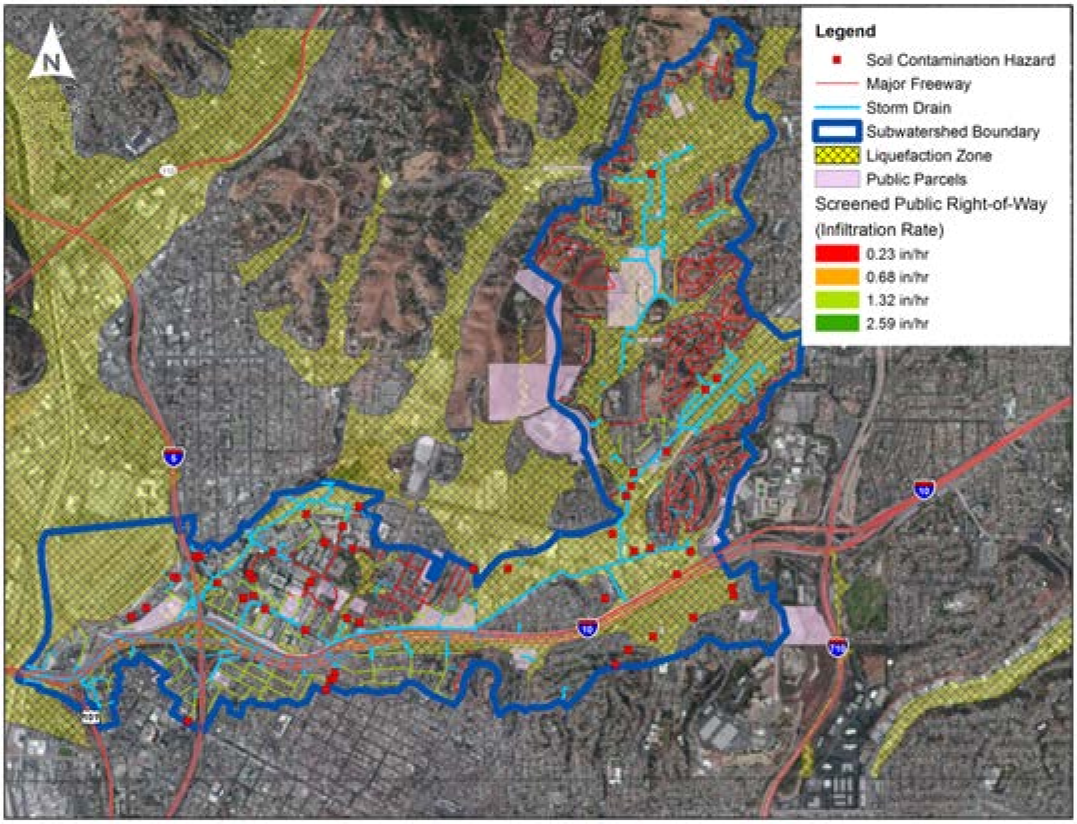

Figure 4-7 Example of GIS Data used to Screen for Regional and Distributed BMP Opportunities

4.2.3 Evaluate Effectiveness of Potential BMPs (Step 3)

BMP performance varies according to multiple factors including BMP type, location, size to drainage area ratio, contributing area imperviousness, and so on. WMMS will be used to explore scenarios for BMPs to be included in the EWMP, including the following:

- **Institutional BMPs:** using the LSPC watershed model, the potential effectiveness of new or enhanced institutional BMPs including enhanced street sweeping, enhanced irrigation control, and brake pad replacement will be quantified. In addition, a small percent will be assumed to apply to all other "non-modeled" institutional BMP enhancements. Note that only enhancements will be modeled as it is assumed the affect on water quality of the current level of institutional BMP implementation is captured in the water quality data utilized to establish baseline loading.

- **Distributed BMPs:** using the SUSTAIN BMP model, the potential effectiveness of distributed BMPs on volume reduction and pollutant loading from each of the 133 subwatersheds in the RH/SGRWQG area will be assessed. The specific distributed BMPs to be modeled are presented in **Section 4.3**.

- **Regional BMPs:** using the LSPC watershed model, the potential effectiveness of regional EWMP projects identified through the regional BMP selection process as described in **Section 3.1.4** will be quantified. A generalized approach to incorporating regional EWMP projects into the RAA process is shown in **Figure 4-8**.

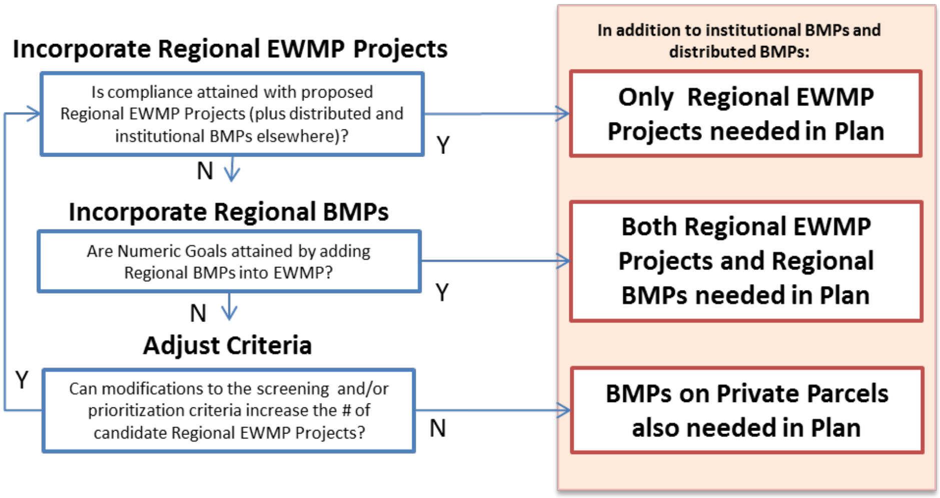

Figure 4-8 Generalized Process for Incorporating Regional EWMP Projects into the RAA

Using WMMS to identify required BMP capacities at the watershed-scale is shown in **Figure 4-9**. The figure shows the interaction between compliance points, distributed BMP capacities, and decisions on regional BMPs. Additional detail on the approach to modeling BMPs is provided in **Section 4.3.4**.

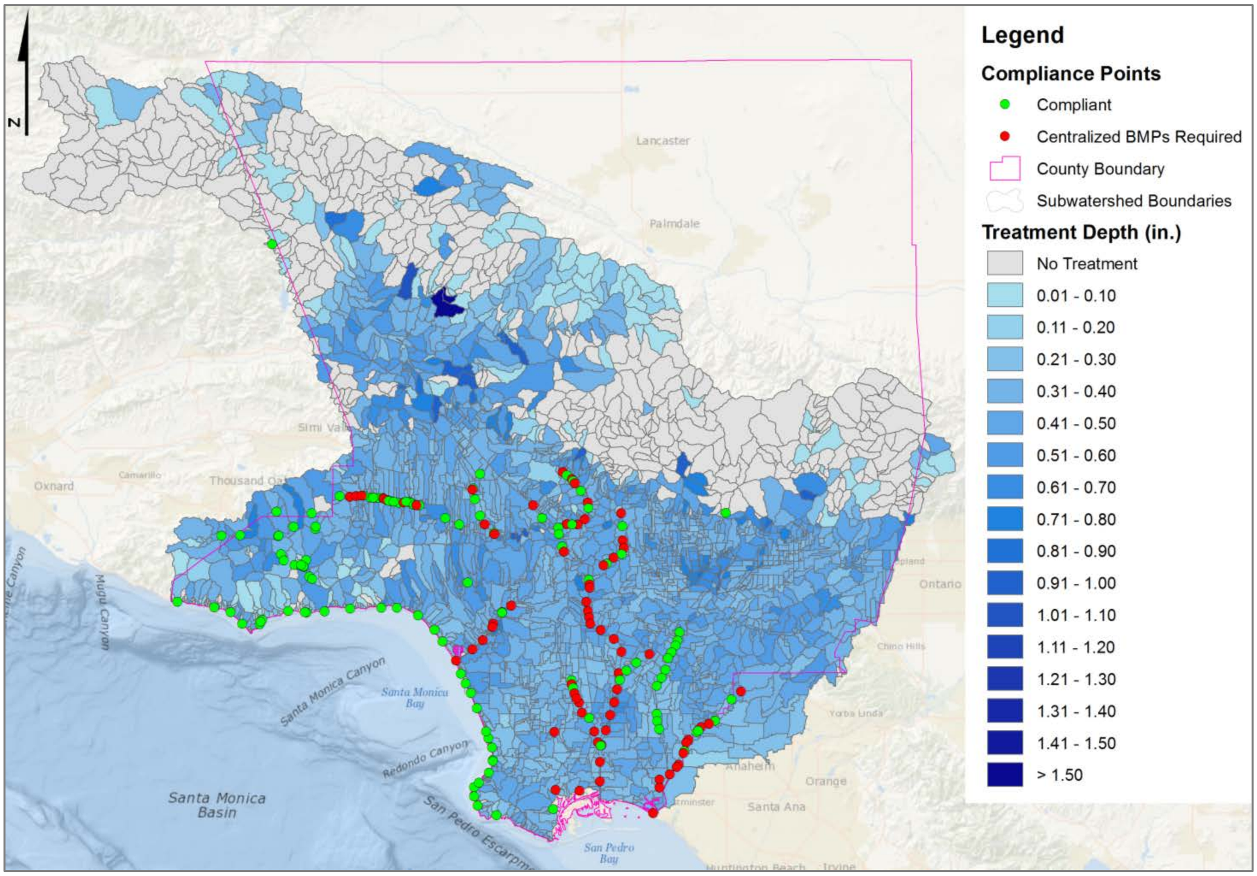

Figure 4-9 Example WMMS Output Showing BMP Capacities by Subwatershed and Linkage to Receiving Water Conditions

Note: The shading of the subwatersheds shows the capacity of distributed BMPs (darker blue indicates more BMP capacity to be implemented). The dots indicate whether RWLs are attained (green is attainment, red is non-attainment). In cases, where red dots are shown, the output indicates that additional BMPs are required upstream to attain RWLs. For the EWMP, the in-stream compliance points will be those defined by TMDLs.

The process for determining the necessary cumulative BMP capacity for both distributed and regional BMPs in each of the 133 subwatersheds in the RH/SGRWQG area depends on the type of numeric goal being addressed. As shown in **Figure 4-10**, using the volume-based approach (85^{th} percentile, 24-hour storm event), the required BMP capacity is determined through a design storm analysis. For the load-based approach (pollutant reduction), the analysis is more intensive and will consider a mix of both structural and non-structural practices during optimization. Attainment of load-based numeric goals will be evaluated based on (1) analysis of the subwatershed loadings and opportunities and (2) linkage to receiving water conditions through simulation of the representative year. The required BMP treatment capacities determined will drive the number and type of BMPs selected for inclusion in the EWMP, as described in the next subsection. A key factor for selecting those BMPs is the preferences among the different BMP types.

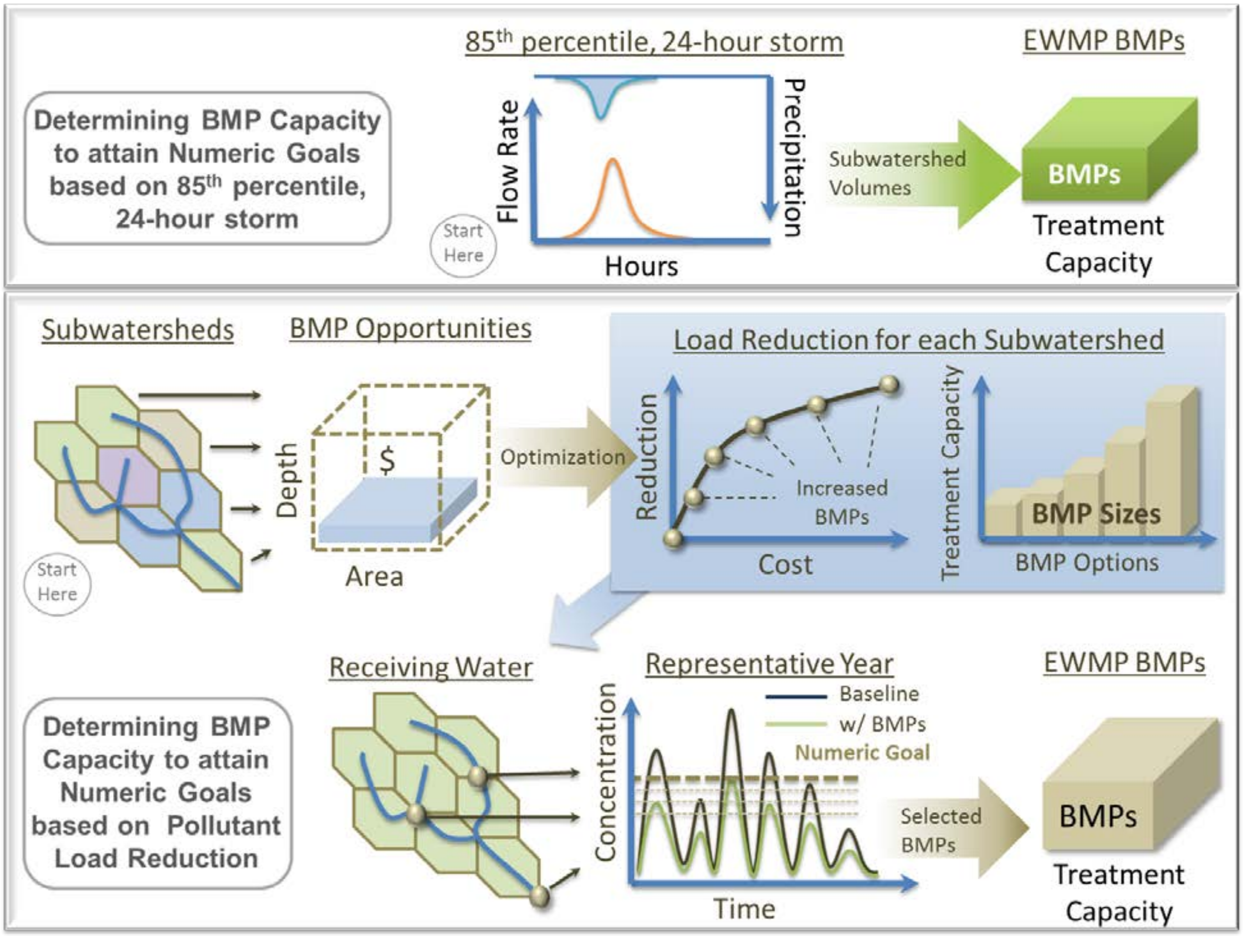

Figure 4-10 Process for Determining Required BMP Capacity using Volume- and Load-Based Numeric Goals

In general, the BMP preferences for the RAA are shown in **Figure 4-11**, based on cost-effectiveness. Notice the diminishing returns of load reduction associated with each additional BMP effort moving up the curve. These default preferences will be modified on a jurisdiction-by-jurisdiction basis based on individual preferences. Some RH/SGRWQG members may choose to implement a BMP type, while others choose not to. The generalized approach to BMP preferences includes the following:

- **MCMs/Institutional BMPs** (such as street sweeping) often reduce flows and/or pollutants with little capital cost. Enhancement of institutional BMPs can provide an immediate load reduction at a relatively low cost. However, implementation of institutional BMPs often requires coordination with multiple departments within a municipality/agency.

- The preference of distributed versus regional BMPs is determined on a case-by-case basis.

  - **Regional BMPs** located on public parcels are often preferred because (1) there are little to no land acquisition costs, (2) publicly-owned land has fewer barriers for maintenance, and (3) regional facilities offer economies-of-scale in terms of treated drainage area. However, while they may have the lowest cost per pollutant load reduced, regional BMPs are also generally the most expensive individual projects. Finally, the regional BMPs that qualify as regional EWMP projects provide additional compliance coverage.

- **Distributed BMPs** may be preferred because (1) they can often be implemented in the rights-of-way, (2) they often have multiple benefits including green infrastructure (e.g., green streets) improving aesthetics and enhancing property values, and (3) the costs for individual projects are less than regional BMPs. However, distributed BMPs may be limited in their ability to achieve the necessary volume/load reductions identified by the RAA. Also, it may take more time to treat the volume that regional BMPs can treat because so many individual projects must be completed and the multitude of projects increases maintenance requirements.

There will likely be subwatersheds where the BMP capacity on public parcels is insufficient to attain the numeric goals, and BMP sites on private land will need to be incorporated into the EWMP. During the BMP planning component of the EWMP, BMPs on private land will be avoided to the extent possible. However, where needed to support compliance, they will be slated for deployment later in the EWMP implementation schedule as described in **Section 4.2.5**.

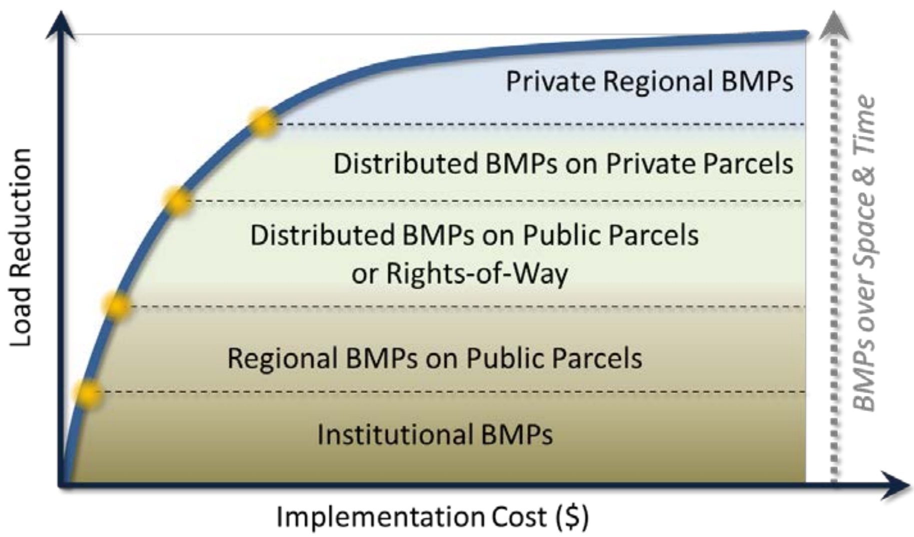

Figure 4-11 Generalized Preferences for BMP Types to be used in the RAA and EWMP

4.2.4 Identify BMP Combinations Expected to Attain Numeric Goals (Step 4)

The iterative RAA process will ultimately result in combinations of BMPs predicted by WMMS to cost-effectively attain the numeric goals. As shown in **Figure 4-12**, a hypothetical example RAA output for an individual numeric goal will present BMPs in the following manner:

- **Individual jurisdictions:** each jurisdiction will have its own set of BMPs to attain the numeric goals (top of **Figure 4-12**). In addition, each jurisdiction will receive a detailed BMP "recipe" for each subwatershed within its jurisdiction (bottom of **Figure 4-12**).

- **Regional BMPs:** the regional BMPs, including regional EWMP projects selected by the RH/SGRWQG members according to the approach identified in **Section 3.1.4**, will be included. In the EWMP, these BMPs will be identified with details on location (cross streets) and concepts for the projects (capacity, footprint, etc.).

- **Distributed BMPs:** for each jurisdiction and each of the 133 subwatersheds, a total treatment capacity ("treatment depth" expressed in inches of runoff) to be achieved by distributed BMPs will be identified. Within that treatment capacity, recommendations for the types of distributed

BMPs to implement will be provided. The RH/SGRWQG will have flexibility to substitute one type of distributed BMP for another type, as long as the total treatment capacity is achieved for the subwatershed (bottom of **Figure 4-12**). The model identifies the capacities of distributed BMPs needed in each of the 133 subwatersheds, but does not identify specific locations (cross streets) for the distributed BMPs within a subwatershed. Also, there may be opportunities to leverage LID ordinances to achieve some distributed BMP capacity on private land (implemented by private developers).

- **Institutional BMPs:** for RH/SGRWQG members that choose to implement the modeled institutional BMPs (enhanced street sweeping, enhanced irrigation control, or brake pad replacement) those enhanced BMPs will be highlighted in the RAA output. In addition, a small percentage will be assumed to apply to all other "non-modeled" institutional BMP enhancements.

A unique set of BMPs will be identified for each interim and final TMDL and other EWMP milestones that occur in the next two MS4 Permit cycles. EWMP milestones are the milestones proposed to address EPA TMDLs, Category 2 water quality priorities, and Category 3 water quality priorities which do not have adopted TMDL implementation schedules. In contrast, TMDL milestones that occur more than two MS4 Permit cycles in the future (but prior to the final TMDL compliance dates) will not be considered to the same level of detail. This BMP sequencing process is described in the next subsection.

Jurisdiction	Total Number of Regional BMPs	Total Capacity of Distributed BMPs				Institutional BMPs/MCMs	
		Treat-ment Depth (inches)	Green streets (ft)	Bio-retention (ft³)	LID on private (ft³)	Enhanced Irrigation ordinances	Enhanced sweeping
Arcadia	1	0.54	884,323	662,676	421,567	●	
Bradbury	1	0.37	97,634	88,954	14,623	·	●
Monrovia	2	0.34	56,534	47,453	7,890	●	
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
Azusa	4	0.48	297,634	188,954	114,623		●

Jurisdictional Sub-area (sub-watershed)	Total Number of Regional BMPs	Total Capacity of Distributed BMPs				Institutional BMPs/MCMs	
		Treat-ment Depth (inches)	Green streets (ft)	Bio-retention (ft³)	LID on private (ft³)	Enhanced Irrigation ordinances	Enhanced sweeping
1	1	0.54	4,323	676	567	●	
2	0	0	0	0	0	●	
3	1	0.24	534	453	890	●	
4	2	0	0	0	0	●	
.	.	.	.	.	.	.	
.	.	.	.	.	.	.	
133	0	0.68	8,634	4,954	3,623	●	

Figure 4-12 Hypothetical Example RAA Output for the EWMP Area and Individual Jurisdictions

Notes: 1) The BMP numbers, types, capacities and locations are completely hypothetical, for illustration purposes only. Note the output (bottom) is separated into 133 subwatersheds. This type of output will be generated for each interim and final TMDL and other EWMP milestones that occur in the next two MS4 Permit cycles.

4.2.5 Use RAA to Support BMP Scheduling (Step 5)

The TMDL and EWMP milestones/compliance dates establish the pace at which BMPs must be implemented. Traditionally, the approach of TMDL implementation plans has been focused on final TMDL compliance, whereas the MS4 Permit compliance paths offered to EWMPs increase emphasis on milestones. For each interim and final TMDL and other EWMP milestones that occur in the next two MS4 Permit cycles, the combination of BMPs expected to result in attainment of the corresponding numeric goals will be identified. An illustration of the BMP scheduling to account for milestones is shown in **Figure 4-13**.

The TMDL milestones for the RH/SGRWQG EWMP area are shown in **Table 1-6**, which illustrates the potentially complicated sequence based on multiple pollutants. The limiting pollutant analysis will be important for establishing the pace of BMPs to be implemented. Furthermore, dry-weather milestones tend to occur earlier in the schedule than wet-weather milestones. Because the structural BMPs implemented for wet-weather will also be relied on for dry-weather reductions, the pacing to attain dry-weather milestones may be dependent on the pacing to attain wet-weather milestones. It is important to note that **Table 1-6** does not show the EWMP milestones (for Category 2 and 3 water quality priorities), which will be established during EWMP development.

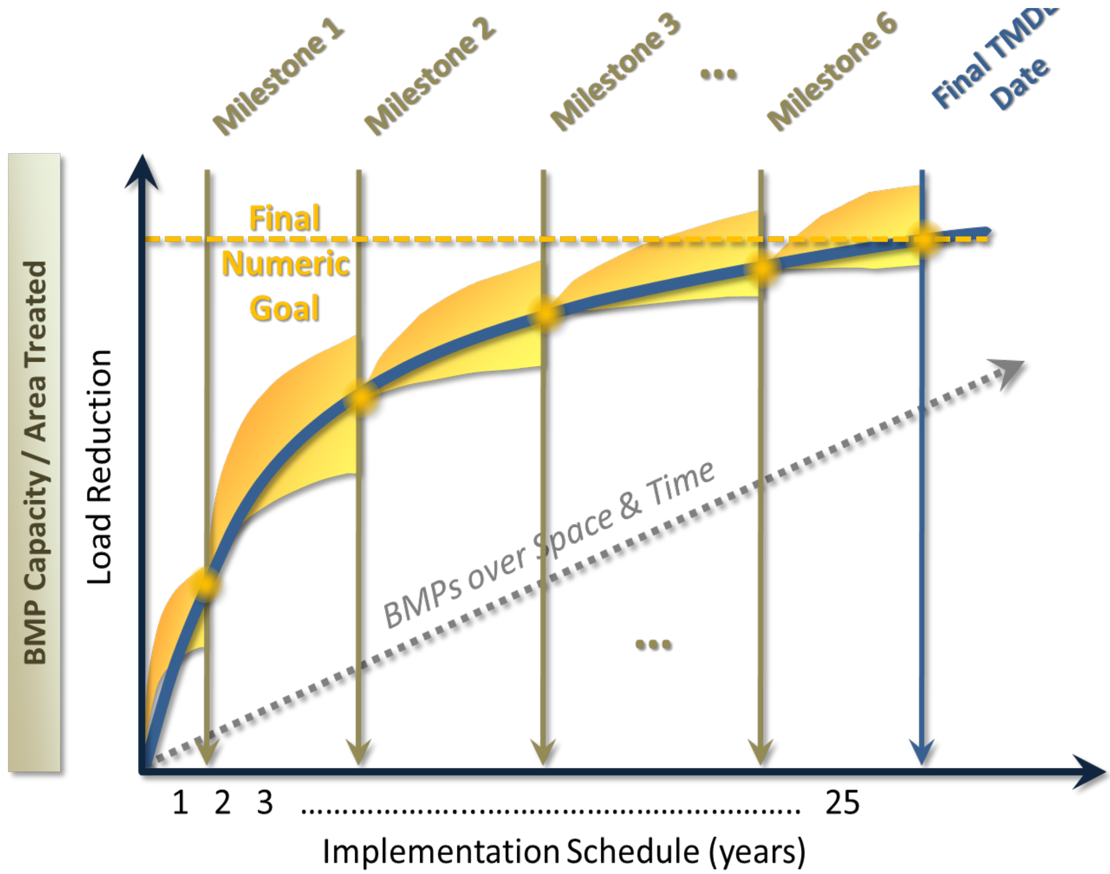

Figure 4-13 Illustration of BMP Scheduling Based on TMDL and EWMP Milestones

A unique set of BMPs will be generated for each interim and final TMDL and other EWMP milestones that occur in the next two MS4 Permit cycles. The width of the yellow bands represents the relative cumulative BMP capacity to be constructed over the course of each milestone period. The BMPs being implemented during early versus late milestones will likely reflect the BMP preferences shown in **Figure 4-11** (i.e., BMPs on private land will be implemented late in the schedule).

4.2.6 Use RAA to Support Adaptive Management (Step 6)

Adaptive management is a critical component of the EWMP implementation process, and EWMP updates are required over two-year cycles by the MS4 Permit. The CIMP will gather additional data on receiving water conditions and stormwater/non-stormwater quality. The data collected will support adaptive management at multiple levels, including (1) generating data not previously available to support model updates and (2) tracking improvements in water quality over the course of EWMP implementation. Certain elements of the adaptive management process, as related to the RAA, are highlighted below.

4.2.6.1 Model Updates During EWMP Implementation

The EWMP implementation process will span decades, and the modeling systems used to develop the RAA will be iteratively improved over that period, by incorporating monitoring data collected through the CIMP and assessing important parameters to develop adaptive management.

Incorporating Monitoring Data Collected through the CIMP

The CIMP data collected over the course of EWMP implementation will provide additional data to support model updates. The non-stormwater and stormwater outfall monitoring data, in particular, will increase the available data to calibrate/validate the discharge flows and pollutant loads predicted by WMMS. While land use-specific data are often sought to support model calibration, the data that would be most readily incorporated in a WMMS calibration would be monitoring at subwatershed outlets (which likely limits the ability to monitor homogenous land uses). By monitoring subwatershed outlets, the monitored spatial scale is consistent with the modeled scale.

Assessment of Important Parameters to Evaluate During Adaptive Management

When applied in the context of an adaptive management framework, the RAA will be updated through future refinements as newer, more reliable, or more representative information becomes available. As the model is updated, uncertainty associated with the projected BMP effectiveness will be reduced.

4.3 Modeling Approach

Continuous simulation modeling provides a robust framework to develop the RH/SGRWQG RAA that reliably predicts hydrology and water quality conditions and the effect of potential BMPs on those conditions. Furthermore, considering the tremendous implementation costs within the highly urbanized context, a key objective for WMMS is to use optimization to navigate through the many possibilities for BMP types, designs, and locations.

The volume- and load-based RAA pathways for determining required BMP capacities to attain numeric goals were described and presented in the previous section (see **Figure 4-10**). The watershed and BMP model components of these RAA pathways are modular, making them well suited for use within an adaptive management framework. The modeling components (i.e., land, stream, and BMP), in concert with their respective supporting data or processes, inform and interact with each other to provide reasonable assurance the EWMP will be effective. **Figure 4-14** illustrates the sequence and interactions between the major RAA modeling components and their supporting processes and data.

While detailed modeling methods are described below, the RAA effort will begin in mid-2014 and the methodology described will likely evolve over the course of EWMP development.

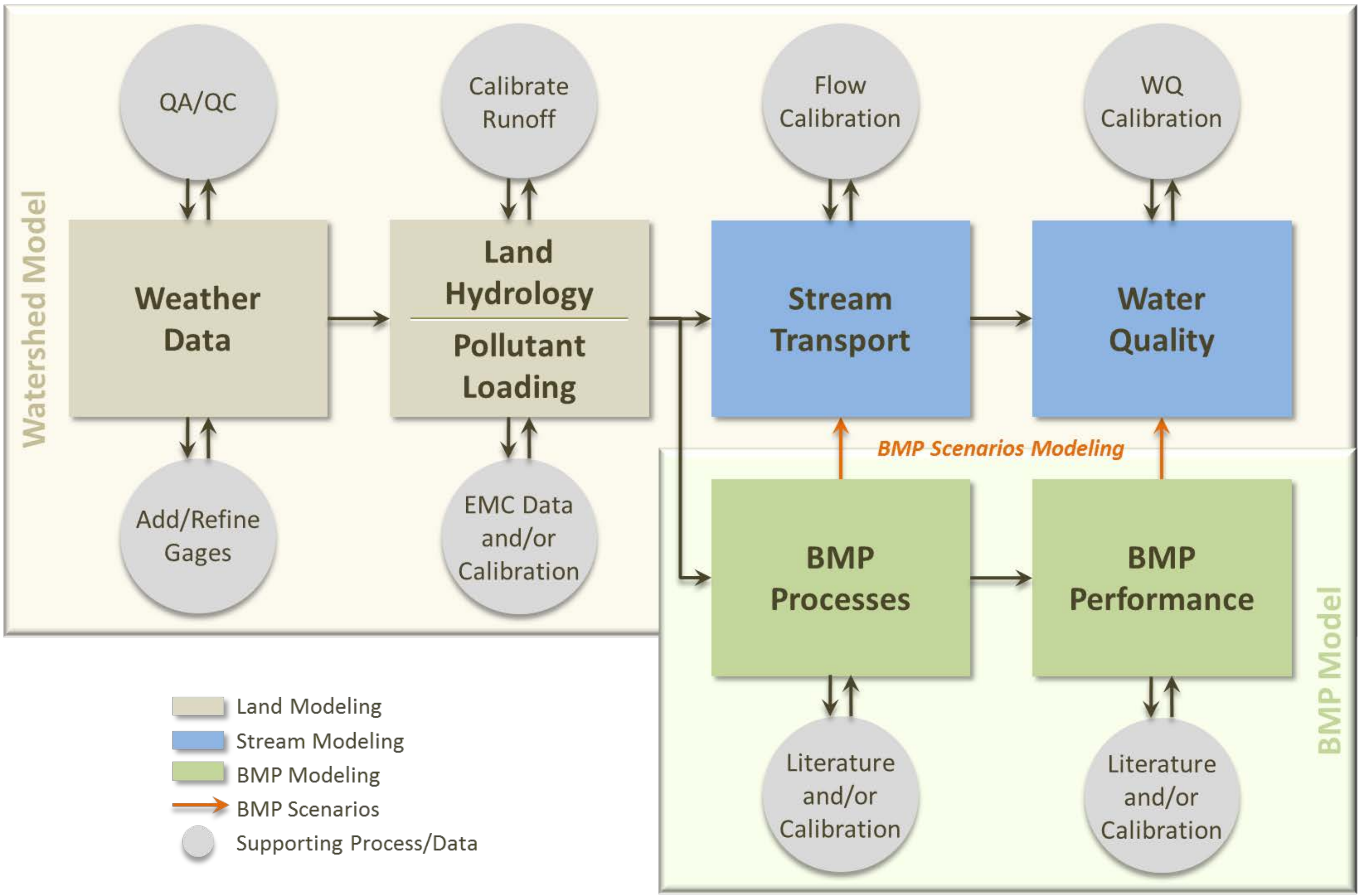

Figure 4-14 RAA Modeling Components and Supporting Processes/Data

4.3.1 Spatial Domain

Because the RAA must account for jurisdictional boundaries, the spatial domain of WMMS requires some refinement for RAA applications, as follows:

- First, WMMS was watershed based—with spatial boundaries defined by hydrology instead of jurisdiction. As previously noted, there are 2,655 subwatersheds in the entire WMMS modeling domain and 133 within the RH/SGRWQG area. Certain spatial refinements are needed in order to quantify management activities at the jurisdictional level. The intersects of subwatersheds and jurisdictions will be identified and re-sampled to revise the spatial domain and allow estimation of jurisdictional responsibilities (based on assessment of downstream compliance points).

- Second, a spatial adjustment is needed to account for run-on between jurisdictions (including jurisdictions outside of the EWMP areas) and accounting for non-MS4 discharges (e.g., industrial areas) within the MS4 jurisdiction (**Figure 4-15**). For EWMPs in which City A and City B develop independent plans, for City A's plan, run-on from City B will have to be assumed to be in compliance in order to properly compute the management responsibility of City A. On the other hand, for an EWMP in which both City A and City B collaborate, it could be that a regionalized facility located further downstream of the combined area may address both City's compliance needs in a more cost-effective way. Parcels subject to industrial NPDES Permits will be excluded from the spatial domain, likely by excluding their runoff volume, prevent their loading from affecting the MS4 baseline.

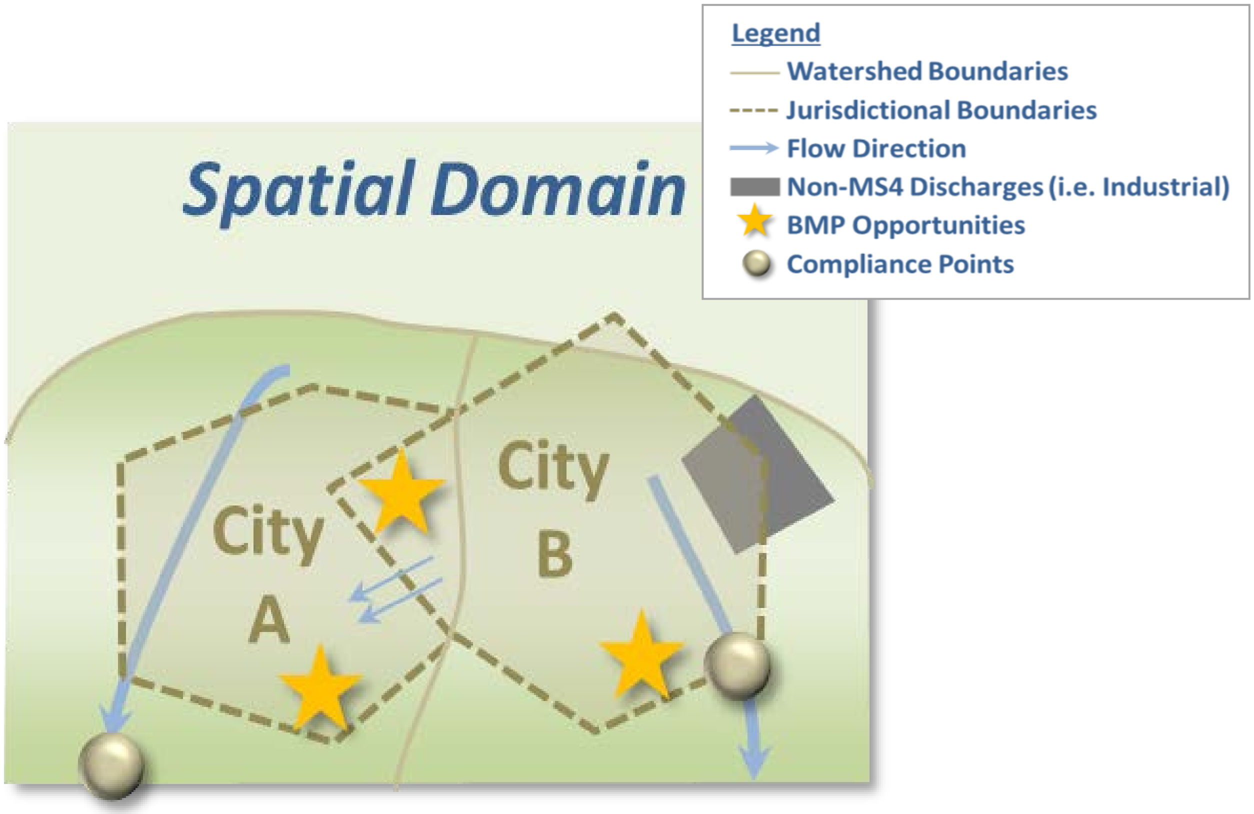

Figure 4-15 Conceptual Representation of Spatial Domain Adjustments

4.3.2 Watershed Modeling in LSPC

The algorithms in the LSPC watershed model are identical to a subset of those in HSPF, with some selected new additions, such as an irrigation module, street sweeping module, and algorithms to dynamically address land use change over time. Listed in **Table 4-2** are the land and receiving water modules in LSPC.

Each of the LSPC modules includes formulations that calculate the various hydrologic, sediment, and pollutant processes in the watershed. Many options are available for both simplified and complex process formulations. Spatially, the watershed is divided into a series of 133 subwatersheds representing the drainage areas that contribute to each of the stream reaches. These subwatersheds are then further subdivided into segments representing different land uses. For the developed areas, the land use segments are further divided into pervious and impervious fractions. The stream network links the surface runoff and subsurface flow contributions from each of the land segments and subwatersheds and routes them through the water bodies using storage-routing techniques. The stream-routing component considers direct precipitation and evaporation from the water surfaces, as well as flow contributions from the watershed, tributaries, and upstream stream reaches. Reservoir storage and releases, flow withdrawals and diversions will also be accounted for.

The stream network to be used in LSPC represent all the major tributary streams and channels, as well as reaches where significant changes in water quality occur. Like the watershed components, several options are available for simulating water quality in the receiving waters. Transport through the waterways, transformation processes, and removal processes (e.g., settling and adsorption) will be simulated using first-order decay approaches.

Table 4-2 LSPC Modules for Simulating Watershed and Receiving Water Conditions

Model Group	Module Name	Description
Land modules (PERLND/IMPLND)	PWATER/IWATER	Simulates water budget for a pervious/impervious land segment
	SEDMNT/SOLIDS	Simulates production and removal of sediment for a pervious/impervious land segment
	PSTEMP	Simulates soil layer temperatures
	PWTGAS/IWTGAS	Estimates water temperature and dissolved gas concentrations in the outflows from pervious/impervious land segments
	PQUAL/IQUAL	Simulates water quality in the outflows from pervious/impervious land segments
	SNOW	Simulates snow fall, accumulation, and melting
Receiving water modules (RCHRES)	HYDR	Simulates in-stream hydraulic behavior
	ADCALC	Simulates in-stream advection of dissolved or entrained constituents
	HTRCH	Simulates in-stream heat exchange
	SEDTRN	Simulates in-stream behavior of inorganic sediment
	GQUAL	Simulates in-stream behavior of a generalized quality constituent
	RQUAL	Simulates in-stream behavior constituents involved in biochemical transformations

Hydrology Modeling

Hydrology is the driver for water quality. A goal of the RAA is to ensure that a representative range of wet and dry conditions are evaluated (including a range of runoff and pollutant loadings). LSPC is a continuous model that will be applied using an hourly time step. During wet-weather events, rainfall/runoff is modeled based on 18 rain gauges near the RH/SGRWQG area. During dry-weather, the LSPC model generates continuous time series of overland flow rates for each subwatershed outlet and in-stream flow rate at each receiving water compliance point. LSPC represents in-stream dry-weather flows as a function of point source inputs such as treated wastewater and imported water and an estimation of over irrigation based on urban grass cover.

The RAA Guidelines recommend using the most recent 10 years of data for modeling scenarios. Because that period is more recent than the original WMMS model calibration period, which ended in 2006, a calibration update will be performed for the period 2001 to 2012. For any given jurisdiction, the closest, most representative stream flow gauge may be used to validate the model when applicable.

Validation criteria will also include some of the same numeric error metrics used during the original WMMS model calibration. For model calibration and validation, a variety of watershed model performance targets have been documented in the literature, including Donigian et al. (1984), Lumb et al. (1994), and Donigian (2000). Many of these metrics were used during the development of WMMS. Based on these references and past experience, the LSPC performance targets for simulation of the water balance components are summarized in **Table 4-3**. The Nash-Sutcliffe coefficient of model fit efficiency is another reliable metric for assessing how well the model replicates the timing of rises and falls in the hydrograph. Three measures will be considered the most critical for evaluating performance at each gauge: error in total volume, error in the 10 percent highest flow volumes, and the Nash-Sutcliffe coefficient. It is important to clarify that the tolerance ranges are intended to be applied to longer-term time-averaged values—individual events or observations may show larger differences and still be acceptable.

To illustrate an example calibration performed during WMMS development, **Figure 4-16** shows an example seasonal aggregated plot of modeled versus observed over multiple years. **Table 4-4** shows the corresponding relative mean difference between modeled versus observed at the same location. The average performance captures model performance over a range of years (2002 to 2006). For this time period, the model produced very good results throughout, representing both wet-weather and dry-weather condition flows.

Table 4-3 Modeled Hydrology Calibration Criteria

Model Hydrology Calibration Metric	Recommended Criteria (Relative Mean Error)			
	Very Good	Good	Fair	Poor
Error in total volume:	≤ 5%	5 - 10%	10 - 15%	>15%
Error in 50 percent lowest flows:	≤ 10%	10 - 15%	15 - 25%	>25%
Error in 10 percent highest flows:	≤ 10%	10 - 15%	15 - 25%	>25%
Seasonal volume error - Summer:	≤ 15%	15 - 30%	30 - 50%	>50%
Seasonal volume error - Fall:	≤ 15%	15 - 30%	30 - 50%	>50%
Seasonal volume error - Winter:	≤ 15%	15 - 30%	30 - 50%	>50%
Seasonal volume error - Spring:	≤ 15%	15 - 30%	30 - 50%	>50%
Error in storm volumes:	≤ 10%	10 - 15%	15 - 25%	>25%
Nash-Sutcliffe Coefficient of Efficiency, E:	Model prediction efficiency increases as E → 1.0			

Source: (Lumb, 1984)

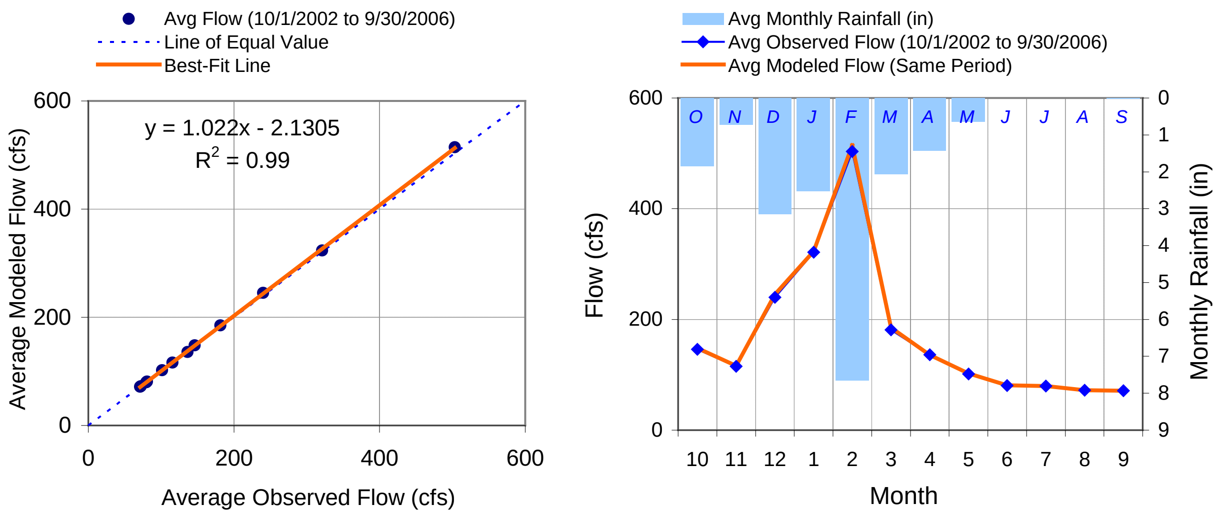

Figure 4-16 Example Seasonal Aggregate Calibration Performed for WMMS Development (USGS Gauge 11092450: Los Angeles River at Sepulveda Dam)

Table 4-4 Example Modeled Versus Observed Error Statistics Calculated During WMMS Development

Model Hydrology Calibration Metric	Recommended Criteria (Relative Mean Error)	
	Relative Error	**Criteria: Very Good**
Error in total volume	1.25	≤ 5%
Error in 50 percent lowest flows:	0.71	≤ 10%
Error in 10 percent highest flows:	0.56	≤ 10%
Seasonal volume error - Summer:	0.21	≤ 15%
Seasonal volume error - Fall:	1.63	≤ 15%
Seasonal volume error - Winter:	1.67	≤ 15%
Seasonal volume error - Spring:	0.11	≤ 15%
Error in storm volumes:	-4.35	≤ 10%
Nash-Sutcliffe Coefficient of Efficiency, E:	0.777	Efficiency improves as E → 1.0

Example based on USGS Gauge 11092450: Los Angeles River at Sepulveda Dam

Water Quality Modeling

Water quality is also simulated uniquely by subwatershed and land use in WMMS, while responses vary spatially as a function of weather data. As with hydrology, the processes are simulated on an hourly time step. For pervious land segments, sediment is simulated as erosion from a soil matrix as a function of rainfall and/or runoff energy, while build-up wash-off cycles are used to simulate solids particles on impervious surfaces. Total sediment from the land is partitioned into three classes (sand, silt, and clay) at the edge-of-field and routed to the stream for simulating transport deposition and resuspension. Some pollutants, like metals and phosphorus, are simulated as sediment associated, meaning that they are expressed (by land use source) as a fraction of the delivered sediment mass. For those pollutants, the non-sediment associated portions are simulated using build-up/wash-off on the land surface plus baseflow concentrations. The other pollutants (i.e., nitrogen and bacteria) are simulated using a build-up/wash-off formulation by land use on the land surface plus baseflow concentrations. Once those pollutants are routed to the stream, their fate and transport is modeled using first-order decay by pollutant (as applicable).

Water quality modeling in LSPC is performed through the modules in **Table 4-2**. As with hydrology, the RAA aims to incorporate a representative range of wet- and dry-weather pollutant loading conditions. The selected time period for presenting modeled water quality results will coincide with the period selected for hydrology (i.e., the most recent 10 years). However, it is important to note that water quality samples (unlike flow rates) are rarely collected on a continuous basis. For certain constituents, correlation analysis with continuous flow data can help to characterize hydrologic conditions that influence pollutant loading behavior over time. Based on the previously noted references regarding model performance, past experience, and guidance provided by the Regional Board, the LSPC performance targets for simulation of the water balance components are summarized in **Table 4-5**. These error metrics are applicable for evaluation of mean/median average error for both concentration and load over the model calibration or validation period.

The recommended criteria inherently reflect the degrees of uncertainty associated with modeling each water quality constituent, compounded upon the hydrology calibration. For example, if the water balance is well represented, constituents like water temperature are simpler to model. Sediment has a wider range of allowable variability because of the non-linear relationship of its fate and transport behavior with flow (Donigian and Love 2003). Likewise, sediment associated pollutants will depend in part on the quality of both the hydrology and sediment prediction.

Table 4-5 Modeled Pollutant Load Calibration Criteria

Modeled Water Quality Constituent	Recommended Criteria (Long-term average)			
	Very Good	Good	Fair	Poor
Sediment	<20	20-30	30-45	>45
Water Temperature[1]	<7	8-12	13-18	>18
Water Quality/Nutrients	<15	15-25	25-35	>35
Pesticides/Toxics[2]	<20	20-30	30-40	>40

1 Temperature is not modeled in WMMS, but recommended criteria are presented for comparison purposes.
2 Toxics are not directly modeled in WMMS, but notice similarity of literature recommended ranges to sediment.

4.3.3 Establishing Pollutant Reduction Goals for Water Quality Priorities

Two pathways available in the MS4 Permit for achieving compliance are (1) through concurrent pollutant load reductions or (2) by controlling the 85th percentile storm. The Los Angeles County design storm study demonstrated that controlling the 85th percentile storm would achieve water quality compliance for pollutants of interest, while considering allowable exceedances for extreme events. After removing non-MS4 parcels from the spatial domain, the WMMS models will be used for the following:

- Estimate load reduction requirements for all pollutants at the compliance points of interest based on in-stream water quality criteria
- Estimate volume reduction requirements to the 85th percentile, 24-hour storm
- Identify the limiting pollutant(s) and management criteria (i.e., load reduction or design storm)
- Compare the impact of selecting load- versus volume-based numeric goals on necessary BMP capacities

The pollutants identified as water quality priorities will be simulated for the RAA (see **Section 4.2.1**). Pollutants of significant interest for the RAA include indicator bacteria and metals. In addition to being challenging to control in urbanized watersheds, they also have unique components of their WQOs that deserve special attention as follows:

- **Bacteria:** two additional analyses will be applied when calculating numeric goals to account for allowable exceedance days and High Flow Suspension (HFS) days.

- **Metals:** the potential impact of a Water Effects Ratios (WER) will be assessed, which account for in-stream conditions that reduce the toxicity/bioavailability of metals compared to laboratory water.

The following subsections discuss these additional analyses in more detail.

Approach for Incorporating Allowable Exceedance Days

Since WMMS produces continuous time series of flow and bacteria concentration it is possible to directly evaluate the magnitude and frequency of applicable WQO exceedances at compliance points-of-interest. For each compliance point, the daily load dataset can be ranked by magnitude of associated flow. The modeled daily loads can be classified as occurring on either wet days or dry days. A wet day is defined as a day with at least 0.1 inch of rainfall plus the three following days. An HFS day is defined as a day with at least 0.5 inch of precipitation plus the following day. Using these definitions, any day not classified as a wet day or HFS day is considered a dry day.

The single sample WQO for *E. coli* is 235 MPN/100mL, as specified in the amendment to the Los Angeles Regional Water Quality Control Plan (LARWQCB 2002) and the Los Angeles River Bacteria TMDL (CREST, 2010). The TMDL includes 17 allowable exceedance days per year. By post-processing the time series of flow and bacteria, an associated daily load can be calculated and the load from each day can be tracked. The top 17 *E. coli* loads that occurred on days with WQO exceedances are labeled as exceedance days and subtracted when determining the numeric goals for *E. coli*. Modeled daily loads greater than this threshold are considered exceedances. **Figure 4-17** shows an example of annual calculated *E. coli* loads during exceedance days. Accounting for the green and gray portion of the bars in **Figure 4-17** lowers the required percent reduction for bacteria.

Approach to Incorporating High Flow Suspension (in Applicable Reaches)

Similar to the approach for accounting for allowable exceedance days, any modeled load occurring on a day considered an HFS day can be subtracted when determining the numeric goals for *E. coli*. The HFS loads are removed from consideration during the analysis and tracked separately from other loads. **Figure 4-17** shows an example of annual calculated *E. coli* loads during HFS days.

Approach for Incorporating Water Effects Ratio

The WER is expressed as a “multiplier” on metals WQOs. For example, in the case of certain metals, the organics present in the water column reduce the toxicity/bioavailability of metals and thus a multiplier is added to the WQO to account for the reduced risk to aquatic life from exposure to metals. Though only currently proposed for Rio Hondo (not San Gabriel River), a WER may be applicable to receiving waters in the entire RH/SGRWQG area, and a special study could be performed in the future to support a Basin Plan Amendment. Two comparative model scenarios with two WQOs (i.e., a scenario with and without WER) will be developed and used to evaluate the impact on the EWMP BMPs to address metals water quality priorities.

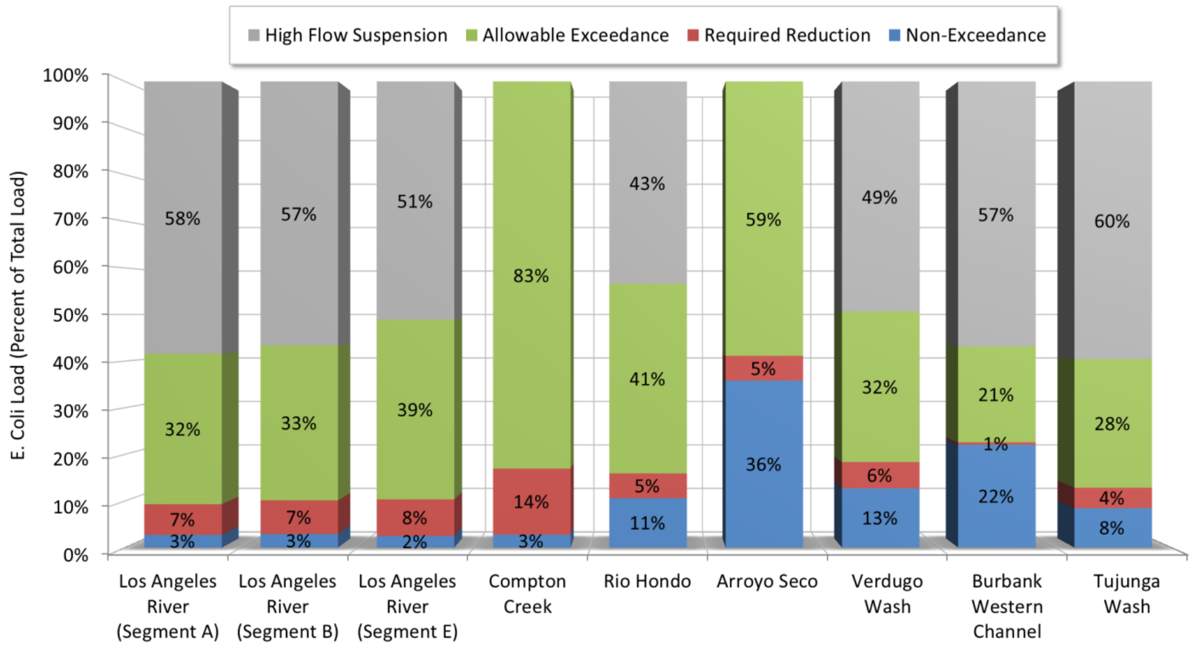

Figure 4-17 Approach for Accounting for Allowable Exceedance Days and HFS when Modeling Annual *E. coli* Loads

Note: This example is from the Los Angeles River Watershed. Each bar represents the annual average *E. coli* loading from water bodies in the watershed. The percentages reflect the proportion of annual loading that occurred during days that were subject to the HFS (gray) and allowable exceedance days (green). The remaining days are those required to achieve the applicable WQOs for *E. coli*, and loading is divided among days that attained the WQOs (blue) or did not attain the WQOs (red).

4.3.4 Representation of Individual BMPs with SUSTAIN

The EWMP will incorporate many different types of BMPs, and the preferences of each jurisdiction will be used to incorporate jurisdictional preferences into the EWMP. This subsection describes how individual BMPs are represented in the customized WMMS modeling system.

Regional stormwater monitoring data show that pollutant delivery varies both spatially and temporally with storm size. As such, WMMS uses continuous simulation models, meaning it does not directly apply EMCs to runoff to represent pollutant runoff, nor does it use effluent concentrations or percent reduction efficiencies alone to represent BMP performance. Instead, the modeling system predicts long-term, continuous, hourly flow rates and water quality concentrations for BMP effluent. **Table 4-6** lists and describes the options available within SUSTAIN for modeling different BMP physical processes. The table illustrates the BMPs which are generally modeled dynamically, but certain complex processes are simplified for computational efficiency. **Figure 4-18** illustrates physical processes that occur within certain structural BMPs, and **Table 4-7** shows whether they are represented explicitly or implicitly in SUSTAIN.

In general, an overwhelming majority of the pollutant load reduction associated with BMPs in the EWMP will be due to infiltration. Load reduction due to treatment will be a small component of the EWMP's effectiveness. Nonetheless, EMCs of outflows from BMPs and BMP efficiencies will be summarized from the model output and compared to peer-reviewed EMC values and BMP performance ranges, as recommended by the RAA Guidelines. The statistical analysis of monitoring data from the International BMP Database, as described in **Section 3.2**, will support these comparisons.

Table 4-6 BMP Model Physical Processes Modeled in SUSTAIN			
Processes	**Option 1**	**Option 2**	**Option 3**
Flow Routing	Box model: stage-outflow storage routing using weir or orifice equations	For swale: kinematic routing by solving the coupled continuity equation and Manning's equation	User-specified functional table (F-Table) for flexible geometry and outflow rates
Infiltration	Green-Ampt method	Holtan-Lopez equation	Horton method
Evapotranspiration (ET)	Constant ET rate or monthly average value, or daily values	Calculate potential ET using Hamon's method	Imports user-specified evapotranspiration time series
Sediment Transport Losses	HSPF in-stream sediment transport routines (SEDTRN)	1^{st} order decay as a function of residence time	k'-C* method
Pollutant Transport Losses	1^{st} order decay as a function of residence time	k'-C* method	—
Soil Media Filtration	Removal efficiency (%) on infiltrated mass (constant saturated infiltration rate) or assumed effluent concentration	—	—
Buffer Strip Simulation			
Process	**Description**		
Flow Routing	Sheet Flow: kinematic wave overland flow routing		
Sediment Trapping	Process-based University of Kentucky sediment interception simulation method as applied in VFSMOD		
Pollutant Removal	1^{st} order decay as a function of transport time		

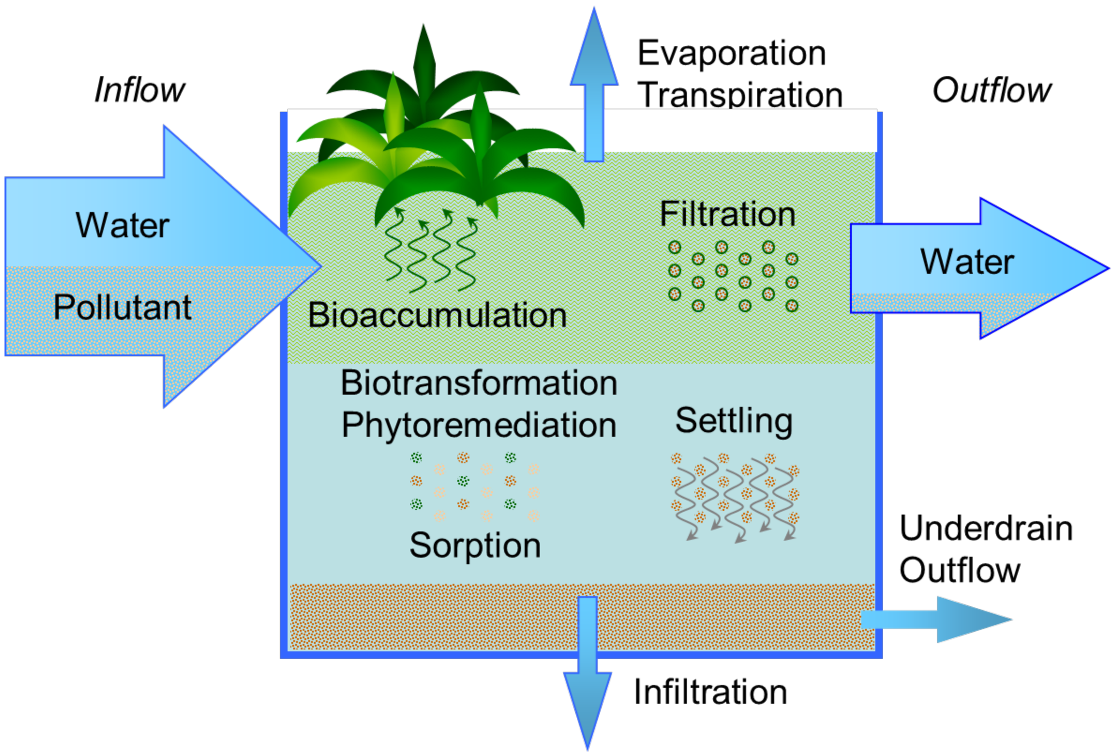

Figure 4-18 Examples of Physical Processes Occurring within Structural BMPs

Table 4-7 Model Representation for Physical Processes in Structural BMPs

Layer	Process	Model Representation			
		● Explicit ○ Implicit	Options for Representation x Option – Not applicable		
			Decay Rate Over Time	Percent Removal[1]	Effluent Concentration[1]
Surface	Storage, outflow, or bypass	●	–	–	–
	Evaporation	●	–	–	–
	Settling	●	x	–	–
Vegetation	Transpiration	●	–	–	–
	Bioaccumulation	○	x	–	x
	Phytoremediation	○	x	x	x
	Biotransformation	○	x	x	x
Soil/Media Interface	Filtration	○	–	x	x
	Sorption	○	x	x	x
Subsurface	Underdrain outflow	●	–	–	–
	Background infiltration	●	–	–	–

[1] Percent removal or effluent concentrations are only applied to outflow discharged through underdrain.

Regional Structural BMPs

Regional structural BMPs are designed to capture and/or treat runoff from large drainage areas that typically encompass multiple jurisdictions. There are four types of regional BMPs that may be modeled, depending on whether they are selected for the EWMP. Note that the BMP types represented are consistent with those described in the **Section 3**. **Table 4-8** lists the regional structural BMPs and describes how they are represented in the SUSTAIN model. BMP performance for some of the regional BMP types will be modeled using continuous simulation, while others will be done using empirical performance data. While the WMMS model will support the regional BMP selection process (including regional EWMP projects), the number, type and location of regional BMPs will generally be decided by the RH/SGRWQG members according to the regional BMP decision process (see **Section 3.1.4**; also see **Figure 4-8**). **Section 4.3.5** further describes how WMMS can support the BMP selection process.

Distributed Structural BMPs

Distributed structural BMPs are designed to treat runoff as close to the source as possible. Distributed BMPs tend to be effective at controlling runoff volume because they capture the poor quality associated with the first flush, and with proper design, can completely retain runoff onsite. There are four types of distributed BMPs that may be modeled for the RAA, as shown in **Table 4-9**, which may or may not be selected for the EWMP. The BMP types represented here are consistent with those described in the **Section 3**. **Table 4-9** lists the candidates for modeled distributed structural BMPs and describes how they are represented in the model. BMP performance for most of the BMP types will be modeled using continuous simulation, while a few will be represented using empirical performance data.

There is an emphasis on green infrastructure BMPs for the RAA analysis because they are able to retain runoff and address the volume-based numeric goals. Further evaluation will be made during the EWMP development process to determine if any other BMPs will be emphasized.

Table 4-8 Model Representation for Regional Structural BMPs

BMP Type	Description	Modeled BMP Process ● Dynamic[1] ○ Static[2] – Not Applicable		
		Infiltration	Storage	WQ Treatment
Infiltration Facilities	Surface infiltration basin, subsurface infiltration gallery	●	●	●
Detention Facilities	Surface detention basin, subsurface detention gallery	–	●	●
Constructed Wetlands	Constructed wetland	●	●	●
	Flow-through/linear wetland	–	–	○
Treatment Facilities	Low flow diversions and facilities designed to treat runoff from and return it to the receiving water	–	–	○

1 Dynamic process simulation results in BMP performance that varies with hydrology.
2 Static process simulation applies a fixed BMP efficiency or effluent concentration to the portion of runoff treated and discharged.

Table 4-9 Model Representation for Distributed Structural BMPs

	BMP Type	Description	Modeled BMP Process ● Dynamic[1] ○ Static[2] – Not Applicable		
			Infiltration	Storage	WQ Treatment
Green Infrastructure (GI)	Bioretention and Biofiltration	Vegetated practices with a soil filter media, and the latter with an underdrain	●	●	●/○[3]
Green Infrastructure (GI)	Permeable Pavement	Porous pavement with or without an underdrain	●	●	●
Green Infrastructure (GI)	Bioswales	Vegetative filter strips and vegetated swales	●	●	●
Green Infrastructure (GI)	Rainfall Harvest	Green roofs, cisterns, rain barrels	–	●	●
Green Infrastructure (GI)	Green Streets	Integrated/cascading network of a group of GI practices	●	●	●

1 Dynamic process simulation results in BMP performance that varies with hydrology.
2 Static process simulation applies a fixed BMP efficiency or effluent concentrations to the portion of runoff treated and discharged.
3 For biofiltration BMPs, water quality treatment of water that passes through the soil media and out the underdrain is assumed to achieve a fixed removal efficiency or fixed concentration (static). When large storms result in overflows that bypass the system, the fixed efficiency/concentration is not applied to the overflow (dynamic).

Minimum Control Measures/Institutional BMPs

MCMs/institutional BMPs tend to be effective at controlling pollutant loads by removing them from potential sources before they can be mobilized and transported to receiving waters. Three performance mechanisms are associated with institutional BMPs: flow prevention, pollutant prevention, or transport prevention. **Table 4-10** lists the institutional BMPs to be modeled for the RAA and describes how they will be represented in the model, supported by the following description:

- **Street sweeping:** representation of sweeping in LSPC requires information about (1) baseline and enhanced sweeping frequency and (2) sweeper removal efficiency. During model simulation, built-up sediment mass is removed at the specified frequency and efficiency (independent of the wash-off sequence); therefore, higher frequency sweeping has a higher chance of preventing transport. During the EWMP development process, available data will be reviewed to determine if representing the enhanced conditions is desired in the RAA.

- **Enhanced irrigation control:** the irrigation routine in LSPC is based on the irrigation settings derived from the watershed model calibration to account for (1) irrigation frequency, (2) volume, and/or (3) type. In order to represent enhanced irrigation control, the irrigation footprint in LSPC is reduced.

- **Brake pad replacement:** the effects of State Senate Bill 386 will be represented by reducing/removing the build-up rate of copper from road surfaces, which is a static approach. It should be noted that in cases where copper is the limiting pollutant, brake pad replacement tends to change the limiting pollutant to zinc.

Table 4-10 Model Representation for MCMs/Institutional BMPs				
BMP Type	**Description**	**Modeled BMP Process** ● Dynamic[1] ○ Static[2] – Not Applicable		
		Flow Prevention	**Pollutant Prevention**	**Transport Prevention**
Street Sweeping	Reduces sediment load (and any associated pollutant loads) from roadways, due to changes sweeping frequency and type of equipment used	–	●	●
Irrigation Control	Reduces dry-weather runoff due to irrigation by changing the irrigated area footprint	●	–	●
Brake Pads	Reduces copper build-up and loads from roadways, using a fixed efficiency	–	○	–
Other (Non-modeled)	A small percentage will be assumed to apply to all other "non-modeled" institutional BMP enhancements	–	○	○

1 Dynamic process simulation results in BMP performance that varies with hydrology.
2 Static process simulation applies a fixed BMP efficiency.

4.3.5 Approach for Using Optimization to Support BMP Selection with SUSTAIN and NIMS

The previous subsection presented details about the individual BMP modeling components, which will be integrated for the RAA to represent cumulative effects of BMPs. BMPs will be represented over space and time, and cost-benefit optimization will support selection of potential BMPs. Optimization analysis considers costs as part of an overall strategy to aid in watershed-wide BMP prioritization and implementation. The BMP preferences for each jurisdiction will be based on cost-effectiveness curves similar to the conceptual diagram previously presented in **Figure 4-11** and the preferences of the RH/SGRWQG members. This section describes how optimization routines in WMMS will support BMP selection.

WMMS was specifically designed to dynamically identify BMP strategies for meeting downstream WQOs that minimize cost and maximize benefit. During the WMMS development process, local cost data was compiled and synthesized in order to assign a dollar value to each type of BMP. Because a single BMP can have both flow and water quality benefits, the ability to dynamically model the watershed's response to a large number of alternative BMPs and BMP types is an important feature of WMMS. Recognizing that location affects BMP effectiveness, the ability to identify the subwatersheds where BMP implementation would be most effective is another important feature of WMMS that will support the RAA.

The WMMS output (1) provides guidance as to relative costs and benefits of implementing different BMPs at different locations, (2) identifies the BMP treatment capacities that are necessary and how it might be optimally distributed upstream of a receiving water, and (3) assists in demonstrating watershed sensitivity to different BMP approaches.

Figure 4-19 is a conceptual schematic of how various layers of information are integrated in WMMS for evaluating BMP opportunities using cost-benefit optimization. Both the SUSTAIN and NIMS models support this optimization. The figure includes a number of panels representing steps in the optimization sequence as described below:

1. The leftmost panel labeled "Baseline Condition" represents the calibrated watershed model, and the baseline existing condition. At this point in the RAA process, numeric goals are established, incorporating allowable exceedances.

2. The second panel from the left, labeled "Optimization Baseline," illustrates how committed BMPs (existing or planned for construction) are considered by the optimization routine. The blue space is the loading reduction the optimization model is seeking to achieve. This optimization starting point includes the institutional BMPs represented by the LSPC watershed model.

3. The third panel, labeled "Optimization Scenario 1", incorporates the regional BMPs identified through the regional BMP selection process described in **Section 3.1.4**. The optimization model is primarily used to identify the BMPs for achieving the load reduction not achieved by regional EWMP projects.

4. The fourth panel, labeled "Optimization Scenario N," illustrates different exploratory optimization scenarios to identify the BMPs for achieving the load reduction not achieved by regional EWMP projects. For the RAA, it is possible that more than 1 million iterations (N = 1 million) will be required to identify optimal solutions. For all of these scenarios, the objective is to maximize the benefit and minimize the cost. The BMP screening described in **Section 4.2.2** will establish the potential capacity for distributed BMPs, and the optimization routine will select among the potential BMPs for achieving that capacity. For some receiving waters, WMMS may determine additional BMP capacity is still needed upstream, this capacity will equate to BMPs needed on private land (or additional regional EWMP projects needed; see **Figure 4-8**).

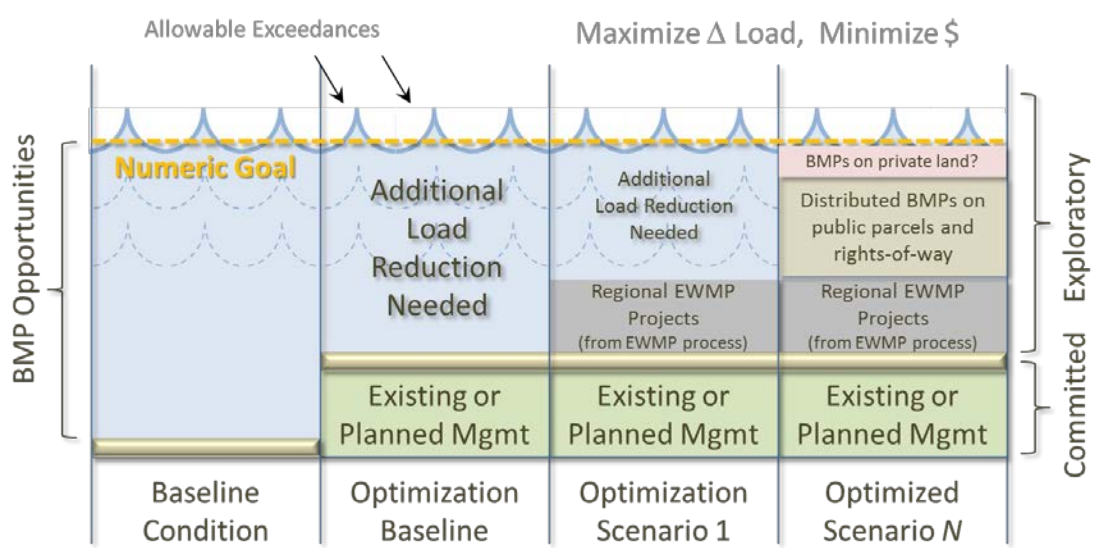

Figure 4-19 Conceptual Schematic of the WMMS Optimization Sequence for Evaluating BMP Opportunities

4.3.6 BMP Scheduling for TMDL and EWMP Milestones

The TMDL and EWMP milestones (see **Table 1-6**) dictate the pace of BMPs needed to achieve numeric goals. An illustration of the BMP scheduling of milestones was previously shown in **Figure 4-13**, and the pollutants associated with each water quality priority are shown in **Table 2-5**. To support scheduling, the initial BMP modeling will determine BMP capacities needed to attain the *final* TMDLs. The combinations of BMPs associated with that solution will be outlined and ranked in terms of cost-effectiveness, to support scheduling for attaining intermediate milestones. Selecting the highest ranked (most cost-effective) BMPs early in the schedule will also demonstrate early progress toward achieving numeric goals. The exact method by which optimization will be incorporated into BMP selection for milestones will be determined during the EWMP development process. In many cases, the schedule for attaining the limiting pollutant(s) may dictate the pace for attaining WQOs associated with other pollutants.

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 determine 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 EWMP development to receive input on structural BMP projects and programmatic implementation through MCMs and other institutional BMPs.
- If available, data collected through the development of the CIMP will be reviewed to refine the water quality priorities already identified and provide information regarding non-stormwater discharges and other source identification findings.
- 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 to determine 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 to determine anticipated load reductions.
- The potential MCM/institutional BMP control measures will be further evaluated to determine if the potential modifications identified in **Section 3.3.2**, or other modifications, would be justifiable due to anticipated pollutant load reductions.
- The limiting pollutant will be established for the RAA and dictate the resulting implementation efforts.
- The BMP preferences will be finalized on a jurisdictional basis so that the preferences may be integrated with the RAA output.
- The method by which optimization will be incorporated into BMP selection for milestones will be determined.
- The EWMP will be developed, submitted, and reviewed before it can be approved. The schedule outlined in Table 9 of Part VI.C.4 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	Notify Regional Board of intent to develop an EWMP and request submittal date for draft program plan.	6 months after MS4 Permit effective date (June 2013)
VI.C.4.c.iv	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	Comments provided to Permittees by Regional Board.	4 months after submittal of draft plan.
VI.C.4.c	Submit final plan to Regional Board.	3 months after receipt of Regional Board comments on draft plan.
VI.C.4.c	Approval or denial of final plan by Regional Board or by the Executive Officer.	3 months after submittal of the final plan.
VI.C.6	Begin implementation of the EWMP.	Upon approval of the final plan.

Table 5-1 EWMP Implementation Requirements		
MS4 Permit Part	**Provision**	**Due Date**
VI.C.8	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, the RH/SGRWQG included a schedule with completion dates and associated milestones for EWMP development in the NOI. Currently the RH/SGRWQG 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 the RH/SGRWQG NOI	
Milestone	**Due Date**
Compile technical memorandum of water quality priorities	December 2013*
Complete internal draft of EWMP Work Plan	April 2014*
Submit EWMP Work Plan to Regional Board	June 2014
Develop interim numeric milestones for EPA developed TMDLs	August 2014*
Conduct initial RAA based on selected watershed control measures	December 2014*
Complete internal draft of EWMP	April 2015*
Submit Draft EWMP to Regional Board	June 2015
Submit Final EWMP to Regional Board (revised based on Regional Board comments)	January 2016

* Dates are tentative estimates and may change on an as needed basis.

This Work Plan will be used as a guide for EWMP development and provides the framework required. As mentioned in the last row of **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 of the MS4 Permit. Part VI.C.8.a 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 compliance schedules;
- Progress towards achieving improved water quality in MS4 discharges and achieving RWLs 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 based on more recent water quality data for discharges from the MS4 and receiving water(s) and a reassessment of pollutant sources;
- Availability of new information and data from sources other than the Permittees monitoring programs within the RH/SGRWQG area 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 RH/SGRWQG to identify a plan that is successful in improving water quality in the region.

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Attachment A

Notice of Intent

City of Sierra Madre

Public Works Department
232 W. Sierra Madre Boulevard, Sierra Madre, CA 91024
phone 626.355.7135 fax 626.355.2251

June 27, 2013

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

VIA Email to:losangeles@waterboards.ca.gov,
Renee.Purdy@waterboards.ca.gov,
Rebecca.Christmann@waterboards.ca.gov

SUBJECT: NOTICE OF INTENT FOR NPDES PERMIT ORDER NO. R4-2012-0175 FOR THE RIO HONDO/SAN GABRIEL RIVER WATER QUALITY GROUP (RH/SGRWQG)

Dear Mr. Unger:

On behalf of the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG), attached is the Notice of Intent to proceed with the collaborative development of an Enhanced Watershed Management Plan (EWMP) and Coordinated Integrated Monitoring Plan (CIMP). The development of the Notice of Intent was a joint effort by the participating agencies listed below:

- City of Arcadia
- City of Azusa
- City of Bradbury
- City of Duarte
- City of Monrovia
- City of Sierra Madre
- County of Los Angeles (local portions)
- Los Angeles County Flood Control District

The NOI submittal packet includes the NOI, Letters of Intent, MOUs, as well as documentation of the compliance with the "early-action" requirements related to Low Impact Development Ordinance and Green Streets Policy.

Should you have any questions regarding this submittal, please contact me at jcarlson@cityofsierramadre.com or Rafael Casillas at rcasillas@accessduarte.com.

Sincerely,

James Carlson
Management Analyst, City of Sierra Madre

Enc. Notice of Intent

cc: City of Arcadia
City of Azusa
City of Bradbury
City of Duarte
City of Monrovia
City of Sierra Madre
County of Los Angeles (local portions)
Los Angeles County Flood Control District

NOTICE OF INTENT

Rio Hondo/San Gabriel River Water Quality Group

Enhanced Watershed Management Program (EWMP)

Submitted to:
California Regional Water Quality
Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Submitted by:
Cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, and Sierra Madre
County of Los Angeles
Los Angeles County Flood Control District

June 27, 2013

SECTION 1. WATERSHED MANAGEMENT PROGRAM TYPE SELECTION AND PERMITTEES

The Permittees of the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG), listed in Table 1, hereby provide the Los Angeles Regional Water Quality Control Board (Regional Water Board) this Notice of Intent (NOI) to develop an Enhanced Watershed Management Program (EWMP) Plan and Coordinated Integrated Monitoring Program (CIMP) Plan in accordance with Part VI.C.4.b.i and Attachment E, Part IV.C.1 of Order R4-2012-0175.

As will be summarized, the Permittees meet the LID ordinance and Green Street policy development conditions of the Order and will submit an EWMP Development Work Plan within 18 months of the effective date of this Order R4-2012-0175, which is June 28, 2014. The Draft EWMP Plan will be submitted within 30 months of the effective date of Order R4-2012-0175, which is June 28, 2015. In accordance with Attachment E, Part IV.C.3 of the Order, the Permittees will submit the CIMP plan to the Executive Officer on or before June 28, 2015.

Table 1. RH/SGRWQG Permittees
• **City of Arcadia**
• **City of Azusa**
• **City of Bradbury**
• **City of Duarte**
• **City of Monrovia**
• **City of Sierra Madre**
• **County of Los Angeles**
• **Los Angeles County Flood Control District (LACFCD)**

SECTION 2. TOTAL MAXIMUM DAILY LOAD COMPLIANCE DATES PRIOR TO APRIL 28, 2016

Total Maximum Daily Loads (TMDLs), identifying listings for impaired waters bodies for which the RH/SGRWQG subwatersheds drain to, are listed on Table 2Additionally, the San Gabriel River Metals TMDL assigns Waste Load Allocations (WLAs) to each of the RH/SGRWQG Permittees, except the City of Sierra Madre, although no Group subwatershed water bodies are identified in the TMDL as impaired. Interim and final trash TMDL and other TMDL final Water Quality Based Effluent Limitation (WQBEL) and Receiving Water Limitation (RWL) compliance deadlines, occurring prior to the final EWMP approval date of April 28, 2016 are identified in Table 3.

The RH/SGRWQG Permittees have been implementing the trash source control measures and Best Management Practices (BMPs) identified on Table 4. The Permittees will continue to implement these measures to ensure that Municipal Separate Storm Sewer System (MS4) discharges achieve compliance with the interim and final WQBELs on Table 3 during development of the EWMP. The Peck Park Trash TMDL Implementation Schedule will be developed through the EWMP Plan, in accordance with Permit Part VI.E3.

Table 2 TMDLs Applicable to the RH/SGRWQG Watershed

TMDL	Resolution Number	Effective Date	EPA Approval Date
Los Angeles River Watershed Trash TMDL	2001-013 2007-012	August 28, 2002 Reissuance September 23, 2008	August 1, 2002 July 24, 2008
Los Angeles River Nitrogen and Related Effects TMDL	2003-009 2003-016 R12-010	March 23, 2004 Interim WLA Revision September 27, 2004 Reconsideration on December 6, 2012	March 18, 2004 Not Applicable To Be Determined
Los Angeles River and Tributaries Metals TMDL	2007-014 R10-003	October 29, 2008 Reconsideration on November 3, 2011	October 29, 2008 November 3, 2011
Los Angeles River Bacteria TMDL	R10-007	March 23, 2012	March 23, 2012
Los Angeles Area Lakes USEPA TMDLs for Peck Road Lake	Not Applicable	March 26, 2012	Not Applicable
Los Angeles Area Lakes USEPA TMDLs for Santa Fe Dam Park Lake	Not Applicable	March 26, 2012	Not Applicable

Table 3 Interim and Final Trash WQBELs and Other Final WQBELs and Receiving Water Limitations Occurring Before RH/SGRWQG EWMP Plan Approval

TMDL Order	WQBEL	Interim/Final	Compliance Date
Los Angeles River Watershed Trash TMDL	20% Baseline	Interim	September 30, 2013
	10% Baseline	Interim	September 30, 2014
	3.3% Baseline	Interim	September 30, 2015
	0% Baseline	Final	September 30, 2016
Lon Angeles Nitrogen and Related Effects TMDL	10.1 mg/L NH_3-N One Hour Average	Final	December 28, 2012
	2.3 mg/L NH_3-N Thirty Day Average	Final	December 28, 2012
	1.0 mg/L NO_2-N Thirty Day Average	Final	December 28, 2012
	8 mg/L (NO_3+NO_2)-N 30 Day Average	Final	December 28, 2012

Table 4. Control Measures that will be Implemented Concurrently with EWMP Development for TMDLs

TMDL	Permittees	Implementation Plan and Control Measures	Status of Implementation
LA River Trash TMDL	Cities of Arcadia, Bradbury, Duarte, Monrovia, Sierra Madre, County of Los Angeles	Permittees are employing trash source controls, Automatic Retractable Screens, Connector Pipe Screens and other BMPs and Daily Generation Rate Studies	Conforming to interim WQBEL targets and compliance dates

SECTION 3. DEVELOPMENT OF LID ORDINANCE AND GREEN STREETS POLICY REQUIREMENT

The RH/SGR WQG Permittees have all drafted Low Impact Development (LID) ordinances and Green Streets policies. The Cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, and Sierra Madre each initiated development of their LID Ordinances and Green Streets Policies by February 26, 2013 through participating in a cost-sharing agreement with the San Gabriel Valley Council of Governments The County of Los Angeles initiated development of their LID Ordinances and Green Streets Policies by February 26, 2013 through internal processes. (Documentation of participation is provided in Appendix D). Table 5 summarizes the adoption status of the LID ordinances, while Table 6 summarizes the adoption status of the Permittees' Green Streets policies. The entire RH/SGR WQG MS4 area will soon have adopted LID ordinances and Green Streets policies. Prior to adoption, each agency should complete, under a timely if expedited schedule, an agency review, verify Municipal Code conformances, prepare and complete an environmental review, and assess compatibility with the final Los Angeles County LID Ordinance and Green Street Policy, so that they will not have to readopt the policy to utilize County Department of Public Works Plan Checking Services.

Table 5. Status of LID Ordinance Adoption Within the RH/SGRWQG WMA

Permittee	LID Ordinance (Indicate Status)	MS4 Watershed Area for which Permittee is Responsible (Sq. Miles)		MS4 Watershed Area Covered by Permittee's LID Ordinance [Sq. Miles)		Percentage of Watershed Area	
		Rio Hondo	San Gabriel River	Rio Hondo	San Gabriel River	Rio Hondo	San Gabriel River
Arcadia	Draft Ordinance	10.9	0.2	10.9	0.2	34.17%	1.04%
Azusa	Draft Ordinance	0	9.7	0	9.7	0%	50.52%
Bradbury	Draft Ordinance	0.8	1.2	0.8	1.2	2.51%	6.25%
County of Los Angeles	Draft Ordinance	2.8	2.1	2.8	2.1	8.78%	10.94%
Duarte	Draft Ordinance	1.8	4.9	1.8	4.9	5.64%	25.52%
Monrovia	Draft Ordinance	12.6	1.1	12.6	1.1	39.50%	5.73%
Sierra Madre	Draft Ordinance	3	0	3	0	9.40%	0%
LACFCD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MS4 Watershed Area		31.9	19.2	31.9	19.2	**100%**	**100%**

Status Descriptions: Draft Ordinance – By June 28, 2013, Permittee will draft an LID Ordinance in compliance with the requirements of Order R4-2012-0175

Table 6. Status of Green Streets Policy Coverage of the MS4 Watershed Area Addressed by the EWMP

Permittee	Green Street Policy (Indicate Status)	MS4 Watershed Area for which Permittee is Responsible [Sq. Miles]		MS4 Watershed Area Covered by Permittee's LID Ordinance [Sq. Miles]		Percentage of Watershed Area	
		Rio Hondo	San Gabriel River	Rio Hondo	San Gabriel River	Rio Hondo	San Gabriel River
Arcadia	Draft Policy	10.9	0.2	10.9	0.2	34.17%	1.04%
Azusa	Draft Policy	0	9.7	0	9.7	0%	50.52%
Bradbury	Draft Policy	0.8	1.2	0.8	1.2	2.51%	6.25%
County of Los Angeles	Draft Policy	2.8	2.1	2.8	2.1	8.78%	10.94%
Duarte	Draft Policy	1.8	4.9	1.8	4.9	5.64%	25.52%
Monrovia	Draft Policy	12.6	1.1	12.6	1.1	39.50%	5.73%
Sierra Madre	In Place	3	0	3	0	9.40%	0%
LACFCD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total MS4 Watershed Area		31.9	19.2	31.9	19.2	**100%**	**100%**

Status Descriptions: Draft Policy –By June 28, 2013, Permittee will draft a Green Street Policy in compliance with the requirements of Order R4-2012-0175.

SECTION 4. GEOGRAPHIC SCOPE OF ENHANCED WATERSHED MANAGEMENT PROGRAM:

The RH/SGRWQG includes the Cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, Sierra Madre, and the County of Los Angeles, and the LACFCD, several of which are in both the Los Angeles and San Gabriel River Watersheds. The municipalities are significantly residential and commercial in land use characteristics and have a shared perspective regarding water conservation and water quality related issues.

The headwaters of the 834 square mile Los Angeles River Watershed are primarily within the mountains of the Angeles National Forest. The watershed is bordered by the Santa Monica Mountains, the Simi Hills, the Santa Susana Mountains, the San Gabriel Mountains, the San Gabriel River and Dominguez Channel Watersheds. The river extends 40 miles across urbanized areas of the San Fernando and west San Gabriel Valleys, before flowing into the Los Angeles-Long Beach Harbor and the Pacific Ocean. The Rio Hondo is a tributary of the Los Angeles River, which receives drainage from the RH/SGRWQG Permittees via several smaller tributaries:

- Arcadia Wash drains from the Cities of Arcadia and Sierra Madre;
- Santa Anita Wash drains from Cities of Arcadia, Monrovia, Sierra Madre and County of Los Angeles;
- Sierra Madre Wash drains from the City of Sierra Madre; and
- Sawpit Wash drains from the City of Monrovia, Duarte, Bradbury, and County of Los Angeles.

Prior to draining to the Rio Hondo, the Santa Anita and Sawpit Washes drain to Peck Road Water Conservation Park (aka. Peck Road Lake). Peck Road Lake then drains to the Rio Hondo. Peck Road Lake is owned by the LACFCD and maintained by the Los Angeles County Department of Parks and Recreation.

The San Gabriel River Watershed encompasses approximately 682 square miles of Los Angeles County, northwest Orange County, and a small portion of southwest San Bernardino County. The San Gabriel River extends 60 miles from its headwaters in the mountains of the Angeles National Forest flowing primarily south across urbanized areas of the San Gabriel Valley and Los Angeles County Coastal Plain, eventually reaching the Pacific Ocean between the Cities of Seal Beach and Long Beach. The main tributaries are Walnut Creek, San Jose Creek, and Coyote Creek. Reach 5 of the San Gabriel River receives drainage from Duarte, Bradbury, Monrovia, Azusa, Arcadia, and County of Los Angeles.

About four miles below the mouth of the San Gabriel Canyon is the Santa Fe Dam and Reservoir, which is operated and maintained by the LACFCD through an easement with the United States Army Corps of Engineers (USACE). Both the Rio Hondo and San Gabriel River flow into the Whittier Narrows Reservoir and may merge behind the reservoir during large storm events. Flows from the upper watershed are directed to spreading grounds located in and adjacent to the Rio Hondo and San Gabriel Rivers.

The RH/SGRWQG watersheds encompass approximately 51 square miles and Table 7 provides a breakdown of each Permittee's land area within the two major river watersheds. Figure 1 is a map of the watershed and jurisdictional boundaries in the vicinity of the RH/SGRWQG. Of the total Los Angeles River and San Gabriel River Watershed areas, the RH/SGR WQG Permittees have jurisdiction over just 4% and 3% respectively. The Permittees do not have jurisdiction over lands owned by the State of California (CalTrans), the Federal government (Angeles National Forest), Los Angeles County Metropolitan Transportation Authority (Metro) Gold Line, and local school districts (see Table 8).

Table 7. Watershed Land Area by Permittees

Permittee	Rio Hondo		San Gabriel River	
	Land Area (Square Miles)	Percent of Total Area	Land Area (Square Miles)	Percent of Total Area
Arcadia	10.9	34.17%	0.2	1.04%
Azusa	0	0%	9.7	18.98%
Bradbury	0.8	2.51	1.2	6.25%
County of Los Angeles	2.8	8.78%	2.1	10.94%
Duarte	1.8	5.64%	4.9	25.52%
Monrovia	12.6	39.5%	1.1	5.73%
Sierra Madre	3	9.4%	0	0%
Total	**31.9**	**100%**	**19.2**	**100%**

Figure 1. RH/SGRWQG

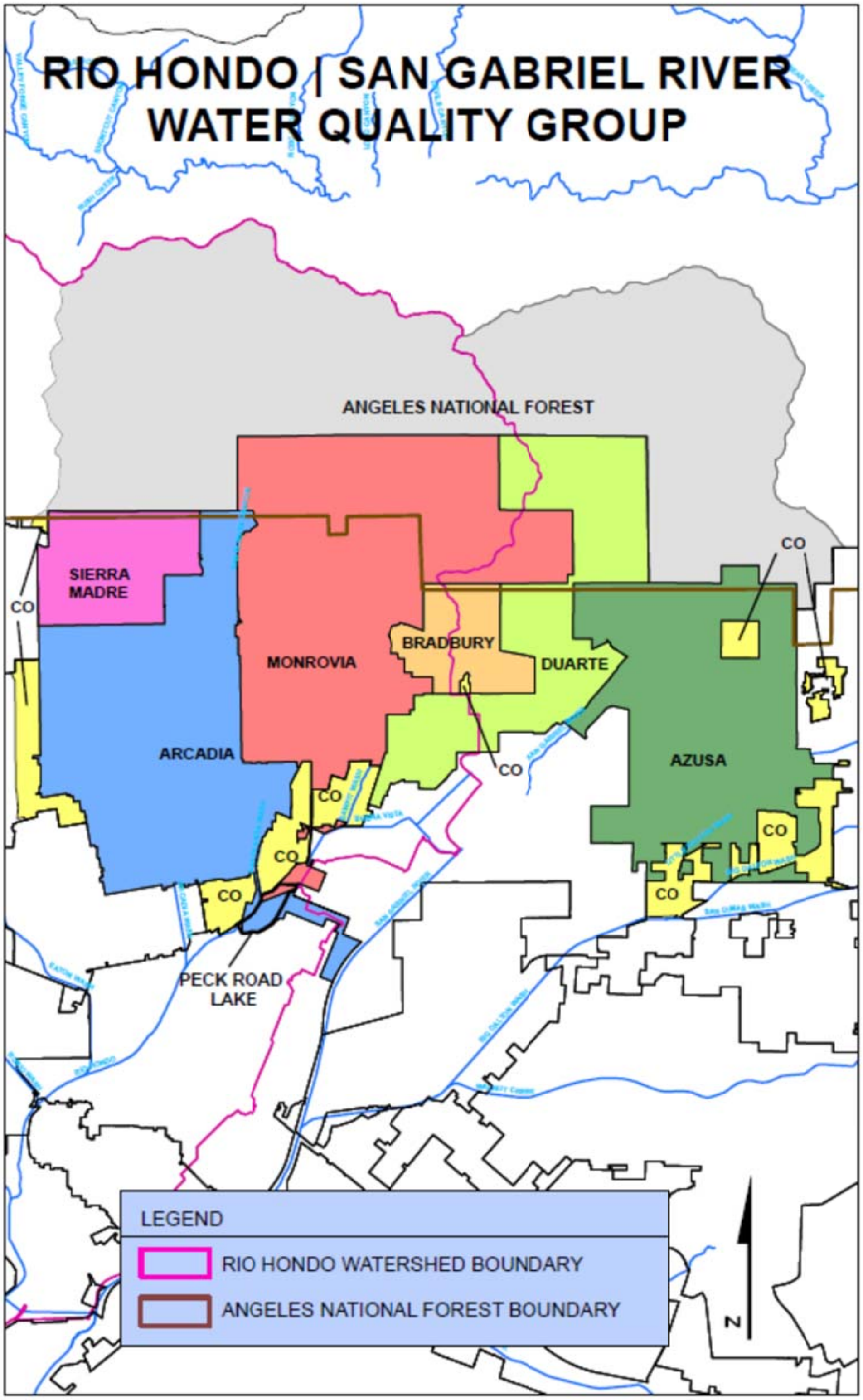


Table 8. RH/SGRWQG Watershed Land Area Distribution and EWMP Participation

Agency	EWMP Agency	Land Area (sq. miles)
Arcadia	Yes	**11.1**
Azusa	Yes	**9.7**
Bradbury	Yes	**2**
County of Los Angeles	Yes	**4.9**
Duarte	Yes	**6.7**
Monrovia	Yes	**13.7**
Sierra Madre	Yes	**3**
Los Angeles County Flood Control District	Yes	**N/A**
Angeles National Forest	No	**TBD**
Caltrans	No	**TBD**
Metro Gold Line	No	**TBD**
State of California	No	**TBD**
	RH/SGRWQG Watershed	**51.1**

SECTION 5. PLAN CONCEPT AND INTERIM MILESTONES AND DEADLINES:

The RH/SGRWQG EWMP agencies have been collaborating since the effective date of the 2012 MS4 Permit and have already selected a consultant and issued a contract for Reasonable Assurance Analysis (RAA), and development of the EWMP and CIMP. The Permittees are planning to develop implementation and compliance strategies that are based on a multi-pollutant approach with green infrastructure best management practices (BMPs) that maximize the use of urban runoff as a resource for aquifer recharge, irrigation, and other beneficial uses. The RH/SGRWQG EWMP will consider existing TMDL implementation plans, evaluate permit proposed watershed source control measures, identify enhanced projects to maximize capture of all non-stormwater runoff and stormwater from the 85^{th} percentile, 24-hour storm event, and identify additional watershed control measures for those areas of the watersheds that cannot be addressed by enhanced projects.

Plan development will be a collaborative process between the RH/SGRWQG EWMP agencies, consultant and Regional Board, coordinated by an Oversight Committee composed of members from each of the RH/SGWQG agencies and receiving local watershed stakeholders input.

Table 9 includes a listing of milestones and deadlines for the development of the EWMP.

Table 9. Enhanced Watershed Management Program & Integrated Coordinated Monitoring Program Interim Milestones and Deadlines

Milestone	**Deadline**
Compile technical memorandum of water quality priorities	*December 2013**
Complete internal draft of EWMP Work Plan	*April 2014**
Complete draft CIMP	*April 2014**
Submit EWMP Work Plan to Regional Water Board	June 2014
Develop interim numeric milestones for EPA developed TMDLs	*August 2014**
Conduct initial RAA based on selected watershed control measures	*December 2014**
Complete internal draft of EWMP	*April 2015**
Submit CIMP Plan to Regional Water Board	June 2015**
Submit Draft EWMP to Regional Water Board	June 2015
Submit Final EWMP to Regional Water Board (revised based on Regional Water Board comments)	January 2016

* Dates are tentative estimates and may change on an as needed basis.

** Attachment E, Part IV.C.3 of the Order.

SECTION 6. COST ESTIMATE:

The RH/SGRWQG EWMP agencies prepared a scope of work and cost estimates for developing the EWMP Work Plan, CIMP, and EWMP for the RH/SGRWQG. It is estimated that the consultant costs will be $212,076 for the CIMP, and $578,461 for the EWMP for a total of $790,537. Table 10 provides a cost break down of the main cost categories involved in EWMP and CIMP plan development. Additionally, agencies of the RH/SGRWQG will contribute several hundred thousand dollars of in-kind services toward the development of the EWMP and CIMP, including attending RH/SGRWQG and Technical Advisory Committee meetings, as well as several hundred thousand dollars for an environmental review to be developed once the EWMP and CIMP have been prepared. For a more detailed scope and cost breakdown, please see Appendix A.

The LACFCD, having no land authority over the RH/SGRWQG watershed, will contribute funds for 10% of the total Consultant EWMP and CIMP Plan development cost while the other 90% of the cost will be funded amongst the remaining Permittees, based upon their respective land area percentages in the RH/SGRWQG watershed as shown in Table 7.

Table 10.Estimated EWMP and CIMP Development Costs

Jurisdiction	Staff/In-kind Costs (EWMP & CIMP)	Consultant EWMP Plan Development	Consultant CIMP Plan Development	Consultant Environmental Review	Total Costs
TOTAL Estimated Costs	$620,000	$578,461	$212, 076	$300,000*	**$1,710,537**

* It is anticipated that Environmental Review will be required once the EWMP has been prepared. Environmental Review costs are anticipated to be approximately $300,000.

SECTION 7. PERMITTEE MEMORANDA OF UNDERSTANDING

All Permittees are committed to development and implementation of the EWMP Plan. Copies of executed Memoranda of Understanding are included in Appendix B.

SECTION 8. COMMITMENT TO IMPLEMENT A STRUCTURAL BMP OR SUITE OF BMPS:

The Permittees listed in Table 11 will implement the identified structural BMP or suite of BMPs to fulfill the obligations under Part VI.C.b.iii. (5).

Table 11. Structural BMP or Suite of BMPs to be Implemented in the EWMP Watershed(s)

Watershed	Permittee	Structural BMP or Suite of BMPs to be Implemented	Planned Implementation Date
Rio Hondo	Monrovia	*Monrovia Station Square/Transit Village Multi-Benefit Park and Greenway Project:* Design and develop a 2.5 acre multi-benefit green space along the future Metro Gold Line Foothill Extension. The project includes a multi-use trail, native trees and shrubs, runoff storage and infiltration systems prior to discharging into Sawpit Wash and Peck Road Water Conservation Park to the south.	Spring 2015
San Gabriel River	Azusa	*Metro Gold Line Infiltration Project:* The City of Azusa in coordination with the Foothill Construction Authority for the Gold Line Project has constructed infiltration systems at some of the major crossings in town. Infiltration will occur at the catch basins which are soft bottom. Anticipated tributary areas are approximately 17 acres and will include the rail corridor. The 10 year storm event is to be infiltrated.	Spring 2015

APPENDIX A

Detailed Cost to Develop EWMP

Table 12. Estimated Costs Per Permittee for Developing the RH/SGRWQG's EWMP & CIMP				
Jurisdiction	Staff/In-Kind Costs	Consultant (EWMP & CIMP Plan Development)	Consultant Environmental Review	Total Costs (*does not include Environmental Review)
Arcadia	$91,000	$179,891.39	TBD	*$270,891
Azusa	$104,000	$153,660.80	TBD	*$257,661
Bradbury	$103,000	$39,480.59	TBD	*$142,481
Duarte	$88,000	$65,711.18	TBD	*$153,711
Monrovia	$99,000	$133,602.11	TBD	*$232,602
Sierra Madre	$45,000	$53,367.37	TBD	*$98,367
County of Los Angeles & Los Angeles County Flood Control District	$90,000	$85,769.86 $79,053.70		*$254,824
TOTAL	**$620,000**	**$790,537.00**	**~$300,000**	**$1,710,537**

APPENDIX B

Memorandum of Understanding

City of Arcadia
City of Azusa
City of Bradbury
City of Duarte
City of Monrovia
City of Sierra Madre

County of Los Angeles and Los Angeles County Flood Control District have each indicated their intent to participate in the MOU in their Letters of Intent (attached). The MOU is tentatively scheduled for the Board of Supervisors' approval on July 30, 2013, but no later than December 28, 2013.

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE LOS ANGELES COUNTY FLOOD CONTROL DISTRICT,
THE COUNTY OF LOS ANGELES, AND
THE CITIES OF <u>ARCADIA, AZUSA, BRADBURY, DUARTE, MONROVIA AND SIERRA MADRE</u>

REGARDING THE ADMINISTRATION AND COST SHARING FOR DEVELOPMENT OF THE ENHANCED WATERSHED MANAGEMENT PROGRAM (EWMP) FOR THE RIO HONDO/SAN GABRIEL RIVER WATER QUALITY GROUP'S WATERSHED

This Memorandum of Understanding (MOU), made and entered into as of the date of the last signature set forth below by and between the LOS ANGELES COUNTY FLOOD CONTROL DISTRICT (LACFCD), a political subdivision of the State of California, the COUNTY OF LOS ANGELES (LA COUNTY), a political subdivision of the State of California, and the CITIES OF ARCADIA, AZUSA, BRADBURY, DUARTE, MONROVIA, AND SIERRA MADRE. Collectively, these entities shall be known herein as "PARTIES" or individually as "PARTY."

<u>WITNESSETH</u>

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

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

WHEREAS, the PARTIES have agreed to collaborate on the compliance of certain elements of the MS4 Permit and have agreed to a cost sharing formula set forth in Table 2 of Exhibit A, which is attached and made part of this MOU; and

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

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

WHEREAS, the PARTIES propose for the Consultant to prepare and deliver a Final Work Plan, Draft Enhanced Watershed Management Program (EWMP) plan, Coordinated Integrated Monitoring Plan (CIMP), Final EWMP plan, and Environmental Review as appropriate to the EWMP and CIMP (collectively, PLANS) in compliance with certain elements of the MS4 Permit, at a total cost of approximately $790,537; and

WHEREAS, the PARTIES have determined that hiring a Consultant to prepare and deliver the PLANS will be beneficial to the PARTIES and they desire to participate and will provide funding in accordance with the cost allocation in Table 2 of Exhibit A; and

WHEREAS, the PARTIES have agreed to establish an Oversight Committee (comprised of City Managers and/or designated staff from each PARTY) to provide technical oversight and project management for the development of the PLANS, and

WHEREAS, the CITY OF ARCADIA will act on behalf of the PARTIES in the administration of the Consultant services agreements for the preparation of the PLANS .

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

(1) Recitals: The recitals set forth above are incorporated into this MOU.

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

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

(4) Terms: This MOU shall become effective the last date of execution by all Parties hereto (“Effective Date”), and shall remain in effect until the CITY OF ARCADIA has provided written notice of completion of the Scope of Work described herein, and payment by all Parties of their allocated pro-rata share hereunder. .

(5) Responsibilities of the CITY OF ARCADIA:

  a. The CITY OF ARCADIA shall act as the contract manager on behalf of, and for the benefit of, PARTIES, and as such agrees to invoice the PARTIES for their pro-rata share of the cost for the preparation and delivery of the PLANS as described in Tables 2 and 3 of Exhibit A.

    1. Payments to Third Parties – The CITY OF ARCADIA shall have no obligation to pay vendors or consultants any funds other than those owed for its proportional share as set forth in Table 2 of Exhibit A, and those funds remitted to the CITY OF ARCADIA following invoice. In the event

the CITY OF ARCADIA elects to make a payment on behalf of a Delinquent Party, the Delinquent Party and/or the remaining Parties shall reimburse the CITY OF ARCADIA the funds expended making the payment as described below.

b. The CITY OF ARCADIA shall solicit proposals for, award, and administer a Consultant contract(s) for the preparation and delivery of the PLANS in accordance with the Scope of Work.

c. The CITY OF ARCADIA shall utilize the funds deposited by the PARTIES only for payment of the Consultant for the preparation and completion of the PLANS.

d. The CITY OF ARCADIA shall provide the PARTIES with an electronic copy of the draft and final PLANS within 5 days of receipt from the Consultant.

e. Upon execution of this MOU, each Party shall provide the name or names of those persons from within the Party's organization who is/are to be representing said Party on the Oversight Committee. Within thirty (30) days from the Effective Date, the CITY OF ARCADIA shall notice all parties hereto of the members of the contact information for the Oversight Committee.

f. All draft and final Plans shall be reviewed by the Oversight Committee for further revision and/or completion. No PLAN OR PLANS shall be submitted to the Regional Board unless and until it/they have been approved, in writing, for submittal by all PARTIES hereto, excepting only a Party or Parties whose involvement in this MOU has been terminated.

g. The CITY OF ARCADIA shall provide an accounting upon the early termination of this MOU pursuant to paragraph (6)t.1 or 60 days after the date the Regional Board gives final approval to the last outstanding portion of the PLANS. The CITY OF ARCADIA shall return the unused portion of all funds deposited with the CITY OF ARCADIA in accordance with the cost allocation formula set forth in Table 2 of Exhibit A.

(6) THE PARTIES FURTHER AGREE:

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

b. The PARTIES shall fund the cost of the preparation and delivery of the PLANS and pay the CITY OF ARCADIA for the preparation and delivery of the PLANS based on the cost allocation set forth in Table 2 of Exhibit A within 60 days of receiving an invoice.

c. Delinquent Payments – A PARTY's payment is considered delinquent 180 days after being invoiced by the CITY OF ARCADIA. The following procedures may be implemented to attain payments from the delinquent PARTY per instructions from the PARTIES: 1) verbally contact/meet with the manager from the delinquent PARTY or PARTIES; and 2) submit a formal letter to the delinquent PARTY OR PARTIES from the City of Arcadia's legal counsel. If the PARTY or PARTIES remain delinquent after the above procedures, then the CITY OF ARCADIA may notify the Regional Board that the delinquent PARTY OR PARTIES are no longer a participating member of the PLANS, and said PARTY or PARTIES shall then be deemed to have terminated its participation as a PARTY to this MOU ("EXCLUDED PARTY") and their name(s) may be removed from the PLANS. Any EXCLUDED PARTY'S delinquent amount(s) will be paid in accordance with the remaining PARTIES pro-rata share pursuant to Table 2 of Exhibit A, as adjusted to remove the EXCLUDED PARTY from the allocation. The CITY OF ARCADIA will revise Table 2 of Exhibit A to show the recalculated costs for each remaining participating PARTY; these revised exhibits will be included with the next invoice to the PARTIES. The PARTIES shall retain all contractual, legal, and equitable rights and causes of action to recover any delinquent amounts paid that were owed by an EXCLUDED PARTY or PARTIES who failed to make such payments.

d. Interest Accrual - Any interest accrued on the funds collected per this MOU during the term of this MOU shall be refunded or credited toward any amount owed at the time of the final accounting. The CITY OF ARCADIA shall report to the PARTIES the amount of the interest accrued by the collected funds at the time of the final accounting.

e. Excess Funds - Any collected funds not spent in any annual period shall be refunded or credited toward any amount owed at the time of the final accounting.

f. Each PARTY shall allow reasonable access and entry to the Consultant, on an as needed basis, during the term of this MOU to the PARTY's storm drains, channels, catch basins, and similar properties (FACILITIES) to achieve the purposes of this MOU, provided, however, that prior to entering any PARTY's facilities, the Consultant shall secure a permit of entry from the applicable PARTY.

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

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

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

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

k. Any notices, bills, invoices, or reports relating to this MOU, and any request, demand, statement, or other communication required or permitted hereunder shall be in writing and shall be delivered to the representatives of the

PARTIES at the addresses set forth in Exhibit B attached hereto and incorporated herein by reference.

l. This MOU shall be binding upon, and shall be to the benefit of the respective successors, heirs, and assigns of each PARTY; provided, however, no PARTY may assign its respective rights or obligations under this MOU without the prior written consent of the other PARTIES.

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

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

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

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

q. No PARTY shall have any financial obligation to any other PARTY to this MOU, except as herein expressly provided.

r. The terms and provisions of this MOU may not be amended, modified, or waived, except by an instrument in writing signed by all PARTIES who have not terminated their interests herein or whose involvement has not terminated by reason of non-payment. This paragraph applies to any changes proposed as a result of the following circumstances: 1) changes to the MS4 Permit terms with regards to compliance through an EWMP or CIMP; or (2) changes in the number of parties to this MOU. This list is not intended to be exhaustive.

s. This MOU may be signed in multiple counterparts with the same force and effect as if all original signatures appeared on one copy; and in the event this MOU is signed in counterparts, each counterpart shall be deemed an original and all of the counterparts shall be deemed to be one agreement.

t. Early Termination or Withdrawal

1. This MOU may be terminated upon the express written agreement of all PARTIES. If this MOU is terminated, any remaining funds not due and payable or otherwise legally committed to a Consultant(s) shall be distributed to the remaining PARTIES (not including any EXCLUDED or WITHDRAWN PARTY or PARTIES) so that all such remaining PARTIES have paid no more than their pro-rata share (in accordance with the most current allocation set forth in Table 2 of Exhibit A). Completed work shall be owned by all PARTIES at the time of completion of the work who are not EXCLUDED or WITHDRAWN PARTIES. Similarly, rights to uncompleted work by the Consultant still under contract is to be owned by the PARTY or PARTIES who are not EXCLUDED or WITHDRAWN PARTIES at such time.

2. A PARTY may withdraw from this MOU ("WITHDRAWN PARTY") upon 60 days written notice to the other PARTIES, subject to payment of any invoice received from the CITY OF ARCADIA prior to or during the 60-day notice period for its share of the cost of the work completed as of the date of its notice of withdrawal, calculated in accordance with the cost-sharing percentages set forth in Table 2 of Exhibit A. The effective withdrawal date shall be the sixtieth (60th) day after the CITY OF ARCADIA receives the withdrawing PARTY's notice to withdraw from this MOU. The CITY OF ARCADIA shall refund to the WITHDRAWN PARTY any unused funds paid by the WITHDRAWN PARTY's effective withdrawal date. All PARTIES understand, acknowledge, and agree that withdrawal from this MOU will terminate any responsibility, liability, or obligation of the WITHDRAWN PARTY under this MOU commencing on the effective withdrawal date and that the WITHDRAWN PARTY shall remain liable for its share of any loss, debt or liability incurred prior to the withdrawal date, and for any work which could not be suspended. Withdrawal from this MOU does not release any PARTY from the obligations set forth in MS4 Permit.

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

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

COUNTY OF LOS ANGELES,

By ______________________________ ____________________
GAIL FARBER Date

APPROVED AS TO FORM:

John F. Krattli
County Counsel

By ______________________________ ____________________
Deputy Date

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

By ______________________
Chief Engineer

APPROVED AS TO FORM:

John F. Krattli
County Counsel

By ______________________________ ____________________
Deputy Date

CITY OF _______

By ______________________________ ____________________
NAME, POSITION Date

ATTEST:
By ______________________________ ____________________
NAME, City Clerk Date

APPROVED AS TO FORM:

By ______________________________ ____________________
NAME, City Attorney Date

EXHIBIT A

Rio Hondo/San Gabriel River Water Quality Group EWMP Funding Contributions

Table 1. Total Contract Costs

Work Scope	Cost
Project Management	$111,231
EWMP Work Plan	$146,234
CIMP	$136,464
Final EWMP	$ 394,816
Notice of Intent Review	$1,792
Total Contract Cost	**$ 790,537.00**

Table 2. Cost Allocation Formula

Party	Base Fee (10%)	Acres (Developed Land)	Percent of Area(2)	Cost based on Acres (90%)	Total Cost
City of Arcadia	$10,164.05	11	26.51%	$169.727.34	$179,891.39
City of Azusa	$10,164.05	9.3	22.41%	$143,496.75	$153,660.80
City of Bradbury	$10,164.05	1.9	4.58%	$29,316.54	$39,480.59
City of Duarte	$10,164.05	3.6	8.67%	$55,547.13	$65,711.18
City of Monrovia	$10,164.05	8	19.28%	$123,438.07	$133,602.11
City of Sierra Madre	$10,164.05	2.8	6.75%	$43,203.32	$53,367.37
County of Los Angeles	$10,164.05	4.9	11.81%	$75,605.82	$85,769.86
Los Angeles County Flood Control District(1)	$79,053.70	-	-	-	$79,053.70
Total	**$150,202.03**	**41.5**	**100%**	**$640,334.97**	**$790,537.00**

(1) Los Angeles County Flood Control District's cost share equals 10% of total contracted costs; the remaining costs are then divided by the 10% base fee and land area (90%).

(2) - Based on percent of developed land in each Party area of the total watershed area (excludes Angeles National Forest land)

On or before June 30th of each year, the Oversight Committee shall review the Cost Allocation Formula and may adjust the formula as deemed necessary for such reasons including, but not limited to, revision in Contracted Costs, Scope of Work, scheduling of work, and/or costs related to environmental review.

Table 3. Invoicing Schedule

Invoice #	Invoice Date	Percent of Cost Share Allocation

1	on or before July 2013	10% Base
2	July 2013	1/3 of land Area Allocation
3	July 2014	1/3 of land Area Allocation
4	July 2015	1/3 of land Area Allocation

On or before June 30th of each year, the Oversight Committee shall review the Invoicing Schedule may adjust the percent of Cost Share Allocations due each year as deemed necessary for such reasons including, but not limited to, revision in Contracted Costs, Scope of Work, scheduling of work, and/or costs related to environmental review.

EXHIBIT B

Rio Hondo/San Gabriel River Watershed Quality Group EWMP
Responsible Agencies Representatives

1. City of Arcadia
   240 W. Huntington Dr.
   Arcadia, CA 91006
   Representative: Vanessa Hevener
   E-mail: VHevener@ci.arcadia.ca.us
   Phone: (626) 359-7028

2. City of Azusa
   213 E. Foothill Blvd.
   Azusa, CA 91702-1395
   Representative: Carl E. Hassel
   E-mail: CHassel@ci.azusa.ca.us
   Phone: (626) 812-5064

3. City of Bradbury
   600 Winston Ave.
   Bradbury, CA 91008
   Representative: Michelle Keith
   E-mail: MKeith@CityofBradbury.org
   Phone: (626)358-3218 ext. 300

4. City of Duarte
   1600 Huntington Drive
   Duarte, CA 91010
   Party Representative: Rafael Casillas
   E-mail: RCasillas@accessduarte.com
   Phone: (626)386-6833

5. City of Monrovia
   415 S. Ivy Ave.
   Monrovia, CA 91016
   Representative: Heather Maloney
   E-mail: HMaloney@ci.monrovia.ca.us
   Phone: (626) 932-5577

6. City of Sierra Madre
   232 W. Sierra Madre Blvd
   Sierra Madre, CA 91024
   Representative: James Carlson
   E-mail: JCarlson@cityofsierramadre.com

Phone: (626) 355-7135 ext. 803

7. County of Los Angeles
   Department of Public Works
   Watershed Management Division, 11th Floor
   900 South Fremont Avenue
   Alhambra, CA 91803-1331
   Representative: Gary Hildebrand
   E-mail: GHILDEB@dpw.lacounty.gov
   Phone: (626) 458-4300

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

CITY OF ARCADIA

By ______________________________
Dominic Lazzaretto, City Manager

June 4, 2013
Date

ATTEST:

By ______________________________
Chief Deputy City Clerk

June 4, 2013
Date

APPROVED AS TO FORM:

By Stephen P. Deitsch
Stephen P. Deitsch, City Attorney

June 4, 2013
Date

CITY OF AZUSA

By ______________________________
Mayor Joseph R. Rocha

____
Date

ATTEST:
By ______________________________
City Clerk Jeffrey Cornejo, Jr.

May 6, 2013
Date

APPROVED AS TO FORM:

By ______________________________
City Attorney

5/14/13
Date

CITY OF BRADBURY

By ______________________ 6-25-13
RICHARD PYCZ, MAYOR Date

ATTEST:

By Claudia Saldana 6-25-13
CLAUDIA SALDANA, City Clerk Date

APPROVED AS TO FORM:

By ______________________ 6-25-13
CARY REISMAN, City Attorney Date

CITY OF DUARTE

By [signature] May 14, 2013
Darrell George, City Manager Date

ATTEST:
By Marla Akana May 14, 2013
Marla Akana, City Clerk Date

APPROVED AS TO FORM:

By Dan Slater May 14, 2013
Dan Slater, Attorney Date

CITY OF MONROVIA

By ______________________________
Laurie Lile, City Manager

5-22-13
Date

ATTEST:
By ______________________________
Alice D. Atkins, CMC, City Clerk

5/22/2013
Date

APPROVED AS TO FORM:

By ______________________________
Craig A. Steele, City Attorney

5/21/2013
Date

By ________________________
Chief Engineer

APPROVED AS TO FORM:

John F. Krattli
County Counsel

By ________________________ ________________
Deputy Date

CITY OF SIERRA MADRE

By ________________________ May 14, 2013
NANCY WALSH, Mayor Date

ATTEST:
By ________________________ May 14, 2013
NANCY SHOLLENBERGER, City Clerk Date

APPROVED AS TO FORM:

By ________________________ May 14, 2013
TERESA HIGHSMITH, City Attorney Date

APPENDIX C

Signed Letters of Intent

City of Arcadia
City of Azusa
City of Bradbury
City of Duarte
City of Monrovia
City of Sierra Madre
County of Los Angeles
Los Angeles County Flood Control District

City of Arcadia

Public Works Services Department

Tom Tait
Public Works Services Director

June 28, 2013

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

Attention: Renee Purdy

RE: LETTER OF INTENT PLEDGING COMMITMENT IN THE DEVELOPMENT OF AN ENHANCED WATERSHED MANAGEMENT PROGRAM AND COORDINATED INTEGRATED MONITORING PROGRAM IN COLLABORATION WITH THE RIO HONDO/SAN GABRIEL RIVER QUALITY GROUP (RH/SGRWQG)

Dear Mr. Unger:

The City of Arcadia, with this letter, pledges to collaborate with the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) in the development of an Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP) in accordance with the new MS4 Permit by Order No. R4-2012-0175. The RH/SGRWQG is comprised of the cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, Sierra Madre, the local portion of unincorporated County of Los Angeles and the Los Angeles County Flood Control District.

The City of Arcadia also pledges to share in the costs associated with the development of the Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP). A cost sharing formula has been agreed by all participating members of the Group as to the equitable distribution of cost.

Should you have any questions, please contact Vanessa Hevener at (626) 305-5327 or via email at vhevener@ci.arcadia.ca.us.

Sincerely,

Tom Tait

Tom Tait
Public Works Services Director

11800 Goldring Road
Post Office Box 60021
Arcadia, CA 91066-6021
(626) 256-6554
(626) 359-7028 Fax
www.ci.arcadia.ca.us

The Canyon City — Gateway to the American Dream

June 18, 2013

Samuel Unger, Executive Officer
Los Angeles Regional Water Quality Control Board
320 West Fourth Street, Suite 200
Los Angeles, California 90013

Attention: Renee Purdy

LETTER OF INTENT PLEDGING COMMITMENT IN THE DEVELOPMENT OF AN ENHANCED WATERSHED MANAGEMENT PROGRAM AND COORDINATED INTEGRATED MONITORING PROGRAM IN COLLABORATION WITH THE RIO HONDO/SAN GABRIEL RIVER WATER QUALITY GROUP (RH/SGRWQG)

Dear Mr. Unger;

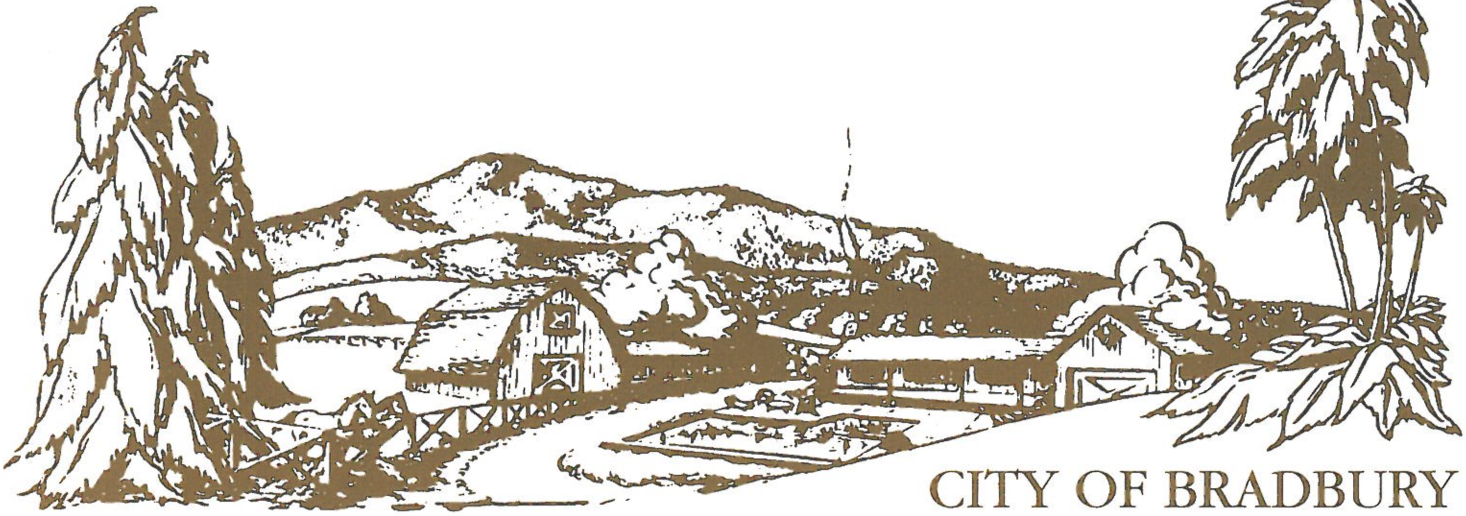
The City of Azusa, with this letter, pledges to collaborate with the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) in the development of an Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP) in accordance with the new MS4 Permit by Order No. R4-2012-0175 for submission to your Board. The RH/SGRWQG is comprised of the cities of Arcadia, Azusa, Bradbury, Duarte, Sierra Madre, Monrovia, the local portion of unincorporated County of Los Angeles and the Los Angeles County Flood Control District.

The City of Azusa also pledges to share in the costs associated with the development of the Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP). A cost sharing formula has been agreed by all participating members of the Group as to the equitable distribution of costs.

Should you have any questions, please contact me at thaes@ci.azusa.ca.us or at (626) 812-5248 or Carl Hassel, of my staff at chassel@ci.azusa.ca.us or at (626) 812-5064.

Sincerely,

Tito Haes
Assistant City Manager / Director of Public Works



CITY OF BRADBURY

Incorporated July 26, 1957

June 17, 2013

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

Attention: Renee Purdy

LETTER OF INTENET PLEDGING COMMITMENT IN THE DEVELOPMENT OF AN ENHANCED WATERSHED MANAGEMENT PROGRAM AND COORDINATED INTEGRATED MONITORING PROGRAM IN COLLABORATION WITH THE RIO HONDO/SAN GABRIEL RIVER WATER QUALITY GROUP (RH/SGRWQG)

Dear Mr. Unger;

The City of Bradbury, with this letter, pledges to collaborate with the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) in the development of an Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP) in accordance with the new MS4 Permit by Order No. R4-2012-0175 for submission to your Board. The RH/SGRWQG is comprised of the cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, Sierra Madre, the local portion of unincorporated County of Los Angeles and the Los Angeles County Flood Control District.

The City of Bradbury pledges to share in the costs associated with the development of the EWMP and CIMP. A cost sharing formula has been agreed by all participating members of the RH/SGRWQG as to the equitable distribution of costs.

If you have any questions, please do not hesitate to contact me at (909) 594-9702, or via email at dgilbertson@rkagroup.com.

Sincerely,

David Gilbertson
Deputy City Engineer

City of Duarte

City of Duarte

Sixteen Hundred Huntington Drive, Duarte, California 91010-2592
Tel 626-357-7931 FAX 626-358-0018 www.accessduarte.com

June 17, 2013

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

Attention: Renee Purdy

LETTER OF INTENT PLEDGING COMMITMENT IN THE DEVELOPMENT OF AN ENHANCED WATERSHED MANAGEMENT PROGRAM AND COORIDNATED INTERGRATED MONITORING PROGRAM IN COLLABORATION WITH THE RIO HONDO/SAN GABRIEL RIVER WATER QUALITY GROUP (RH/SGRWQG)

Dear Mr. Unger;

The City of Duarte, with this letter, pledges to collaborate with the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) in the development of an Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP) in accordance with the new MS4 Permit by Order No. R4-2012-0175 for submission to your Board. The RH/SGRWQG is comprised of the cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, Sierra Madre, the local portion of unincorporated County of Los Angeles and the Los Angeles County Flood Control District.

The City of Duarte pledges to share in the costs associated with the development of the EWMP and CIMP. A cost sharing formula has been agreed by all participating member of the RH/SGRWQG as to the equitable distribution of costs.

If you have any questions, please do not hesitate to contact Rafael O. Casillas at (626) 357-7931, extension 233 or via email at rcasillas@accessduarte.com.

Sincerely,

Darrell George
City Manager

City of MONROVIA 1887
Department of Public Works

June 28, 2013

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

Attention: Renee Purdy

LETTER OF INTENT PLEDGING COMMITMENT IN THE DEVELOPMENT OF AN ENHANCED WATERSHED MANAGEMENT PROGRAM AND COORDINATED INTEGRATED MONITORING PROGRAM IN COLLABORATION WITH THE RIO HONDO/SAN GABRIEL RIVER QUALITY GROUP (RH/SGRWQG)

Dear Mr. Unger:

The City of Monrovia, with this letter, pledges to collaborate with the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) in the development of an Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP) in accordance with the new MS4 Permit by Order No. R4-2012-0175. The RH/SGRWQG is comprised of the cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, Sierra Madre, the local portion of unincorporated County of Los Angeles and the Los Angeles County Flood Control District.

The City of Monrovia also pledges to share in the costs associated with the development of the Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP). A cost sharing formula has been agreed by all participating members of the Group as to the equitable distribution of cost.

Should you have any questions, please contact Heather Maloney at hmaloney@ci.monrovia.ca.us or at (626) 932-5577.

Sincerely,

Ron Bow
Director of Public Works

cc: Heather Maloney, Senior Management Analyst
File

City of Sierra Madre

Public Works Department
232 W. Sierra Madre Boulevard, Sierra Madre, CA 91024
phone 626.355.7135 fax 626.355.2251

June 28, 2013

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

Attention: Renee Purdy

LETTER OF INTENT PLEDGING COMMITMENT IN THE DEVELOPMENT OF AN ENHANCED WATERSHED MANAGEMENT PROGRAM AND COORDINATED INTEGRATED MONITORING PROGRAM IN COLLABORATION WITH THE RIO HONDO/SAN GABRIEL RIVER QUALITY GROUP (RH/SGRWQG)

Dear Mr. Unger:

The City of Sierra Madre, with this letter, pledges to collaborate with the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) in the development of an Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP) in accordance with the new MS4 Permit by Order No. R4-2012-0175. The RH/SGRWQG is comprised of the cities of Arcadia, Azusa, Bradbury, Duarte, Monrovia, Sierra Madre, the local portion of unincorporated County of Los Angeles and the Los Angeles County Flood Control District.

The City of Sierra Madre also pledges to share in the costs associated with the development of the Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP). A cost sharing formula has been agreed by all participating members of the Group as to the equitable distribution of cost.

Should you have any questions, please contact James Carlson at jcarlson@cityofsierramadre.com or at (626) 355-7135.

Sincerely,

Bruce Inman
Director of Public Works

cc: James Carlson, Management Analyst
File

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

GAIL FARBER, Director

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

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

IN REPLY PLEASE
REFER TO FILE: WM-7

June 24, 2013

Mr. Samuel Unger, P.E.
Executive Officer
California Regional Water Quality
Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Attention Ms. Renee Purdy

Dear Mr. Unger:

**LETTER OF INTENT – COUNTY OF LOS ANGELES
RIO HONDO/SAN GABRIEL RIVER WATER QUALITY GROUP WATERSHED
ENHANCED WATERSHED MANAGEMENT PROGRAM
AND COORDINATED INTEGRATED MONITORING PROGRAM**

The County of Los Angeles (County) submits this Letter of Intent to participate in and share the cost to develop an Enhanced Watershed Management Program (EWMP) and a Coordinated Integrated Monitoring Program (CIMP) with the Rio Hondo/San Gabriel River Water Quality Group. This Letter of Intent serves to satisfy the EWMP notification requirements of Section VI.C.4.b.iii(3) of Order No. R4-2012-0175 (Municipal Separate Storm Sewer System Permit) and the CIMP requirements of Section IV.C.1 of Attachment E of the Municipal Separate Storm Sewer System Permit.

The Rio Hondo/San Gabriel River Water Quality Group consists of the following agencies: City of Sierra Madre as the coordinating agency for EWMP and CIMP development, County, Los Angeles County Flood Control District, and cities of Arcadia, Azusa, Bradbury, Duarte, and Monrovia. The Rio Hondo/San Gabriel River Water Quality Group has included a final draft Memorandum of Understanding in Appendix 2 of the Notice of Intent. The County intends to submit a final Memorandum of Understanding to its Board of Supervisors for approval prior to December 28, 2013.

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

Very truly yours,

for GAIL FARBER
Director of Public Works

LP:jht
P:\wmpub\Secretarial\2013 Documents\Letter\LOI - RHSGR County.doc\C13200

cc: City of Arcadia
City of Azusa
City of Bradbury
City of Duarte
City of Monrovia
City of Sierra Madre

GAIL FARBER, Director

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

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

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

IN REPLY PLEASE
REFER TO FILE: WM-7

June 24, 2013

Mr. Samuel Unger, P.E.
Executive Officer
California Regional Water Quality
Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Attention Ms. Renee Purdy

Dear Mr. Unger:

LETTER OF INTENT – LOS ANGELES COUNTY FLOOD CONTROL DISTRICT RIO HONDO/SAN GABRIEL RIVER WATER QUALITY GROUP WATERSHED ENHANCED WATERSHED MANAGEMENT PROGRAM AND COORDINATED INTEGRATED MONITORING PROGRAM

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

The Rio Hondo/San Gabriel River Water Quality Group consists of the following agencies: City of Sierra Madre as the coordinating agency for EWMP and CIMP development, County of Los Angeles, LACFCD, and cities of Arcadia, Azusa, Bradbury, Duarte, and Monrovia. The Rio Hondo/San Gabriel River Water Quality Group has included a final draft Memorandum of Understanding in Appendix 2 of the Notice of Intent. The LACFCD intends to submit a final Memorandum of Understanding to the County of Los Angeles Board of Supervisors (which is the LACFCD's governing body) for approval prior to December 28, 2013.

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

Very truly yours,

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

LP:jht
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cc: City of Arcadia
City of Azusa
City of Bradbury
City of Duarte
City of Monrovia
City of Sierra Madre

APPENDIX D

Documentation for Commencement of and Draft of

LID Ordinance and Green Streets Policy

San Gabriel Valley Council of Governments

1000 S. Fremont Ave. Unit 42, Alhambra, California 91803 Phone: (626) 457-1800 FAX: (626) 457-1285 E-Mail SGV@sgvcog.org

DATE: January 7, 2013

TO: LA Permit Group Authorized Voting Members

FROM: Fran Delach, Interim Executive Director

RE: LA Permit Group Technical Assistance

Requested Action

Confirm participation in the MS4 NPDES implementation technical assistance contract for the LA Permit Group by allowing the SGVCOG to retain its reimbursement from the original $5,000 payment (equal to $2,174). Responses requested by Monday, January 14th.

Background

In November 2011, the SGVCOG administered a public procurement process and contract to obtain technical assistance for the LA Permit Group in negotiations for the new National Pollutant Discharge Elimination System Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit) for Los Angeles County. The SGVCOG reached out to the cities in the LA Permit Group and asked for a voluntary financial contribution of $5,000 from each city to fund the consultant activity. At that time of the request, each city was informed that the money collected would only be used to support the procurement process and, at the end of the contract, if the amount of money collected exceeded the cost of the contract, each jurisdiction would be reimbursed a pro-rata share of the cost.

Contributions were received from a total of 41 cities (38 cities contributed $5,000 each, 1 city contributed $500 and two contributed in-kind services) totaling $190,500. The technical consultant contract was awarded to Larry Walker and Associates, totaling $107,888, leaving $82,612 in remaining funds. This would provide a reimbursement of $2,174 to each city that contributed $5,000.

The new MS4 NPDES Permit was adopted by the Los Angeles Regional Water Quality Control Board (LARWQCB) on November 8, 2012. There is a significant amount of both technical and administrative work required to meet the permit requirements within the first 6-months. Cities could benefit from collaboration developing model documents for some of the required work, such as LID Ordinances and Green Streets Policies.

Role of SGVCOG

Given the SGVCOG's administration of the previous technical consulting service contract, in December 2012, the LA Permit Group asked the SGVCOG about the possibility of using the funds remaining from the original technical services contract to support an additional technical consulting services contract to assist in compliance efforts related to the permit. To support this process, the SGVCOG is asking participating cities if they would be interested in having the SGVCOG retain its reimbursement allocation in order to fund a new technical consulting services contract to assist cities in compliance with the new MS4 NPDES permit. The contract will be to complete the proposed scope of work, which can be found in the next section.

No additional funds will be collected in support of this project; only money remaining from the original contract will be used. As in the original contract, the SGVCOG will only administer the contract and will receive no supplemental funding.

Proposed Scope of Work

The new MS4 NPDES Permit for Los Angeles County contains many new requirements and includes the option for permittees to participate in a watershed management plan (WMP) or enhanced watershed management plan (EWMP). The Permit requires that cities revise development standards and Ordinance to reflect the new permit requirements, requiring an LID Ordinance. Additionally, participation in a WMP or EWMP requires the implementation of a Green Streets Policy and the submittal of a Notice of Intent and proof that the permittee has entered into a Memorandum of Agreement with other participating agencies.

To assist cities with some of the initial work efforts, the LA Permit Group is seeking technical consulting services to include the following scope of work:

- ✓ **Draft Notification of Intent letter:** The consultant would draft a notification of intent letter that includes the information and data that cities would be required to submit for participation in a WMP or EWMP. It would also provide instructions or alternatives for permittees to consider as they apply the documents to their respective municipality/watershed. Both of these documents would serve as a template for permittees to modify for their specific use.
- ✓ **Prepare template for Watershed MOUs:** The consultant would draft a template memorandum of understanding – as required to be submitted to the Regional Board by cities electing to participate in a WMP or EWMP.
- ✓ **Prepare a Draft LID Ordinance:** The permit specifies low impact development (LID) requirements for priority development projects and requires that a LID Ordinance be developed to incorporate these new requirements. The consultant would prepare a draft ordinance based on the City of Los Angeles' current LID ordinance and the new Permit requirements.
- ✓ **Draft Green Street Policy:** The permit encourages the development of a green street policy and requires such a policy for those agencies planning to participate in a WMP or EWMP. The consultant will develop a draft policy based on the Cities of Los Angeles' and Santa Monica's current green street policies that is consistent with the Permit requirements.
- ✓ **Presentation of work and review:** The consultant would attend LA Permit Group meetings to present and discussed the requested work documents and would provide revisions as requested by the LA Permit Group.

Attachment 1

Intent to Participate

The City of __**ARCADIA**___________ is interested in obtaining a technical assistance consultant for to assist with implementation efforts related to the new National Pollutant Discharge Elimination System Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit). The San Gabriel Valley Council of Governments is requesting permission to use your existing funding balance of \$2,174 to fund this consultant. Below I have indicated my City's interest in participating.

☑ Yes, the City is interested in participating and you may use our existing funding balance of \$2,174 towards to the consultant costs.

❑ The City is interested in more information.

❑ No, the City is not interested in participating; please issue a reimbursement payment of \$2,174.

Please sign below and return this form via fax or email to the contacts listed below or mail using the enclosed envelope **no later than Monday, January 14th, 2013.**

Fax Number: (626) 457-1285
Email Address: csims@sgvcog.org

Name	_**Tom Tait**_____________________________
Title	_**Public Works Services Director**____________________
Signature	Tom Tait
Date	_**January 14, 2013**___________________________

Attachment 1

Intent to Participate

The City of Azusa is interested in obtaining a technical assistance consultant for to assist with implementation efforts related to the new National Pollutant Discharge Elimination System Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit). The San Gabriel Valley Council of Governments is requesting permission to use your existing funding balance of $2,174 to fund this consultant. Below I have indicated my City's interest in participating.

- [x] Yes, the City is interested in participating and you may use our existing funding balance of $2,174 towards to the consultant costs.

- [ ] The City is interested in more information.

- [ ] No, the City is not interested in participating; please issue a reimbursement payment of $2,174.

Please sign below and return this form via fax or email to the contacts listed below or mail using the enclosed envelope **no later than Monday, January 14th, 2013.**

Fax Number: (626) 457-1285
Email Address: csims@sgvcog.org

Name: Tito Haes

Title: Public Works Director / Asst City Mgr

Signature: [signature]

Date: 1/14/13

Attachment 1

Intent to Participate

The City of Bradbury is interested in obtaining a technical assistance consultant for to assist with implementation efforts related to the new National Pollutant Discharge Elimination System Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit). The San Gabriel Valley Council of Governments is requesting permission to use your existing funding balance of $2,174 to fund this consultant. Below I have indicated my City's interest in participating.

- [x] Yes, the City is interested in participating and you may use our existing funding balance of $2,174 towards to the consultant costs.

- [ ] The City is interested in more information.

- [ ] No, the City is not interested in participating; please issue a reimbursement payment of $2,174.

Please sign below and return this form via fax or email to the contacts listed below or mail using the enclosed envelope **no later than Monday, January 14th, 2013.**

Fax Number: (626) 457-1285
Email Address: csims@sgvcog.org

Name Michelle Keith

Title City Manager

Signature

Date 1/14/13

Attachment 1

Intent to Participate

The City of Duarte is interested in obtaining a technical assistance consultant for to assist with implementation efforts related to the new National Pollutant Discharge Elimination System Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit). The San Gabriel Valley Council of Governments is requesting permission to use your existing funding balance of $2,174 to fund this consultant. Below I have indicated my City's interest in participating.

- ☒ Yes, the City is interested in participating and you may use our existing funding balance of $2,174 towards to the consultant costs.

- ☐ The City is interested in more information.

- ☐ No, the City is not interested in participating; please issue a reimbursement payment of $2,174.

Please sign below and return this form via fax or email to the contacts listed below or mail using the enclosed envelope **no later than Monday, January 14th, 2013.**

Fax Number: (626) 457-1285
Email Address: csims@sgvcog.org

Name Rafael O. Casillas, PE

Title Public Works Manager

Signature Rafael O Casillas

Date January 14, 2013

Attachment 1

Intent to Participate

The City of Monrovia is interested in obtaining a technical assistance consultant for to assist with implementation efforts related to the new National Pollutant Discharge Elimination System Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit). The San Gabriel Valley Council of Governments is requesting permission to use your existing funding balance of $2,174 to fund this consultant. Below I have indicated my City's interest in participating.

- [x] Yes, the City is interested in participating and you may use our existing funding balance of $2,174 towards to the consultant costs.

- [ ] The City is interested in more information.

- [ ] No, the City is not interested in participating; please issue a reimbursement payment of $2,174.

Please sign below and return this form via fax or email to the contacts listed below or mail using the enclosed envelope **no later than Monday, January 14th, 2013.**

Fax Number: (626) 457-1285
Email Address: csims@sgvcog.org

Name	Ron Bow
Title	Director of Public Works
Signature	
Date	1/14/2013

Intent to Participate

The City of Sierra Madre is interested in obtaining a technical assistance consultant for to assist with implementation efforts related to the new National Pollutant Discharge Elimination System Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit). The San Gabriel Valley Council of Governments is requesting permission to use your existing funding balance of $2,174 to fund this consultant. Below I have indicated my City's interest in participating.

- [x] Yes, the City is interested in participating and you may use our existing funding balance of $2,174 towards to the consultant costs.

- [ ] The City is interested in more information.

- [ ] No, the City is not interested in participating; please issue a reimbursement payment of $2,174.

Please sign below and return this form via fax or email to the contacts listed below or mail using the enclosed envelope **no later than Monday, January 14th, 2013.**

Fax Number: (626) 457-1285
Email Address: csims@sgvcog.org

Name	Elaine I. Aguilar
Title	City Manager
Signature	
Date	January 14, 2013

Attachment 4.

AGREEMENT FOR CONSULTANT SERVICES

This Agreement for Consultant Services ("Agreement"), is made and entered into this ___ day of February 2013 ("Effective Date"), by and between the San Gabriel Valley Council of Governments ("SGVCOG") and Larry Walker Associates, Inc. ("Consultant").

In consideration of the mutual covenants and conditions set forth herein, the parties agree as follows:

1. Term of Agreement.

Subject to the provisions of Section 17, the term of this Agreement shall be from the Effective Date through June 30, 2013. Such term may be extended upon written agreement of both parties to this Agreement.

2. Scope of Services.

Consultant shall provide the SGVCOG consultant services in accordance with the proposal attached hereto as Exhibit "A" and incorporated herein by reference. The SGVCOG shall determine within the term of this Agreement whether it will direct Consultant to perform the Optional Task identified in Exhibit A. Consultant shall not be compensated for any services rendered in connection with its performance of this Agreement, which are in addition to or outside of those described in this Section 2, unless such additional services are authorized in advance and in writing by the SGVCOG. Consultant shall be compensated for any such additional authorized services in the amounts and in the manner agreed to in writing by the SGVCOG.

3. Compensation and Method of Payment.

(a) The total compensation to be paid to Consultant pursuant to this Agreement shall not exceed $52,690. Consultant shall be compensated in the manner and in the amounts specified in Exhibit A.

(b) Each month Consultant shall furnish to SGVCOG an original invoice for all work performed and expenses incurred during the preceding month. SGVCOG shall independently review each invoice submitted by the Consultant to determine whether the work performed and expenses incurred are in compliance with the provisions of this Agreement. In the event that no charges or expenses are disputed, the invoice shall be approved and paid according to the terms set forth in subsection (c). In the event any charges or expenses are disputed by SGVCOG, SGVCOG shall withhold that portion of the invoice that is in dispute and remit the remainder.

(c) Except as to any charges for work performed or expenses incurred by Consultant to the extent disputed by SGVCOG, SGVCOG will use its best efforts to cause Consultant to be paid within thirty (30) days of receipt of Consultant's invoice.

4. Consultant's Books and Records.

Consultant shall maintain any and all documents and records demonstrating or relating to Consultant's performance of services pursuant to this Agreement. Consultant shall maintain any and all ledgers, books of account, invoices, vouchers, canceled checks, or other documents or records evidencing or relating to work, services, expenditures and disbursements charged to SGVCOG pursuant to this Agreement. Any and all such documents or records shall be maintained in accordance with generally accepted accounting principles and shall be sufficiently complete and detailed so as to permit an accurate evaluation of the services provided by Consultant pursuant to this Agreement. Any and all such documents or records shall be maintained for three years from the date of execution of this Agreement and to the extent required by laws relating to audits of public agencies and their expenditures.

5. Ownership of Documents

All original maps, models, designs, drawings, photographs, studies, survey, reports, data, notes, computer files, files and other documents prepared, developed or discovered by Consultant in the course of providing any services pursuant to this Agreement shall be the sole property of the SGVCOG and may be used, reused or otherwise disposed of by the SGVCOG without the permission of the Consultant. Upon satisfactory completion of, or in the event of expiration, termination, suspension, or abandonment of this Agreement, Consultant shall turn over to SGVCOG all such maps, models, designs, drawings, photographs, studies, surveys, reports, data, notes, computer files, files and other documents which Consultant may have temporarily retained for use by Consultant staff. With respect to computer files, Consultant shall make available to the SGVCOG, upon reasonable written request by the SGVCOG, the necessary computer software and hardware for purposes of accessing, compiling, transferring and printing computer files.

6. Status of Consultant.

(a) Consultant is and shall at all times remain a wholly independent contractor and not an officer, employee or agent of SGVCOG. Consultant shall have no authority to bind SGVCOG in any manner, nor to incur any obligation, debt or liability of any kind on behalf of or against SGVCOG, whether by contract or otherwise, unless such authority is expressly conferred under this Agreement or is otherwise expressly conferred in writing by SGVCOG.

(b) The personnel performing the services under this Agreement on behalf of Consultant shall at all times be under Consultant's exclusive direction and control. Neither SGVCOG, nor any elected or appointed boards, officers, officials, employees, members or agents of SGVCOG, shall have control over the conduct of Consultant or any of Consultant's officers, employees or agents, except as set forth in this Agreement. Consultant shall not at any time or in any manner represent that Consultant or any of Consultant's officers, employees or agents are in any manner officials, officers, employees, members or agents of SGVCOG.

(c) Neither Consultant, nor any of Consultant's officers, employees or agents, shall obtain any rights to retirement, health care or any other benefits which may otherwise accrue to SGVCOG's employees. Consultant expressly waives any claim Consultant may have to any such rights.

7. Deficient Services.

Consultant represents and warrants that it has the qualifications, experience and facilities necessary to properly perform the services required under this Agreement in a thorough, competent and professional manner. Consultant shall at all times faithfully, competently and to the best of its ability, experience and talent, perform all services described herein. In meeting its obligations under this Agreement, Consultant shall employ, at a minimum, generally accepted standards and practices utilized by persons engaged in providing services similar to those required of Consultant under this Agreement. SGVCOG may disapprove services that do not conform to these standards and practices and may withhold or deny compensation for deficient services. Upon disapproval of services by SGVCOG, Consultant shall immediately re-perform, at its own costs, the services that are deficient. SGVCOG must notify Consultant in writing of the existence of such deficient services within a reasonable time, not to exceed sixty (60) days after its discovery thereof, but in no event later than one (1) year after the completion of such deficient services. No approval, disapproval, or omission to provide approval or disapproval shall release Consultant from any responsibility under this Agreement.

8. Compliance With Applicable Laws; Permits and Licenses.

Consultant shall keep itself informed of and comply with all applicable federal, state and local laws, statutes, codes, ordinances, regulations and rules in effect during the term of this Agreement. Consultant shall obtain any and all licenses, permits and authorizations necessary to perform the services set forth in this Agreement. Neither SGVCOG, nor any elected or appointed boards, officers, officials, employees, members or agents of SGVCOG, shall be liable, at law or in equity, as a result of any failure of Consultant to comply with this Section 8.

9. Nondiscrimination.

Consultant shall not discriminate in any way against any person on the basis of race, color, religious creed, national origin, ancestry, sex, age, physical handicap, pregnancy, medical condition or marital status in connection with or related to the performance of this Agreement.

10. Unauthorized Aliens.

Consultant hereby promises and agrees to comply with all of the provisions of the Federal Immigration and Nationality Act, 8 U.S.C.A. §§ 1101, et seq., as amended, and in connection therewith, shall not employ unauthorized aliens as defined therein. Should Consultant so employ such unauthorized aliens for the performance of work and/or services covered by this Agreement, and should any liability or sanctions be imposed against SGVCOG for such use of unauthorized aliens, Consultant hereby agrees to and shall reimburse SGVCOG for the cost of all such liabilities or sanctions imposed, together with any and all costs, including reasonable attorney fees, incurred by SGVCOG.

11. Conflicts of Interest

Consultant covenants that neither it, nor any officer or principal of its firm, has or shall acquire any interest, directly or indirectly, (but not including ownership of stock in a publicly traded company), which would conflict in any manner with the interests of SGVCOG or which would in any way hinder Consultant's performance of services under this Agreement. Consultant further covenants that in the performance of this Agreement, no person having any such interest shall be employed by it as an officer, employee, agent or subcontractor without the express written consent of the SGVCOG. Consultant agrees to at all times avoid conflicts of interest or the appearance of any conflicts of interest with the interests of SGVCOG in the performance of this Agreement.

12. Confidential Information; Release of Information.

(a) All information gained or work product produced by Consultant in performance of this Agreement shall be considered confidential, unless such information is in the public domain or already known to Consultant. Consultant shall not release or disclose any such information or work product to persons or entities other than SGVCOG without prior written authorization from the SGVCOG, except as may be required by law. Consultant, its officers, employees, agents or subcontractors, shall not, without so approved in writing by the SGVCOG. Consultant agrees to provide SGVCOG with copies of required policies or certificates evidencing the required policies upon request.

(b) Consultant shall provide and maintain insurance acceptable to the SGVCOG in full force and effect throughout the term of this Agreement, against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by Consultant, its agents, representatives or employees. Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VII. Consultant shall provide the following scope and limits of insurance:

(1) Minimum Scope of Insurance. Coverage shall be at least as broad as:

A. Insurance Services Office form Commercial General Liability coverage (Occurrence Form CG 0001).

B. Insurance Services Office form number CA 0001 (Ed. 1/87) covering Automobile Liability, including code 1 "any auto" and endorsement CA 0025, or equivalent forms subject to the written approval of the SGVCOG.

C. Workers' Compensation insurance as required by the Labor Code of State of California and Employer's Liability insurance and covering all persons providing services on behalf of the Consultant and all risks to such persons under this Agreement.

D. Errors and omissions liability insurance appropriate to the Consultant's profession.

(2) Limits of Insurance. Consultant shall maintain limits of insurance no less than:

A. General Liability: $1,000,000 general aggregate for bodily injury, personal injury and property damage.

B. Automobile Liability: $1,000,000 per accident for bodily injury and property damage.

C. Workers' Compensation and Employer's Liability: Workers' Compensation as required by the Labor Code of the State of California and Employers Liability limits of $1,000,000 per accident.

D. Errors and Omissions Liability: $1,000,000 per claim and aggregate.

(c) Other Provisions. Insurance policies required by this Agreement shall contain the following provisions:

(1) All Policies. Each insurance policy required by this Section 13 shall be endorsed and state the coverage shall not be cancelled by the insurer or Consultant except after 30 days' prior written notice by Certified mail, return receipt requested, has been given to SGVCOG. Consultant shall provide to SGVCOG notice of suspension or voiding of coverage, or reduction in coverage, or limits below those required in this Section 14.

(2) General Liability and Automobile Liability Coverages.

A. SGVCOG, and its respective elected and appointed officers, officials, members and employees are to be covered as additional insureds as respects: liability arising out of activities Consultant performs; products and completed operations of Consultant; premises owned, occupied or used by Consultant; or automobiles owned, leased, hired or borrowed by Consultant. The coverage shall contain no special limitations on the scope of protection afforded to SGVCOG, and its respective elected and appointed officers, officials, members or employees.

B. Consultant's insurance coverage shall be primary insurance with respect to SGVCOG, and its respective elected and appointed officials, its officers, members and employees. Any insurance or self insurance maintained by SGVCOG, and its respective elected and appointed officers, officials, members or employees, shall apply in excess of, and not contribute with, Consultant's insurance.

C. Consultant's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

D. Any failure to comply with the reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to SGVCOG, and its respective elected and appointed officers, officials, members or employees.

(3) Workers' Compensation and Employer's Liability Coverage. Unless the SGVCOG otherwise agrees in writing, the insurer shall agree to waive all rights of subrogation against SGVCOG, and its respective elected and appointed officers, officials, members and employees for losses arising from services performed by Consultant.

(d) Other Requirements. Consultant agrees to deposit with SGVCOG, at or before the effective date of this contract, certificates of insurance necessary to satisfy SGVCOG that Consultant has complied with the insurance provisions of this Agreement. The SGVCOG's general counsel may require that Consultant furnish SGVCOG with copies of original endorsements effecting coverage required by this Section. The certificates and endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. SGVCOG reserves the right to inspect complete, certified copies of all required insurance policies, at any time.

(1) Consultant shall furnish certificates and endorsements from each subcontractor identical to those Consultant provides.

(2) Any deductibles or self-insured retentions must be declared to and approved by SGVCOG, such approval not to be unreasonably withheld.

(3) The procuring of such required policy or policies of insurance shall not be construed to limit Consultant's liability hereunder nor to fulfill the indemnification provisions and requirements of this Agreement.

15. Assignment.

The expertise and experience of Consultant are material considerations for this Agreement. SGVCOG has an interest in the qualifications of and capability of the persons and entities who will fulfill the duties and obligations imposed upon Consultant under this Agreement. In recognition of that interest, Consultant shall not assign or transfer this Agreement or any portion of this Agreement or the performance of any of Consultant's duties or obligations under this Agreement without the prior written consent of the SGVCOG. Any attempted assignment shall be ineffective, null and void, and shall constitute a material breach of this Agreement entitling SGVCOG to any and all remedies at law or in equity, including summary termination of this Agreement.

16. Continuity of Personnel.

Consultant may not replace key staff, set forth in Consultant's Proposal, unless their employment is terminated or their replacement is agreed upon by the SGVCOG. The SGVCOG must approve replacement staff before the replacement staff are assigned to perform services under this Agreement. SGVCOG reserves the right to request that Consultant replace a staff person assigned to perform services under this Agreement in the event the SGVCOG, in its sole discretion, determines such a replacement is necessary. Replacement staff in every case are subject to SGVCOG approval prior to assignment to perform services under this Agreement.

17. Termination of Agreement.

SGVCOG may terminate this Agreement, with or without cause, at any time by giving thirty (30) days written notice of termination to Consultant. In the event such notice is given, Consultant shall cease immediately all work in progress. Consultant may terminate this Agreement at any time upon thirty (30) days written notice of termination to SGVCOG. If either Consultant or SGVCOG fail to perform any material obligation under this Agreement, then, in addition to any other remedies, either Consultant, or SGVCOG may terminate this Agreement immediately upon written notice. Upon termination of this Agreement, Consultant shall furnish to SGVCOG a final invoice for work performed and expenses incurred by Consultant, prepared as set forth in Section 3 of this Agreement. This final invoice shall be reviewed and paid in the same manner as set forth in Section 3 of this Agreement.

18. Default.

In the event that Consultant is in default under the terms of this Agreement, the SGVCOG shall not have any obligation or duty to continue compensating Consultant for any work performed after the date of default and may terminate this Agreement immediately by written notice to the Consultant. For purposes of this section only, "date of default" shall be deemed to be the date that SGVCOG personally delivers or transmits by facsimile a Notice of Default to the person(s) at the address or facsimile number as set forth in Section 19 of this Agreement. "Default" shall mean the failure to perform the terms, covenants or conditions of this Agreement.

19. Notices.

All notices required or permitted to be given under this Agreement shall be in writing and shall be personally delivered, or sent by facsimile or certified mail, postage prepaid and return receipt requested, addressed as follows:

To SGVCOG:	Francis Delach Interim Executive Director San Gabriel Valley Council of Governments The Alhambra 1000 South Fremont Avenue, Unit #42 Building A-10, Suite 10220 Alhambra, CA 91803
with a copy to:	Richard D. Jones General Counsel San Gabriel Valley Council of Governments Jones & Mayer 3777 N. Harbor Blvd Fullerton, CA 92835
To Consultant:	Larry Walker Associates, Inc. 720 Wilshire Blvd, Suite 204 Santa Monica, CA 90401 Attention: Malcolm Walker

Notice shall be deemed effective on the date personally delivered or transmitted by facsimile or, if mailed, three (3) days after deposit of the same in the custody of the United States Postal Service.

20. Authority To Execute.

The person or persons executing this Agreement on behalf of Consultant represents and warrants that he/she/they has/have the authority to so execute this Agreement and to bind Consultant to the performance of its obligations hereunder.

21. Binding Effect.

This Agreement shall be binding upon the heirs, executors, administrators, successors and assigns of the parties.

22. Waiver.

Waiver by any party to this Agreement of any term, condition, or covenant of this Agreement shall not constitute a waiver of any other term, condition, or covenant. Waiver by any party of any breach of the provisions of this Agreement shall not constitute a waiver of any other provision, nor a waiver of any subsequent breach or violation of any provision of this Agreement. Acceptance by SGVCOG of any work or services by Consultant shall not constitute a waiver of any of the provisions of this Agreement.

23. Law To Govern; Venue.

This Agreement shall be interpreted, construed and governed according to the laws of the State of California. In the event of litigation between the parties, venue in state trial courts shall lie exclusively in the County of Los Angeles. In the event of litigation in a U.S. District Court, venue shall lie exclusively in the Central District of California, in Los Angeles.

24. Attorney Fees, Costs and Expenses.

In the event litigation or other proceeding is required to enforce or interpret any provision of this Agreement, the prevailing party in such litigation or other proceeding shall be entitled to an award of reasonable attorney fees, costs and expenses, in addition to any other relief to which it may be entitled.

25. Entire Agreement.

This Agreement, including the attached Exhibit "A" which is incorporated herein by this reference, is the entire, complete, final and exclusive expression of the parties with respect to the matters addressed therein and supersedes all other agreements or understandings, whether oral or written, or entered into between Consultant and SGVCOG prior to the execution of this Agreement. No statements, representations or other agreements, whether oral or written, made by any party which are not embodied herein shall be valid and binding. No amendment to this Agreement shall be valid and binding unless in writing duly executed by the parties or their authorized representatives. Any attempt to waive the requirement for a written amendment shall be void.

26. Section Headings.

The section headings contained in this Agreement are for convenience and identification only and shall not be deemed to limit or define the contents to which they relate.

27. Severability.

If any term, condition or covenant of this Agreement is declared or determined by any court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions of this Agreement shall not be affected thereby and the Agreement shall be read and construed without the invalid, void or unenforceable provision(s).

28. Time is of the Essence.

Time is of the essence in the performance of this Agreement.

29. Excusable Delays.

Consultant shall not be liable for damages, including liquidated damages, if any, caused by delay in performance or failure to perform due to causes beyond the control of Consultant. Such causes include, but are not limited to, acts of God, acts of the public enemy, acts of federal, state or local governments, court orders, fires, floods, epidemics, strikes, embargoes, and unusually severe weather. The term and price of this Agreement shall be equitably adjusted for any delays due to such causes.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed the day and year first above written.

LARRY WALKER ASSOCIATES, INC.

By Malcolm Walker

Title Vice President

SAN GABRIEL VALLEY COUNCIL OF GOVERNMENTS

By

Title Interim Executive Director

APPROVED AS TO FORM:

Richard D. Jones, General Counsel

MEMORANDUM

Public Works Services Department

DATE: June 25, 2013

TO: MS4 NPDES Permit File

FROM: Vanessa Hevener, Environmental Services Officer

SUBJECT: **Draft Low Impact Development Ordinance and Draft Green Streets Policy Status**

This memo is to document that the Draft LID Ordinance and Draft Green Streets Policy developed by Larry Walker and Associates on behalf of the LA Permit Group have been distributed via email on April 24, 2013 to key personnel in the Development Services Department for discussion. A meeting has been tentative scheduled in July/August 2013 with staff in both Public Works Services and Development Services Departments.

City of
Arcadia

Public Works
Services
Department

Tom Tait
Public Works Services Director

Please note: *Gray shading in the draft LID Ordinance indicates areas that are optional and/or areas where the City may wish to provide more detail.*

ORDINANCE NO.______________________

An ordinance amending [MUNICIPAL CODE SECTION REFERENCE(S)] of the [CITY NAME] Municipal Code to expand the applicability of the existing [NAME OF POST-CONSTRUCITON REQUIREMENTS – LIKELY "SUSMP" FOR MOST MUNICIPALITIES] requirements by imposing Low Impact Development (LID) strategies on projects that require building permits and/or encroachment permits.

Findings.

(A) The [CITY NAME] is authorized by Article XI, §5 and §7 of the State Constitution to exercise the police power of the State by adopting regulations to promote public health, public safety and general prosperity.

(B) The [CITY NAME] has authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity which might degrade the quality of waters of the State.

(C) The city is a permittee under the "Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4," issued by the California Regional Water Quality Control Board--Los Angeles Region," (Order No. R4-2012-0175) which also serves as an NPDES Permit under the Federal Clean Water Act (NPDES No. CAS004001), as well as Waste Discharge Requirements under California law (the "Municipal NPDES permit"). In order to participate in a Watershed Management Program and/or Enhanced Watershed Management Program, the Municipal NPDES permit requires permittees to develop and implement a LID Ordinance.

(D) The [CITY NAME] has applied an integrated approach to incorporate wastewater, stormwater and runoff, and recycled water management into a single strategy through its Integrated Resources Plan.

(E) The [CITY NAME] is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental, social, and economic considerations.

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(F) Urbanization has led to increased impervious surface areas resulting in increased water runoff causing the transport of pollutants to downstream receiving waters.

(G) The [CITY NAME] needs to take a new approach to managing rainwater and urban runoff while mitigating the negative impacts of development and urbanization.

(H) LID is widely recognized as a sensible approach to managing the quantity and quality of storm water and non-stormwater runoff by setting standards and practices to maintain or restore the natural hydrologic character of a development site, reduce off-site runoff, improve water quality, and provide groundwater recharge.

(I) It is the intent of the [CITY NAME] to replace the existing Standard Urban Stormwater Mitigation Plan (SUSMP) requirements by providing stormwater and rainwater LID strategies for Development and Redevelopment projects as defined under "Applicability." Where there are conflicts between this Ordinance and previously adopted SUSMP or LID Manuals, the standards in this Ordinance shall prevail.

[MUNICIPAL CODE SECTION REFERENCE(S)] of the [CITY NAME] Municipal Code is amended in its entirety to read as follows:

Definitions.

Except as specifically provided herein, any term used in this [SECTION REFERENCE] shall be defined as that term in the current Municipal NPDES permit, or if it is not specifically defined in either the Municipal NPDES permit, then as such term is defined in the Federal Clean Water Act, as amended, and/or the regulations promulgated thereunder. If the definition of any term contained in this chapter conflicts with the definition of the same term in the current Municipal NPDES permit, then the definition contained in the Municipal NPDES permit shall govern. The following words and phrases shall have the following meanings when used in this chapter:

Automotive Service Facility means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to stormwater (Source: Order No. R4-2012-0175).

Basin Plan means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments (Source: Order No. R4-2012-0175).

Best Management Practice (BMP) means practices or physical devices or systems designed to prevent or reduce pollutant loading from stormwater or non-stormwater discharges to receiving waters, or designed to reduce the volume of stormwater or non-stormwater discharged to the receiving water (Source: Order No. R4-2012-0175).

Biofiltration means a LID BMP that reduces stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration. Incidental infiltration is an important factor in achieving the required pollutant load reduction. Therefore, the term "biofiltration" as used in this Ordinance is defined to include only systems designed to facilitate incidental infiltration or achieve the equivalent pollutant reduction as biofiltration BMPs with an underdrain (subject to approval by the Regional Board's Executive Officer). Biofiltration BMPs include bioretention systems with an underdrain and bioswales (Modified from: Order No. R4-2012-0175).

Bioretention means a LID BMP that reduces stormwater runoff by intercepting rainfall on vegetative canopy, and through evapotranspiration and infiltration. The bioretention system typically includes a minimum 2-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. As defined in the Municipal NPDES permit, a bioretention BMP may be designed with an overflow drain, but may not include an underdrain. When a bioretention BMP is designed or constructed with an underdrain it is regulated by the Municipal NPDES permit as biofiltration (Modified from: Order No. R4-2012-0175).

Bioswale means a LID BMP consisting of a shallow channel lined with grass or other dense, low-growing vegetation. Bioswales are designed to collect stormwater runoff and to achieve a uniform sheet flow through the dense vegetation for a period of several minutes (Source: Order No. R4-2012-0175).

City means the [CITY NAME].

Clean Water Act (CWA) means the Federal Water Pollution Control Act enacted in 1972, by Public Law 92-500, and amended by the Water Quality Act of 1987. The Clean Water Act prohibits the discharge of pollutants to Waters of the United States unless the discharge is in accordance with an NPDES permit.

Commercial Malls means any development on private land comprised of one or more buildings forming a complex of stores which sells various merchandise, with interconnecting walkways enabling visitors to easily walk from store to store, along with parking area(s). A commercial mall includes, but is not limited to: mini-malls, strip malls, other retail complexes, and enclosed shopping malls or shopping centers (Source: Order No. R4-2012-0175).

Construction Activity means any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that result in land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility. See "Routine Maintenance" definition for further explanation. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage by the State of California General Permit for Storm Water Discharges Associated with Industrial Activities or for Stormwater Discharges Associated with Construction Activities is required if more than one acre is disturbed or the activities are part of a larger plan (Source: Order No. R4-2012-0175).

Control means to minimize, reduce or eliminate by technological, legal, contractual, or other means, the discharge of pollutants from an activity or activities (Source: Order No. R4-2012-0175).

Development means construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail, and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

Directly Adjacent means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area (Source: Order No. R4-2012-0175).

Discharge means any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid, or solid substance.

Disturbed Area means an area that is altered as a result of clearing, grading, and/or excavation (Source: Order No. R4-2012-0175).

Flow-through BMPs means modular, vault type "high flow biotreatment" devices contained within an impervious vault with an underdrain or designed with an impervious liner and an underdrain (Modified from: Order No. R4-2012-0175).

General Construction Activities Storm Water Permit (GCASP) means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from construction activities under certain conditions.

General Industrial Activities Storm Water Permit (GIASP) means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from certain industrial activities under certain conditions.

Green Roof means a LID BMP using planter boxes and vegetation to intercept rainfall on the roof surface. Rainfall is intercepted by vegetation leaves and through evapotranspiration. Green roofs may be designed as either a bioretention BMP or as a biofiltration BMP. To receive credit as a bioretention BMP, the green roof system planting medium shall be of sufficient depth to provide capacity within the pore space volume to contain the design storm depth and may not be designed or constructed with an underdrain (Source: Order No. R4-2012-0175).

Hazardous Material(s) means any material(s) defined as hazardous by Division 20, Chapter 6.95 of the California Health and Safety Code.

Hillside means a property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes (Source: Order No. R4-2012-0175).

Hydromodification means the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation. (Source: GCASP)

Impervious Surface means any man-made or modified surface that prevents or significantly reduces the entry of water into the underlying soil, resulting in runoff from the surface in greater quantities and/or at an increased rate, when compared to natural conditions prior to development. Examples of places that commonly exhibit impervious surfaces include parking lots, driveways, roadways, storage areas, and rooftops. The imperviousness of these areas commonly results from paving, compacted gravel, compacted earth, and oiled earth.

Industrial Park means land development that is set aside for industrial development. Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry (Source: Order No. R4-2012-0175).

Infiltration BMP means a LID BMP that reduces stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Examples of infiltration BMPs include infiltration basins, dry wells, and pervious pavement (Source: Order No. R4-2012-0175).

LID means Low Impact Development. LID consists of building and landscape features designed to retain or filter stormwater runoff (Source: Order No. R4-2012-0175).

MS4 means Municipal Separate Storm Sewer System (MS4). The MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a combined sewer; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

(40 CFR § 122.26(b)(8)) (Source: Order No. R4-2012-0175)

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405. The term includes an "approved program" (Source: Order No. R4-2012-0175).

Natural Drainage System means a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system (Source: Order No. R4-2012-0175).

New Development means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision (Source: Order No. R4-2012-0175).

Non-Stormwater Discharge means any discharge to a municipal storm drain system that is not composed entirely of stormwater (Source: Order No. R4-2012-0175).

Parking Lot means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces (Source: Order No. R4-2012-0175).

Person means any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, state, governmental entity or any other legal entity, or their legal representatives, agents or assigns. The masculine gender shall include the feminine and the singular shall include the plural where indicated by the context.

Planning Priority Projects means development projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s) (Modified from: Order No. R4-2012-0175).

Pollutant means any "pollutant" defined in Section 502(6) of the Federal Clean Water Act or incorporated into the California Water Code Sec. 13373. Pollutants may include, but are not limited to the following:

(1) Commercial and industrial waste (such as fuels, solvents, detergents, plastic pellets, hazardous substances, fertilizers, pesticides, slag, ash, and sludge).

(2) Metals (such as cadmium, lead, zinc, copper, silver, nickel, chromium, and non- metals such as phosphorus and arsenic).

(3) Petroleum hydrocarbons (such as fuels, lubricants, surfactants, waste oils, solvents, coolants, and grease).

(4) Excessive eroded soil, sediment, and particulate materials in amounts that may adversely affect the beneficial use of the receiving waters, flora, or fauna of the State.

(5) Animal wastes (such as discharge from confinement facilities, kennels, pens, recreational facilities, stables, and show facilities).

(6) Substances having characteristics such as pH less than 6 or greater than 9, or unusual coloration or turbidity, or excessive levels of fecal coliform, or fecal streptococcus, or enterococcus.

Project means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065) (Source: Order No. R4-2012-0175).

Rainfall Harvest and Use means a LID BMP system designed to capture runoff, typically from a roof but can also include runoff capture from elsewhere within the site, and to provide for temporary storage until the harvested water can be used for irrigation or non-potable uses. The harvested water may also be used for potable water uses if the system includes disinfection treatment and is approved for such use by the local building department (Source: Order No. R4-2012-0175).

Receiving Water means "water of the United States" into which waste and/or pollutants are or may be discharged (Source: Order No. R4-2012-0175).

Redevelopment means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

Regional Board means the California Regional Water Quality Control Board, Los Angeles Region.

Restaurant means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812) (Source: Order No. R4-2012-0175).

Retail Gasoline Outlet means any facility engaged in selling gasoline and lubricating oils (Source: Order No. R4-2012-0175).

Routine Maintenance

Routine maintenance projects include, but are not limited to projects conducted to:

1. Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.
2. Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.

3. Includes road shoulder work, regrading dirt or gravel roadways and shoulders and performing ditch cleanouts.
4. Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
5. Repair leaks

Routine maintenance does not include construction of new** lines or facilities resulting from
compliance with applicable codes, standards and regulations.

* Update existing lines includes replacing existing lines with new materials or pipes.

** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines (Source: Order No. R4-2012-0175).

Significant Ecological Areas (SEAs) means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan. Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.
2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.
3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.
4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
6. Areas important as game species habitat or as fisheries.
7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
8. Special areas (Source: Order No. R4-2012-0175).

Site means land or water area where any “facility or activity” is physically located or conducted, including adjacent land used in connection with the facility or activity (Source: Order No. R4-2012-0175).

Storm Drain System means any facilities or any part of those facilities, including streets, gutters, conduits, natural or artificial drains, channels, and watercourses that are used for the purpose of collecting, storing, transporting or disposing of stormwater and are located within the [CITY NAME].

Storm Water or Stormwater means water that originates from atmospheric moisture (rain or snow) and that falls onto land, water, or other surfaces. Without any change in its meaning, this term may be spelled or written as one word or two separate words.

Stormwater Runoff means that part of precipitation (rainfall or snowmelt) which travels across a surface to the storm drain system or receiving waters.

SUSMP means the Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP was required as part of the previous Municipal NPDES Permit (Order No. 01-182, NPDES No. CAS004001) and required plans that designate best management practices (BMPs) that must be used in specified categories of development projects.

Urban Runoff means surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial, or industrial activities involving the use of potable and non-potable water.

[MUNICIPAL CODE SECTION REFERENCE(S)] is amended to read as follows:

SEC. [X]. STORMWATER POLLUTION CONTROL MEASURES FOR DEVELOPMENT PLANNING AND CONSTRUCTION ACTIVITIES

(A) Objective. The provisions of this section contain requirements for construction activities and facility operations of Development and Redevelopment projects to comply with the current "Municipal NPDES permit," lessen the water quality impacts of development by using smart growth practices, and integrate LID design principles to mimic predevelopment hydrology through infiltration, evapotranspiration and rainfall harvest and use. LID shall be inclusive of previously adopted SUSMP requirements.

(B) Scope. This Section contains requirements for stormwater pollution control measures in Development and Redevelopment projects and authorizes the [CITY NAME] to further define and adopt stormwater pollution control measures, to develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies, and to grant waivers or alternate compliance as allowed by the Municipal NPDES permit and collect fees from projects granted exceptions. . Except as otherwise provided herein, the [CITY NAME] shall administer, implement and enforce the provisions of this Section. Guidance documents supporting implementation of requirements in this Ordinance are hereby incorporated by reference, including SUSMP and LID Manuals.

(C) Applicability. The following Development and Redevelopment projects, termed "Planning Priority Projects," shall comply with the requirements of [SECTION NUMBER]:

(1) All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.

(2) Industrial parks 10,000 square feet or more of surface area.

(3) Commercial malls 10,000 square feet or more of surface area.

(4) Retail gasoline outlets with 5,000 square feet or more of surface area.

(5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of surface area.

(6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.

(7) Streets and roads construction of 10,000 square feet or more of impervious surface area.

(8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) 5,000 square feet or more of surface area.

(9) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:

a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and

b. Create 2,500 square feet or more of impervious surface area

(10) Single-family hillside homes.

(11) Redevelopment Projects

a. Land disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on Planning Priority Project categories.

b. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.

c. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire development.

d. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

e. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

(12) Any other project as deemed appropriate by the Director.

(D) Effective Date. The Planning and Land Development requirements contained in this Ordinance shall become effective XX days from the adoption of the Ordinance. This includes Planning Priority Projects that are discretionary permit projects or project phases that have not been deemed complete for processing, or discretionary permit projects without vesting tentative maps that have not requested and received an extension of previously granted approvals within 90 days of adoption of the Ordinance. Projects that have been deemed complete within 90 days of adoption of the Ordinance are not subject to the requirements of this Chapter.

(E) Stormwater Pollution Control Requirements. The Site for every Planning Priority Project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

(1) A new single-family hillside home development shall include mitigation measures to:

a. Conserve natural areas;

b. Protect slopes and channels;

c. Provide storm drain system stenciling and signage;

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

e. Direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

(2) Street and road construction of 10,000 square feet or more of impervious surface shall follow USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets (December 2008 EPA-833-F-08-009) to the maximum extent practicable.

(3) The remainder of Planning Priority Projects shall prepare a LID Plan to comply with the following:

a. Retain stormwater runoff onsite for the Stormwater Quality Design Volume (SWQDv) defined as the runoff from:

i. The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or

ii. The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

b. Minimize hydromodification impacts to natural drainage systems as defined in the Municipal NPDES Permit. Hydromodification requirements are further specified in [NAME OF POST-CONSTRUCITON BMP HANDBOOK].

c. When, as determined by the [APPROVING AGENCY], 100 percent onsite retention of the SWQDv is technically infeasible, partially or fully, the infeasibility shall be demonstrated in the submitted LID Plan. The technical infeasibility may result from conditions that may include, but are not limited to:

i. The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.

ii. Locations where seasonal high groundwater is within five to ten feet of surface grade;

iii. Locations within 100 feet of a groundwater well used for drinking water;

iv. Brownfield development sites or other locations where pollutant mobilization is a documented concern;

v. Locations with potential geotechnical hazards;

vi. Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.

d. If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in the Municipal NPDES Permit.

i. Additional alternative compliance options such as offsite infiltration may be available to the project Site. The project Site should contact the [APPROVING AGENCY] to determine eligibility. Alternative compliance options are further specified in [NAME OF POST-CONSTRUCITON BMP HANDBOOK].

e. The remaining SWQDv that cannot be retained or biofiltered onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required per the Municipal NPDES Permit.

Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

i. 0.2 inches per hour, or
ii. The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

f. A Multi-Phased Project may comply with the standards and requirements of this section for all of its phases by: (a) designing a system acceptable to the [APPROVING AGENCY] to satisfy these standards and requirements for the entire Site during the first phase, and (b) implementing these standards and requirements for each phase of Development or Redevelopment of the Site during the first phase or prior to commencement of construction of a later phase, to the extent necessary to treat the stormwater from such later phase. For purposes of this section, "Multi-Phased Project" shall mean any Planning Priority Project implemented over more than one phase and the Site of a Multi-Phased Project shall include any land and water area designed and used to store, treat or manage stormwater runoff in connection with the Development or Redevelopment, including any tracts, lots, or parcels of real property, whether Developed or not, associated with, functionally connected to, or under common ownership or control with such Development or Redevelopment.

(E) Other Agencies of the [CITY NAME]. All [CITY NAME] departments, offices, entities and agencies, shall establish administrative procedures necessary to implement the provisions of this Article on their Development and Redevelopment projects and report their activities annually to the [REPSONSIBLE AGENCY].

(F) Validity. If any provision of this Ordinance is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect remaining provisions of this Ordinance are declared to be severable.

(G) Certification. The City Clerk shall certify to the passage of this ordinance and have it published in accordance with Council policy.

I hereby certify that this ordinance was passed by the Council of the [CITY NAME], at its meeting of ______________________.

[NAME], City Clerk

By ____________________________
Deputy

Approved _______________________

____
Mayor

Approved as to Form and Legality
[NAME], City Attorney

By ______________________________________
[NAME]
Deputy City Attorney

Date _____________________________

File No. ___________________________

City of
Arcadia

Public Works
Services
Department

Tom Tait
Public Works Services Director

Green Street Policy

Purpose

The City of [INSERT CITY NAME] [DEPARTMENT OF PUBLIC WORKS] shall implement green street BMPs for transportation corridors associated with new and redevelopment street and roadway projects, including Capital Improvement Projects (CIPs). This policy is enacted to demonstrate compliance with the NPDES MS4 Permit for the Los Angeles Region (Order No. R4-2012-0175).

Green streets are an amenity that provides many benefits including water quality improvement, groundwater replenishment, creation of attractive streetscapes, creation of parks and wildlife habitats, and pedestrian and bicycle accessibility. Green streets are defined as right-of-way areas that incorporate infiltration, biofiltration, and/or storage and use BMPs to collect, retain, or detain stormwater runoff as well as a design element that creates attractive streetscapes.

Policy

A. Application. The [DEPARTMENT OF PUBLIC WORKS] shall require new development and/or redevelopment streets and roadway projects and CIP projects conducted within the right-of-way of transportation corridors to incorporate green street BMPs. Transportation corridors projects are major arterials as defined in the [CITY'S] General Plan which add at least 10,000 square feet of impervious surface. Routine maintenance or repair and linear utility projects are excluded from these requirements. Routine maintenance includes slurry seals, repaving, and reconstruction of the road or street where the original line and grade are maintained.

   Alternate A (without General Plan reference).

   Application. The [DEPARTMENT OF PUBLIC WORKS] shall require new development and/or redevelopment streets and roadway projects and CIP projects conducted within the right-of-way of transportation corridors to incorporate green street BMPs. Transportation corridors projects are roadway projects that add at least 10,000 square feet of impervious surface. Routine maintenance or repair and linear utility projects are excluded from these requirements. Routine maintenance includes slurry seals, repaving, and reconstruction of the road or street where the original line and grade are maintained.

Alternatives to the 10,000 sf threshold: Use other mechanism in lieu of the 10,000 sf of impervious area to determine threshold for green streets requirements.

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As an example, City of Santa Monica utilizes construction costs (>$500,000) as the trigger for green street BMPs. Another option would be to establish a threshold of either the 10,000 sf impervious area or construction cost >$500,000 whichever is smaller.
Alternatives to the major arterial: Use another General Plan defined street classification, such as secondary arterials, and define the transportation corridor as all that type of street and larger arterials.

B. Amenities. The [DEPARTMENT OF PUBLIC WORKS] shall consider opportunities to replenish groundwater, create attractive streetscapes, create parks and wildlife habitats, and provide pedestrian and bicycle accessibility through new development and redevelopment of streets and roadway projects and CIPs.

C. Guidance. The [DEPARTMENT OF PUBLIC WORKS] shall use the City of Los Angeles Green Streets guidance, USEPA's *Managing Wet Weather with Green Infrastructure Municipal Handbook: Green Streets*[1], or equivalent guidance developed by the [DEPARTMENT OF PUBLIC WORKS] for use in public and private developments.

D. Retrofit Scope. The [DEPARTMENT OF PUBLIC WORKS] shall use the City's Watershed Management Program or Enhanced Watershed Management Program to identify opportunities for green street BMP retrofits. Final decisions regarding implementation will be determined by the [CITY ENGINEER] based on the availability of adequate funding.

E. Training. The [DEPARTMENT OF PUBLIC WORKS] shall incorporate aspects of green streets into internal annual staff trainings.

[1] EPA-833-F-08-009, December 2008.

DRAFT LID ORDINANCE

ORDINANCE NO.________________________

An ordinance amending [MUNICIPAL CODE SECTION REFERENCE(S)] of the City of Azusa Municipal Code to expand the applicability of the existing [NAME OF POST-CONSTRUCITON REQUIREMENTS – LIKELY "SUSMP" FOR MOST MUNICIPALITIES] requirements by imposing Low Impact Development (LID) strategies on projects that require building permits and/or encroachment permits.

Findings.

(A) The City of Azusa is authorized by Article XI, §5 and §7 of the State Constitution to exercise the police power of the State by adopting regulations to promote public health, public safety and general prosperity.

(B) The City of Azusa has authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity which might degrade the quality of waters of the State.

(C) The city is a permittee under the "Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4," issued by the California Regional Water Quality Control Board--Los Angeles Region," (Order No. R4-2012-0175) which also serves as an NPDES Permit under the Federal Clean Water Act (NPDES No. CAS004001), as well as Waste Discharge Requirements under California law (the "Municipal NPDES permit"). In order to participate in a Watershed Management Program and/or Enhanced Watershed Management Program, the Municipal NPDES permit requires permittees to develop and implement a LID Ordinance.

(D) The City of Azusa has applied an integrated approach to incorporate wastewater, stormwater and runoff, and recycled water management into a single strategy through its Integrated Resources Plan.

(E) The City of Azusa is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental, social, and economic considerations.

(F) Urbanization has led to increased impervious surface areas resulting in increased water runoff causing the transport of pollutants to downstream receiving waters.

(G) The City of Azusa needs to take a new approach to managing rainwater and urban runoff while mitigating the negative impacts of development and urbanization.

(H) LID is widely recognized as a sensible approach to managing the quantity and quality of storm water and non-stormwater runoff by setting standards and practices to maintain or restore the natural hydrologic character of a development site, reduce off-site runoff, improve water quality, and provide groundwater recharge.

(I) It is the intent of the City of Azusa to replace the existing Standard Urban Stormwater Mitigation Plan (SUSMP) requirements by providing stormwater and rainwater LID strategies for Development and Redevelopment projects as defined under "Applicability." Where there are conflicts between this Ordinance and previously adopted SUSMP or LID Manuals, the standards in this Ordinance shall prevail.

[MUNICIPAL CODE SECTION REFERENCE(S)] of the City of Azusa Municipal Code is amended in its entirety to read as follows:

Definitions.

Except as specifically provided herein, any term used in this [SECTION REFERENCE] shall be defined as that term in the current Municipal NPDES permit, or if it is not specifically defined in either the Municipal NPDES permit, then as such term is defined in the Federal Clean Water Act, as amended, and/or the regulations promulgated thereunder. If the definition of any term contained in this chapter conflicts with the definition of the same term in the current Municipal NPDES permit, then the definition contained in the Municipal NPDES permit shall govern. The following words and phrases shall have the following meanings when used in this chapter:

Automotive Service Facility means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to stormwater (Source: Order No. R4-2012-0175).

Basin Plan means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments (Source: Order No. R4-2012-0175).

Best Management Practice (BMP) means practices or physical devices or systems designed to prevent or reduce pollutant loading from stormwater or non-stormwater discharges to receiving waters, or designed to reduce the volume of stormwater or non-stormwater discharged to the receiving water (Source: Order No. R4-2012-0175).

Biofiltration means a LID BMP that reduces stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration. Incidental infiltration is an important factor in achieving the required pollutant load reduction. Therefore, the term "biofiltration" as used in this Ordinance is defined to include only systems designed to facilitate incidental infiltration or achieve the equivalent pollutant reduction as biofiltration BMPs with an underdrain (subject to approval by the Regional Board's Executive Officer). Biofiltration BMPs include bioretention systems with an underdrain and bioswales (Modified from: Order No. R4-2012-0175).

Bioretention means a LID BMP that reduces stormwater runoff by intercepting rainfall on vegetative canopy, and through evapotranspiration and infiltration. The bioretention system typically includes a minimum 2-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. As defined in the Municipal NPDES permit, a bioretention BMP may be designed with an overflow drain, but may not include an underdrain. When a bioretention BMP is designed or constructed with an underdrain it is regulated by the Municipal NPDES permit as biofiltration (Modified from: Order No. R4-2012-0175).

Bioswale means a LID BMP consisting of a shallow channel lined with grass or other dense, low-growing vegetation. Bioswales are designed to collect stormwater runoff and to achieve a uniform sheet flow through the dense vegetation for a period of several minutes (Source: Order No. R4-2012-0175).

City means the City of Azusa.

Clean Water Act (CWA) means the Federal Water Pollution Control Act enacted in 1972, by Public Law 92-500, and amended by the Water Quality Act of 1987. The Clean Water Act prohibits the discharge of pollutants to Waters of the United States unless the discharge is in accordance with an NPDES permit.

Commercial Malls means any development on private land comprised of one or more buildings forming a complex of stores which sells various merchandise, with interconnecting walkways enabling visitors to easily walk from store to store, along with parking area(s). A commercial mall includes, but is not limited to: mini-malls, strip malls, other retail complexes, and enclosed shopping malls or shopping centers (Source: Order No. R4-2012-0175).

Construction Activity means any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that result in land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility. See "Routine Maintenance" definition for further explanation. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage by the State of California General Permit for Storm Water Discharges Associated with Industrial Activities or for Stormwater Discharges Associated with Construction Activities is required if more than one acre is disturbed or the activities are part of a larger plan (Source: Order No. R4-2012-0175).

Control means to minimize, reduce or eliminate by technological, legal, contractual, or other means, the discharge of pollutants from an activity or activities (Source: Order No. R4-2012-0175).

Development means construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail, and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

Directly Adjacent means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area (Source: Order No. R4-2012-0175).

Discharge means any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid, or solid substance.

Disturbed Area means an area that is altered as a result of clearing, grading, and/or excavation (Source: Order No. R4-2012-0175).

Flow-through BMPs means modular, vault type "high flow biotreatment" devices contained within an impervious vault with an underdrain or designed with an impervious liner and an underdrain (Modified from: Order No. R4-2012-0175).

General Construction Activities Storm Water Permit (GCASP) means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from construction activities under certain conditions.

General Industrial Activities Storm Water Permit (GIASP) means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from certain industrial activities under certain conditions.

Green Roof means a LID BMP using planter boxes and vegetation to intercept rainfall on the roof surface. Rainfall is intercepted by vegetation leaves and through evapotranspiration. Green roofs may be designed as either a bioretention BMP or as a biofiltration BMP. To receive credit as a bioretention BMP, the green roof system planting medium shall be of sufficient depth to provide capacity within the pore space volume to contain the design storm depth and may not be designed or constructed with an underdrain (Source: Order No. R4-2012-0175).

Hazardous Material(s) means any material(s) defined as hazardous by Division 20, Chapter 6.95 of the California Health and Safety Code.

Hillside means a property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes (Source: Order No. R4-2012-0175).

Hydromodification means the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation. (Source: GCASP)

Impervious Surface means any man-made or modified surface that prevents or significantly reduces the entry of water into the underlying soil, resulting in runoff from the surface in greater quantities and/or at an increased rate, when compared to natural conditions prior to development. Examples of places that commonly exhibit impervious surfaces include parking lots, driveways, roadways, storage areas, and rooftops. The imperviousness of these areas commonly results from paving, compacted gravel, compacted earth, and oiled earth.

Industrial Park means land development that is set aside for industrial development. Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry (Source: Order No. R4-2012-0175).

Infiltration BMP means a LID BMP that reduces stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Examples of infiltration BMPs include infiltration basins, dry wells, and pervious pavement (Source: Order No. R4-2012-0175).

LID means Low Impact Development. LID consists of building and landscape features designed to retain or filter stormwater runoff (Source: Order No. R4-2012-0175).

MS4 means Municipal Separate Storm Sewer System (MS4). The MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a combined sewer; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

(40 CFR § 122.26(b)(8)) (Source: Order No. R4-2012-0175)

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405. The term includes an "approved program" (Source: Order No. R4-2012-0175).

Natural Drainage System means a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system (Source: Order No. R4-2012-0175).

New Development means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision (Source: Order No. R4-2012-0175).

Non-Stormwater Discharge means any discharge to a municipal storm drain system that is not composed entirely of stormwater (Source: Order No. R4-2012-0175).

Parking Lot means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces (Source: Order No. R4-2012-0175).

Person means any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, state, governmental entity or any other legal entity, or their legal representatives, agents or assigns. The masculine gender shall include the feminine and the singular shall include the plural where indicated by the context.

Planning Priority Projects means development projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s) (Modified from: Order No. R4-2012-0175).

Pollutant means any "pollutant" defined in Section 502(6) of the Federal Clean Water Act or incorporated into the California Water Code Sec. 13373. Pollutants may include, but are not limited to the following:

(1) Commercial and industrial waste (such as fuels, solvents, detergents, plastic pellets, hazardous substances, fertilizers, pesticides, slag, ash, and sludge).

(2) Metals (such as cadmium, lead, zinc, copper, silver, nickel, chromium, and non- metals such as phosphorus and arsenic).

(3) Petroleum hydrocarbons (such as fuels, lubricants, surfactants, waste oils, solvents, coolants, and grease).

(4) Excessive eroded soil, sediment, and particulate materials in amounts that may adversely affect the beneficial use of the receiving waters, flora, or fauna of the State.

(5) Animal wastes (such as discharge from confinement facilities, kennels, pens, recreational facilities, stables, and show facilities).

(6) Substances having characteristics such as pH less than 6 or greater than 9, or unusual coloration or turbidity, or excessive levels of fecal coliform, or fecal streptococcus, or enterococcus.

Project means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065) (Source: Order No. R4-2012-0175).

Rainfall Harvest and Use means a LID BMP system designed to capture runoff, typically from a roof but can also include runoff capture from elsewhere within the site, and to provide for temporary storage until the harvested water can be used for irrigation or non-potable uses. The harvested water may also be used for potable water uses if the system includes disinfection treatment and is approved for such use by the local building department (Source: Order No. R4-2012-0175).

Receiving Water means "water of the United States" into which waste and/or pollutants are or may be discharged (Source: Order No. R4-2012-0175).

Redevelopment means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

Regional Board means the California Regional Water Quality Control Board, Los Angeles Region.

Restaurant means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812) (Source: Order No. R4-2012-0175).

Retail Gasoline Outlet means any facility engaged in selling gasoline and lubricating oils (Source: Order No. R4-2012-0175).

Routine Maintenance

Routine maintenance projects include, but are not limited to projects conducted to:

1. Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.
2. Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.

3. Includes road shoulder work, regrading dirt or gravel roadways and shoulders and performing ditch cleanouts.
4. Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
5. Repair leaks

Routine maintenance does not include construction of new** lines or facilities resulting from compliance with applicable codes, standards and regulations.

* Update existing lines includes replacing existing lines with new materials or pipes.

** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines (Source: Order No. R4-2012-0175).

Significant Ecological Areas (SEAs) means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan. Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.
2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.
3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.
4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
6. Areas important as game species habitat or as fisheries.
7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
8. Special areas (Source: Order No. R4-2012-0175).

Site means land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity (Source: Order No. R4-2012-0175).

Storm Drain System means any facilities or any part of those facilities, including streets, gutters, conduits, natural or artificial drains, channels, and watercourses that are used for the purpose of collecting, storing, transporting or disposing of stormwater and are located within the City of Azusa.

Storm Water or Stormwater means water that originates from atmospheric moisture (rain or snow) and that falls onto land, water, or other surfaces. Without any change in its meaning, this term may be spelled or written as one word or two separate words.

Stormwater Runoff means that part of precipitation (rainfall or snowmelt) which travels across a surface to the storm drain system or receiving waters.

SUSMP means the Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP was required as part of the previous Municipal NPDES Permit (Order No. 01-182, NPDES No. CAS004001) and required plans that designate best management practices (BMPs) that must be used in specified categories of development projects.

Urban Runoff means surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial, or industrial activities involving the use of potable and non-potable water.

[MUNICIPAL CODE SECTION REFERENCE(S)] is amended to read as follows:

SEC. [X]. STORMWATER POLLUTION CONTROL MEASURES FOR DEVELOPMENT PLANNING AND CONSTRUCTION ACTIVITIES

(A) **Objective**. The provisions of this section contain requirements for construction activities and facility operations of Development and Redevelopment projects to comply with the current "Municipal NPDES permit," lessen the water quality impacts of development by using smart growth practices, and integrate LID design principles to mimic predevelopment hydrology through infiltration, evapotranspiration and rainfall harvest and use. LID shall be inclusive of previously adopted SUSMP requirements.

(B) **Scope.** This Section contains requirements for stormwater pollution control measures in Development and Redevelopment projects and authorizes the City of Azusa to further define and adopt stormwater pollution control measures, to develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies, and to grant waivers or alternate compliance as allowed by the Municipal NPDES permit and collect fees from projects granted exceptions. . Except as otherwise provided herein, the City of Azusa shall administer, implement and enforce the provisions of this Section. Guidance documents supporting implementation of requirements in this Ordinance are hereby incorporated by reference, including SUSMP and LID Manuals.

(C) **Applicability**. The following Development and Redevelopment projects, termed "Planning Priority Projects," shall comply with the requirements of [SECTION NUMBER]:

(1) All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.

(2) Industrial parks 10,000 square feet or more of surface area.

(3) Commercial malls 10,000 square feet or more of surface area.

(4) Retail gasoline outlets with 5,000 square feet or more of surface area.

(5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of surface area.

(6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.

(7) Streets and roads construction of 10,000 square feet or more of impervious surface area.

(8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) 5,000 square feet or more of surface area.

(9) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:

a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and

b. Create 2,500 square feet or more of impervious surface area

(10) Single-family hillside homes.

(11) Redevelopment Projects

a. Land disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on Planning Priority Project categories.

b. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.

c. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire development.

d. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

e. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

(12) Any other project as deemed appropriate by the Director.

(D) Effective Date. The Planning and Land Development requirements contained in this Ordinance shall become effective XX days from the adoption of the Ordinance. This includes Planning Priority Projects that are discretionary permit projects or project phases that have not been deemed complete for processing, or discretionary permit projects without vesting tentative maps that have not requested and received an extension of previously granted approvals within 90 days of adoption of the Ordinance. Projects that have been deemed complete within 90 days of adoption of the Ordinance are not subject to the requirements of this Chapter.

(E) Stormwater Pollution Control Requirements. The Site for every Planning Priority Project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

(1) A new single-family hillside home development shall include mitigation measures to:

a. Conserve natural areas;

b. Protect slopes and channels;

c. Provide storm drain system stenciling and signage;

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

e. Direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

(2) Street and road construction of 10,000 square feet or more of impervious surface shall follow USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets (December 2008 EPA-833-F-08-009) to the maximum extent practicable.

(3) The remainder of Planning Priority Projects shall prepare a LID Plan to comply with the following:

a. Retain stormwater runoff onsite for the Stormwater Quality Design Volume (SWQDv) defined as the runoff from:

i. The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or

ii. The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

b. Minimize hydromodification impacts to natural drainage systems as defined in the Municipal NPDES Permit. Hydromodification requirements are further specified in [NAME OF POST-CONSTRUCITON BMP HANDBOOK].

c. When, as determined by the [APPROVING AGENCY], 100 percent onsite retention of the SWQDv is technically infeasible, partially or fully, the infeasibility shall be demonstrated in the submitted LID Plan. The technical infeasibility may result from conditions that may include, but are not limited to:

i. The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.

ii. Locations where seasonal high groundwater is within five to ten feet of surface grade;

iii. Locations within 100 feet of a groundwater well used for drinking water;

iv. Brownfield development sites or other locations where pollutant mobilization is a documented concern;

v. Locations with potential geotechnical hazards;

vi. Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.

d. If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in the Municipal NPDES Permit.

i. Additional alternative compliance options such as offsite infiltration may be available to the project Site. The project Site should contact the [APPROVING AGENCY] to determine eligibility. Alternative compliance options are further specified in [NAME OF POST-CONSTRUCITON BMP HANDBOOK].

e. The remaining SWQDv that cannot be retained or biofiltered onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required per the Municipal NPDES Permit. Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

i. 0.2 inches per hour, or
ii. The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

f. A Multi-Phased Project may comply with the standards and requirements of this section for all of its phases by: (a) designing a system acceptable to the [APPROVING AGENCY] to satisfy these standards and requirements for the entire Site during the first phase, and (b) implementing these standards and requirements for each phase of Development or Redevelopment of the Site during the first phase or prior to commencement of construction of a later phase, to the extent necessary to treat the stormwater from such later phase. For purposes of this section, "Multi-Phased Project" shall mean any Planning Priority Project implemented over more than one phase and the Site of a Multi-Phased Project shall include any land and water area designed and used to store, treat or manage stormwater runoff in connection with the Development or Redevelopment, including any tracts, lots, or parcels of real property, whether Developed or not, associated with, functionally connected to, or under common ownership or control with such Development or Redevelopment.

(E) Other Agencies of the City of Azusa. All City of Azusa departments, offices, entities and agencies, shall establish administrative procedures necessary to implement the provisions of this Article on their Development and Redevelopment projects and report their activities annually to the [REPSONSIBLE AGENCY].

(F) Validity. If any provision of this Ordinance is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect remaining provisions of this Ordinance are declared to be severable.

(G) Certification. The City Clerk shall certify to the passage of this ordinance and have it published in accordance with Council policy.

I hereby certify that this ordinance was passed by the Council of the City of Azusa, at its meeting of ______________________.

Jeffrey Corenjo, Jr., City Clerk

By ______________________________
Deputy

Approved ______________________

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Joseph R. Rocha, Mayor

Approved as to Form and Legality
BBK representative, TBD, City Attorney

By ______________________________
City Attorney

Date ______________________

File No. ______________________

DRAFT Green Street Policy

Purpose

The City of Azusa DEPARTMENT OF PUBLIC WORKS shall implement green street BMPs for transportation corridors associated with new and redevelopment street and roadway projects, including Capital Improvement Projects (CIPs). This policy is enacted to demonstrate compliance with the NPDES MS4 Permit for the Los Angeles Region (Order No. R4-2012-0175).

Green streets are an amenity that provides many benefits including water quality improvement, groundwater replenishment, creation of attractive streetscapes, creation of parks and wildlife habitats, and pedestrian and bicycle accessibility. Green streets are defined as right-of-way areas that incorporate infiltration, biofiltration, and/or storage and use BMPs to collect, retain, or detain stormwater runoff as well as a design element that creates attractive streetscapes.

Policy

A. Application. The DEPARTMENT OF PUBLIC WORKS shall require new development and/or redevelopment streets and roadway projects and CIP projects conducted within the right-of-way of transportation corridors to incorporate green street BMPs. Transportation corridors projects are major arterials as defined in the CITY'S General Plan which add at least 10,000 square feet of impervious surface. Routine maintenance or repair and linear utility projects are excluded from these requirements. Routine maintenance includes slurry seals, repaving, and reconstruction of the road or street where the original line and grade are maintained.

   Alternate A (without General Plan reference).

   Application. The DEPARTMENT OF PUBLIC WORKS shall require new development and/or redevelopment streets and roadway projects and CIP projects conducted within the right-of-way of transportation corridors to incorporate green street BMPs. Transportation corridors projects are roadway projects that add at least 10,000 square feet of impervious surface. Routine maintenance or repair and linear utility projects are excluded from these requirements. Routine maintenance includes slurry seals, repaving, and reconstruction of the road or street where the original line and grade are maintained.

Alternatives to the 10,000 sf threshold: Use other mechanism in lieu of the 10,000 sf of impervious area to determine threshold for green streets requirements. As an example, City of Santa Monica utilizes construction costs (>$500,000) as the trigger for green street BMPs. Another option would be to establish a threshold of either the 10,000 sf impervious area or construction cost >$500,000 whichever is smaller.

Alternatives to the major arterial: Use another General Plan defined street classification, such as secondary arterials, and define the transportation corridor as all that type of street and larger arterials.

B. Amenities. The DEPARTMENT OF PUBLIC WORKS shall consider opportunities to replenish groundwater, create attractive streetscapes, create parks and wildlife habitats, and provide pedestrian and bicycle accessibility through new development and redevelopment of streets and roadway projects and CIPs.

C. Guidance. The DEPARTMENT OF PUBLIC WORKS shall use the City of Los Angeles Green Streets guidance, USEPA's *Managing Wet Weather with Green Infrastructure Municipal Handbook: Green Streets*[1], or equivalent guidance developed by the DEPARTMENT OF PUBLIC WORKS for use in public and private developments.

D. Retrofit Scope. The DEPARTMENT OF PUBLIC WORKS shall use the City's Watershed Management Program or Enhanced Watershed Management Program to identify opportunities for green street BMP retrofits. Final decisions regarding implementation will be determined by the CITY ENGINEER based on the availability of adequate funding.

E. Training. The DEPARTMENT OF PUBLIC WORKS shall incorporate aspects of green streets into internal annual staff trainings.

CITY OF AZUSA
ENGINEERING DIVISION

MEMORANDUM

TO: MS4 NPDES (EWMP) Permit File

FROM: Carl Hassel, Assistant Director of Public Works / City Engineer

DATE: June 26, 2013

SUBJECT: Draft Low Impact Development (LID) Ordinance and draft Green Streets Policy status

As a requirement of the new MS4 Permit, cities are to have in place a LID Ordinance and Green Streets Policy for the future. At the time of the submittal of the NOI at the end of this month, The LID Ordinance and Green Streets Policy are in draft form and will be included in the NOI submittal that the Rio Hondo/San Gabriel River Watershed Quality Control Group are preparing.

The LA Permit Group hired Larry Walker and Associates, a consultant, with permission from the cities from the LA Permit Group to provide services including preparation of a draft LID Ordinance and Green Streets Policy.

On May 16th, 2013, I met with Conal McNamara, Assistant Director of Economic and Community Development, to review the draft LID ordinance and the draft Green Streets Policy. He was in agreement with the drafts and that the City will look to further advance the work but that the bulk of the work is complete. He was in agreement that it would be fine to submit them with the MS4 Permit NOI.

On May 20th, 2013, I checked with Tito Haes, the Assistant City Manager/Director of Public Works regarding the submittal of the draft LID ordinance and the draft Green Streets Policy and he was fine with the submittal but that we would need to look toward any changes to make it fit with the community and to get Council approval before they would be instituted.

It was indicated to me that all parties involved were aware of the implications of the LID Ordinance and the Green Streets Policy and that once adopted they would be part of the conditions of approval for developments or included in CIP's that the City of Azusa conducts.

Carl E. Hassel, P.E.

City of Bradbury

Memorandum

DATE: **June 3, 2013**

TO: David Gilbertson, Assistant City Engineer

CC: Michelle Keith, City Manager

SUBJECT: **Draft Green Street Policy**

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Green Street Policy

Purpose

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Policy

A. Application. The City shall require new development and/or redevelopment streets and roadway projects and CIP projects conducted within the right-of-way of transportation corridors to incorporate green street BMPs. Transportation corridors projects are major arterials as defined in the [CITY'S] General Plan which add at least 10,000 square feet of impervious surface. Routine maintenance or repair and linear utility projects are excluded from these requirements Routine maintenance includes slurry seals, repaving, and reconstruction of the road or street where the original line and grade are maintained and new impervious surface is not added.

Comment [m1]: Decision point on how to define transportation corridors. Is the preference to use the 10,000 sf threshold from the Land Development section of the Permit or to use a street type definition from the General Plan, e.g. major arterials.

Alternatives:
Use other mechanism in lieu of the 10,000 sf of impervious area to determine threshold for green streets requirements. As an example, City of Santa Monica utilizes construction costs (>$500,000) as the trigger for green street BMPs. Another option would be to establish a threshold of either the 10,000 sf impervious area or construction cost >$500,000 whichever is smaller.

B. Amenities. The City shall consider opportunities to replenish groundwater, create attractive streetscapes, create parks and wildlife habitats, and provide pedestrian and bicycle accessibility through new development and redevelopment of streets and roadway projects and CIPs.

C. Guidance. The City shall use the City of Los Angeles Green Streets guidance, USEPA's *Managing Wet Weather with Green Infrastructure Municipal Handbook: Green Streets*[1], or equivalent guidance for use in public and private developments.

D. Retrofit Scope. The City shall use the City's Enhanced Watershed Management Program to identify opportunities for green street BMP retrofits. Final decisions regarding implementation will be determined by the City Council based on the availability of adequate funding.

E. Training. The City's contract City Engineer shall incorporate aspects of green streets into internal annual staff trainings.

[1] EPA-833-F-08-009, December 2008.

City of Bradbury
Memorandum

DATE: **June 3, 2013**

TO: Michelle Keith, City Manager
Anne McIntosh, City Planner

FROM: David Gilbertson, Assistant City Engineer

SUBJECT: **Draft LID Ordinance**

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Below is the Draft LID Ordinance that key City staff needs to review. We need to discuss the revision and several critical issues of the Ordinance such as bonding amounts and the levying of fines.

ORDINANCE NO. XX

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF BRADBURY, CALIFORNIA, AMENDING SECTION________ OF THE CITY OF BRADBURY MUNICIPLE CODE TO EXPAND THE APPLICABILITY OF THE EXISTING STANDARD URBAN STORMWATER MITIGATION PLAN (SUSMP) REQUIREMENTS BY IMPOSING LOW IMPACT DEVELOPMENT (LID) STRATEGIES ON THE PROJECTS REQUIRING BUILDING PERMITS.

WHEREAS, The City of Bradbury is authorized by Article XI, §5 and §7 of the State Constitution to exercise the police power of the State by adopting regulations to promote public health, public safety and general prosperity.

WHEREAS, The City of Bradbury has authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity which might degrade the quality of waters of the State.

WHEREAS, The city is a permittee under the “Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4,” issued by the California Regional Water Quality Control Board--Los Angeles Region,” (Order No. R4-2012-0175) which also serves as an NPDES Permit under the Federal Clean Water Act (NPDES No. CAS004001), as well as Waste Discharge Requirements under California law (the “Municipal NPDES permit”). In order to participate in a Watershed Management Program and/or Enhanced Watershed Management Program, the Municipal NPDES permit requires permittees to develop and implement a LID Ordinance.

WHEREAS, The City of Bradbury has applied an integrated approach to incorporate wastewater, stormwater and runoff, and recycled water management into a single strategy through its Integrated Resources Plan.

WHEREAS, The City of Bradbury is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental, social, and economic considerations.

~~**WHEREAS,** Urbanization has led to increased impervious surface areas resulting in increased water runoff and less percolation to groundwater aquifers causing the transport of pollutants to downstream receiving waters.~~

~~**WHEREAS,** The City of Bradbury needs to take a new approach to managing rainwater and urban runoff while mitigating the negative impacts of development and urbanization.~~

~~**WHEREAS,** LID is widely recognized as a sensible approach to managing the quantity and quality of stormwater runoff by setting standards and practices to maintain or restore the natural hydrologic character of a development site, reduce off-site runoff, improve water quality, and provide groundwater recharge.~~

WEREAS, It is the intent of the City of Bradbury to expand the applicability of the existing Standard Urban Stormwater Mitigation Plan (SUSMP) requirements by providing stormwater and rainwater LID strategies for Development and Redevelopment projects as defined under "Applicability."

[MUNICIPAL CODE SECTION REFERENCE(S)] OF THE CITY OF BRADBURY MUNICIPAL CODE IS AMENDED IN ITS ENTIRETY TO READ AS FOLLOWS:

Definitions.

Except as specifically provided herein, any term used in this section shall be defined as that term in the current Municipal NPDES permit, or if it is not specifically defined in either the Municipal NPDES permit, then as such term is defined in the Federal Clean Water Act, as amended, and/or the regulations promulgated thereunder. If the definition of any term contained in this chapter conflicts with the definition of the same term in the current Municipal NPDES permit, then the definition contained in the Municipal NPDES permit shall govern. The following words and phrases shall have the following meanings when used in this chapter:

Automotive Service Facility means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to stormwater (Source: Order No. R4-2012-0175).

Basin Plan means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments (Source: Order No. R4-2012-0175).

Best Management Practice (BMP) means practices or physical devices or systems designed to prevent or reduce pollutant loading from stormwater or non-stormwater discharges to receiving waters, or designed to reduce the volume of stormwater or non-stormwater discharged to the receiving water (Source: Order No. R4-2012-0175).

Biofiltration means a LID BMP that reduces stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration. Incidental infiltration is an important factor in achieving the required pollutant load reduction. Therefore, the term “biofiltration” as used in this Ordinance is defined to include only systems designed to facilitate incidental infiltration or achieve the equivalent pollutant reduction as biofiltration BMPs with an underdrain (subject to approval by the Regional Board’s Executive Officer). Biofiltration BMPs include bioretention systems with an underdrain and bioswales (Modified from: Order No. R4-2012-0175).

Bioretention means a LID BMP that reduces stormwater runoff by intercepting rainfall on vegetative canopy, and through evapotranspiration and infiltration. The bioretention system typically includes a minimum 2-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. As defined in the Municipal NPDES permit, a bioretention BMP may be designed with an overflow drain, but may not include an underdrain. When a bioretention BMP is designed or constructed with an underdrain it is regulated by the Municipal NPDES permit as biofiltration (Modified from: Order No. R4-2012-0175).

Bioswale means a LID BMP consisting of a shallow channel lined with grass or other dense, low-growing vegetation. Bioswales are designed to collect stormwater runoff and to achieve a uniform sheet flow through the dense vegetation for a period of several minutes (Source: Order No. R4-2012-0175).

City means the City of Bradbury

Clean Water Act (CWA) means the Federal Water Pollution Control Act enacted in 1972, by Public Law 92-500, and amended by the Water Quality Act of 1987. The Clean Water Act prohibits the discharge of pollutants to Waters of the United States unless the discharge is in accordance with an NPDES permit.

Commercial Malls means any development on private land comprised of one or more buildings forming a complex of stores which sells various merchandise, with interconnecting walkways enabling visitors to easily walk from store to store, along with parking area(s). A commercial mall includes, but is not limited to: mini-malls, strip malls, other retail complexes, and enclosed shopping malls or shopping centers (Source: Order No. R4-2012-0175).

Construction Activity means any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that result in land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility. See “Routine Maintenance” definition for further explanation. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage by the State of California General Permit for Storm Water Discharges Associated with Industrial Activities or for Stormwater Discharges Associated with Construction Activities is required if more than one acre is disturbed or the activities are part of a larger plan (Source: Order No. R4-2012-0175).

Control means to minimize, reduce or eliminate by technological, legal, contractual, or other means, the discharge of pollutants from an activity or activities (Source: Order No. R4-2012-0175).

Development means construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail, and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

Directly Adjacent means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area (Source: Order No. R4-2012-0175).

Discharge means any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid, or solid substance.

Disturbed Area means an area that is altered as a result of clearing, grading, and/or excavation (Source: Order No. R4-2012-0175).

Flow-through BMPs means modular, vault type “high flow biotreatment” devices contained within an impervious vault with an underdrain or designed with an impervious liner and an underdrain (Modified from: Order No. R4-2012-0175).

General Construction Activities Storm Water Permit (GCASP) means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from construction activities under certain conditions.

General Industrial Activities Storm Water Permit (GIASP) means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from certain industrial activities under certain conditions.

Green Roof means a LID BMP using planter boxes and vegetation to intercept rainfall on the roof surface. Rainfall is intercepted by vegetation leaves and through evapotranspiration. Green roofs may be designed as either a bioretention BMP or as a biofiltration BMP. To receive credit as a bioretention BMP, the green roof system planting medium shall be of sufficient depth to provide capacity within the pore space volume to contain the design storm depth and may not be designed or constructed with an underdrain (Source: Order No. R4-2012-0175).

Hazardous Material(s) means any material(s) defined as hazardous by Division 20, Chapter 6.95 of the California Health and Safety Code.

Hillside means a property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes (Source: Order No. R4-2012-0175).

Impervious Surface means any man-made or modified surface that prevents or significantly reduces the entry of water into the underlying soil, resulting in runoff from the surface in greater quantities and/or at an increased rate, when compared to natural conditions prior to development. Examples of places that commonly exhibit impervious surfaces include parking lots, driveways, roadways, storage areas, and rooftops. The imperviousness of these areas commonly results from paving, compacted gravel, compacted earth, and oiled earth.

Industrial Park means land development that is set aside for industrial development. Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry (Source: Order No. R4-2012-0175).

Infiltration BMP means a LID BMP that reduces stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Examples of infiltration BMPs include infiltration basins, dry wells, and pervious pavement (Source: Order No. R4-2012-0175).

LID means Low Impact Development. LID consists of building and landscape features designed to retain or filter stormwater runoff (Source: Order No. R4-2012-0175).

MS4 means Municipal Separate Storm Sewer System (MS4). The MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a combined sewer; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

(40 CFR § 122.26(b)(8)) (Source: Order No. R4-2012-0175)

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405. The term includes an “approved program” (Source: Order No. R4-2012-0175).

Natural Drainage System means a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system (Source: Order No. R4-2012-0175).

New Development means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision (Source: Order No. R4-2012-0175).

Non-Stormwater Discharge means any discharge to a municipal storm drain system that is not composed entirely of stormwater (Source: Order No. R4-2012-0175).

Parking Lot means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces (Source: Order No. R4-2012-0175).

Person means any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, state, governmental entity or any other legal entity, or their legal representatives, agents or assigns. The masculine gender shall include the feminine and the singular shall include the plural where indicated by the context.

Planning Priority Projects means development projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s) (Modified from: Order No. R4-2012-0175).

Pollutant means any "pollutant" defined in Section 502(6) of the Federal Clean Water Act or incorporated into the California Water Code Sec. 13373. Pollutants may include, but are not limited to the following:

(1) Commercial and industrial waste (such as fuels, solvents, detergents, plastic pellets, hazardous substances, fertilizers, pesticides, slag, ash, and sludge).

(2) Metals (such as cadmium, lead, zinc, copper, silver, nickel, chromium, and non- metals such as phosphorus and arsenic).

(3) Petroleum hydrocarbons (such as fuels, lubricants, surfactants, waste oils, solvents, coolants, and grease).

(4) Excessive eroded soil, sediment, and particulate materials in amounts that may adversely affect the beneficial use of the receiving waters, flora, or fauna of the State.

(5) Animal wastes (such as discharge from confinement facilities, kennels, pens, recreational facilities, stables, and show facilities).

(6) Substances having characteristics such as pH less than 6 or greater than 9, or unusual coloration or turbidity, or excessive levels of fecal coliform, or fecal streptococcus, or enterococcus.

Project means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065) (Source: Order No. R4-2012-0175).

Rainfall Harvest and Use means a LID BMP system designed to capture runoff, typically from a roof but can also include runoff capture from elsewhere within the site, and to provide for temporary storage until the harvested water can be used for irrigation or non-potable uses. The harvested water may also be used for potable water uses if the system includes disinfection treatment and is approved for such use by the local building department (Source: Order No. R4-2012-0175).

Receiving Water means "water of the United States" into which waste and/or pollutants are or may be discharged (Source: Order No. R4-2012-0175).

Redevelopment means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

Regional Board means the California Regional Water Quality Control Board, Los Angeles Region.

Restaurant means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812) (Source: Order No. R4-2012-0175).

Retail Gasoline Outlet means any facility engaged in selling gasoline and lubricating oils (Source: Order No. R4-2012-0175).

Routine Maintenance
Routine maintenance projects include, but are not limited to projects conducted to:

1. Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.
2. Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
3. Includes road shoulder work, regrading dirt or gravel roadways and shoulders and performing ditch cleanouts.
4. Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
5. Repair leaks

Routine maintenance does not include construction of new** lines or facilities resulting from compliance with applicable codes, standards and regulations.
* Update existing lines includes replacing existing lines with new materials or pipes.
** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines (Source: Order No. R4-2012-0175).

Significant Ecological Areas (SEAs) means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan. Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.
2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.
3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.
4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
6. Areas important as game species habitat or as fisheries.

7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
8. Special areas (Source: Order No. R4-2012-0175).

Site means land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity (Source: Order No. R4-2012-0175).

Storm Drain System means any facilities or any part of those facilities, including streets, gutters, conduits, natural or artificial drains, channels, and watercourses that are used for the purpose of collecting, storing, transporting or disposing of stormwater and are located within the City of Bradbury.

Storm Water or Stormwater means water that originates from atmospheric moisture (rain or snow) and that falls onto land, water, or other surfaces. Without any change in its meaning, this term may be spelled or written as one word or two separate words.

Stormwater Runoff means that part of precipitation (rainfall or snowmelt) which travels across a surface to the storm drain system or receiving waters.

SUSMP means the Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP was required as part of the previous Municipal NPDES Permit (Order No. 01-182, NPDES No. CAS004001) and required plans that designate best management practices (BMPs) that must be used in specified categories of development projects.

Urban Runoff means surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial, or industrial activities involving the use of potable and non-potable water.

[MUNICIPAL CODE SECTION REFERENCE(S)] is amended to read as follows:

SEC. [X]. STORMWATER POLLUTION CONTROL MEASURES FOR DEVELOPMENT PLANNING AND CONSTRUCTION ACTIVITIES

(A) **Objective**. The provisions of this section contain requirements for construction activities and facility operations of Development and Redevelopment projects to comply with the current "Municipal NPDES permit," lessen the water quality impacts of development by using smart growth practices, and integrate LID design principles to mimic predevelopment hydrology through infiltration, evapotranspiration and rainfall harvest and use. LID shall be inclusive of SUSMP requirements.

(B) **Scope.** This Section contains requirements for stormwater pollution control measures in Development and Redevelopment projects and authorizes the City of Bradbury to further define and adopt stormwater pollution control measures, develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies, grant waivers from the requirements of the Standard Urban Stormwater Mitigation Plan, and collect funds for projects that are granted waivers. Except as otherwise provided herein, the City of Bradbury shall administer, implement and enforce the provisions of this Section.

(C) Applicability. The following Development and Redevelopment projects, termed "Planning Priority Projects," shall comply with the requirements of [SECTION NUMBER]:

(1) All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.

(2) Industrial parks 10,000 square feet or more of surface area.

(3) Commercial malls 10,000 square feet or more of surface area.

(4) Retail gasoline outlets with 5,000 square feet or more of surface area.

(5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of surface area.

(6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.

(7) Streets and roads construction of 10,000 square feet or more of impervious surface area.

(8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) 5,000 square feet or more of surface area.

(9) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:

a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and

b. Create 2,500 square feet or more of impervious surface area

(10) Single-family hillside homes.

(11) Redevelopment Projects

a. Land disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on Planning Priority Project categories.

b. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.

c. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire development.

d. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

e. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

(D) Effective Date. The Planning and Land Development requirements contained in Section 7 of Order No. R4-2012-0175 shall become effective 90 days from the adoption of the Order (February 6, 2013). This includes Planning Priority Projects that are discretionary permit projects or project phases that have not been deemed complete for processing, or discretionary permit projects without vesting tentative maps that have not requested and received an extension of previously granted approvals within 90 days of adoption of the Order. Projects that have been deemed complete within 90 days of adoption of the Order are not subject to the requirements Section 7.

(E) Stormwater Pollution Control Requirements. The Site for every Planning Priority Project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

(1) A new single-family hillside home development shall include mitigation measures to:

a. Conserve natural areas;

b. Protect slopes and channels;

c. Provide storm drain system stenciling and signage;

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

e. Direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

(2) Street and road construction of 10,000 square feet or more of impervious surface shall follow USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets (December 2008 EPA-833-F-08-009) to the maximum extent practicable.

(3) The remainder of Planning Priority Projects shall prepare a LID Plan to comply with the following:

a. Retain stormwater runoff onsite for the Stormwater Quality Design Volume (SWQDv) defined as the runoff from:

   i. The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or

   ii. The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

b. Minimize hydromodification impacts to natural drainage systems as defined in the Municipal NPDES Permit. Hydromodification requirements are further specified in [NAME OF POST-CONSTRUCITON BMP HANDBOOK].

c. When, as determined by the [APPROVING AGENCY(City of Bradbury?)], 100 percent onsite retention of the SWQDv is technically infeasible, partially or fully, the infeasibility shall be demonstrated in the submitted LID Plan. The technical infeasibility may result from conditions that may include, but are not limited to:

   i. The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.

   ii. Locations where seasonal high groundwater is within five to ten feet of surface grade;

   iii. Locations within 100 feet of a groundwater well used for drinking water;

   iv. Brownfield development sites or other locations where pollutant mobilization is a documented concern;

   v. Locations with potential geotechnical hazards;

   vi. Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.

d. If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in the Municipal NPDES Permit.

   i. Additional alternative compliance options such as offsite infiltration may be available to the project Site. The project Site should contact the [APPROVING AGENCY(City of Bradbury?)] to determine eligibility. Alternative compliance options are further specified in [NAME OF POST-CONSTRUCITON BMP HANDBOOK].

e. The remaining SWQDv that cannot be retained or biofiltered onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required per the Municipal NPDES Permit. Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

   i. 0.2 inches per hour, or
   ii. The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

f. A Multi-Phased Project may comply with the standards and requirements of this section for all of its phases by: (a) designing a system acceptable to the [APPROVING AGENCY] to satisfy these standards and requirements for the entire Site during the first phase, and (b) implementing these standards and requirements for each phase of Development or Redevelopment of the Site during the first phase or prior to commencement of construction of a later phase, to the extent necessary to treat the stormwater from such later phase. For purposes of this section, “Multi-Phased Project” shall mean any Planning Priority Project implemented over more than one phase and the Site of a Multi-Phased Project shall include any land and water area designed and used to store, treat or manage stormwater runoff in connection with the Development or Redevelopment, including any tracts, lots, or parcels of real property, whether Developed or not, associated with, functionally connected to, or under common ownership or control with such Development or Redevelopment.

~~**(E) Other Agencies of the City of Bradbury.** All City of Bradbury departments, offices, entities and agencies, shall establish administrative procedures necessary to implement the provisions of this Article on their Development and Redevelopment projects and report their activities annually to the [REPSONSIBLE AGENCY].~~

(F) Validity. If any provision of this Ordinance is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect remaining provisions of this Ordinance are declared to be severable.

(G) Certification. The City Clerk shall certify to the passage of this ordinance and have it published in accordance with Council policy.

PASSED, APPROVED, AND ADOPTED this XX day of XX, 2013.

____
MAYOR

ATTEST:

I, Claudia Saldana, City Clerk of the City of Bradbury, do hereby certify that the foregoing ordinance, being Ordinance No. XXX, was duly passed by the City Council of the City of Bradbury, signed by the Mayor of said City, and attested by the City Clerk, all at a regular meeting of the City Council held on the XXth day of XX, 2013, that it was duly posted and that the same was passed and adopted by the following vote:

AYES:
NAYS:
ABSENT:

Claudia Saldana
CITY CLERK

APPROVED AS TO FORM:

Cary Reisman
CITY ATTORNEY

City of Duarte

City of Duarte

1600 Huntington Drive, Duarte, CA 91010 - (626) 357-7931 - FAX (626) 358-0018

ORDINANCE NO.________________________

An ordinance amending [MUNICIPAL CODE SECTION REFERENCE(S)] of the ~~[CITY NAME]~~City of Duarte Municipal Code to expand the applicability of the existing ~~[NAME OF POST CONSTRUCITON REQUIREMENTS – LIKELY "SUSMP" FOR MOST MUNICIPALITIES]~~STORMWATER AND URBAN RUNOFF POLLUTION CONTROL requirements by imposing Low Impact Development (LID) strategies on projects that require building permits and/or encroachment permits.

Findings.

(A) The ~~[CITY NAME]~~City of Duarte is authorized by Article XI, §5 and §7 of the State Constitution to exercise the police power of the State by adopting regulations to promote public health, public safety and general prosperity.

(B) The ~~[CITY NAME]~~City of Duarte has authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity which might degrade the quality of waters of the State.

(C) The city is a permittee under the "Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4," issued by the California Regional Water Quality Control Board--Los Angeles Region," (Order No. R4-2012-0175) which also serves as an NPDES Permit under the Federal Clean Water Act (NPDES No. CAS004001), as well as Waste Discharge Requirements under California law (the "Municipal NPDES permit"). In order to participate in a Watershed Management Program and/or Enhanced Watershed Management Program, the Municipal NPDES permit requires permittees to develop and implement a LID Ordinance.

(D) The ~~[CITY NAME]~~ City of Duarte has applied an integrated approach to incorporate wastewater, stormwater and runoff, and recycled water management into a single strategy through its Integrated Resources Plan.

(E) The ~~[CITY NAME]~~City of Duarte is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental, social, and economic considerations.

(F) Urbanization has led to increased impervious surface areas resulting in increased water runoff causing the transport of pollutants to downstream receiving waters.

(G) The ~~[CITY NAME]~~City of Duarte needs to take a new approach to managing rainwater and urban runoff while mitigating the negative impacts of development and urbanization.

(H) LID is widely recognized as a sensible approach to managing the quantity and quality of storm water and non-stormwater runoff by setting standards and practices to maintain or restore the natural hydrologic character of a development site, reduce off-site runoff, improve water quality, and provide groundwater recharge.

(I) It is the intent of the ~~[CITY NAME]~~ City of Duarte to replace the existing Standard Urban Stormwater Mitigation Plan (SUSMP) requirements by providing stormwater and rainwater LID strategies for Development and Redevelopment projects as defined under "Applicability." Where there are conflicts between this Ordinance and previously adopted SUSMP or LID Manuals, the standards in this Ordinance shall prevail.

[MUNICIPAL CODE SECTION REFERENCE(S)] of the ~~[CITY NAME]~~City of Duarte Municipal Code is amended in its entirety to read as follows:

Definitions.

Except as specifically provided herein, any term used in this [SECTION REFERENCE] shall be defined as that term in the current Municipal NPDES permit, or if it is not specifically defined in either the Municipal NPDES permit, then as such term is defined in the Federal Clean Water Act, as amended, and/or the regulations promulgated thereunder. If the definition of any term contained in this chapter conflicts with the definition of the same term in the current Municipal NPDES permit, then the definition contained in the Municipal NPDES permit shall govern. The following words and phrases shall have the following meanings when used in this chapter:

Automotive Service Facility means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to stormwater (Source: Order No. R4-2012-0175).

Basin Plan means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments (Source: Order No. R4-2012-0175).

Best Management Practice (BMP) means practices or physical devices or systems designed to prevent or reduce pollutant loading from stormwater or non-stormwater discharges to receiving waters, or designed to reduce the volume of stormwater or non-stormwater discharged to the receiving water (Source: Order No. R4-2012-0175).

Biofiltration means a LID BMP that reduces stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration. Incidental infiltration is an important factor in achieving the required pollutant load reduction. Therefore, the term "biofiltration" as used in this Ordinance is defined to include only systems designed to facilitate incidental infiltration or achieve the equivalent pollutant reduction as biofiltration BMPs with an underdrain (subject to approval by the Regional Board's Executive Officer). Biofiltration BMPs include bioretention systems with an underdrain and bioswales (Modified from: Order No. R4-2012-0175).

Bioretention means a LID BMP that reduces stormwater runoff by intercepting rainfall on vegetative canopy, and through evapotranspiration and infiltration. The bioretention system typically includes a minimum 2-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. As defined in the Municipal NPDES permit, a bioretention BMP may be designed with an overflow drain, but may not include an underdrain. When a bioretention BMP is designed or constructed with an underdrain it is regulated by the Municipal NPDES permit as biofiltration (Modified from: Order No. R4-2012-0175).

Bioswale means a LID BMP consisting of a shallow channel lined with grass or other dense, low-growing vegetation. Bioswales are designed to collect stormwater runoff and to achieve a uniform sheet flow through the dense vegetation for a period of several minutes (Source: Order No. R4-2012-0175).

City means the ~~[CITY NAME].~~City of Duarte

Clean Water Act (CWA) means the Federal Water Pollution Control Act enacted in 1972, by Public Law 92-500, and amended by the Water Quality Act of 1987. The Clean Water Act prohibits the discharge of pollutants to Waters of the United States unless the discharge is in accordance with an NPDES permit.

Commercial Malls means any development on private land comprised of one or more buildings forming a complex of stores which sells various merchandise, with interconnecting walkways enabling visitors to easily walk from store to store, along with parking area(s). A commercial mall includes, but is not limited to: mini-malls, strip malls, other retail complexes, and enclosed shopping malls or shopping centers (Source: Order No. R4-2012-0175).

Construction Activity means any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that result in land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility. See "Routine Maintenance" definition for further explanation. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage by the State of California General Permit for Storm Water Discharges Associated with Industrial Activities or for Stormwater Discharges Associated with Construction Activities is required if more than one acre is disturbed or the activities are part of a larger plan (Source: Order No. R4-2012-0175).

Control means to minimize, reduce or eliminate by technological, legal, contractual, or other means, the discharge of pollutants from an activity or activities (Source: Order No. R4-2012-0175).

Development means construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail, and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

Directly Adjacent means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area (Source: Order No. R4-2012-0175).

Discharge means any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid, or solid substance.

Disturbed Area means an area that is altered as a result of clearing, grading, and/or excavation (Source: Order No. R4-2012-0175).

Flow-through BMPs means modular, vault type "high flow biotreatment" devices contained within an impervious vault with an underdrain or designed with an impervious liner and an underdrain (Modified from: Order No. R4-2012-0175).

General Construction Activities Storm Water Permit (GCASP) means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from construction activities under certain conditions.

General Industrial Activities Storm Water Permit (GIASP) means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from certain industrial activities under certain conditions.

Green Roof means a LID BMP using planter boxes and vegetation to intercept rainfall on the roof surface. Rainfall is intercepted by vegetation leaves and through evapotranspiration. Green roofs may be designed as either a bioretention BMP or as a biofiltration BMP. To receive credit as a bioretention BMP, the green roof system planting medium shall be of sufficient depth to provide capacity within the pore space volume to contain the design storm depth and may not be designed or constructed with an underdrain (Source: Order No. R4-2012-0175).

Hazardous Material(s) means any material(s) defined as hazardous by Division 20, Chapter 6.95 of the California Health and Safety Code.

Hillside means a property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes (Source: Order No. R4-2012-0175).

Hydromodification means the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation. (Source: GCASP)

Impervious Surface means any man-made or modified surface that prevents or significantly reduces the entry of water into the underlying soil, resulting in runoff from the surface in greater quantities and/or at an increased rate, when compared to natural conditions prior to development. Examples of places that commonly exhibit impervious surfaces include parking lots, driveways, roadways, storage areas, and rooftops. The imperviousness of these areas commonly results from paving, compacted gravel, compacted earth, and oiled earth.

Industrial Park means land development that is set aside for industrial development. Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry (Source: Order No. R4-2012-0175).

Infiltration BMP means a LID BMP that reduces stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Examples of infiltration BMPs include infiltration basins, dry wells, and pervious pavement (Source: Order No. R4-2012-0175).

LID means Low Impact Development. LID consists of building and landscape features designed to retain or filter stormwater runoff (Source: Order No. R4-2012-0175).

MS4 means Municipal Separate Storm Sewer System (MS4). The MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a combined sewer; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

(40 CFR § 122.26(b)(8)) (Source: Order No. R4-2012-0175).

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405. The term includes an "approved program" (Source: Order No. R4-2012-0175).

Natural Drainage System means a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system (Source: Order No. R4-2012-0175).

New Development means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision (Source: Order No. R4-2012-0175).

Non-Stormwater Discharge means any discharge to a municipal storm drain system that is not composed entirely of stormwater (Source: Order No. R4-2012-0175).

Parking Lot means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces (Source: Order No. R4-2012-0175).

Person means any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, state, governmental entity or any other legal entity, or their legal representatives, agents or assigns. The masculine gender shall include the feminine and the singular shall include the plural where indicated by the context.

Planning Priority Projects means development projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s) (Modified from: Order No. R4-2012-0175).

Pollutant means any "pollutant" defined in Section 502(6) of the Federal Clean Water Act or incorporated into the California Water Code Sec. 13373. Pollutants may include, but are not limited to the following:

(1) Commercial and industrial waste (such as fuels, solvents, detergents, plastic pellets, hazardous substances, fertilizers, pesticides, slag, ash, and sludge).

(2) Metals (such as cadmium, lead, zinc, copper, silver, nickel, chromium, and non-metals such as phosphorus and arsenic).

(3) Petroleum hydrocarbons (such as fuels, lubricants, surfactants, waste oils, solvents, coolants, and grease).

(4) Excessive eroded soil, sediment, and particulate materials in amounts that may adversely affect the beneficial use of the receiving waters, flora, or fauna of the State.

(5) Animal wastes (such as discharge from confinement facilities, kennels, pens, recreational facilities, stables, and show facilities).

(6) Substances having characteristics such as pH less than 6 or greater than 9, or unusual coloration or turbidity, or excessive levels of fecal coliform, or fecal streptococcus, or enterococcus.

Project means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065) (Source: Order No. R4-2012-0175).

Rainfall Harvest and Use means a LID BMP system designed to capture runoff, typically from a roof but can also include runoff capture from elsewhere within the site, and to provide for temporary storage until the harvested water can be used for irrigation or non-potable uses. The harvested water may also be used for potable water uses if the system includes disinfection treatment and is approved for such use by the local building department (Source: Order No. R4-2012-0175).

Receiving Water means "water of the United States" into which waste and/or pollutants are or may be discharged (Source: Order No. R4-2012-0175).

Redevelopment means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

Regional Board means the California Regional Water Quality Control Board, Los Angeles Region.

Restaurant means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812) (Source: Order No. R4-2012-0175).

Retail Gasoline Outlet means any facility engaged in selling gasoline and lubricating oils (Source: Order No. R4-2012-0175).

Routine Maintenance
Routine maintenance projects include, but are not limited to projects conducted to:

1. Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.
2. Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
3. Includes road shoulder work, regrading dirt or gravel roadways and shoulders and performing ditch cleanouts.
4. Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
5. Repair leaks

Routine maintenance does not include construction of new** lines or facilities resulting from
compliance with applicable codes, standards and regulations.
* Update existing lines includes replacing existing lines with new materials or pipes.
** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines (Source: Order No. R4-2012-0175).

Significant Ecological Areas (SEAs) means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan. Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.
2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.

3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.
4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
6. Areas important as game species habitat or as fisheries.
7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
8. Special areas (Source: Order No. R4-2012-0175).

Site means land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity (Source: Order No. R4-2012-0175).

Storm Drain System means any facilities or any part of those facilities, including streets, gutters, conduits, natural or artificial drains, channels, and watercourses that are used for the purpose of collecting, storing, transporting or disposing of stormwater ~~and are located within the [CITY NAME]~~.

Storm Water or Stormwater means water that originates from atmospheric moisture (rain or snow) and that falls onto land, water, or other surfaces. Without any change in its meaning, this term may be spelled or written as one word or two separate words.

Stormwater Runoff means that part of precipitation (rainfall or snowmelt) which travels across a surface to the storm drain system or receiving waters.

SUSMP means the Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP was required as part of the previous Municipal NPDES Permit (Order No. 01-182, NPDES No. CAS004001) and required plans that designate best management practices (BMPs) that must be used in specified categories of development projects.

Urban Runoff means surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial, or industrial activities involving the use of potable and non-potable water.

[MUNICIPAL CODE SECTION REFERENCE(S)] is amended to read as follows:

SEC. [X]. STORMWATER POLLUTION CONTROL MEASURES FOR DEVELOPMENT PLANNING AND CONSTRUCTION ACTIVITIES

(A) Objective. The provisions of this section contain requirements for construction activities and facility operations of Development and Redevelopment projects to comply with the current "Municipal NPDES permit," lessen the water quality impacts of development by using smart growth practices, and integrate LID design principles to mimic predevelopment hydrology through infiltration, evapotranspiration and rainfall harvest and use. LID shall be inclusive of previously adopted SUSMP requirements.

(B) Scope. This Section contains requirements for stormwater pollution control measures in Development and Redevelopment projects and authorizes the ~~[CITY NAME]~~City of Duarte to further define and adopt stormwater pollution control measures, to develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies, and to grant waivers or alternate compliance as allowed by the Municipal NPDES permit and collect fees from projects granted exceptions. . Except as otherwise provided herein, the ~~[CITY NAME]~~City of Duarte shall administer, implement and enforce the provisions of this Section. Guidance documents supporting implementation of requirements in this Ordinance are hereby incorporated by reference, including SUSMP and LID Manuals.

(C) Applicability. The following Development and Redevelopment projects, termed "Planning Priority Projects," shall comply with the requirements of [SECTION NUMBER]:

(1) All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.

(2) Industrial parks 10,000 square feet or more of surface area.

(3) Commercial malls 10,000 square feet or more of surface area.

(4) Retail gasoline outlets with 5,000 square feet or more of surface area.

(5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of surface area.

(6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.

(7) Streets and roads construction of 10,000 square feet or more of impervious surface area.

(8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) 5,000 square feet or more of surface area.

(9) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:

a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and

b. Create 2,500 square feet or more of impervious surface area

(10) Single-family hillside homes.

(11) Redevelopment Projects

a. Land disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on Planning Priority Project categories.

b. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.

c. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire development.

d. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

e. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

(12) Any other project as deemed appropriate by the Director.

(D) Effective Date. The Planning and Land Development requirements contained in this Ordinance shall become effective XX days from the adoption of the Ordinance. This includes Planning Priority Projects that are discretionary permit projects or project phases that have not been deemed complete for processing, or discretionary permit projects without vesting tentative maps that have not requested and received an extension of previously granted approvals within 90 days of adoption of the Ordinance. Projects that have been deemed complete within 90 days of adoption of the Ordinance are not subject to the requirements of this Chapter.

(E) Stormwater Pollution Control Requirements. The Site for every Planning Priority Project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

(1) A new single-family hillside home development shall include mitigation measures to:

a. Conserve natural areas;

b. Protect slopes and channels;

c. Provide storm drain system stenciling and signage;

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

e. Direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

(2) Street and road construction of 10,000 square feet or more of impervious surface shall follow USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets (December 2008 EPA-833-F-08-009) to the maximum extent practicable.

(3) The remainder of Planning Priority Projects shall prepare a LID Plan to comply with the following:

a. Retain stormwater runoff onsite for the Stormwater Quality Design Volume (SWQDv) defined as the runoff from:

i. The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or

ii. The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

b. Minimize hydromodification impacts to natural drainage systems as defined in the Municipal NPDES Permit. Hydromodification requirements are further specified in [NAME OF POST-CONSTRUCITON BMP HANDBOOK].

c. When, as determined by the [APPROVING AGENCY], 100 percent onsite retention of the SWQDv is technically infeasible, partially or fully, the infeasibility shall be demonstrated in the submitted LID Plan. The technical infeasibility may result from conditions that may include, but are not limited to:

i. The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.

ii. Locations where seasonal high groundwater is within five to ten feet of surface grade;

iii. Locations within 100 feet of a groundwater well used for drinking water;

iv. Brownfield development sites or other locations where pollutant mobilization is a documented concern;

v. Locations with potential geotechnical hazards;

vi. Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.

d. If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in the Municipal NPDES Permit.

i. Additional alternative compliance options such as offsite infiltration may be available to the project Site. The project Site should contact the [APPROVING AGENCY] to determine eligibility. Alternative compliance options are further specified in [NAME OF POST-CONSTRUCITON BMP HANDBOOK].

e. The remaining SWQDv that cannot be retained or biofiltered onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required per the Municipal NPDES Permit. Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

   i. 0.2 inches per hour, or
   ii. The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

f. A Multi-Phased Project may comply with the standards and requirements of this section for all of its phases by: (a) designing a system acceptable to the [APPROVING AGENCY] to satisfy these standards and requirements for the entire Site during the first phase, and (b) implementing these standards and requirements for each phase of Development or Redevelopment of the Site during the first phase or prior to commencement of construction of a later phase, to the extent necessary to treat the stormwater from such later phase. For purposes of this section, "Multi-Phased Project" shall mean any Planning Priority Project implemented over more than one phase and the Site of a Multi-Phased Project shall include any land and water area designed and used to store, treat or manage stormwater runoff in connection with the Development or Redevelopment, including any tracts, lots, or parcels of real property, whether Developed or not, associated with, functionally connected to, or under common ownership or control with such Development or Redevelopment.

(E) Other Agencies of the ~~[CITY NAME]~~City of Duarte. All ~~[CITY NAME]~~City of Duarte departments, offices, entities and agencies, shall establish administrative procedures necessary to implement the provisions of this Article on their Development and Redevelopment projects and report their activities annually to the [REPSONSIBLE AGENCY].

(F) Validity. If any provision of this Ordinance is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect remaining provisions of this Ordinance are declared to be severable.

(G) Certification. The City Clerk shall certify to the passage of this ordinance and have it published in accordance with Council policy.

I hereby certify that this ordinance was passed by the Council of the ~~[CITY NAME]~~City of Duarte, at its meeting of ______________________.

[NAME], City Clerk

By ______________________________________ Deputy

Approved ___________________________ ____________________________________ Mayor

Approved as to Form and Legality
[NAME], City Attorney

By ____
[NAME]
Deputy City Attorney

Date _______________________________

File No. ___________________________

MEMORANDUM

To: MS4 NPDES Permit File

From: Rafael Casillas, P.E., Public Works Manager

Date: June 26, 2013

Subject: Draft Low Impact Development Ordinance and Draft Green Streets Policy

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The Director of Community Development, City Engineer and Public Works Manager reviewed and discussed the template Draft Low Impact Development (LID) Ordinance and Draft Green Streets Policy that was developed by Larry Walker and Associates on behalf of the Los Angeles Permit Group. The Los Angeles Permit Group members are seeking clarification from the Regional Board staff on the deadline for applicability and final Ordinance and Policy adoption. The proposed LID Ordinance and Green Streets Policy implementation will be incorporated into the Municipal Code.

City of Duarte

1600 Huntington Drive, Duarte, CA 91010 - (626) 357-7931 - FAX (626) 358-0018

Green Street Policy (DRAFT)

Purpose

The City of Duarte Departm[illegible] Community Developme[illegible]nt green street BMPs for transportation corridors as [illegible] new and red[illegible]et and roadway projects, including Capital Improve[illegible]acted to demonstrate compliance with the NPDES MS4 Permit fo[illegible]geles R[illegible]No. R4-2012-0175).

Green streets are an amenity that provides ma[illegible]s including water quality improvement, groundwater replenishment, creation of attr[illegible]capes, creation of parks and wildlife habitats, and pedestrian and bicycle acc[illegible]re defined as right-of-way areas that incorporate infiltration, biofil[illegible]se BMPs to collect, retain, or detain stormwater runoff as wel[illegible]es attractive streetscapes.

Policy

A. Application. T[illegible]ent of Commu[illegible]lopment shall require new development and/or redev[illegible]reets and roadw[illegible]ts and CIP projects conducted within the right-of-way [illegible]tation corridors t[illegible]ate green street BMPs. Transportation corridors pro[illegible]adway projects [illegible]t least 10,000 square feet of impervious surface. Rou[illegible]nance or repair [illegible] utility pro[illegible]e excluded from these requirements[illegible]aintenance inc[illegible]y seals, [illegible]nd reconstruction of the road or street [illegible]iginal line an[illegible]e mainta[illegible]

B. Amenities. The De[illegible]ities to replenish groundwater[illegible]e habitats, and provide pedestrian and bic[illegible]edevelopment of streets and roadway projects and CIPs.

C. Guidance. The Department of Community Development sh[illegible] City of Los Angeles Green Streets guidance, USEPA's *Managing Wet Weather wi[illegible]een Infrastructure Municipal Handbook: Green Streets*[1], or equivalent guidance developed by the Department of Community Development for use in public and private developments.

D. Retrofit Scope. The Department of Community Development shall use the City's Watershed Management Program or Enhanced Watershed Management Program to identify opportunities

[1] EPA-833-F-08-009, December 2008.

for green street BMP retrofits. Final decisions regarding implementation will be determined by the City Engineer based on the availability of adequate funding.

E. Training. The Department of Community Development shall incorporate aspects of green streets into internal annual staff trainings.

City of MONROVIA
Department of Public Works

1887

CITY OF MONROVIA

File No. X.XX
Administrative Policy

Subject: GREEN STREETS POLICY **(DRAFT)**

Effective Date: **TBD**

I. POLICY OBJECTIVE

The City of Monrovia provides that the City of Monrovia shall *require the implementation of* green street BMPs for transportation corridors associated with new and redevelopment streets, shall implement green street BMPs for transportation corridors associated with roadway projects, including Capital Improvement Projects (CIPs). This policy is enacted to demonstrate compliance with the NPDES MS4 Permit for the Los Angeles Region (Order No. R4-2012-0175).

Green streets are an amenity that provides many benefits including water quality improvement, groundwater replenishment, creation of attractive streetscapes, creation of parks and wildlife habitats, and pedestrian and bicycle accessibility. Green streets are defined as right-of-way areas that incorporate infiltration, biofiltration, and/or storage and use BMPs to collect, retain, or detain stormwater runoff as well as a design element that creates attractive streetscapes.

II. AUTHORITY

Green Streets Policy as adopted by the City Council

III. ASSIGNED RESPOSIBILITIES

600 South Mountain Avenue, Monrovia, California 91016-3611 • (626) 932-5575 • FAX (626) 932-5559

The *Department of Public Works* shall condition projects pertaining to new and redevelopment of transportation corridors to implement green street BMPs. These project conditional shall apply to privately developed new and redevelopment streets. Additionally, the Department of Public Works shall ensure that green street BMPs for transportation corridors associated with roadway projects, including Capital Improvement Projects (CIPs), are implemented.

IV. APPLICABILITY

TBD

The Department of Public Works shall require new development and/or redevelopment streets and roadway projects and CIP projects conducted within the right-of-way of transportation corridors to incorporate green street BMPs. Transportation corridors projects are *major arterials as defined in the City's General Plan* which add at least 10,000 square feet of impervious surface. Routine maintenance or repair and linear utility projects are excluded from these requirements. Routine maintenance includes slurry seals, repaving, and reconstruction of the road or street where the original line and grade are maintained.

V. POLICY

A. The *Department of Public Works* shall consider opportunities to replenish groundwater, create attractive streetscapes, create parks and wildlife habitats, and provide pedestrian and bicycle accessibility through new development and redevelopment of streets and roadway projects and CIPs.

B. The *Department of Public Works and Department of Community* Development shall use the City of Los Angeles Green Streets guidance, USEPA's *Managing Wet Weather with Green Infrastructure Municipal Handbook: Green Streets*[1], or equivalent guidance developed by the City] for use in public and private developments.

C. The *Department of Public Works and Department of Community* shall use the City's Watershed Management Program or Enhanced Watershed Management Program to identify opportunities for green street BMP retrofits. Final decisions regarding implementation will be determined by the *Director of Public Works* based on the availability of adequate funding.

D. The *Department of Public Works* shall incorporate aspects of green streets into internal annual staff trainings.

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[1] EPA-833-F-08-009, December 2008.

DRAFT

***Items highlighted in grey are optional clauses**

ORDINANCE NO. 201X-XX

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF MONROVIA, CALIFORNIA AMENDING CHAPTER 12.36 OF TITLE 12 (STORMWATER AND URBAN RUNOFF POLLUTION CONTROL) OF THE MONROVIA MUNICIPAL CODE ESTABLISHING LOW IMPACT DEVELOPMENT REQUIREMENTS FOR NEW AND REDEVELOPED PROPERTIES

THE CITY COUNCIL OF THE CITY OF MONROVIA, CALIFORNIA does ordain as follows:

SECTON 1. Chapter 12.36 of Title 12 of the Monrovia Municipal Code is hereby amended by adding the following findings to Sections 12.36.020 as follows:

(H) The City of Monrovia is authorized by Article XI, §5 and §7 of the State Constitution to exercise the police power of the State by adopting regulations to promote public health, public safety and general prosperity.

(I) The City of Monrovia has authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity which might degrade the quality of waters of the State.

(J) The city is a permittee under the "Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4," issued by the California Regional Water Quality Control Board--Los Angeles Region," (Order

600 South Mountain Avenue, Monrovia, California 91016-3611 • (626) 932-5575 • FAX (626) 932-5559

No. R4-2012-0175) which also serves as an NPDES Permit under the Federal Clean Water Act (NPDES No. CAS004001), as well as Waste Discharge Requirements under California law (the "Municipal NPDES permit"). In order to participate in a Watershed Management Program and/or Enhanced Watershed Management Program, the Municipal NPDES permit requires permittees to develop and implement a LID Ordinance.

(K) The City of Monrovia has applied an integrated approach to incorporate wastewater, stormwater and runoff, and recycled water management into a single strategy through its Integrated Resources Plan.

(L) The City of Monrovia is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental, social, and economic considerations.

(M) Urbanization has led to increased impervious surface areas resulting in increased water runoff causing the transport of pollutants to downstream receiving waters.

(N) The City of Monrovia needs to take a new approach to managing rainwater and urban runoff while mitigating the negative impacts of development and urbanization.

(O) LID is widely recognized as a sensible approach to managing the quantity and quality of storm water and non-stormwater runoff by setting standards and practices to maintain or restore the natural hydrologic character of a development site, reduce off-site runoff, improve water quality, and provide groundwater recharge.

(P) It is the intent of the City of Monrovia to replace the existing Standard Urban Stormwater Mitigation Plan (SUSMP) requirements by providing stormwater and rainwater LID strategies for Development and Redevelopment projects as defined under "Applicability." Where there are conflicts between this Ordinance and previously adopted SUSMP or LID Manuals, the standards in this Ordinance shall prevail.

SECTON 2. Chapter 12.36 of Title 12 of the Monrovia Municipal Code is hereby amended by amending the following definitions to Sections 12.36.040 as follows:
Except as specifically provided herein, any term used in this [SECTION REFERENCE] shall be defined as that term in the current Municipal NPDES permit, or if it is not specifically defined in either the Municipal NPDES permit, then as such term is defined in the Federal Clean Water Act, as amended, and/or the regulations promulgated thereunder. If the definition of any term contained in this chapter conflicts with the definition of the same term in the current Municipal NPDES permit, then the definition contained in the Municipal NPDES permit shall govern. The following words and phrases shall have the following meanings when used in this chapter:

AUTOMOTIVE SERVICE FACILITY. A facility that is categorized in any one of the following Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to stormwater (Source: Order No. R4-2012-0175).

BEST MANAGEMENT PRACTICE (BMP). Practices or physical devices or systems designed to prevent or reduce pollutant loading from stormwater or non-stormwater discharges to receiving waters, or designed to reduce the volume of stormwater or non-stormwater discharged to the receiving water (Source: Order No. R4-2012-0175).

REPLACE "CONSTRUCTION" WITH "CONSTRUCTION ACTIVITY". Any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that result in land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility. See "Routine Maintenance" definition for further explanation. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage by the State of California General Permit for Storm Water Discharges Associated with Industrial Activities or for Stormwater Discharges Associated with Construction Activities is required if more than one acre is disturbed or the activities are part of a larger plan (Source: Order No. R4-2012-0175).

POLLUTANT. Any "pollutant" defined in Section 502(6) of the Federal Clean Water Act or incorporated into the California Water Code Sec. 13373. Pollutants may include, but are not limited to the following:

(1) Commercial and industrial waste (such as fuels, solvents, detergents, plastic pellets, hazardous substances, fertilizers, pesticides, slag, ash, and sludge).

(2) Metals (such as cadmium, lead, zinc, copper, silver, nickel, chromium, and non- metals such as phosphorus and arsenic).

(3) Petroleum hydrocarbons (such as fuels, lubricants, surfactants, waste oils, solvents, coolants, and grease).

(4) Excessive eroded soil, sediment, and particulate materials in amounts that may adversely affect the beneficial use of the receiving waters, flora, or fauna of the State.

(5) Animal wastes (such as discharge from confinement facilities, kennels, pens, recreational facilities, stables, and show facilities).

(6) Substances having characteristics such as pH less than 6 or greater than 9, or unusual coloration or turbidity, or excessive levels of fecal coliform, or fecal streptococcus, or enterococcus.

(7) ??? Need to check on revision to #7

DEVELOPMENT. Construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail, and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

DISCHARGE. Any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid, or solid substance.

PLANNING PRIORITY PROJECTS. Development projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s) (Modified from: Order No. R4-2012-0175).

PROJECT. All development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065) (Source: Order No. R4-2012-0175).

REDEVELOPMENT. Land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

STANDARD URBAN STORM WATER MITIGATION PLAN OR SUSMP. The Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP was required as part of the previous Municipal NPDES Permit (Order No. 01-182, NPDES No. CAS004001) and required plans that designate best management practices (BMPs) that must be used in specified categories of development projects.

URBAN RUNOFF. Surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial, or industrial activities involving the use of potable and non-potable water.

STORMWATER RUNOFF. That part of precipitation (rainfall or snowmelt) which travels across a surface to the storm drain system or receiving waters.

SECTON 3. Chapter 12.36 of Title 12 of the Monrovia Municipal Code is hereby amended by adding the following definitions to Sections 12.36.040 as follows:

BASIN PLAN. The Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments (Source: Order No. R4-2012-0175).

BIOFILTRATION. A LID BMP that reduces stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration. Incidental infiltration is an important factor in achieving the required pollutant load reduction. Therefore, the term "biofiltration" as used in this Ordinance is defined to include only systems designed to facilitate incidental infiltration or achieve the equivalent pollutant reduction as biofiltration BMPs with an underdrain (subject to approval by the Regional Board's Executive Officer). Biofiltration BMPs include bioretention systems with an underdrain and bioswales (Modified from: Order No. R4-2012-0175).

BIORETENTION. A LID BMP that reduces stormwater runoff by intercepting rainfall on vegetative canopy, and through evapotranspiration and infiltration. The bioretention system typically includes a minimum 2-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. As defined in the Municipal

NPDES permit, a bioretention BMP may be designed with an overflow drain, but may not include an underdrain. When a bioretention BMP is designed or constructed with an underdrain it is regulated by the Municipal NPDES permit as biofiltration (Modified from: Order No. R4-2012-0175).

BIOSWALE. A LID BMP consisting of a shallow channel lined with grass or other dense, low-growing vegetation. Bioswales are designed to collect stormwater runoff and to achieve a uniform sheet flow through the dense vegetation for a period of several minutes (Source: Order No. R4-2012-0175).

~~**City** means the City of Monrovia.~~

CLEAN WATER ACT (CWA). The Federal Water Pollution Control Act enacted in 1972, by Public Law 92-500, and amended by the Water Quality Act of 1987. The Clean Water Act prohibits the discharge of pollutants to Waters of the United States unless the discharge is in accordance with an NPDES permit.

COMMERCIAL MALLS. Any development on private land comprised of one or more buildings forming a complex of stores which sells various merchandise, with interconnecting walkways enabling visitors to easily walk from store to store, along with parking area(s). A commercial mall includes, but is not limited to: mini-malls, strip malls, other retail complexes, and enclosed shopping malls or shopping centers (Source: Order No. R4-2012-0175).

~~**Control** means to minimize, reduce or eliminate by technological, legal, contractual, or other means, the discharge of pollutants from an activity or activities (Source: Order No. R4-2012-0175).~~

~~**Directly Adjacent** means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area (Source: Order No. R4-2012-0175).~~

~~**Disturbed Area** means an area that is altered as a result of clearing, grading, and/or excavation (Source: Order No. R4-2012-0175).~~

FLOW-THROUGH BMPS. Modular, vault type "high flow biotreatment" devices contained within an impervious vault with an underdrain or designed with an impervious liner and an underdrain (Modified from: Order No. R4-2012-0175).

GENERAL CONSTRUCTION ACTIVITIES STORM WATER PERMIT (GCASP). The general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from construction activities under certain conditions.

GENERAL INDUSTRIAL ACTIVITIES STORM WATER PERMIT (GIASP). The general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from certain industrial activities under certain conditions.

GREEN ROOF. A LID BMP using planter boxes and vegetation to intercept rainfall on the roof surface. Rainfall is intercepted by vegetation leaves and through evapotranspiration. Green roofs may be designed as either a bioretention BMP or as a biofiltration BMP. To receive credit as a bioretention BMP, the green roof system planting medium shall be of sufficient depth to provide capacity within the pore space volume to contain the design storm depth and may not be designed or constructed with an underdrain (Source: Order No. R4-2012-0175).

HAZARDOUS MATERIAL(S). Any material(s) defined as hazardous by Division 20, Chapter 6.95 of the California Health and Safety Code.

~~**Hillside** means a property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes (Source: Order No. R4-2012-0175).~~

HYDROMODIFICATION. The alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation. (Source: GCASP)

IMPERVIOUS SURFACE. Any man-made or modified surface that prevents or significantly reduces the entry of water into the underlying soil, resulting in runoff from the surface in greater quantities and/or at an increased rate, when compared to natural conditions prior to development. Examples of places that commonly exhibit impervious surfaces include parking lots, driveways, roadways, storage areas, and rooftops. The imperviousness of these areas commonly results from paving, compacted gravel, compacted earth, and oiled earth.

INDUSTRIAL PARK. Land development that is set aside for industrial development. Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry (Source: Order No. R4-2012-0175).

INFILTRATION BMP. A LID BMP that reduces stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Examples of infiltration BMPs include infiltration basins, dry wells, and pervious pavement (Source: Order No. R4-2012-0175).

LID. Low Impact Development. LID consists of building and landscape features designed to retain or filter stormwater runoff (Source: Order No. R4-2012-0175).

MS4. Municipal Separate Storm Sewer System (MS4). The MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

(ii) Designed or used for collecting or conveying stormwater;

(iii) Which is not a combined sewer; and

(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

(40 CFR § 122.26(b)(8)) (Source: Order No. R4-2012-0175)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES). The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405. The term includes an "approved program" (Source: Order No. R4-2012-0175).

NATURAL DRAINAGE SYSTEM. A drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system (Source: Order No. R4-2012-0175).

~~**New Development** means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision (Source: Order No. R4-2012-0175).~~

~~**Non-Stormwater Discharge** means any discharge to a municipal storm drain system that is not composed entirely of stormwater (Source: Order No. R4-2012-0175).~~

~~**Parking Lot** means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces (Source: Order No. R4-2012-0175).~~

PERSON. Any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, state, governmental entity or any other legal entity, or their legal representatives, agents or assigns. The masculine gender shall include the feminine and the singular shall include the plural where indicated by the context.

RAINFALL HARVEST AND USE. A LID BMP system designed to capture runoff, typically from a roof but can also include runoff capture from elsewhere within the site, and to provide for temporary storage until the harvested water can be used for irrigation or non-potable uses. The harvested water may also be used for potable water uses if the system includes disinfection treatment and is approved for such use by the local building department (Source: Order No. R4-2012-0175).

RECEIVING WATER . "Water of the United States" into which waste and/or pollutants are or may be discharged (Source: Order No. R4-2012-0175).

~~**Regional Board** means the California Regional Water Quality Control Board, Los Angeles Region.~~

~~**Restaurant** means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812) (Source: Order No. R4-2012-0175).~~

~~**Retail Gasoline Outlet** means any facility engaged in selling gasoline and lubricating oils (Source: Order No. R4-2012-0175).~~

ROUTINE MAINTENANCE. Routine maintenance projects include, but are not limited to projects conducted to:

1. Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.

2. Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.

3. Includes road shoulder work, regrading dirt or gravel roadways and shoulders and performing ditch cleanouts.

4. Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
5. Repair leaks

Routine maintenance does not include construction of new** lines or facilities resulting from compliance with applicable codes, standards and regulations.
* Update existing lines includes replacing existing lines with new materials or pipes.
** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines (Source: Order No. R4-2012-0175).

SIGNIFICANT ECOLOGICAL AREAS (SEAS). An area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan. Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.

2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.

3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.

4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.

5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.

6. Areas important as game species habitat or as fisheries.

7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.

8. Special areas (Source: Order No. R4-2012-0175).

~~**Site** means land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity (Source: Order No. R4-2012-0175).~~

STORM DRAIN SYSTEM. Any facilities or any part of those facilities, including streets, gutters, conduits, natural or artificial drains, channels, and watercourses that are used for the purpose of collecting, storing, transporting or disposing of stormwater and are located within the City of Monrovia.

STORM WATER OR STORMWATER. Water that originates from atmospheric moisture (rain or snow) and that falls onto land, water, or other surfaces. Without any change in its meaning, this term may be spelled or written as one word or two separate words.

SECTON 4. Chapter 12.36 of Title 12 of the Monrovia Municipal Code is hereby amended by adding a new Section 12.36.XXX:

"12.36.XXX. STORMWATER POLLUTION CONTROL MEASURES FOR DEVELOPMENT PLANNING AND CONSTRUCTION ACTIVITIES

(A) Objective. The provisions of this section contain requirements for construction activities and facility operations of Development and Redevelopment projects to comply with the current "Municipal NPDES permit," lessen the water quality impacts of development by using smart growth practices, and integrate LID design principles to mimic predevelopment hydrology through infiltration, evapotranspiration and rainfall harvest and use. LID shall be inclusive of previously adopted SUSMP requirements.

(B) Scope. This Section contains requirements for stormwater pollution control measures in Development and Redevelopment projects and authorizes the City of Monrovia to further define and adopt stormwater pollution control measures, to develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies, and to grant waivers or alternate compliance as allowed by the Municipal NPDES permit and collect fees from projects granted exceptions. . Except as otherwise provided herein, the City of Monrovia shall administer, implement and enforce the provisions of this Section. Guidance documents supporting implementation of requirements in this Ordinance are hereby incorporated by reference, including SUSMP and LID Manuals.

(C) Applicability. The following Development and Redevelopment projects, termed "Planning Priority Projects," shall comply with the requirements of [SECTION NUMBER]:

(1) All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.

(2) Industrial parks 10,000 square feet or more of surface area.

(3) Commercial malls 10,000 square feet or more of surface area.

(4) Retail gasoline outlets with 5,000 square feet or more of surface area.

(5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of surface area.

(6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.

(7) Streets and roads construction of 10,000 square feet or more of impervious surface area.

(8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) 5,000 square feet or more of surface area.

(9) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:

   a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and

   b. Create 2,500 square feet or more of impervious surface area

(10) Single-family hillside homes.

(11) Redevelopment Projects

   a. Land disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on Planning Priority Project categories.

   b. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.

   c. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire development.

   d. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

   e. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

(12) Any other project as deemed appropriate by the Director.

(D) Effective Date. The Planning and Land Development requirements contained in this Ordinance shall become effective XX days from the adoption of the Ordinance. This includes Planning Priority Projects that are discretionary permit projects or project phases that have not been deemed complete for processing, or discretionary permit projects without vesting tentative maps that have not requested and received an extension of previously granted approvals within 90 days of adoption of the Ordinance. Projects that have been deemed complete within 90 days of adoption of the Ordinance are not subject to the requirements of this Chapter.

(E) Stormwater Pollution Control Requirements. The Site for every Planning Priority Project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

(1) A new single-family hillside home development shall include mitigation measures to:

a. Conserve natural areas;

b. Protect slopes and channels;

c. Provide storm drain system stenciling and signage;

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

e. Direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

(2) Street and road construction of 10,000 square feet or more of impervious surface shall follow USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets (December 2008 EPA-833-F-08-009) to the maximum extent practicable.

(3) The remainder of Planning Priority Projects shall prepare a LID Plan to comply with the following:

a. Retain stormwater runoff onsite for the Stormwater Quality Design Volume (SWQDv) defined as the runoff from:

i. The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or

ii. The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

b. Minimize hydromodification impacts to natural drainage systems as defined in the Municipal NPDES Permit. Hydromodification requirements are further specified in [NAME OF POST-CONSTRUCITON BMP HANDBOOK].

c. When, as determined by the [APPROVING AGENCY], 100 percent onsite retention of the SWQDv is technically infeasible, partially or fully, the infeasibility shall be demonstrated in the submitted LID Plan. The technical infeasibility may result from conditions that may include, but are not limited to:

   i. The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.

   ii. Locations where seasonal high groundwater is within five to ten feet of surface grade;

   iii. Locations within 100 feet of a groundwater well used for drinking water;

   iv. Brownfield development sites or other locations where pollutant mobilization is a documented concern;

   v. Locations with potential geotechnical hazards;

   vi. Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.

d. If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in the Municipal NPDES Permit.

   i. Additional alternative compliance options such as offsite infiltration may be available to the project Site. The project Site should contact the [APPROVING AGENCY] to determine eligibility. Alternative compliance options are further specified in [NAME OF POST-CONSTRUCITON BMP HANDBOOK].

e. The remaining SWQDv that cannot be retained or biofiltered onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required per the Municipal NPDES Permit. Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

   i. 0.2 inches per hour, or
   ii. The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

f. A Multi-Phased Project may comply with the standards and requirements of this section for all of its phases by: (a) designing a system acceptable to the [APPROVING AGENCY] to satisfy these standards and requirements for the entire Site during the first phase, and (b) implementing these standards and requirements for each phase of Development or Redevelopment of the Site during the first phase or prior to commencement of construction of a later phase, to the extent necessary to treat the stormwater from such later phase. For purposes of this section, "Multi-Phased Project" shall mean any Planning Priority Project implemented over more than one phase and the Site of a Multi-Phased Project shall include any land and water area designed and used to store, treat or manage stormwater runoff in connection with the Development or Redevelopment, including any tracts, lots, or parcels of real property, whether Developed or not, associated with, functionally connected to, or under common ownership or control with such Development or Redevelopment.

(E) Other Agencies of the City of Monrovia. All City of Monrovia departments, offices, entities and agencies, shall establish administrative procedures necessary to implement the provisions of this Article on their Development and Redevelopment projects and report their activities annually to the [REPSONSIBLE AGENCY].

(F) Validity. If any provision of this Ordinance is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect remaining provisions of this Ordinance are declared to be severable.

SECTION X. Severability. If any section, subsection, subdivision, sentence, clause, phrase, or portion of this ordinance or the application thereof to any person or place, is for any reason held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remainder of this ordinance. The City Council hereby declares that it would have adopted this ordinance, and each and every section, subsection, subdivision, sentence, clause, phrase, or portion thereof, irrespective of the fact that any one or more sections, subsections, subdivisions, sentences, clauses, phrases, or portions thereof be declared invalid or unconstitutional.

SECTION X. The City Clerk shall certify to the passage of this ordinance and shall cause same to be published pursuant to state law within fifteen (15) days after its passage, and this ordinance shall become effective thirty (30) days after its passage.

INTRODUCED this Xst day of [MONTH] 201X.

PASSED, APPROVED, AND ADOPTED this Xst day of [MONTH] 201X. by the following vote:

AYES:
NOES:
ABSTAIN:
EXCUSED:

BY:

____

	Mary Ann Lutz, Mayor City of Monrovia
ATTEST:	**APPROVED AS TO FORM:**
Alice D. Atkins, CMC, City Clerk City of Monrovia	Craig A. Steele, City Attorney City of Monrovia

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES)
CITY OF MONROVIA)

I, ALICE D. ATKINS, CMC, City Clerk of the City of Monrovia, California, do hereby certify that the foregoing Ordinance No. 201X-XX authorizing the City Council to contract for residential solid waste, green waste and recyclable materials collection was duly adopted and passed at a regular meeting of the City Council on the Xth day of [MONTH] 201X by the following vote:

AYES:
NOES:
ABSTAIN:
EXCUSED:

ATTEST:

Alice D. Atkins, CMC, City Clerk
City of Monrovia

CITY OF MONROVIA

INTER-OFFICE MEMORANDUM

DATE: June 24, 2013

TO: MS4 NPDES Permit File

FROM: Heather Maloney, Senior Management Analyst

SUBJECT: **Draft Low Impact Development Ordinance and Draft Green Streets Policy Status**

This memo is to document that the Draft LID Ordinance and Draft Green Streets Policy have been review and discussed with key City staff. On May 7, 2013, I met with the following City Staff:

- Jun Cervantes, City Engineer
- Craig Jiminez, Planning Division Manager
- Brian O'Connor, Planning Management Analyst
- Sharon Gallant, Environemental Services Management Analyst

During the meeting, we reviewed the Template/Draft LID Ordinance and Draft Green Streets Policy language that was developed by Larry Walker and Associates on behlaf of the LA Permit Group. Furthermore, we discussed a rough Final Ordinance and Policy development timeline, potential coforming changes that would need to take place in other Municipal Code/General Plan sections, CEQA review, and technical consulting and legal assistance needed.

In June 2013, the Draft LID Ordinance and Draft Green Streets Policy was also dicussed with the contract engineer utilized by the City for plan reviews. He indicated he understod the drafts and requested clarification on when they would be implemented and applicable to new/redvelopement and streets projects. I told him that I along with several other LA Permit Group members were trying to seek clarification from Regional Board staff on this guideline as the deadline for applicability and final Ordinance/Policy adoption is not clearly called out in the MS4 Permit.

The Draft LID Ordinance and Draft Green Streets Policy have also been discussed with our Director of Public Works, City Manager and City Attorney's Office on several occasions.

City of Sierra Madre

Public Works Department
232 W. Sierra Madre Boulevard, Sierra Madre, CA 91024
phone 626.355.7135 fax 626.355.2251

DRAFT

Draft Green Streets Policy
6/25/2013

Green Street Policy

<u>Purpose</u>
The City of Sierra Madre's Department of Public Works shall implement green street BMPs for transportation corridors associated with new and redevelopment street and roadway projects, including Capital Improvement Projects (CIPs). This policy is enacted to demonstrate compliance with the NPDES MS4 Permit for the Los Angeles Region (Order No. R4-2012-0175).

Green streets are an amenity that provides many benefits including water quality improvement, groundwater replenishment, creation of attractive streetscapes, creation of parks and wildlife habitats, and pedestrian and bicycle accessibility. Green streets are defined as right-of-way areas that incorporate infiltration, biofiltration, and/or storage and use BMPs to collect, retain, or detain stormwater runoff as well as a design element that creates attractive streetscapes.

<u>Policy</u>

A. Application. The Department of Public Works shall require new development and/or redevelopment streets and roadway projects and CIP projects conducted within the right-of-way of transportation corridors to incorporate green street BMPs. Transportation corridors projects are major arterials as defined in the (add year, existing or updated) Sierra Madre General Plan which add at least 10,000 square feet of impervious surface. Routine maintenance or repair and linear utility projects are excluded from these requirements. Routine maintenance includes slurry seals, repaving, and reconstruction of the road or street where the original line and grade are maintained.

B. Amenities. The Department of Public Works shall consider opportunities to replenish groundwater, create attractive streetscapes, create parks and wildlife habitats, and provide pedestrian and bicycle accessibility through new development and redevelopment of streets and roadway projects and CIPs.

C. Guidance. The Department of Public Works shall use the City of Los Angeles Green Streets guidance, USEPA's *Managing Wet Weather with Green Infrastructure Municipal Handbook: Green Streets*[1], or equivalent guidance developed by the Department of Public Works for use in public and private developments.

D. Retrofit Scope. The Department of Public Works shall use the City's Watershed Management Program or Enhanced Watershed Management Program to identify opportunities for green street BMP retrofits. Final decisions regarding implementation will be determined by the Director of Public Works based on the availability of adequate funding.

E. Training. The Department of Public Works shall incorporate aspects of green streets into internal annual staff trainings.

[1] EPA-833-F-08-009, December 2008.

City of Sierra Madre

Public Works Department
232 W. Sierra Madre Boulevard, Sierra Madre, CA 91024
phone 626.355.7135   fax 626.355.2251

DRAFT

Draft Low Impact Development Ordinance
6/25/2013

ORDINANCE NO. XX-XX

An ordinance amending [MUNICIPAL CODE SECTION REFERENCE(S)] of the City of Sierra Madre Municipal Code to expand the applicability of the existing Sierra Madre Municipal Code sections 15.04.070 “Building Code and Permits - Stormwater retention”and Sierra Madre Municipal Code Chapter 7.04 “Stormwater Pollutant Elimination” requirements by imposing Low Impact Development (LID) strategies on projects that require building permits.

Findings.

(A) The City of Sierra Madre is authorized by Article XI, §5 and §7 of the State Constitution to exercise the police power of the State by adopting regulations to promote public health, public safety and general prosperity.

(B) The City of Sierra Madre has authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity which might degrade the quality of waters of the State.

(C) The city is a permittee under the “Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4,” issued by the California Regional Water Quality Control Board--Los Angeles Region,” (Order No. R4-2012-0175) which also serves as an NPDES Permit under the Federal Clean Water Act (NPDES No. CAS004001), as well as Waste Discharge Requirements under California law (the “Municipal NPDES permit”). In order to participate in a Watershed Management Program and/or Enhanced Watershed Management Program, the Municipal NPDES permit requires permittees to develop and implement a LID Ordinance.

(D) The City of Sierra Madre is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental and economic considerations.

(E) Urbanization has led to increased impervious surface areas resulting in increased water runoff and less percolation to groundwater aquifers causing the transport of pollutants to downstream receiving waters.

(F) The City of Sierra Madre seeks to update its approach to managing rainwater and urban runoff while mitigating the negative impacts of development and urbanization.

(G) LID is widely recognized as a sensible approach to managing the quantity and quality of stormwater runoff by setting standards and practices to maintain or restore the natural hydrologic character of a development site, reduce off-site runoff, improve water quality, and provide groundwater recharge.

(H) It is the intent of the City of Sierra Madre to expand the applicability of the existing Standard Urban Stormwater Mitigation Plan (SUSMP) requirements by providing stormwater and rainwater LID strategies for Development and Redevelopment projects as defined under "Applicability."

[MUNICIPAL CODE SECTION REFERENCE(S)] of the City of Sierra Madre Municipal Code is amended in its entirety to read as follows:

Definitions.

Except as specifically provided herein, any term used in this [SECTION REFERENCE] shall be defined as that term in the current Municipal NPDES permit, or if it is not specifically defined in either the Municipal NPDES permit, then as such term is defined in the Federal Clean Water Act, as amended, and/or the regulations promulgated thereunder. If the definition of any term contained in this chapter conflicts with the definition of the same term in the current Municipal NPDES permit, then the definition contained in the Municipal NPDES permit shall govern. The following words and phrases shall have the following meanings when used in this chapter:

Automotive Service Facility means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to stormwater (Source: Order No. R4-2012-0175).

Basin Plan means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments (Source: Order No. R4-2012-0175).

Best Management Practice (BMP) means practices or physical devices or systems designed to prevent or reduce pollutant loading from stormwater or non-stormwater discharges to receiving waters, or designed to reduce the volume of stormwater or non-stormwater discharged to the receiving water (Source: Order No. R4-2012-0175).

Best Management Practice (BMP) Manual means a manual identified to assist applicants with meeting the requirements of this chapter. The BMP Manual shall be selected by the City Engineer and may be updated, or replaced from time to time when additional qualified and available specifications are produced. The BMP Manual shall be available at the Development Services and Public Works Departments for public access.

Biofiltration means a LID BMP that reduces stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration. Incidental infiltration is an important factor in achieving the required pollutant load reduction. Therefore, the term "biofiltration" as used in this Ordinance is defined to include only systems designed to facilitate incidental infiltration or achieve the equivalent pollutant reduction as biofiltration BMPs with an underdrain (subject to approval by the Regional Board's Executive Officer). Biofiltration BMPs include bioretention systems with an underdrain and bioswales (Modified from: Order No. R4-2012-0175).

Bioretention means a LID BMP that reduces stormwater runoff by intercepting rainfall on vegetative canopy, and through evapotranspiration and infiltration. The bioretention system typically includes a minimum 2-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. As defined in the Municipal NPDES permit, a bioretention BMP may be designed with an overflow drain, but may not include an underdrain. When a bioretention BMP is designed or constructed with an underdrain it is regulated by the Municipal NPDES permit as biofiltration (Modified from: Order No. R4-2012-0175).

Bioswale means a LID BMP consisting of a shallow channel lined with grass or other dense, low-growing vegetation. Bioswales are designed to collect stormwater runoff and to achieve a uniform sheet flow through the dense vegetation for a period of several minutes (Source: Order No. R4-2012-0175).

City means the City of Sierra Madre.

Clean Water Act (CWA) means the Federal Water Pollution Control Act enacted in 1972, by Public Law 92-500, and amended by the Water Quality Act of 1987. The Clean Water Act prohibits the discharge of pollutants to Waters of the United States unless the discharge is in accordance with an NPDES permit.

Commercial Malls means any development on private land comprised of one or more buildings forming a complex of stores which sells various merchandise, with interconnecting walkways enabling visitors to easily walk from store to store, along with parking area(s). A commercial mall includes, but is not limited to: mini-malls, strip malls, other retail complexes, and enclosed shopping malls or shopping centers (Source: Order No. R4-2012-0175).

Construction Activity means any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that result in land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility. See “Routine Maintenance” definition for further explanation. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage by the State of California General Permit for Storm Water Discharges Associated with Industrial Activities or for Stormwater Discharges Associated with Construction Activities is required if more than one acre is disturbed or the activities are part of a larger plan (Source: Order No. R4-2012-0175).

Control means to minimize, reduce or eliminate by technological, legal, contractual, or other means, the discharge of pollutants from an activity or activities (Source: Order No. R4-2012-0175).

Development means construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail, and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include -- certain conditions.

Green Roof means a LID BMP using planter boxes and vegetation to intercept rainfall on the roof surface. Rainfall is intercepted by vegetation leaves and through evapotranspiration. Green roofs may be designed as either a bioretention BMP or as a biofiltration BMP. To receive credit as a bioretention BMP, the green roof system planting medium shall be of sufficient depth to provide capacity within the pore space volume to contain the design storm depth and may not be designed or constructed with an underdrain (Source: Order No. R4-2012-0175).

Hazardous Material(s) means any material(s) defined as hazardous by Division 20, Chapter 6.95 of the California Health and Safety Code.

Hillside means a property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes (Source: Order No. R4-2012-0175).

Impervious Surface means any man-made or modified surface that prevents or significantly reduces the entry of water into the underlying soil, resulting in runoff from the surface in greater quantities and/or at an increased rate, when compared to natural conditions prior to development. Examples of places that commonly exhibit impervious surfaces include parking lots, driveways, roadways, storage areas, and rooftops. The imperviousness of these areas commonly results from paving, compacted gravel, compacted earth, and oiled earth.

Industrial Park means land development that is set aside for industrial development. Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry (Source: Order No. R4-2012-0175).

Infiltration BMP means a LID BMP that reduces stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Examples of infiltration BMPs include infiltration basins, dry wells, and pervious pavement (Source: Order No. R4-2012-0175).

LID means Low Impact Development. LID consists of building and landscape features designed to retain or filter stormwater runoff (Source: Order No. R4-2012-0175).

MS4 means Municipal Separate Storm Sewer System (MS4). The MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a combined sewer; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

(40 CFR § 122.26(b)(8)) (Source: Order No. R4-2012-0175)

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA

§307, 402, 318, and 405. The term includes an "approved program" (Source: Order No. R4-2012-0175).

Natural Drainage System means a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system (Source: Order No. R4-2012-0175).

New Development means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision (Source: Order No. R4-2012-0175).

Non-Stormwater Discharge means any discharge to a municipal storm drain system that is not composed entirely of stormwater (Source: Order No. R4-2012-0175).

Parking Lot means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces (Source: Order No. R4-2012-0175).

Person means any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, state, governmental entity or any other legal entity, or their legal representatives, agents or assigns. The masculine gender shall include the feminine and the singular shall include the plural where indicated by the context.

Planning Priority Projects means development projects subject to City conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s) (Modified from: Order No. R4-2012-0175).

Pollutant means any "pollutant" defined in Section 502(6) of the Federal Clean Water Act or incorporated into the California Water Code Sec. 13373. Pollutants may include, but are not limited to the following:

(1) Commercial and industrial waste (such as fuels, solvents, detergents, plastic pellets, hazardous substances, fertilizers, pesticides, slag, ash, and sludge).

(2) Metals (such as cadmium, lead, zinc, copper, silver, nickel, chromium, and non-metals such as phosphorus and arsenic).

(3) Petroleum hydrocarbons (such as fuels, lubricants, surfactants, waste oils, solvents, coolants, and grease).

(4) Excessive eroded soil, sediment, and particulate materials in amounts that may adversely affect the beneficial use of the receiving waters, flora, or fauna of the State.

(5) Animal wastes (such as discharge from confinement facilities, kennels, pens, recreational facilities, stables, and show facilities).

(6) Substances having characteristics such as pH less than 6 or greater than 9, or unusual coloration or turbidity, or excessive levels of fecal coliform, or fecal streptococcus, or enterococcus.

Project means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065) (Source: Order No. R4-2012-0175).

Rainfall Harvest and Use means a LID BMP system designed to capture runoff, typically from a roof but can also include runoff capture from elsewhere within the site, and to provide for temporary storage until the harvested water can be used for irrigation or non-potable uses. The harvested water may also be used for potable water uses if the system includes disinfection treatment and is approved for such use by the local building department (Source: Order No. R4-2012-0175).

Receiving Water means “water of the United States” into which waste and/or pollutants are or may be discharged (Source: Order No. R4-2012-0175).

Redevelopment means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

Regional Board means the California Regional Water Quality Control Board, Los Angeles Region.

Restaurant means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812) (Source: Order No. R4-2012-0175).

Retail Gasoline Outlet means any facility engaged in selling gasoline and lubricating oils (Source: Order No. R4-2012-0175).

Routine Maintenance

Routine maintenance projects include, but are not limited to projects conducted to:

1. Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.
2. Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
3. Includes road shoulder work, regrading dirt or gravel roadways and shoulders and performing ditch cleanouts.
4. Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
5. Repair leaks

Routine maintenance does not include construction of new** lines or facilities resulting from
compliance with applicable codes, standards and regulations.

* Update existing lines includes replacing existing lines with new materials or pipes.

** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines (Source: Order No. R4-2012-0175).

Significant Ecological Areas (SEAs) means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan. Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.
2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.
3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.
4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
6. Areas important as game species habitat or as fisheries.
7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
8. Special areas (Source: Order No. R4-2012-0175).

Site means land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity (Source: Order No. R4-2012-0175).

Storm Drain System means any facilities or any part of those facilities, including streets, gutters, conduits, natural or artificial drains, channels, and watercourses that are used for the purpose of collecting, storing, transporting or disposing of stormwater and are located within the City of Sierra Madre.

Storm Water or Stormwater means water that originates from atmospheric moisture (rain or snow) and that falls onto land, water, or other surfaces. Without any change in its meaning, this term may be spelled or written as one word or two separate words.

Stormwater Runoff means that part of precipitation (rainfall or snowmelt) which travels across a surface to the storm drain system or receiving waters.

SUSMP means the Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP was required as part of the previous Municipal NPDES Permit (Order No. 01-182, NPDES No. CAS004001) and required plans that designate best management practices (BMPs) that must be used in specified categories of development projects.

Urban Runoff means surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial, or industrial activities involving the use of potable and non-potable water.

Sierra Madre Municipal Code Section 15.04.070 is amended to read as follows:

STORMWATER POLLUTION CONTROL MEASURES FOR DEVELOPMENT PLANNING AND CONSTRUCTION ACTIVITIES

(A) Objective. The provisions of this section contain requirements for construction activities and facility operations of Development and Redevelopment projects to comply with the current "Municipal NPDES permit," lessen the water quality impacts of development, and integrate LID design principles to mimic predevelopment hydrology through infiltration, evapotranspiration and rainfall harvest and use. LID shall be inclusive of SUSMP requirements.

(B) Scope. This Section contains requirements for stormwater pollution control measures in Development and Redevelopment projects and authorizes the City of Sierra Madre to further define and adopt stormwater pollution control measures, develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies, grant waivers from the requirements of the Standard Urban Stormwater Mitigation Plan, and collect funds for projects that are granted waivers. Except as otherwise provided herein, the City of Sierra Madre shall administer, implement and enforce the provisions of this Section.

(C) Applicability. The following Development and Redevelopment projects, termed "Planning Priority Projects," shall comply with the requirements of 15.04.070.

(1) All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.

(2) Industrial parks 10,000 square feet or more of surface area.

(3) Commercial malls 10,000 square feet or more of surface area.

(4) Retail gasoline outlets with 5,000 square feet or more of surface area.

(5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of surface area.

(6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.

(7) Streets and roads construction of 10,000 square feet or more of impervious surface area.

(8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) 5,000 square feet or more of surface area.

(9) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:

   a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and

   b. Create 2,500 square feet or more of impervious surface area

(10) Single-family hillside homes.

(11) Redevelopment Projects

   a. Land disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on Planning Priority Project categories.

   b. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.

   c. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire development.

d. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

e. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

(D) Effective Date. The Planning and Land Development requirements contained in Section 7 of Order No. R4-2012-0175 shall become effective 90 days from the adoption of the Order (February 6, 2013). This includes Planning Priority Projects that are discretionary permit projects or project phases that have not been deemed complete for processing, or discretionary permit projects without vesting tentative maps that have not requested and received an extension of previously granted approvals within 90 days of adoption of the Order. Projects that have been deemed complete within 90 days of adoption of the Order are not subject to the requirements Section 7.

(E) Stormwater Pollution Control Requirements. The Site for every Planning Priority Project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

(1) A new single-family hillside home development shall include mitigation measures to:

a. Conserve natural areas;

b. Protect slopes and channels;

c. Provide storm drain system stenciling and signage;

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

e. Direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

(2) Street and road construction of 10,000 square feet or more of impervious surface shall follow USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets (December 2008 EPA-833-F-08-009) to the maximum extent practicable.

(3) The remainder of Planning Priority Projects shall prepare a LID Plan to comply with the following:

a. Retain stormwater runoff onsite for the Stormwater Quality Design Volume (SWQDv) defined as the runoff from:

i. The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or

ii. The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

b. When, as determined by the City Engineer, 100 percent onsite retention of the SWQDv is technically infeasible, partially or fully, the infeasibility shall be demonstrated in the submitted LID Plan. The technical infeasibility may result from conditions that may include, but are not limited to:

i. The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.

ii. Locations where seasonal high groundwater is within five to ten feet of surface grade;

iii. Locations within 100 feet of a groundwater well used for drinking water;

iv. Brownfield development sites or other locations where pollutant mobilization is a documented concern;

v. Locations with potential geotechnical hazards;

c. If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in the Municipal NPDES Permit.

i. Additional alternative compliance options such as offsite infiltration may be available to the project Site. The project Site should contact the City Engineer to determine eligibility.

d. The remaining SWQDv that cannot be retained or biofiltered onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required per the Municipal NPDES Permit. Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

i. 0.2 inches per hour, or
ii. The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

e. A Multi-Phased Project may comply with the standards and requirements of this section for all of its phases by: (a) designing a system acceptable to the City Engineer to satisfy these standards and requirements for the entire Site during the first phase, and (b) implementing these standards and requirements for each phase of Development or Redevelopment of the Site during the first phase or prior to commencement of construction of a later phase, to the extent necessary to treat the stormwater from such later phase. For purposes of this section, "Multi-Phased Project" shall mean any Planning Priority Project implemented over more than one phase and the Site of a Multi-Phased Project shall include any land and water area designed and used to store, treat or manage stormwater runoff in connection with the Development or Redevelopment, including any tracts, lots, or parcels of real property, whether Developed or not, associated with, functionally connected to, or under common ownership or control with such Development or Redevelopment.

(E) Other Agencies of the City of Sierra Madre. All City of Sierra Madre departments, offices, entities and agencies, shall establish administrative procedures necessary to implement the provisions of this Article on their Development and Redevelopment projects and report their activities annually to the Department of Public Works.

(F) Validity. If any provision of this Ordinance is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect remaining provisions of this Ordinance are declared to be severable.

(G) Certification. The City Clerk shall certify to the passage of this ordinance and have it published in accordance with Council policy.

I hereby certify that this ordinance was passed by the Council of the City of Sierra Madre at its meeting of ________________________.

Nancy Shollenberger, City Clerk

By ______________________________________

Deputy

Approved ___________________________

______

____

Mayor

Approved as to Form and Legality
[NAME], City Attorney

By ____
[NAME]
Deputy City Attorney

Date _______________________________

File No. ______________________________

City of Sierra Madre

Memo

To: 2012/2013 NPDES New Permit File

From: James Carlson, Management Analyst

Date: June 25, 2013

Re: Development of Low Impact Development (LID) Ordinance and Green Streets Policy

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This memo is to document the progress of the City of Sierra Madre's efforts to produce both a Low Impact Development (LID) Ordinance and Green Streets Policy. The origin of these efforts can be identified by the necessities that are required by the new MS4 permit. The importance of developing (and now updating) these items is further warranted by our current water source emergency.

On December 11, 2012 the Sierra Madre City Council adopted resolution 12-92 which included the immediate adoption of the City of Los Angeles LID Ordinance and the City of Los Angeles Green Streets Policy. This also included the associated BMP Manuals. Resolution 12-92 was adopted to ensure that the City of Sierra Madre had an LID Ordinance and Green Street's Policy in place as an interim measure while staff worked to update both the ordinance and policy to more closely fit with Sierra Madre's conditions. The ordinance has been in effect and used during all qualifying plan checks.

The City of Sierra Madre also contributed funds to the San Gabriel Valley Council of Governments to work with Larry Walker and Associates to create templates of an LID Ordinance and Green Street Policy. I have been working with Public Works Director Bruce Inman, City Engineer Kev Tcharkhoutian, and City Attorney Theresa Highsmith in this development. The update to our interim LID Ordinance and Green Streets policy is tentatively scheduled to go back to the City Council for approval on July 23, 2013.

Thank you!

Attachment B

MS4 Permit TMDL Water Quality Objectives

This attachment includes tables summarizing the existing Total Maximum Daily Load (TMDL) requirements relevant to the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG), corresponding with **Section 1.3.2** of the RH/SGRWQG Enhanced Watershed Management Program (EWMP) Work Plan. The following TMDL water quality objectives are outlined in this attachment, based on the Los Angeles County Municipal Separate Storm Sewer System (MS4) Permit:

- Los Angeles River (LAR) Watershed Trash TMDL;
- LAR Nitrogen Compounds and Related Effects TMDL;
- LAR and Tributaries Metals TMDL;
- LAR Watershed Bacteria TMDL;
- Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL (DC and LA Harbor Toxic Pollutants TMDL);
- San Gabriel River Metals and Impaired Tributaries Metals and Selenium TMDL (USEPA TMDL); and
- Los Angeles Area Lakes TMDLs (USEPA TMDL) for Peck Road Park Lake.

Attachment B List of Tables

Table B-1 demonstrates which RH/SGRWQG members are affected by each of the TMDLs per Attachment K, Table K-5, K-6, K-9, and K-10 of the Los Angeles County Municipal Separate Storm Sewer System (MS4) Permit.

Table B-1 RH/SGRWQG TMDLs and Applicability

RH/SGRWQG Member	LAR Watershed Trash TMDL	LAR Nitrogen Compounds and Related Effects TMDL	LAR and Tributaries Metals TMDL	LAR Watershed Bacteria TMDL	Los Angeles Area Lakes TMDLs for Peck Road Park Lake	Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxics TMDL	SGR and Impaired Tributaries Metals and Selenium TMDL
Arcadia	X	X	X	X	X		X
Azusa					X		X
Bradbury	X	X	X	X	X		X
Duarte	X	X	X	X	X		X
Monrovia	X	X	X	X	X		X
Sierra Madre	X	X	X	X	X		
County of Los Angeles	X	X	X	X	X	X	X
LACFCD		X	X	X	X	X	X

LAR Watershed Trash TMDL

The litigation and implementation history of the LAR Watershed Trash TMDL is complex, however the current TMDL was adopted by the Los Angeles Regional Water Quality Control Board (LARWQCB) as Resolution 2007-012, which became effective on September 23, 2008. Simplistically, TMDL compliance is assessed based on Daily Generation Rate (DGR) studies, the remainder of the catchment not protected by Full Capture Certified Devices (FCCDs), or a combination of both metrics. **Table B-2** and **Table B-3** list (in gallons and pounds) interim and final DGR estimated residual Water Quality-Based Effluent Limitations (WQBELs) from Attachment O Part A.3 of the MS4 Permit, while the allowable remainder of the catchment unprotected by FCCDs is identified in parentheses within the table header rows.

Table B-2 LAR Watershed Trash TMDL Effluent Limitations per Storm Year (gal of uncompressed trash)

Permittees	Baseline	2012 (30%)	2013 (20%)	2014 (10%)	2015 (3.3%)	2016 (0%)
Arcadia	50108	15032	10022	5011	1654	0
Bradbury	4277	1283	855	428	141	0
Duarte	12210	3663	2442	1221	403	0
Monrovia	46687	14006	9337	4669	1541	0
Sierra Madre	11611	3483	2322	1161	383	0
County of Los Angeles	310223	93067	62045	31022	10237	0

Table B-3 LAR Watershed Trash TMDL Effluent Limitations per Storm Year (lbs of drip dry trash)

Permittees	Baseline	2012 (30%)	2013 (20%)	2014 (10%)	2015 (3.3%)	2016 (0%)
Arcadia	93036	27911	18607	6876	2269	0
Bradbury	12160	3648	2432	1216	401	0
Duarte	23687	7106	4737	2369	782	0
Monrovia	100988	30296	20198	10099	3333	0
Sierra Madre	25192	7558	5038	2519	831	0
County of Los Angeles	651806	195542	130361	65181	21510	0

The final WQBEL of zero trash discharged, or catchment area unprotected, is to be achieved for the 2016 storm year that begins on October 1, 2015 and ends on September 30, 2016. During the current period from October 1, 2013 to September 30, 2014, 90% of the baseline study trash volume or weight must be captured based on DGR study analysis and only 10% estimated to have been discharged. Alternatively, 90% of a Permittee catchment may be protected by FCCDs, leaving 10% unprotected.

LAR Nitrogen Compounds and Related Effects TMDL

The LAR Nitrogen TMDL was adopted by the LARWQCB as Resolution 2003-009 and became effective on March 23, 2004. Site Specific Objectives (SSOs) for ammonia were approved by the State Water Resources Control (SWRCB) Board on June 4, 2013. This TMDL has been primarily addressed by Publically Owned Treatment Works (POTWs), or Water Recovery Plants (WRPs), and MS4 Permittee discharges do not appear to cause or contribute to the exceedance of the applicable Receiving Water Limitations (RWLs). **Table B-4** lists the currently effective TMDL WQBELs, as identified in Attachment O, Part B.2 of the MS4 Permit, which the RH/SGRWQG Permittee discharges would be expected to comply with as assessed through the Coordinated Integrated Monitoring Program (CIMP).

Table B-4 LAR Nitrogen Compounds and Related Effects TMDL Final WQBELs

Water Body	NH_3-N (mg/L)		NO_3-N (mg/L)	NO_2-N (mg/L)	NO_3-N+NO_2-N (mg/L)
	One-hour Average	Thirty-day Average	Thirty-day Average	Thirty-day Average	Thirty-day Average
LAR below LAG	8.7	2.4	8.0	1.0	8.0
Rio Hondo Reach 1 and 2	10.1	2.3	8.0	1.0	8.0

LAG = Los Angeles-Glendale WRP

LAR and Tributaries Metals TMDL

The litigation and implementation history of the LAR and Tributaries Metals TMDL is complex, however the current TMDL was adopted by the LARWQCB as Resolution 2007-014 and became effective on October 29, 2008. The TMDL assesses compliance based on the load or concentration of several metals in comparison to the California Toxic Rule (CTR) values, during dry- and wet-weather conditions. Dry-weather is defined as days when the maximum daily flow in the Los Angeles River is less than 500 cubic feet per second (cfs) as measured at the Wardlow Street gauge station in Long Beach. Since metal toxicity is correlated to bioavailability, which is higher for dissolved metals, and decreases in the presence of competing cations, as assessed by water hardness, the permit and TMDL WQBEL values were determined using total to dissolved "translator" values, prepared by the USEPA, weather, and water body specific hardness data, which results in relatively significant variability in WQBELs among the various water body and weather combinations. Furthermore, local water characteristics, such as organic content, may result in Water Effect Ratios (WERs) and SSOs that alter the preliminary toxicity assessment used in developing a TMDL and may change the final numeric WQBELs.

Table B-5 through **Table B-8** list the "final" WQBELs that may be of importance to the RH/SGRWQG, subject to any future basin plan amendments, established by the LAR and Tributaries Metals TMDL and identified in Attachment O Parts C.2 and C.3 of the MS4 Permit. **Table B-5** lists the grouped (shared) dry-weather final WQBELs, expressed as total recoverable metals daily loads. Dry-weather flows in Rio Hondo Reach 1, have normally been much lower than the TMDL estimate of 0.5 cfs, however TMDL watershed compliance has generally been first assessed based on concentration, rather than load.

Table B-5 LAR Metals TMDL Dry-Weather Final WQBELs Expressed as Total Recoverable Metals

Water Body	Effluent Limitations Daily Maximum (kg/day)		
	Copper	Lead	Zinc
LAR Reach 2	WER[1] x 0.13	WER[1] x 0.07	--
LAR Reach 1	WER[1] x 0.14	WER[1] x 0.07	--
Rio Hondo Reach 1	WER[1] x 0.01	WER[1] x 0.006	WER[1] x 0.16

1 WER(s) have a default value of 1.0 unless site-specific WER(s) are approved via the Basin Plan Amendment process

Concentration based dry-weather WQBEL that may be of importance to the RH/SGRWQG are summarized in **Table B-6**.

Table B-6 LAR Metals TMDL Concentration Based Dry-Weather Final WQBELs Expressed as Total Recoverable Metals

Water Body	Effluent Limitations Daily Maximum (µg)		
	Copper	Lead	Zinc
LAR Reach 2	WER[1] x 22	WER[1] x 11	--
LAR Reach 1	WER[1] x 23	WER[1] x 12	--
Rio Hondo Reach 1	WER[1] x 13	WER[1] x 5.0	WER[1] x 131

1 WER(s) have a default value of 1.0 unless site-specific WER(s) are approved via the Basin Plan Amendment process

Load and approximate concentration based wet-weather WQBELs that are applicable to the RH/SGRWQG are summarized in **Table B-7**. Since the TMDL includes both Waste Loads (WLs) and WLAs, and multiple discharge groups, the WQBEL concentration for MS4 Permittees varies with the volume of runoff measured at Wardlow Street, but the rightmost column is a serviceable first order estimate.

Table B-7 LAR Metals TMDL Wet-Weather Final WQBEL Expressed as Total Recoverable Metals

Constituent	Effluent Limitations Daily Maximum (kg/day)	Approximate Effluent Limitation (μg/L)
Cadmium	WER[1] x 2.8 x 10^{-9} x daily volume (L) - 1.8	WER[1] x 2.8
Copper	WER[1] x 1.5 x 10^{-8} x daily volume (L) - 9.5	WER[1] x 15
Lead	WER[1] x 5.6 x 10^{-8} x daily volume (L) - 3.85	WER[1] x 56
Zinc	WER[1] x 1.4 x 10^{-7} x daily volume (L) - 83	WER[1] x 140

Table B-8 outlines the interim and final Metals TMDL WQBELs schedule which Permittees are expected to comply with through the EWMP and RAA development process. Since the RH/SGRWQG affected by this TMDL is located within Jurisdictional Group 2, it should be noted that the June 29, 2012 Implementation Study, funded by the Permittees, identified Watershed Control Measures to achieve the interim and final WQBELs. Among the more important measures was State Senate Bill 346, chaptered in September 2010, which called for phased elimination of copper from automotive friction (brake) pads. A similar effort to reduce the zinc content in automotive tires has also been initiated, but is many years from being chaptered.

Table B-8 LAR Metals TMDL Schedule of Interim and Final WQBELs

Deadline	Total Drainage Area Served by the MS4 required to meet the water quality-based effluent limitations (%)	
	Dry Weather	Wet Weather
January 11, 2012	50	25
January 11, 2020	75	-
January 11, 2024	100	50
January 11, 2028	100	100

Along with most other LAR Watershed municipalities, the RH/SGRWQG Permittees supported a study to develop Copper WER and Lead Recalculation SSOs that will become effective after approved by the LARWQCB as Basin Plan Amendments. The draft study reports suggest that for copper, in both dry- and wet-weather, a final WER of 3.971 for LAR Reaches 1 and 2 and 9.691 for the Rio Hondo should be adopted. The lead recalculation study suggest that during dry-weather the WQBELs for LAR Reach 1 should increase from 12 to 102 μg/L for LAR Reach 1, increase from 11 to 94 μg/L for LAR Reach 2, and rise from 5 to 37 μg/L for the Rio Hondo. In wet-weather, the lead WQBEL should increase from 62 to 94 μg/L in all of these water bodies. Favorable translators between total and dissolved metal concentrations were also determined by these studies, but are not explicitly referenced in the MS4 Permit so their eventual impact is unclear at this time. As a result of these studies and legislative efforts, the LAR Metals TMDL has probably moved from a regional to specific outfall priority.

LAR Watershed Bacteria TMDL

The LAR Watershed Bacteria TMDL was adopted by the LARWQCB as Resolution 2010-007 and became effective on March 23, 2012. As expressed in Attachment O Part D4 of the MS4 Permit, this TMDL is very complex with multiple implementation phases, river segments that do not coincide with reaches, wet and dry compliance schedules, WLAs expressed as both WQBELs and RWLs, complex analytical methods, and requires the development with submission of Segment Specific Load Reduction Strategies (LRS). In addition, studies indicate that there are significant natural sources including endogenous replication of the "pollutant." **Table B-9** through **Table B-12** summarize the final WQBELs and RWLs that may be of importance to the RH/SGRWG.

Table B-9 LAR Bacteria TMDL WQBEL

Constituent	Effluent Limitation (MPN or cfu)	
	Daily Maximum	Geometric Mean
E. coli	235/100 mL	126/100 mL

Table B-10 summaries the "grouped interim dry-weather single sample bacteria WQBEL for the specific river segment and tributaries," that may be of importance to the RH/SGRWQG. While the Rio Hondo watershed area is approximately half of the total Segment B catchment area and would be expected to generate comparable discharge volumes during dry- and wet-weather, the WQBEL differs by over 250 fold. This is a result of the latter being based on the flow of water, mostly discharged from wastewater treatment plants, into the reach, while the Rio Hondo is primarily a headwater catchment. The interim dry-weather WQBELs are group-based and shared among the Permittees within a drainage area; however, alternatively they may be distributed based on proportion of drainage area, upon approval of the Regional Board Executive Officer. It is currently unclear how compliance with the LAR Bacteria TMDL will be assessed.

Table B-10 LAR Bacteria TMDL Grouped Interim Dry-Weather Single Sample Bacteria WQBEL

River Segment of Tributary	Daily Maximum *E. coli* Load (10^9 MPN/day)	First Phase Compliance Date	Second Phase Compliance Date
LAR Segment A (Willow to Rosecrans)	301	March 23, 2024	September 23, 2031
LAR Segment B (Rosecrans to Figueroa)	518	March 23, 2022	September 23 2028
Rio Hondo	2	September 23, 2023	March 23, 2030

In addition to WQBELs for MS4 discharges, the LAR Bacteria TMDL includes a RWL that is attributable to all MS4 Permittees, including the City of Long Beach and Caltrans. This RWL is assessed as a limit on the number of days, or weeks, per year, where the RWLs are not achieved. The final compliance dates, for the annually assessed grouped single sample bacteria RWLs, are March 23, 2022 for dry-weather and March 23, 2037 for wet-weather. These requirements can be found in **Table B-11**, while the numeric water quality objective is shown on **Table B-12**.

Table B-11 LAR Bacteria TMDL Grouped Final Single Sample Bacteria RWLs

Time Period	Annual Allowable Exceedance Days of the Single Sample Objective (days)	
	Daily Sampling	Weekly Sampling
Dry-Weather	5	1
Non-HFS[1] Waterbodies Wet-Weather	15	2
HFS[1] Waterbodies Wet-Weather	10 (not including HFS days)	2 (not including HFS days)

1 HFS stands for high flow suspension as defined in Chapter 2 of the Basin Plan

Table B-12 LAR Bacteria TMDL Geometric Mean RWL	
Constituent	**Geometric Mean (MPN or cfu)**
E. coli	126/100 mL

The distinction that these water quality objectives are expressed annually may be important, as MS4 Permit Part VI.A.13.g states that for some WQBELs that are expressed as annual effluent limitations, such as those for trash, violations may only be assessed annually; however Part VI.C.1.d.(i) states that EWMPs must "achieve applicable WQBELs in Part VI.E and Attachments L through R pursuant to the corresponding compliance schedules." It is unclear why an annually assessed WQBEL is substantially and inherently different than an annually assessed RWL, although this question is likely to be resolved long before the dry-weather final compliance schedule is reached.

DC and LA Harbor Waters Toxic Pollutants TMDL

The DC and LA Harbor Waters Toxic Pollutants TMDL (also known as the Los Angeles and Long Beach Harbor Toxic and Metals TMDL) became effective on March 23, 2012 as Resolution No. R11-008.

Per Attachment N Part E.2 of the MS4 Permit, the Permittees subject to this TMDL must comply with sediment interim WQBELs for discharges to the Dominguez Channel Estuary and Greater Los Angeles and Long Beach Harbor Waters, Permittees should comply with interim concentration-based WQBELs presented in **Table B-13**.

Table B-13 DC and LA Harbor Waters Toxic Pollutants TMDL Sediment Interim WQBELs

Water Body	Interim Effluent Limitations Daily Maximum (mg/kg sediment)					
	Copper	Lead	Zinc	DDT	PAHs	PCBs
Long Beach Inner Harbor	142.3	50.4	240.6	0.070	4.58	0.060
Long Beach Outer Harbor (inside breakwater)	67.3	46.7	150	0.075	4.022	0.248
Los Angeles River Estuary	53.0	46.7	183.5	0.254	4.36	0.683

Per Attachment N Part E.3.c of the MS4 Permit, the Dominguez Channel Estuary and Greater Los Angeles (and Long Beach) Harbor Waters must comply with final mass-based WQBELs, expressed as an annual loading of pollutants in the sediment deposited to the Dominguez Channel Estuary and the Greater Los Angeles and Long Beach Harbor Waters and final concentration-based WQBELs for sediments as shown in **Table B-14**. Compliance with these limitations should be met by March 23, 2032 and every year thereafter.

Table B-14 DC and LA Harbor Waters Toxic Pollutants TMDL Final Sediment Metals WQBELs for DC Estuary and Los Angeles Harbor

Water Body	Final Effluent Limitations Annual (kg/yr)			
	Total Cu	Total Pb	Total Zn	Total PAHs
Inner Harbor	1.7	34.0	115.9	0.088
Outer Harbor	0.91	26.1	81.5	0.105
LAR Estuary	35.3	65.7	242.0	2.31

Per Attachment N Part E.3.d of the MS4 Permit, Permittees must comply with final mass-based WQBELs, listed in **Table B-15**, expressed as an annual loading of total DDT and total PCBs in the sediment deposited to the Dominguez Channel Estuary and Greater Los Angeles (and Long Beach) Harbor Waters by March 23, 2032 and every year thereafter.

Table B-15 DC and LA Harbor Waters Toxic Pollutants TMDL Final Sediment Metals WQBELs for DC Estuary and Los Angeles Harbor

Water Body	Final Effluent Limitations Annual (g/yr)	
	Total DDTs	Total PCBs
Inner Harbor	0.051	0.059
Outer Harbor	0.005	0.020
LAR Estuary	0.100	0.324

Per Attachment N Part E.4, compliance with the limitations specified in Attachment N Part E.3.a-d, listed in **Table B-13** to **Table B-15**, can be determined according to **Table B-16**. The table includes the MS4 Permit Part, which specifies the WQBELs associated with the DC and LA Harbor Waters Toxic Pollutants TMDL, the Table Reference for which the limitations are specified within this document and the various compliance determination methods.

Table B-16 DC and LA Harbor Waters Toxic Pollutants TMDL Compliance Determination

MS4 Permit Section[1]	Table Reference	Compliance Determination
Part E.2.b	**Table B-13**	i. Demonstrate that the sediment quality condition of *Unimpacted* or *Likely Unimpacted* via the interpretation and integration of multiple lines of evidence as defined in the Sediment Quality Objectives (SQO) Part 1 is met. ii. Meet the interim WQBELs in bed sediment over a three-year averaging period. iii. Meet the interim WQBELs in the discharge over a three-year averaging period.
		ii. California Toxics Rule (CTR) total metals criteria are met instream.
Parts E.3.c.i and E.3.c.ii	**Table B-14**	i. Final WQBELs for pollutants in the sediment are met ii. The qualitative sediment conditions of *Unimpacted* or *Likely Unimpacted* via the interpretation and integration of multiples lines of evidence as defined in the SQO Part 1, is met, with the exception of chromium, which is not included in the SQO Part 1. iii. Sediment numeric targets are met in the bed sediments over a three-year averaging period.
Part E.3.d	**Table B-15**	i. Fish tissue targets are met in species resident to the specified waterbodies[2].
		ii. Final WQBELs for pollutants in the sediment are met.

1 Attachment N of the MS4 Permit
2 A site-specific study to determine resident species should be submitted to the Regional Board Executive Officer for approval

San Gabriel River Metals and Impaired Tributaries Metals and Selenium TMDL

The San Gabriel River (SGR) Metals and Impaired Tributaries Metals and Selenium TMDL (SGR Metals TMDL) was established by the USEPA, approved on March 26, 2007. On June 6, 2013, the SWRCB amended the Basin Plan with Resolution No. R13-004 to "Incorporate Implementation Plans for the TMDLs for Metals in the Los Cerritos Channel and for Metals and Selenium in the San Gabriel River and Impaired Tributaries." The USEPA-established TMDL includes Problem Statements, Numeric Targets, Source Analysis, Loading Capacities, Load Allocations, Waste Load Allocations, and Margins of Safety. However, an implementation plan or schedules to achieve WLAs is not considered a required element of USEPA established TMDLs, therefore the SWRCB approved this resolution.

Pursuant to Part VI.E.3 of the MS4 Permit, Permittees are encouraged to incorporate WLAs established in USEPA TMDLs in the EWMP development process in order to establish a schedule for implementation, which in this case, the EWMP itself will fulfill the implementation plan requirements. Per Attachment P Part A.2 of the MS4 Permit, the grouped wet-weather WLAs relevant to the RH/SGRWQG, expressed as total recoverable metals, are summarized in **Table B-17**. In SGR Reach 2, wet-weather TMDLs apply when the maximum daily flow of the river is equal to or greater than 260 cfs as measured at the United States Geological Survey (USGS) station 11085000, located at the bottom of Reach 3 just above Whittier Narrows Dam. Per Attachment P Part A.3 of the MS4 Permit, the grouped dry-weather WLAs relevant to the RH/SGRWQG, expressed as total recoverable metals, are summarized in **Table B-18**. The wet- and dry-weather WLAs are group-based and shared among all MS4 Permittees, which includes Los Angeles MS4 Permittees, the City of Long Beach, Orange County MS4 Permittees, and Caltrans located within the drainage area.

Table B-17 SGR Metals TMDL Grouped Wet-Weather WLAs as Total Recoverable Metals

Water Body	WLA Daily Maximum (kg/day)		
	Copper	Lead	Zinc
SGR Reach 2	---	8.34 µg/L x daily storm volume (L)	---

Table B-18 SGR Metals TMDL Grouped Dry-Weather WLAs as Total Recoverable Metals

Water Body	WLA Daily Maximum	
	Copper	Selenium
SGR Reach 1	18 µg/L	---
SGR Estuary	3.7 µg/L	---

Los Angeles Area Lakes TMDLs

The Los Angeles Area Lakes TMDL was established by the USEPA, approved March 26, 2012. This TMDL is essentially a compilation of various Lake TMDLs in Los Angeles County. Within the USEPA TMDL, WLAs are established for both Peck Road Park Lake and Santa Fe Dam Park Lake, however only load allocations for Peck Road Park Lake are included in the MS4 Permit and are summarized herein. Pursuant to Part VI.E.3 of the MS4 Permit, Permittees are encouraged to incorporate WLAs established in USEPA TMDLs in the EWMP development process in order to establish a schedule for implementation, which in this case, the EWMP itself will fulfill the implementation plan requirements.

Peck Road Park Lake Nutrient TMDL
Per Attachment O Part G.8, Peck Road Park Lake is subject to nutrient WLAs and the RH/SGRWQG members must comply with the annual mass-based allocations dependent on current flow conditions summarized in **Table B-19**.

Table B-19 Peck Road Park Lake - Nutrient Load Allocations

Permittee	Total Phosphorus (lb-P/yr)	Total Nitrogen (lb-N/yr)
Eastern Subwatershed		
Arcadia	383	2,320
Bradbury	497	3,223
Duarte	1,540	9,616
Monrovia	6,243	38,736
County of Los Angeles	129	773
Near Lake Subwatershed		
Arcadia	158	1,115
Monrovia	60.4	415
County of Los Angeles	129	773
Western Subwatershed		
Arcadia	2,840	16,334
Monrovia	425	2,678
Sierra Madre	695	4,254
County of Los Angeles	467	2,818

Measured at the point of discharge using a three-year average. Mass-based allocations are equivalent to existing concentrations of 0.076 mg/L total phosphorus as a summer average (May-September) and annual average, and 0.76 mg/L total nitrogen as a summer average (May-September) and annual average based on approved flow conditions.

Per Attachment O. Part G.8.d of the MS4 Permit, if the applicable water quality objectives for ammonia, dissolved oxygen, and pH are achieved, and the chlorophyll a target of 20 µg/L as a summer average (May-September) and as an annual average is met, in the lake then the total phosphorus and total nitrogen concentration-based WLAs shall be considered attained.

Peck Road Park Lake PCBs TMDL

Per Attachment O Part G.9, Peck Road Park Lake is subject to WLAs associated with PCBs. Part G.9.c specifies applicable WLAs and Part G.9.d specifies Permittees may comply with alternative WLAs upon approval by the Regional Board based upon documentation that the fish target of 3.6 parts per billion wet weight has been met for the preceding three or more years. A demonstration that the fish tissue target has been met in any given year must at a minimum include a composite sample of skin of fillets from at least five largemouth bass each measuring at least 350 millimeters in length. Documentation must be submitted to the Regional Board and USEPA. Compliance may be demonstrated based on the alternative WLAs upon approval by the Regional Board so long as the USEPA does not object within 60 days. **Table B-20** summarizes the current and alternative WLAs.

Table B-20 Peck Road Park Lake - PCB Load Allocations

Permittee	WLAs[1]		Alternative WLAs[2]	
	Total PCBs (Suspended Sediment) (µg/kg dry weight)	Total PCBs in Water Column (ng/L)	Total PCBs (Suspended Sediment) (µg/kg dry weight)	Total PCBs in Water Column (ng/L)[4]
Eastern Subwatershed				
Arcadia	1.29	0.17	59.8	0.17
Bradbury	1.29	0.17	59.8	0.17
Duarte	1.29	0.17	59.8	0.17
Monrovia	1.29	0.17	59.8	0.17
County of Los Angeles	1.29	0.17	59.8	0.17
Near Lake Subwatershed				
Arcadia	1.29	0.17	59.8	0.17
Monrovia	1.29	0.17	59.8	0.17
County of Los Angeles	1.29	0.17	59.8	0.17
Western Subwatershed				
Arcadia	1.29	0.17	59.8	0.17
Monrovia	1.29	0.17	59.8	0.17
Sierra Madre	1.29	0.17	59.8	0.17
County of Los Angeles	1.29	0.17	59.8	0.17

1 Measured at the point of discharge. Applied as an annual average.
2 Measured at the point of discharge.
3 Applied as a three-year average.
4 Applied as an annual average.

Peck Road Park Lake Chlordane TMDL

Per Attachment O Part G.10, Peck Road Park Lake is subject to WLAs associated with chlordane. Part G.10.c specifies applicable WLAs and Part G.10.d specifies Permittees may comply with alternative WLAs upon approval by the Regional Board based upon documentation that the fish target of 5.6 parts per billion wet weight has been met for the preceding three or more years. A demonstration that the fish tissue target has been met in any given year must at a minimum include a composite sample of skin of fillets from at least five largemouth bass each measuring at least 350 millimeters in length. Documentation must be submitted to the Regional Board and USEPA. Compliance may be demonstrated based on the alternative WLAs upon approval by the Regional Board so long as the USEPA does not object within 60 days. **Table B-21** summarizes the current and alternative WLAs.

Table B-21 Peck Road Park Lake - Chlordane Load Allocations

Permittee	WLAs[1]		Alternative WLAs[2]	
	Total Chlordane (Suspended Sediment) (µg/kg dry weight)	Total Chlordane in Water Column (ng/L)	Total Chlordane (Suspended Sediment) (µg/kg dry weight)	Total Chlordane in Water Column (ng/L)
Eastern Subwatershed				
Arcadia	1.73	0.59	3.24	0.59
Bradbury	1.73	0.59	3.24	0.59
Duarte	1.73	0.59	3.24	0.59
Monrovia	1.73	0.59	3.24	0.59
County of Los Angeles	1.73	0.59	3.24	0.59
Near Lake Subwatershed				
Arcadia	1.73	0.59	3.24	0.59
Monrovia	1.73	0.59	3.24	0.59
County of Los Angeles	1.73	0.59	3.24	0.59
Western Subwatershed				
Arcadia	1.73	0.59	3.24	0.59
Monrovia	1.73	0.59	3.24	0.59
Sierra Madre	1.73	0.59	3.24	0.59
County of Los Angeles	1.73	0.59	3.24	0.59

1 Measured at the point of discharge. Applied as an annual average.
2 Measured at the point of discharge.
3 Applied as a three-year average.
4 Applied as an annual average.

Peck Road Park Lake DDT TMDL

Per Attachment O Part G.11, Peck Road Park Lake is subject to DDT WLAs and the allocations applicable to the RH/SGRWQG members are summarized in **Table B-22**.

Table B-22 Peck Road Park Lake - DDT Load Allocations

Permittee	Total DDT (Suspended Sediment) (µg/kg dry weight)	4-4' DDT in Water Column (ng/L)
Eastern Subwatershed		
Arcadia	5.28	0.59
Bradbury	5.28	0.59
Duarte	5.28	0.59
Monrovia	5.28	0.59
County of Los Angeles	5.28	0.59
Near Lake Subwatershed		
Arcadia	5.28	0.59
Monrovia	5.28	0.59
County of Los Angeles	5.28	0.59
Western Subwatershed		
Arcadia	5.28	0.59
Monrovia	5.28	0.59
Sierra Madre	5.28	0.59
County of Los Angeles	5.28	0.59

Measured at the point of discharge using a three-year average. Mass-based allocations are equivalent to existing concentrations of 0.076 mg/L total phosphorus as a summer average (May-September) and annual average, and 0.76 mg/L total nitrogen as a summer average (May-September) and annual average based on approved flow conditions.

Peck Road Park Lake Dieldrin TMDL

Per Attachment O Part G.12, Peck Road Park Lake is subject to WLAs associated with dieldrin. Part G.12.c specifies applicable WLAs and Part G.12.d specifies Permittees may comply with alternative WLAs upon approval by the Regional Board based upon documentation that the fish target of 0.46 parts per billion wet weight has been met for the preceding three or more years. A demonstration that the fish tissue target has been met in any given year must at a minimum include a composite sample of skin of fillets from at least five largemouth bass each measuring at least 350 millimeters in length. Documentation must be submitted to the Regional Board and USEPA. Compliance may be demonstrated based on the alternative WLAs upon approval by the Regional Board so long as the USEPA does not object within 60 days. **Table B-23** summarizes the current and alternative WLAs.

Table B-23 Peck Road Park Lake - Dieldrin Load Allocations

Permittee	WLAs[1]		Alternative WLAs[2]	
	Dieldrin (Suspended Sediment) (µg/kg dry weight)	Dieldrin in Water Column (ng/L)	Dieldrin (Suspended Sediment) (µg/kg dry weight)	Dieldrin in Water Column (ng/L)
Eastern Subwatershed				
Arcadia	0.43	0.14	1.90	0.14
Bradbury	0.43	0.14	1.90	0.14
Duarte	0.43	0.14	1.90	0.14
Monrovia	0.43	0.14	1.90	0.14
County of Los Angeles	0.43	0.14	1.90	0.14
Near Lake Subwatershed				
Arcadia	0.43	0.14	1.90	0.14
Monrovia	0.43	0.14	1.90	0.14
County of Los Angeles	0.43	0.14	1.90	0.14
Western Subwatershed				
Arcadia	0.43	0.14	1.90	0.14
Monrovia	0.43	0.14	1.90	0.14
Sierra Madre	0.43	0.14	1.90	0.14
County of Los Angeles	0.43	0.14	1.90	0.14

1 Measured at the point of discharge. Applied as an annual average.
2 Measured at the point of discharge.
3 Applied as a three-year average.
4 Applied as an annual average.

Peck Road Park Lake Trash TMDL

Per Attachment O Part G.13, Peck Road Park Lake is subject to Trash WLAs and the allocations. The Cities of Arcadia, Bradbury, Duarte, Monrovia, and Sierra Madre and the County of Los Angeles must comply with a zero trash WLA.

Attachment C

Supporting Information for the Receiving Water Analysis

This attachment summarizes the key findings from the receiving water data analysis relevant to the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) in determining applicable water quality priorities, corresponding with **Section 2.1.1** of the RH/SGRWQG Enhanced Watershed Management Program (EWMP) Work Plan.

Summary of Key Findings of Receiving Water Data Analysis

The following provides a summary of key findings from the receiving water data analysis. It is not intended to be a detailed discussion of all the results of the data analysis, instead, the summary highlights outcomes of the data analysis that may affect the constituents addressed by the EWMP and/or the way the EWMP will approach addressing the constituent. For example, some constituents addressed by the Los Angeles River Metals TMDL appear to exceed less frequently than in the past and as such, are discussed in this subsection. Conversely, indicator bacteria continue to exceed on a frequent basis and nothing "new" was learned from the data analysis. As such, indicator bacteria are not discussed in this subsection. The key findings are organized as follows:

- Summary of findings related to the Los Angeles River Metals TMDL.
- Summary of findings related to the Los Angeles River Nitrogen TMDL.
- Summary of findings related to the Los Angeles River Bacteria TMDL.
- Summary of findings related to the San Gabriel River Metals and impaired Tributaries Metals and Selenium TMDL.
- Identification of constituents that are not currently on the 303(d) list.

Key findings related to the Los Angeles River Metals TMDL

Over the past five years, copper, lead and zinc exceedances of TMDL targets are infrequent in Rio Hondo Reach 3. Cadmium did not exceed in any of the data reviewed. The following provides a generalized summary of the key findings from comparing the data collected over the past five years to the Metals TMDL targets (note that percentages are rounded) (please see **Table C-1** below for detailed summary):

- Copper: Rarely exceeds in Rio Hondo Reach 3 (6-9%).
- Lead: Rarely exceeds in Rio Hondo Reach 3 (0-3%).
- Zinc: Rarely exceeds in Rio Hondo Reach 3 (0-1%).

Key findings related to the Los Angeles River Nitrogen TMDL

Over the past five years ammonia, nitrate and nitrite have not exceeded the Los Angeles River Nitrogen TMDL targets in Rio Hondo Reach 3. This is likely due to the fact that the primary sources of these constituents (DC Tillman, LA/Glendale, and Burbank WRPs) are not up gradient. The data analysis suggests that ammonia, nitrate and nitrite are not a water quality issue in the watershed. The following provides a generalized summary of the key findings from comparing the data collected over the past five years to the Nitrogen TMDL targets:

- Ammonia as N: Of the 198 samples collected only one exceeded (Rio Hondo Reach 3).
- Nitrate as N: Of the 203 samples collected zero samples exceeded.
- Nitrite as N: Of the 203 samples collected zero samples exceeded.
- Nitrogen (NO_3-N+NO_2-N): Of the 2,465 samples only one exceeded (Rio Hondo Reach 3).

Key findings related to the San Gabriel River Metals and impaired Tributaries Metals and Selenium TMDL

Over the past 5 years copper, lead, and zinc exceedances of TMDL targets are infrequent in the San Gabriel River, with no exceedances occurring in San Gabriel River Reach 5, which is applicable to the RH/SGRWQG. Selenium did not exceed in any of the data reviewed.

Constituents not on the 303(d) List

All water quality data obtained was reviewed for potential exceedances of the water quality objectives. The only constituents identified through the data analysis that had not already been identified through the review of TMDLs, 303(d) listings, and annual monitoring were polycyclic aromatic hydrocarbons (PAHs). Six PAHs were observed at levels exceeding the relevant water quality objectives benzo(a)Pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene). **Table C-1** identifies the constituents by water body and presents the frequency of exceedances over the past five and ten year periods.

Table C-1 Summary of Exceedances

Constituent	All Data (2002-2012)		Past 5 Years (2007 - 2012)		Source of Water Quality Objective
	N	% Exceed	N	% Exceed	
Rio Hondo Reach 3					
Aluminum	0	0%			Basin Plan
Ammonia	1	1%	0	0%	LA River Nutrients TMDL
2,3,7,8-TCDD	0	0%	0	0%	CTR HH Organism
Benzo(a)Pyrene	1	2%	1	9%	CTR HH Organism
Benzo(b)Fluoranthene	2	7%	1	9%	CTR HH Organism
Benzo(k)Fluoranthene	3	6%	2	18%	CTR HH Organism
Bis(2-Ethylhexyl)Phthalate	5	45%			CTR HH Organism
Chloride	3	2%	1	2%	Basin Plan
Chrysene	1	2%	1	9%	CTR HH Organism
Diazinon	6	8%	2	11%	CTR
Dibenzo(a,h)Anthracene	3	6%	2	18%	CTR HH Organism
Copper	11	9%	3	6%	LA River Metals TMDL
Total Dissolved Solids	0	0%	0	0%	Basin Plan
Dissolved Oxygen	82	37%	23	39%	Basin Plan
pH	47	21%	5	10%	Basin Plan
E. coli	43	73%	36	69%	Los Angeles River Bacteria TMDL
Fecal Coliform	158	72%	35	67%	Los Angeles River Bacteria TMDL
Total Coliform	220	100%	52	100%	Basin Plan
Indeno(1,2,3-cd)Pyrene	3	6%	3	33%	CTR HH Organism
Mercury	2	3%	1	2%	CTR HH Organism
N-Nitrosodimethylamine	4	8%	0	0%	CTR

Table C-1 Summary of Exceedances

Constituent	All Data (2002-2012)		Past 5 Years (2007 - 2012)		Source of Water Quality Objective
	N	% Exceed	N	% Exceed	
Lead	4	3%	0	0%	LA River Metals TMDL
Nitrate	0	0%	0	0%	LA River Nutrients TMDL
Nitrite	0	0%	0	0%	LA River Nutrients TMDL
Total Nitrogen	1	0%	0	0%	LA River Nutrients TMDL
Cyanide	6	7%	0	0%	CTR
Zinc	1	1%	0	0%	LA River Metals TMDL
San Gabriel River Reach 5					
Ammonia	0	0%			Basin Plan
Chloride	0	0%	0	0%	Basin Plan
Copper	1	25%	0	0%	Basin Plan
Total Dissolved Solids	0	0%	0	0%	Basin Plan
pH	0	0%			Basin Plan
Lead	0	0%	0	0%	Basin Plan
Nitrate	0	0%	0	0%	Basin Plan
Nitrite	0	0%			Basin Plan
Selenium	0	0%			Basin Plan
Zinc	0	0%			Basin Plan
San Dimas Wash					
Ammonia	0	0%			Basin Plan
Chloride	0	0%			Basin Plan
Dissolved Oxygen	0	0%			Basin Plan
pH	0	0%			Basin Plan
Nitrate	0	0%			Basin Plan
Nitrite	0	0%			Basin Plan
Big Dalton Wash					
Aluminum	0	0%			Basin Plan
Ammonia	0	0%			Basin Plan
Chloride	0	0%			Basin Plan
Dissolved Oxygen	0	0%			Basin Plan
pH	0	0%			Basin Plan

Attachment D

Regional and Distributed BMP Fact Sheets

This attachment includes Best Management Practice (BMP) Fact Sheets for regional and distributed BMPs that may be implemented by the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) through the Enhanced Watershed Management Program (EWMP) development process, corresponding with **Section 3.1.1** of the RH/SGRWQG EWMP Work Plan.

Regional BMPs are constructed structural practices intended to treat runoff from a contributing area of multiple parcels (normally on the order of 10s or 100s of acres or larger). Fact Sheets are included for the following regional BMPs:

- Infiltration facilities
- Detention facilities
- Constructed wetlands
- Treatment facilities

Distributed BMPs are constructed structural practices intended to treat runoff relatively close to the source and typically implemented at a single- or few-parcel level (normally less than one acre). Fact Sheets are included for the following distributed BMPs:

- Site-scale detention facilities
- Green infrastructure
- Flow-through treatment BMPs
- Source control structural BMPs

Attachment D Table of Contents

Fact Sheet 1 Infiltration Facilities (Regional BMP)

Infiltration facilities are designed to decrease runoff volume through groundwater recharge and improve water quality through filtration and sorption. Facilities can incorporate engineered medias to improve percolation into native soils. Infiltration facilities can be open-surface basins or subsurface galleries.

Surface Infiltration Basin

Subsurface Infiltration Gallery

BMP Performance Functions

Design Variations

Several design variations include:

- **Surface Infiltration Basins:** depressions designed to infiltrate stormwater into the subgrade soils. Facilities can be vegetated to encourage evapotranspiration and aesthetics.
- **Subsurface Infiltration Galleries:** underground storage systems designed to infiltrate stormwater into subgrade soils. Subsurface systems are used when limited area is available for BMP implementation

Typical Design Components

Figure D-1 presents a typical design and highlights potential design variations:

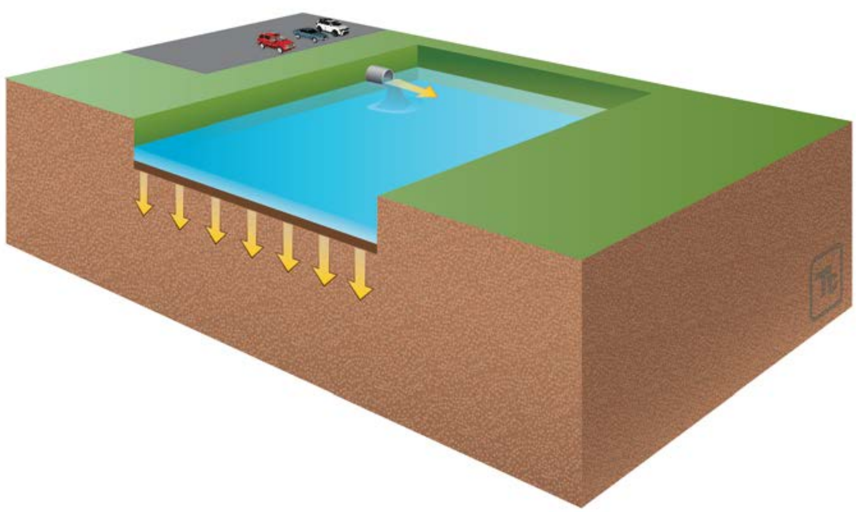


Figure D-1 Typical Regional Infiltration Facility Schematic (arrows indicate water pathways)

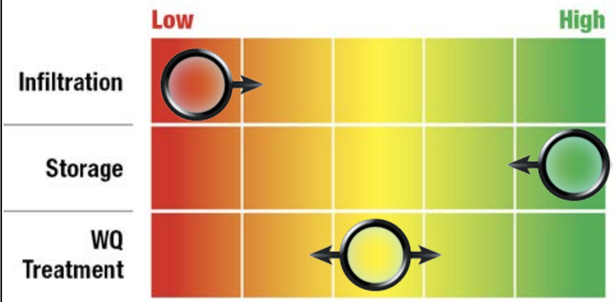
Fact Sheet 2 Detention Facilities (Regional BMP)

Detention facilities are designed to detain runoff and improve water quality through pollutant settling. Facilities encourage settling by decreasing runoff flow rates and allowing ponding to occur. Detention facilities can be open-surface practices or subsurface galleries and can be dry during non-rainy seasons or wet year-round.

Surface Detention Basin

Subsurface Detention Gallery

BMP Performance Functions



Design Variations

Several design variations include:

- **Surface Detention Basins:** basins designed to detain stormwater runoff for a specified time to allow sedimentation of particle-bound pollutants. Surface systems can have permanent pools or fully drain between storms.
- **Subsurface Detention Galleries:** underground storage systems designed to detain stormwater. Subsurface systems are used when limited area is available for BMP implementation.

Typical Design Components

Figure D-2 presents a typical design and highlights potential design variations:

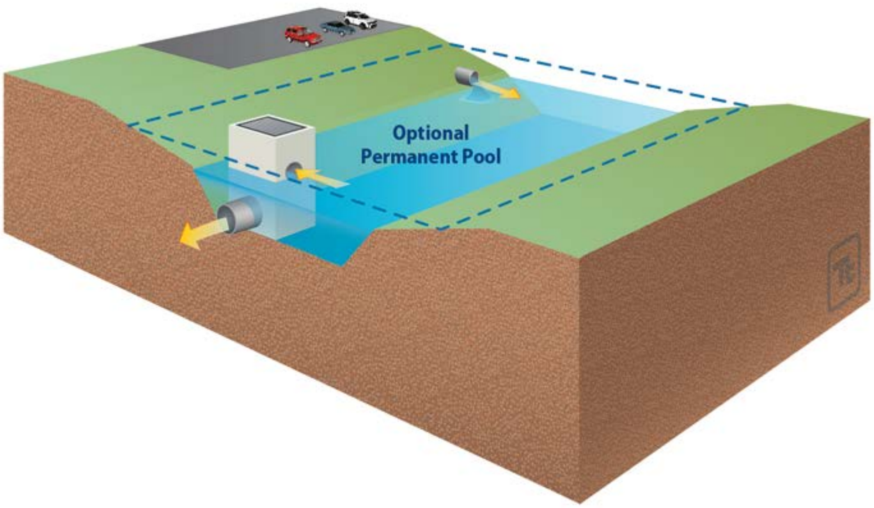


Figure D-2 Typical Regional Detention Facility Schematic (arrows indicate water pathways)

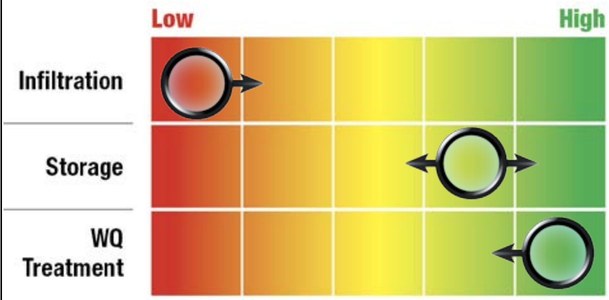
Fact Sheet 3 Constructed Wetlands (Regional BMP)

Constructed wetlands are engineered, shallow-marsh systems designed to control and treat stormwater runoff. Particle-bound pollutants are removed through settling, and other pollutants are removed through biogeochemical activity. Constructed wetlands must always maintain a baseflow into the system, which can come from an intersected groundwater or an associated low-flow diversion utilizing dry-weather flows.

Wetland Basin

Flow-Through/Linear Wetland

BMP Performance Functions



Design Variations

Several design variations include:

- **Wetland Basins:** basins with shallow permanent pools and a temporary shallow ponding zone. An outlet control structure typically regulates dewatering of the temporary storage volume.
- **Flow-through/Linear Wetlands:** wetlands that provide treatment as water passes through a long flow path. These wetlands are typically constructed parallel to existing channels such that water can be easily diverted.

Typical Design Components

Figure D-3 presents a typical design and highlights potential design variations:

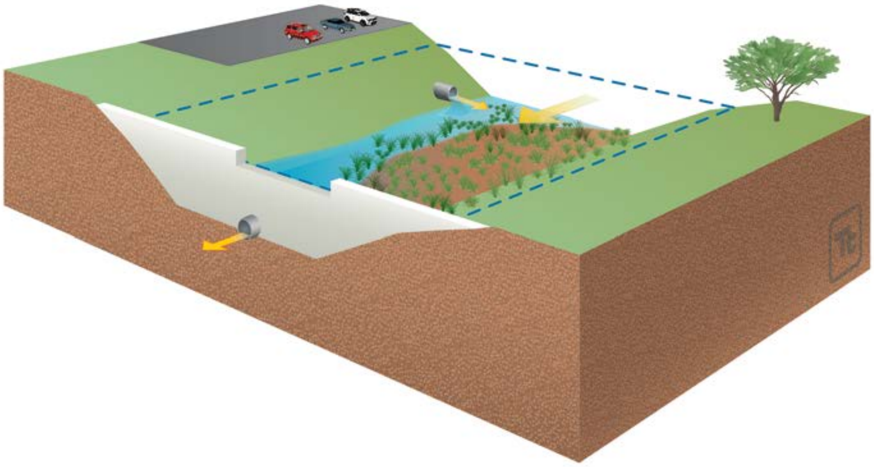


Figure D-3 Typical Regional Constructed Wetland Schematic (arrows indicate water pathways)

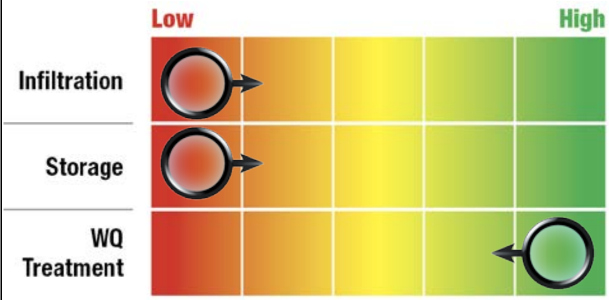
Fact Sheet 4 Treatment Facilities and Low Flow Diversions (Regional BMP)

Other regional water quality technology falls into the treatment facilities and low flow diversions subcategories. These systems typically divert flow from engineered channels to a treatment facility. Water is treated using physical, chemical, or radiological processes and is then returned to the original channel or discharged to the treatment plant outfall.

Treatment Facility

Low-Flow Diversion Dam and Inlet in a Storm Drain

BMP Performance Functions



Design Variations

Several design variations include:

- **Low Flow Diversion:** a design flow rate (typically dry-weather flow) is diverted from the storm drain to a sanitary sewer for treatment.
- **Treatment and Return:** water is pumped or conveyed by gravity from a channel to a small-scale wastewater treatment facility where it is treated and discharged back into the original channel. Sometimes a portion of treated water can be diverted for reuse.

Typical Design Components

Figure D-4 presents a typical design and highlights potential design variations:

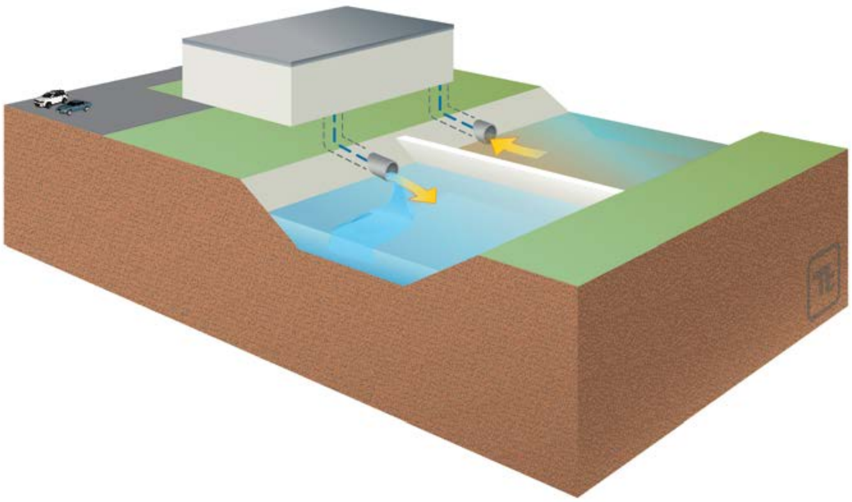


Figure D-4 Typical Regional Treatment Facility Schematic (arrows indicate water pathways)

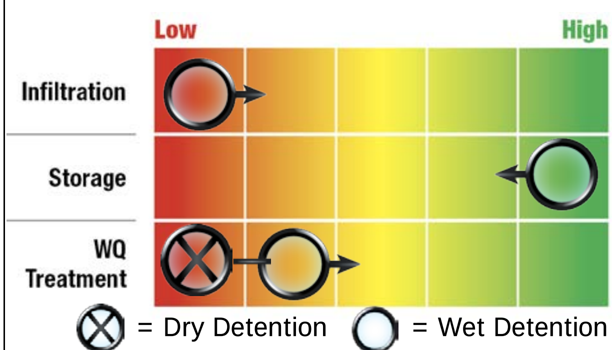
Fact Sheet 5 Site Scale Detention (Distributed BMP)

Site-scale detention facilities are designed to detain runoff from an individual parcel and improve water quality through pollutant settling. Site-scale detention facilities can reduce peak flows and improve water quality by storing water in a basin before slowly draining the water through an orifice to the downstream waterway. Settling of sediment and sediment-bound pollutants is the primary pollutant removal mechanism.

Dry Detention Basin

Wet Detention Pond

BMP Performance Functions



Design Variations

Several design variations include:

- **Dry Detention Basins:** runoff ponds on the basin surface and fully drains between storm events. The drawdown orifice is located at the bottom of the basin.
- **Wet Detention Pond:** runoff is captured in a temporary storage zone above a permanent pool. The drawdown orifice sets the depth of the permanent pool.
- **Detention Chambers:** subsurface chambers or vaults designed to detain captured runoff.

Typical Design Components

Figure D-5 presents a typical design and highlights potential design variations:

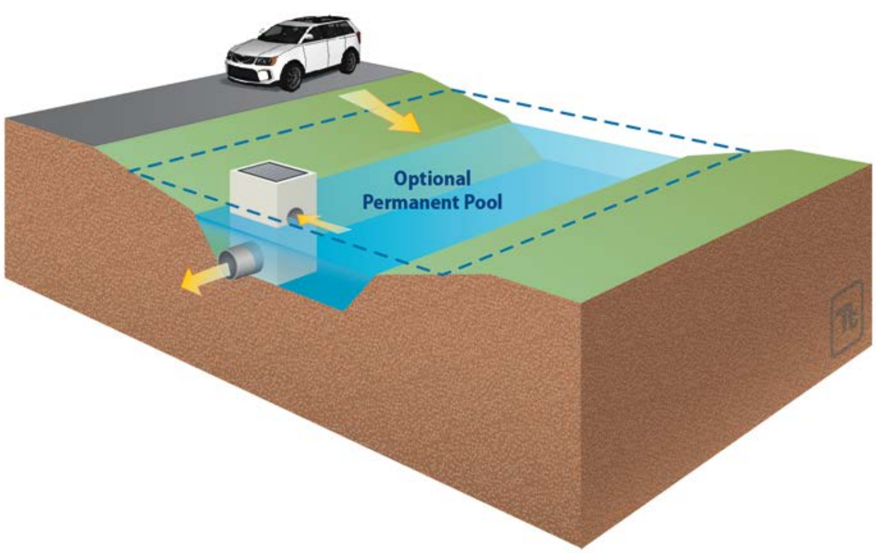


Figure D-5 Typical Distributed Detention Schematic (arrows indicate water pathways)

Fact Sheet 6 Bioretention and Biofiltration (Green Infrastructure BMP)

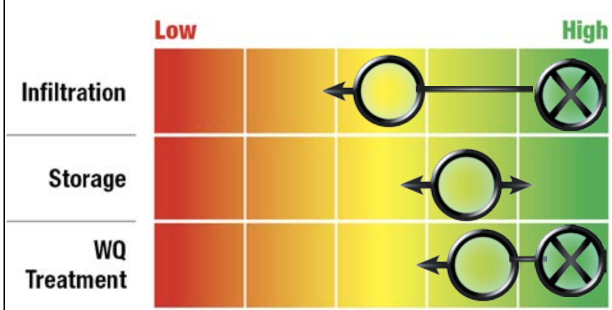
Bioretention and biofiltration are vegetated BMPs designed to capture and filter stormwater runoff through a soil layer. Following filtration, treated runoff infiltrates underlying soils (bioretention), or, if the subgrade has poor permeability, exits through an underdrain to the downstream conveyance network (biofiltration). Vegetation can enhance biological treatment processes.

Residential Bioretention

Bioretention in an Alley

Parking Lot Biofiltration

BMP Performance Functions



= Bioretention   = Biofiltration (unlined)

Design Variations

Several design variations include:

- **Bioretention:** shallow, depressed, vegetated basins with permeable soil media. Runoff temporarily ponds on the surface before filtering through the soil. Bioretention does not include underdrains.
- **Biofiltration:** bioretention areas with underdrains. Infiltration is considered incidental, although substantial infiltration can occur in some unlined systems.

Typical Design Components

Figure D-6 presents a typical design and highlights potential design variations:

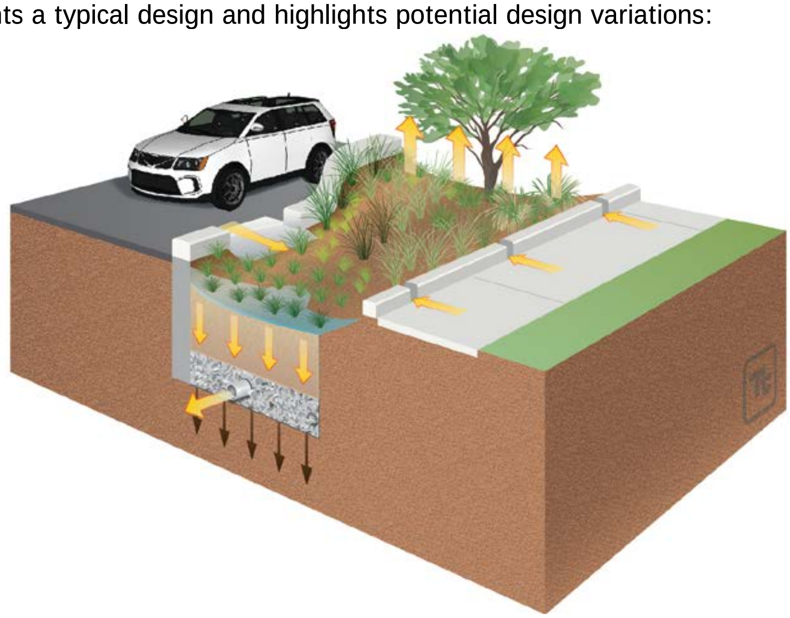


Figure D-6 Typical Distributed Bioretention and Biofiltration Schematic Showing Underdrain Option (arrows indicate water pathways)

Fact Sheet 7 Permeable Pavement (Green Infrastructure BMP)

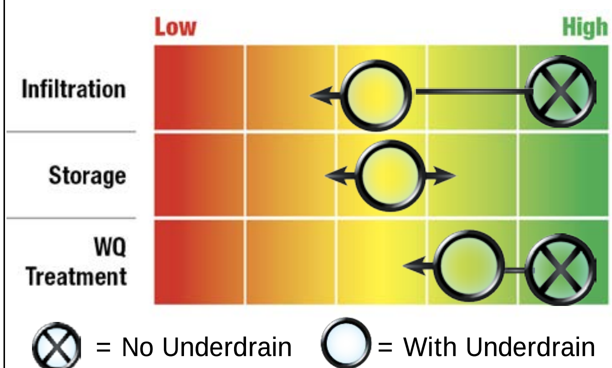
Permeable pavement is a stable load-bearing surface that allows for stormwater infiltration. Beneath the permeable surface is a crushed-rock reservoir that provides structural support while allowing runoff to percolate to the underlying soils. Permeable pavement can be fully infiltrating or can have an underdrain like bioretention and biofiltration practices.

Pervious Concrete

Permeable Interlocking

Porous Asphalt

BMP Performance Functions



Design Variations

Several design variations include:

- **Pervious Concrete:** fines are excluded from typical concrete aggregate to create permeable void space within the section.
- **Porous Asphalt:** fines are excluded from typical hot-mix asphalt to create pores within the section.
- **Permeable Interlocking Concrete Pavers:** pavers that allow infiltration of rainwater through joints between the blocks

Typical Design Components

Figure D-7 presents a typical design and highlights potential design variations:

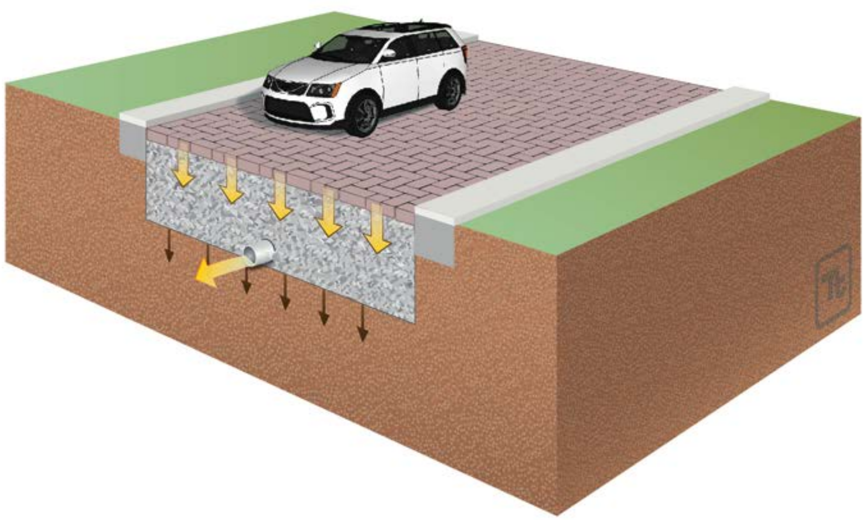


Figure D-7 Typical Distributed Permeable Pavement Schematic Showing Underdrain Option (arrows indicate water pathways)

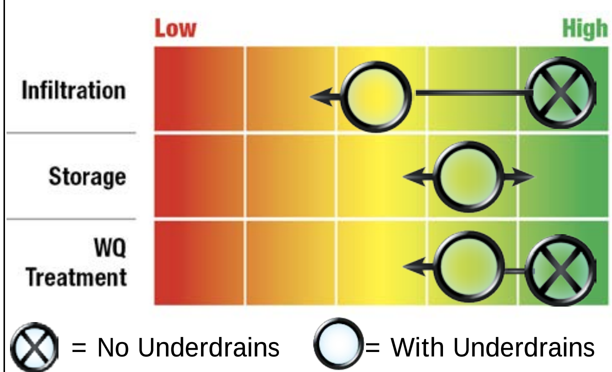
Fact Sheet 8 Green Streets (Green Infrastructure BMP)

Green streets are systems of multiple BMPs arranged in a linear fashion within the street right-of-way (as opposed to a parcel-based implementation). Green streets are designed to reduce runoff and improve water quality for the runoff from the roadway and adjacent parcels. Bioretention, biofiltration, and permeable pavement BMPs are commonly used in conjunction and can be hydraulically connected using subsurface stone reservoirs.

Green Street

Green Street

BMP Performance Functions



Design Variations

Green streets can feature several design variations. Some common features include:

- **Linear Bioretention/Biofiltration:** BMPs can be incorporated as linear systems between the road and parcel to intercept runoff from both roadways and properties.
- **Curb Extensions:** bioretention/ biofiltration BMP "bumpouts" can intercept gutter flow.
- **Permeable Parking Lanes:** street parking can be designed with permeable pavement to intercept roadway runoff.

Typical Design Components

Figure D-8 presents a typical design and highlights potential design variations:

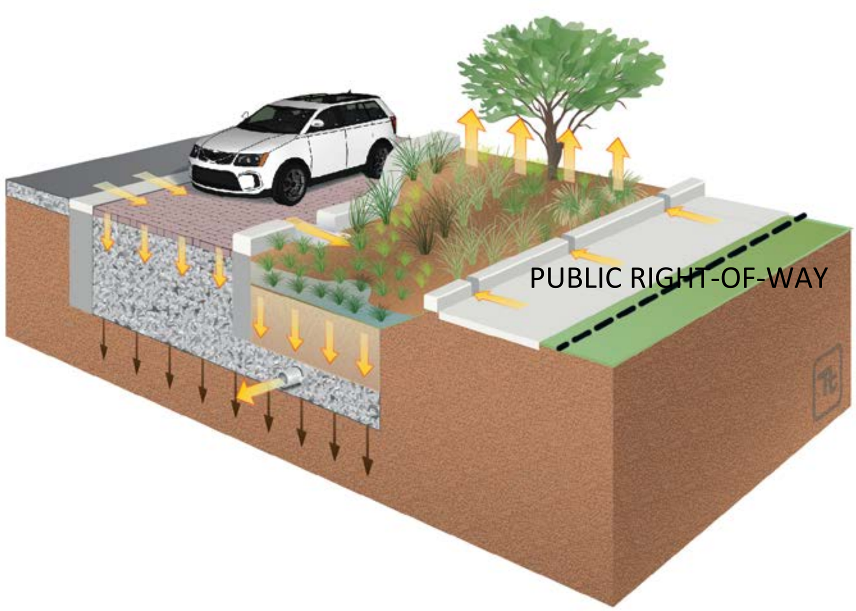


Figure D-8 Typical Distributed Green Street Schematic (arrows indicate water pathways)

Fact Sheet 9 Infiltration BMPs (Green Infrastructure BMP)

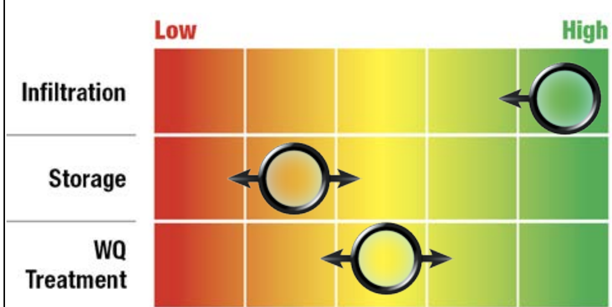
Infiltration BMPs capture and infiltrate runoff into underlying soils. Runoff is typically stored in subsurface trenches or pits filled with engineered soil media, gravel, or concrete chambers. Some infiltration BMPs that inject water into subsurface reservoirs are considered Class V injection wells and must be registered as such. Infiltration BMPs are unvegetated (see Bioretention for vegetated practices).

Various Dry-Well Sizes(Source: www.peerlessconcrete.com)

Infiltration Trench

Infiltration Trench

BMP Performance Functions



Design Variations

Several design variations include:

- **Infiltration Trench:** a media-filled trench that captures runoff in the pore space of gravel or soil prior to infiltration.
- **Dry/Wet Well:** a gravel-surrounded vault with perforated walls that receives runoff from a pipe and allows direct infiltration into the ground.
- **Rock Well:** a gravel-filled pit that receives runoff from a pipe. This BMP is essentially a dry well without a concrete vault.

Typical Design Components

Figure D-9 presents a typical design and highlights potential design variations:

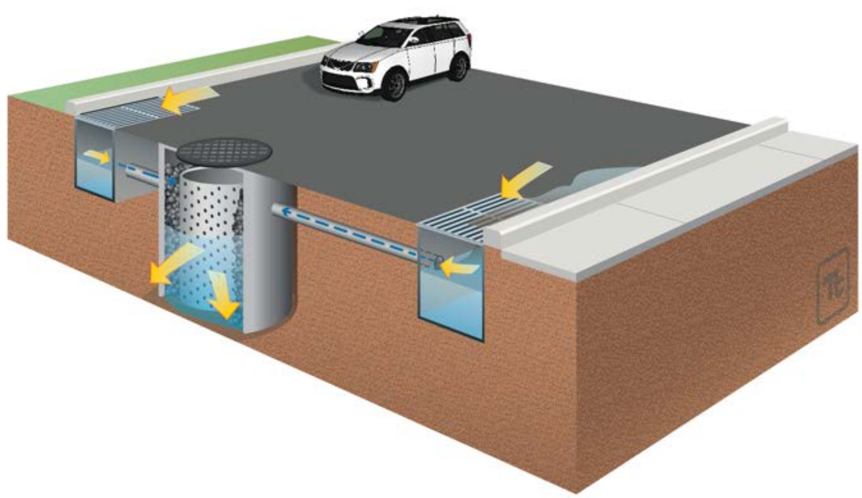


Figure D-9 Typical Distributed Infiltration BMP Schematic Showing Perforated Concrete Dry Well Variation (arrows indicate water pathways; for infiltration trenches, see Figure B-2 and omit vegetation)

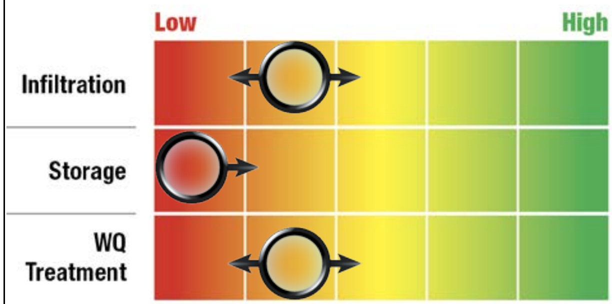
Fact Sheet 10 Bioswales (Green Infrastructure BMP)

Bioswales are practices that convey uniform sheet flow through vegetated, shallow depressions to remove sediment-associated pollutants by settling and straining. Infiltration and filtration through soil media are not key components of bioswales; rather, bioswales are typically implemented to act as pretreatment and used to transport runoff to an associated structural BMP.

Vegetated Swale

Vegetative Filter Strip

BMP Performance Functions



Design Variations

Several design variations include:

- **Vegetated Swale:** linear, vegetated channels used to convey concentrated flow from the contributing area to a structural BMP. Check dams can be added in areas of steep slopes or to further decrease the flow rates and spread the runoff over a larger area.
- **Vegetative Filter Strip:** broad-sloped, vegetated areas used to convey sheet flow from the contributing area to a structural BMP or other conveyance channel.

Typical Design Components

Figure D-10 presents a typical design and highlights potential design variations:

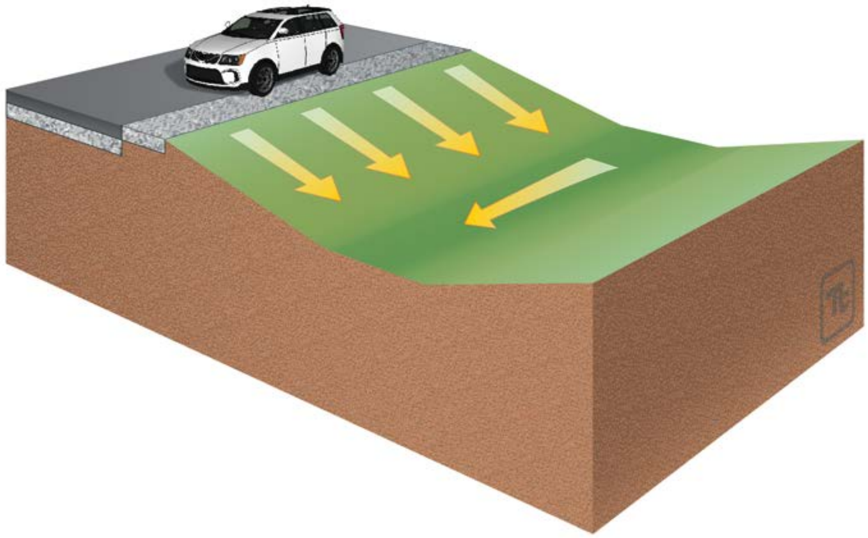


Figure D-10 Typical Distributed Bioswale Schematic (arrows indicate water pathways)

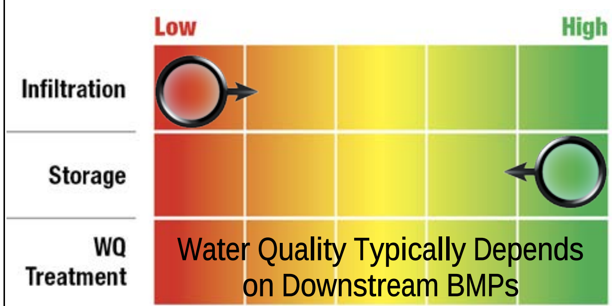
Fact Sheet 11 Rainfall Harvest (Green Infrastructure BMP)

The primary goal for rainfall harvest is improving water quality by intercepting rooftop runoff and lowering the overall impervious impact of a developed site. Runoff can be reduced through interception and evapotranspiration on green roofs or used for alternative uses with a cistern or rain barrel.

Green Roof

Cistern

BMP Performance Functions



Design Variations

Several design variations include:

- **Green Roof:** engineered, vegetated roof structures intended to intercept rainfall in a growing medium. Rooftop detention can be incorporated if structures allow.
- **Cisterns and Rain Barrels:** storage tanks used to intercept and store rooftop runoff. Captured runoff can be reused to offset non-potable water uses such as irrigation and toilet flushing. Alternatively, stored water can be slowly released to a pervious surface.

Typical Design Components

Figure D-11 presents a typical design and highlights potential design variations:

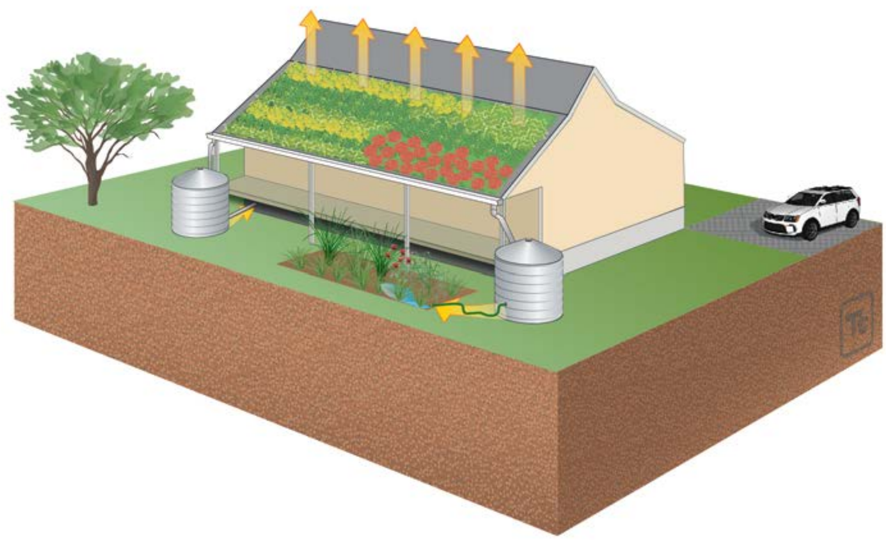


Figure D-11 Typical Distributed Rainfall Harvest Schematic (arrows indicate water pathways)

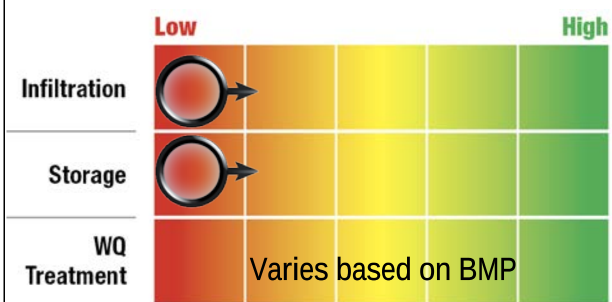
Fact Sheet 12 Flow-Through Treatment BMP (Distributed BMP)

Manufactured flow-through devices are commercial products that aim to provide stormwater treatment using patented, innovative technologies. Typical types of manufactured devices for stormwater management include cartridge filters, media filters, and high-flow biotreatment devices.

Media / Cartridge Filter

High-Flow Biotreatment **(Photo Source: Jonathan Page, NCSU-BAE)**

BMP Performance Functions



Design Variations

Several design variations include:

- **Media / Cartridge Filters:** proprietary filtration devices used to remove pollutants.
- **High-Flow Biotreatment Device:** modular, vault-type practices containing high-flow media. Typically incorporate vegetation.

Typical Design Components

Figure D-12 presents a typical design and highlights potential design variations:

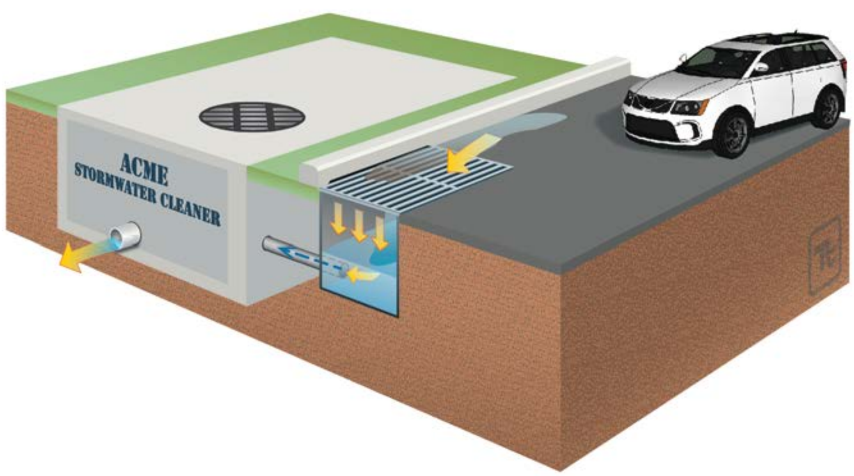


Figure D-12 Typical Distributed Flow-Through Treatment BMP Schematic (arrows indicate water pathways)

Fact Sheet 13 Source Control Structural BMP (Distributed BMP)

Source control structural BMPs are commercial products designed to treat runoff in highly urbanized environments. Mechanical separation, or more complex physicochemical processes, provides separation of gross solids and other pollutants. Many models feature media or materials designed to sequester hydrocarbons and other pollutants.

Catch Basin Insert

Hydrodynamic Separator

Connector Pipe Screen

BMP Performance Functions

Design Variations

Several design variations include:

- **Hydrodynamic Separators:** mechanical devices that use screens, baffles, and/or vortical flow to separate sediment and gross solids.
- **Catch Basin Inserts:** inserts that use nets, screens, fabric, and/or filtration media to gross solids, fine sediments, oils, and/or grease from runoff entering a catch basin.

Typical Design Components

Figure D-13 presents a typical design and highlights potential design variations:

Figure D-13 Typical Distributed Source Control Structural BMP Schematic (arrows indicate water pathways)

Attachment E

Detailed List of Existing Regional BMPs

This attachment includes a table summarizing the regional Best Management Practice (BMP) projects identified in planning documents within the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG), corresponding with **Section 3.1.2** of the RH/SGRWQG Enhanced Watershed Management Program (EWMP) Work Plan. The BMPs listed in the table are illustrated in **Figure 3-9** of the Work Plan.

Table E-1 Existing Regional Projects

ID	Project Name	Jurisdiction	Location	Description	Sources[1]	Notes
Within RH/SGRWQG EWMP Area						
R1	Rio Hondo Trail Enhancements	Arcadia	Rio Hondo Trail	Greening and installation of new gates and signage along 2.1 miles of trail located on the east bank of the Rio Hondo River from Lower Azusa Road to Peck Water Conservation Park. Planting native plants and shrubs, permeable paving and bioswales to be installed.	1	Completed 2013
R2	Rosemead Boulevard Improvement Project	County Unincorporated Area	Rosemead Boulevard from Foothill Boulevard to the City of Temple City limits	Complete a major road upgrade and revitalization for 2.5 miles of Rosemead Boulevard. Project to include pavement reconstruction and resurfacing, new curb ramps and sidewalks, and sustainable parkways.	2	Project discussed at 12/12/13 meeting. Completed February 2012
R3	San Gabriel Canyon Forest Gateway	Azusa	Sierra Madre Avenue and San Gabriel Canyon Road	The San Gabriel Canyon Forest Gateway is a 2.5 acre pocket park and interpretive center in Azusa that provides a unique interface between urban and Angeles National Forest environments marking the entrance to the National Forest.	1	Completed 2008

[1] Sources: 1: (Amigos de los Rios) and 2: (Green Street, 2013)

Attachment F

Detailed List of Existing Distributed BMPs

This attachment includes tables summarizing the existing distributed Best Management Practices (BMPs) implemented by the Rio Hondo/San Gabriel River Water Quality Management Group (RH/SGRWQG), corresponding with **Section 3.1** of the RH/SGRWQG Enhanced Watershed Management Program (EWMP) Work Plan. Most of these projects correspond to distributed BMPs implemented in response to Standard Urban Stormwater Mitigation Plan (SUSMP) and Low Impact Development (LID) requirements. The projects listed in the table are illustrated in **Figure 3-8** in the Work Plan.

Table F-1 Detailed List of Existing Distributed BMPs in RH / SGRWQG EWMP Area

ID	Jurisdiction	Data Source	BMP Subcategory	BMP	Latitude	Longitude	Purpose	Install Date	Approval Date (SUSMP)	Maintenance	Comments
D1	Arcadia	DR	Unk	Other (see comments)	34.1314	-118.04628		8/13/2012			APN5775024913
D2	Arcadia	LA Layer	RH	Rain Barrel	34.12317	-118.06461					Temple City Blvd
D3	Arcadia	LA Layer	RH	Rain Barrel	34.12074	-118.06337					Camino Real Ave
D4	Arcadia	LA Layer	SC	Landscaping and Irrigation	34.1081	-118.01552					Santa Anita Ave
D5	Azusa	LA Layer	RH	Rain Garden	34.11925	-117.88199					8th Ave
D6	Azusa	SUSMP	SC	3 Filter Inserts	34.15278	-118.03244	SUSMP		12/16/2005		Vision Development
D7	Azusa	SUSMP	SC	16 Filter Inserts	34.1317	-118.0286	SUSMP		1/24/2006		Villa Firenze
D8	Azusa	SUSMP	SC	5 Filter Inserts	34.14191	-118.02866	SUSMP		7/5/2006		Arcadia Fitness Center
D9	Azusa	SUSMP	SC	1 Filter Insert	34.10399	-118.00667	SUSMP		7/18/2006		Foothill Transit
D10	Azusa	SUSMP	SC	2 Filter Inserts	34.10787	-118.05179	SUSMP		7/25/2006		Arco AM/PM
D11	Azusa	SUSMP	SC	2 Drywells and 1 CDS	34.13449	-118.04212	SUSMP		7/25/2006		Methodist Hospital SoCal Parking Structure
D12	Azusa	SUSMP	SC	5 Filter Inserts and 1 CDS	34.13449	-118.04212	SUSMP		7/28/2006		Methodist Hospital SoCal Education Center
D13	Azusa	SUSMP	SC	1 Filter Insert	34.10673	-118.03197	SUSMP		8/1/2006		Automotive Center
D14	Azusa	SUSMP	Inf	10 Infiltration Trenches and 3 Filter Inserts	34.1333	-118.02451	SUSMP		8/22/2006		12 Unit Condominium
D15	Azusa	SUSMP	Inf	2 Filter Inserts, 2 CDS, 2 Infiltration Basins	34.13488	-118.04865	SUSMP		10/6/2006		Cheesecake Factory
D16	Azusa	SUSMP	Inf	5 Infiltration systems and 5 Filter Inserts	34.1314	-118.06492	SUSMP		10/10/2006		Arcadia Bank

Table F-1 Detailed List of Existing Distributed BMPs in RH/SGRWQG EWMP Area

ID	Jurisdiction	Data Source	BMP Subcategory	BMP	Latitude	Longitude	Purpose	Install Date	Approval Date (SUSMP)	Maintenance	Comments
D17	Azusa	SUSMP	PP	Permeable Pavement and 2 Filter Inserts	34.15155	-118.02343	SUSMP		11/30/2006		Walgreens
D18	Azusa	SUSMP	Inf	1 Infiltration System and 3 Filter Inserts	34.10768	-118.02573	SUSMP		1/23/2007		Walgreens
D19	Azusa	SUSMP	Inf	1 Infiltration System and 1 Filter Insert	34.10607	-118.03323	SUSMP		3/6/2007		Arcadia Warehouse
D20	Azusa	SUSMP	Bio	Swale and Filter Insert	34.12998	-118.03097	SUSMP		6/5/2007		EZ Lube
D21	Azusa	SUSMP	SC	43 Filter Inserts, 1 Infiltration Basin and 1 Swale	34.13591	-118.03922	SUSMP		11/29/2007		Santa Anita Racetrack
D22	Azusa	SUSMP	Unk		34.13449	-118.04212	SUSMP		3/18/2008		Methodist Hospital - North Tower Addition
D23	Azusa	SUSMP	Inf	3 Filter Inserts, 1 Swale, 2 Infiltration Systems	34.13522	-118.02846	SUSMP		4/1/2008		409 S. First Street
D24	Azusa	SUSMP	Unk		34.13603	-118.05056	SUSMP		4/15/2008		Westfield Mall Santa Anita
D25	Azusa	SUSMP	Bio	5 Filter Inserts and 1 Swale	34.132	-118.05056	SUSMP		5/27/2008		Firestation 105
D26	Azusa	SUSMP	Inf	1 Infiltration System and 1 Filter Insert	34.10819	-118.02457	SUSMP		3/10/2009		Live Oak Plaza
D27	Azusa	SUSMP	Inf	1 Infiltration System	34.12426	-118.0155	SUSMP		10/20/2009		Tract 69958

Table F-1 Detailed List of Existing Distributed BMPs in RH / SGRWQG EWMP Area

ID	Jurisdiction	Data Source	BMP Subcategory	BMP	Latitude	Longitude	Purpose	Install Date	Approval Date (SUSMP)	Maintenance	Comments
D28	Azusa	SUSMP	Inf	4 Infiltration Trenches and 1 Filter Insert	34.1558	-118.0638	SUSMP		12/7/2009		Tran Residence
D29	Azusa	SUSMP	Inf	1 Infiltration System and 1 Filter Insert	34.10148	-118.00568	SUSMP		12/30/2009		PSM Properties
D30	Azusa	SUSMP	Inf	7 Filter Inserts and 2 Infiltration Trenches	34.14197	-118.0218	SUSMP		3/25/2010		468 E. Santa Clara Street
D31	Azusa	DR	SC	KRISTAR-SWALEGARD	34.12858	-117.92751					
D32	Duarte	LA Layer	SC	Disconnect Impervious Surfaces	34.12095	-117.99309			7/1/2010		Calmia Rd
D33	Duarte	LA Layer	SC	Disconnect Impervious Surfaces	34.12646	-117.98906			2/22/2010		Mountain Ave
D34	Duarte	LA Layer	Unk	Percolation Basin	34.13793	-117.96627					Highland Ave
D35	Duarte	LA Layer	RH	Rain Garden	34.12602	-117.99098			8/30/2012		Beckville Street
D36	Monrovia	LA Layer	Unk	Other	34.11955	-118.00362			3/18/2013		Brisbane Street
D37	Monrovia	LA Layer	SC	Disconnect Impervious Surfaces	34.11955	-118.00159			6/1/2011		Brisbane Street
D38	Monrovia	SUSMP	Inf	So. Calif Gas – Fueling Station	34.13628	-117.99391	SUSMP	9/28/2010		Yes	Infiltration system
D39	Monrovia	SUSMP	Inf		34.13663	-117.98697	SUSMP	6/3/2010		Yes	Infiltration onsite
D40	Monrovia	SUSMP	Inf	Bowden	34.13897	-118.00599	SUSMP				Infiltration
D41	Monrovia	SUSMP	Inf	Car Wash	34.13965	-117.98463	SUSMP	5/3/2013		Yes	Infiltration onsite
D42	Monrovia	SUSMP	Unk	Chase Bank	34.14028	-118.00689	SUSMP				

Table F-1 Detailed List of Existing Distributed BMPs in RH / SGRWQG EWMP Area

ID	Jurisdiction	Data Source	BMP Subcategory	BMP	Latitude	Longitude	Purpose	Install Date	Approval Date (SUSMP)	Maintenance	Comments
D43	Monrovia	SUSMP	Unk		34.14181	-118.00278	SUSMP	7/30/2010		Yes	
D44	Monrovia	SUSMP	Inf		34.14321	-117.97941	SUSMP	10/21/2010		Yes	Infiltration onsite
D45	Monrovia	SUSMP	Unk	Multi Use Res/Com	34.14389	-117.99985	SUSMP				
D46	Monrovia	SUSMP	Inf		34.1443	-118.01266	SUSMP				Infiltration
D47	Monrovia	SUSMP	Inf		34.14485	-118.01815	SUSMP	4/12/2013		Yes	Infiltration onsite
D48	Monrovia	SUSMP	Inf		34.1451	-118.00222	SUSMP	1/20/2011		Yes	Infiltration system/underground
D49	Monrovia	SUSMP	Unk		34.14558	-118.00229	SUSMP	10/18/2012		Yes	
D50	Monrovia	SUSMP	Unk	Big Shrimps – Restaurant	34.14603	-118.00209	SUSMP	8/4/2011		Yes	Daylights to steet, filter fabric at downspouts
D51	Monrovia	SUSMP	Unk	Library	34.14881	-118.00112	SUSMP				
D52	Monrovia	SUSMP	Unk	Bowden	34.15112	-118.00416	SUSMP	10/21/2010		Yes	
D53	Monrovia	SUSMP	Unk		Unknown	Unknown	SUSMP				
D54	Monrovia	SUSMP	Unk		Unknown	Unknown	SUSMP				
D55	Monrovia	SUSMP	SC	Storm drain insert retrofits	Unknown	Unknown	TRASH				catch basin inserts
D56	Unincorporated County	DR	Unk	Other (see comments)	34.1196	-118.00362		3/18/2013			APN8510018011
D57	Unincorporated County	DR	Bio	Rain Garden	34.126	-117.99098		8/30/2012			APN8521009040
D58	Unincorporated County	DR	Bio	Rain Garden	34.1342	-118.07255		11/2/2011			APN5378012022
D59	Unincorporated County	DR	RH	Rain Barrel	34.1412	-118.06902		3/6/2013			APN5755016065
D60	Unincorporated County	DR	RH	Rain Barrel	34.1412	-118.06878		3/6/2013			APN5755016064
D61	Unincorporated County	DR	RH	Rain Barrel	34.1415	-118.06785		10/31/2011			APN5755016002

Table F-1 Detailed List of Existing Distributed BMPs in RH / SGRWQG EWMP Area

ID	Jurisdiction	Data Source	BMP Subcategory	BMP	Latitude	Longitude	Purpose	Install Date	Approval Date (SUSMP)	Maintenance	Comments
D62	Unincorporated County	LA Layer	RH	Rain Barrel	34.10196	-117.91427					TUDOR ST
D63	Unincorporated County	LA Layer	SC	Landscaping and Irrigation	34.1106	-117.88237					TRAYMORE AVE
D64	Unincorporated County	LA Layer	SC	Landscaping and Irrigation	34.14109	-118.07216					WALNUT DR
D65	Unincorporated County	LA Layer	Bio	Planter Box	34.1202	-118.07061					ARDENDALE AVE
D66	Unincorporated County	LA Layer	RH	Rain Barrel	34.14152	-118.06785		10/31/2011			MICHILLINDA AVE
D67	Unincorporated County	LA Layer	SC	Disconnect Impervious Surfaces	34.14155	-118.07063					MOUNTAIN VIEW AVE
D68	Unincorporated County	LA Layer	Unk	Other (see comments)	34.13143	-118.04628		8/13/2012			SANTA ANITA AVE
D69	Unincorporated County	LA Layer	SC	Disconnect Impervious Surfaces	34.12899	-118.0708					SOUTHVIEW RD
D70	Unincorporated County	LA Layer	Unk	Other (see comments)	34.12127	-118.06855					ARDENDALE AVE
D71	Unincorporated County	LA Layer	Bio	Planter Box	34.1351	-118.07135					MICHIGAN BLVD
D72	Unincorporated County	LA Layer	SC	Disconnect Impervious Surfaces	34.10226	-117.91471					TUDOR ST
D73	Unincorporated County	LA Layer	RH	Rain Garden	34.1342	-118.07255		11/2/2011			ROSEMEAD BLVD
D74	Unincorporated County	LA Layer	SC	Disconnect Impervious Surfaces	34.1418	-117.88327					OAK DR

Notes Bio = Bioretention/Biofiltration, DR = Data Request, Inf = Infiltration, PP = Permeable Pavement, RH = Rainfall Harvest, SC = Source Control Structural BMP, Unk = Unknown

Attachment G

BMPs Reported in 2011-2012 Unified Annual Stormwater Report

This attachment includes a table summarizing the existing Best Management Practices (BMPs) implemented by the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) based on the 2011-2012 Unified Annual Stormwater Report, corresponding with **Section 3.1** of the RH/SGRWQG Enhanced Watershed Management Program (EWMP) Work Plan.

Table G-1 Existing BMPs According to Review of 2011-2012 MS4 Annual Report

EWMP Subcategory	BMP Name	Arcadia	Azusa	Bradbury	Duarte	Monrovia	Sierra Madre	LA County (San Gabriel River)	LACFCD (San Gabriel River)	LA County (LA River)	LACFCD (LA River)	TOTAL
Green Infrastructure: Biofiltration	Biofiltration	0	0	0	0	8	0	0	0	0	0	8
	Rain Gardens	0	0	0	0	0	0	0	0	2	0	2
Green Infrastructure: Bioswale	Landscape Swale	0	0	0	0	16	0	0	0	0	0	16
Green Infrastructure: Infiltration	Infiltration Trenches	15[3]	6	0	3[3]	4	0	0	0	8	0	36
	Cultec Recharger	1	0	0	0	0	0	0	0	0	0	1
	Cultec Storm Filter	2[3]	0	0	0	0	0	0	0	0	0	2
	Infiltration Basin/Facility	5[3]	0	0	0	0	0	0	0	0	0	5
	Infiltration Drywell	2[3]	0	0	0	0	0	0	0	0	0	2
	Kristar FloGard Inserts	0	0	0	0	0	0	1[3]	0	10[3]	0	11
	Perforated Drain	0	0	0	1[3]	0	0	0	0	0	0	1
	French Drain	0	0	0	0	6	0	0	0	0	0	6
Green Infrastructure: Permeable Pavement	Geo Block Porous Pavement	0	0	0	0	14	0	0	0	1	0	15
	Grass Block Porous Pavement	0	0	0	0	0	0	1	0	0	0	1
	Grass Pavers Porous Pavement	0	0	0	0	0	0	1	0	0	0	1
	Gravel Pave Porous Pavement	0	0	0	0	0	0	0	0	7	0	7
Green Infrastructure: Rainfall Harvest	Downspout Filters	0	0	0	0	0	0	0	0	2	0	2
	Potable Water/Irrigation	0	0	0	0	0	0	0	0	3[3]	0	3
Detention	Clarifier	0	0	0	0	4	0	0	0	0	3	7
Treatment Facility	Floating Trash Booms	0	0	0	0	0	0	4	1[3]	0	7	12
	Low Flow Diversion (City of Long Beach)	0	0	0	0	0	0	0	3[3]	0	0	3
Flow-Through Treatment BMP	HydroCartridge In-Line Filters	0	0	0	0	0	0	0	0	1	0	1
Source Control Structural BMP	CDS Gross Pollutant Separators	6	2	0	0	2	0	0	2	0	6	18
	Clean Screen Catch Basin Inserts	0	0	6	0	0	2	5	0	26	0	39
	Drain Pac Catch Basin Inserts	1	0	0	0	10	0	0	0	4	0	15
	Fossil Filter Catch Basin Inserts	0	10	0	0	27	0	1	0	31	0	69

Table G-1 Existing BMPs According to Review of 2011-2012 MS4 Annual Report

EWMP Subcategory	BMP Name	Arcadia	Azusa	Bradbury	Duarte	Monrovia	Sierra Madre	LA County (San Gabriel River)	LACFCD (San Gabriel River)	LA County (LA River)	LACFCD (LA River)	TOTAL
Source Control Structural BMPs	Automated Catch Basin Inlet Screens (ARS)	13[3]	0	0	0	0	0	0	0	2,688[3]	3,444[3]	6,145
	Catch Basin Insert (various)	0	0	0	1[3]	0	0	0	0	16	0	17
	Catch Basin Connector Pipe Full Capture (CPS)	13	0	0	0	0	0	0	0	3,081	1011	4,105
	Connector Pipe Screens (CPS)	13	0	0	0	0	0	0	2[3]	851	20	886
	Filter Insert	35	0	0	0	0	0	0	0	0	0	35
	Filter Bag with Debris Trap	0	0	0	0	2	0	0	0	0	0	2
	Filters	35	0	0	0	0	0	0	0	0	0	35
	Filter Basket Catch Basin Inserts	0	0	0	0	0	0	0	0	100	0	100
	Flume Filter	0	0	0	0	1	0	0	0	0	0	1
	Manually Retractable Catch Basin Screen (MRS)	0	0	0	0	0	0	0	0	100	0	100
	Modification to Existing Catch Basin Insert	17[3]	0	0	0	0	0	0	0	0	0	17
	Poured Concrete Catch Basin	0	0	0	0	0	0	0	0	3	0	3
	Storm Drain Inlet Protection	0	0	0	0	0	0	1	0	9[3]	0	10
Institutional	Covered Material Bunkers	0	0	0	0	1	0	31	0	25	14	71
	Covered Trash Bins	12	10	0	0	0	0	9	0	53[3]	0	84
	Dog Parks	1	0	0	0	0	2	0	0	1	0	4
	Enhanced Street Sweeping	1[3]	0	1	0	0	1	0	0	19[3]	0	22
	Extra Trash Cans	0	0	0	0	50	0	242	0	959[3]	0	1,251
	Concrete Waste Management	0	0	0	0	0	0	0	0	6	0	6
	Concrete Wash Containers	0	0	0	0	0	0	3[3]	0	12[3]	0	15
	Construction Road Entrance Wash Rack	0	0	0	0	0	0	0	0	5	0	5
	Containment Berms	0	0	0	0	1	0	0	0	0	0	1
	Covered Waste Fuel Tank	0	0	0	0	0	0	2	0	0	0	2
	Hazardous Waste Management	0	0	0	0	0	0	0	0	7[3]	0	7
	Pig Oil Skimmer for Wash Rack Clarifier	0	0	0	0	0	0	0	0	3	0	3

Table G-1 Existing BMPs According to Review of 2011-2012 MS4 Annual Report

EWMP Subcategory	BMP Name	Arcadia	Azusa	Bradbury	Duarte	Monrovia	Sierra Madre	LA County (San Gabriel River)	LACFCD (San Gabriel River)	LA County (LA River)	LACFCD (LA River)	TOTAL
Institutional	Secondary Containment for Waste Oil Tanks	0	0	0	0	0	0	2	0	1	0	3
	Signage & Stenciling	134[3]	0	0	0	0	0	0	0	0	0	134
	Street Sweeping & Vacuuming	0	0	0	0	0	0	0	0	1[3]	0	1
	Vehicle & Equipment Cleaning	0	0	0	0	0	0	0	0	2	0	2
	Vehicle & Equipment Maintenance	0	0	0	0	0	0	0	0	4[3]	0	4
	Wash Rack Clarifier	0	0	0	0	0	0	0	0	1	0	1
	Waste Oil Recycling Center	0	0	0	0	0	0	0	0	1	0	1
	Water Conservation Practices	0	0	0	0	0	0	0	0	3[3]	0	3
	Wind Erosion Control	0	0	0	0	0	0	0	0	11[3]	0	11
	Wind Screen	0	0	0	0	0	0	1	0	0	0	1
	Liquid Waste Management	0	0	0	0	0	0	0	0	3[3]	0	3
	Material Delivery & Storage	0	0	0	0	0	0	0	0	4[3]	0	4
	Material Use	0	0	0	0	0	0	0	0	1[3]	0	1
	Sanitary/Septic Waste Management	0	0	0	0	0	0	0	0	4[3]	0	4
	Scheduling	0	0	0	0	0	0	0	0	4[3]	0	4
	Solid Waste Management	0	0	0	0	0	0	0	0	9[3]	0	9
	Spill Containment - Temp. Hazardous Material	0	0	0	0	0	0	0	0	17[3]	0	17
	Spill Prevention & Control	0	0	0	0	0	0	0	0	3[3]	0	3
	Stockpile Management	0	0	0	0	0	0	0	0	6[3]	0	6
	Vehicle & Equipment Fueling	0	0	0	0	0	0	0	0	3[3]	0	3
	Dust Control	0	0	0	0	0	0	0	0	9[3]	0	9
	Erosion Control	0	0	0	0	0	0	0	0	4[3]	0	4
	Fiber Rolls	0	0	0	0	0	0	0	0	330[3]	0	330
Other	Concrete Curing	0	0	0	0	0	0	0	0	9[3]	0	9
	Concrete Finishing	0	0	0	0	0	0	0	0	9[3]	0	9
	Restaurant Vent Traps	0	0	0	0	17	0	0	0	1	0	18
	Check Dam	0	0	0	0	0	0	0	0	1	0	1
	Dewatering Operations	0	0	0	0	0	0	0	0	2[3]	0	2

Table G-1 Existing BMPs According to Review of 2011-2012 MS4 Annual Report

EWMP Subcategory	BMP Name	Arcadia	Azusa	Bradbury	Duarte	Monrovia	Sierra Madre	LA County (San Gabriel River)	LACFCD (San Gabriel River)	LA County (LA River)	LACFCD (LA River)	TOTAL
Other	Earth Dikes/Drainage Swales	0	0	0	0	0	0	0	0	4[3]	0	4
	Geotextiles Materials/Plastic Covers Blankets	0	0	0	0	0	0	0	0	1	0	1
	Gravel Bag Berm	0	0	0	0	0	0	0	0	2[3]	0	2
	Outlet Protection/ Velocity Dissipation	0	0	0	0	0	0	0	0	1[3]	0	1
	Paving & Grinding Operations	0	0	0	0	0	0	0	0	6[3]	0	6
	Preserved Existing Vegetation	0	0	0	0	0	0	0	0	8[3]	0	8
	Sandbag	0	0	0	0	0	0	2,123[3]	0	17,162[3]	0	19,285
	Sewer Lift Station	0	0	0	0	0	0	0	0	2	0	2
	Shakers	0	0	0	0	0	0	0	0	13	0	13
	Silt Fence	0	0	0	0	0	0	102[3]	0	20[3]	0	122
	Silt Screens	0	0	0	0	0	0	0	0	2	0	2
	Slope Stabilization	0	0	0	0	0	0	2	0	0	0	2
	Slope Vegetation	0	0	0	0	0	0	0	0	5	0	5
	Soil Stabilizer/ Irrigation	0	0	0	0	0	0	0	0	1	0	1
	Soil Stabilizer Tracking Control	0	0	0	0	0	0	0	0	1	0	1
	Stabilized Construction Entrance/Exit	0	0	0	0	0	0	4	0	32[3]	0	36
	Stabilized Construction Roadway	0	0	0	0	0	0	0	0	2[3]	0	2
	Steel Plate	0	0	0	0	0	0	0	0	20	0	20
	Upgraded Fuel System with Canopy	0	0	0	0	0	0	2	0	1	0	3
	Water Trucks	0	0	0	0	0	0	0	0	8	0	8
	Sediment Trap	0	0	0	0	0	0	0	0	950[3]	0	950
Total		306[3]	28	7	5[3]	163	5	2,537[3]	10[3]	26,717[3]	4,505	34,283[3]

1 The numbers of BMPs herein were estimated based on adding the BMPs reported to be both installed and maintained in 2011-2012.

2 BMPs reported by LA County and LACFCD in the Annual Report are not specific to the EWMP area, instead they are reported for their entire jurisdiction and thus the numbers herein are a gross overestimate of the BMPs in the EWMP area. These estimates will be refined prior to EWMP development.

3 These BMPs are highlighted as potentially double-counted because they may have been both installed and maintained in 2011-2012.

Attachment H

Detailed List of Regional BMP Projects Identified in Planning Documents

This attachment includes a table summarizing the regional Best Management Practice (BMP) projects identified in planning documents within the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG), corresponding with **Section 3.1.3** of the RH/SGRWQG Enhanced Watershed Management Program (EWMP) Work Plan. The BMPs listed in the table correspond to **Figure 3-9** of the Work Plan.

Table H-1 Potential Regional Projects

ID	Project Name	Jurisdiction	Location	Description	Sources[1]	Notes
Within RH / SGRWQG EWMP Area						
R4	Azusa Bike Trail Network	Azusa	See project description	Develop a system of street-side bicycle paths to help bicyclists enter Azusa Canyon from Sierra Madre Avenue or Azusa Canyon Road and connect to the San Gabriel River Bike Trail.	1	May be complete - trail exists
R5	Azusa Rock Quarry Restoration	Azusa	Off of Encanta Parkway near San Gabriel River	Rehabilitate and restore the area within the Azusa Rock Quarry once mining is complete.	1	
R6	Buena Vista Wetlands	LACFCD	Near Duarte Road and Buena Vista Road	Create bio-engineered wetlands for habitat restoration in spreading basin west of Santa Fe Dam.	1	
R7	Duarte Bike Trail Extension	Duarte	See project description	Extend an existing trail for an additional mile from Royal Oaks Park (Duarte) to historic Puente Largo Rail Bridge to the San Gabriel River Bike Trail (Azusa).	1	
R8	Forest Gateway Interpretive Center	Azusa	Entrance to Azusa Canyon	Create a new U.S. Department of Agriculture (USDA) Forest Service Station and Interpretive Center at the entrance to Azusa Canyon. "Green" building practices and watershed sensitive design principles will be incorporated into the site.	1	
R9	Hugo Reid Park - Infiltration Basin	Arcadia and Unincorporated County	Michillinda Avenue and Oakdale Avenue	Provide stormwater treatment and recreational facilities with aboveground treatment at the athletic fields and underground treatment at the tennis courts and parking lot. Provide additional storage and enhanced infiltration capacity at the park.	4	
R10	Improvements to San Gabriel River Diversion and San Gabriel River Water Committee Canal and Appurtenances	Azusa	San Gabriel Canyon Road and Mountain Laurel Way	Install liftgates to allow remote operation of the canal system and upgrade parts of the canal.	5	Canal lining improvements bid in 2013
R11	Pacific Electric Rails-To-Trails Project	Azusa/Duarte	See project description	Create an east-west bike trail on an abandoned rail line running parallel to Foothill Boulevard between Monrovia and Claremont.	1	May be complete - trail exists
R12	Peck Water Conservation Improvement Project	LACFCD	Flood Control Basin near Rio Hondo Parkway and Peck Road	Construction of a pump station at Peck Road Park that will divert water that would normally flow into the San Gabriel River into facilities for groundwater recharge. Sediment will be removed from the middle of Peck Road Spreading Basin, and water will flow freely between two drainage outlets at Santa Anita Wash.	2, 3, 5	Active in planning stages.
R13	Robert's Creek Restoration	Azusa	Robert's Creek	This will be a habitat restoration and park expansion in the canyon area behind Mountain Cove.	1	
R14	Route 66/Foothill Boulevard Gateway	Azusa/Duarte	Route 66 Highway	The future City of Duarte gateway project, in partnership with the City of Azusa, is located on the historic Route 66 Highway.	1	
R15	San Gabriel Canyon Spreading Grounds	LACFCD	Near San Gabriel Canyon Road and Sierra Madre Avenue	Provide landscaping, native habitat restoration, trails, and other park amenities for public enjoyment at two deep spreading basins near San Gabriel River.	1	
R16	San Gabriel River Bike Trail Extension	Azusa	See project description	This project will extend the 38-mile regional bike trail from its current terminus near the southern edge of San Gabriel Canyon to the proposed Azusa Canyon Park and eventually all the way to the Angeles National Forest. A one-mile extension is being built to the Mountain Cove development, near the mouth of the San Gabriel Canyon.	5	
R17	Santa Anita Dam Seismic Rehabilitation	Monrovia	Santa Anita Dam; Santa Anita Canyon Road	Rehabilitate dam by adding a partial buttress to meet current seismic standards and allow for increased long term storage of captured stormwater for groundwater recharge.	5	
R18	Sawpit Debris Dam Seismic Strengthening Project	Monrovia	Monrovia Canyon Trail and Canyon Boulevard	Remove and replace existing outlet tower of the debris basin with a more updated design. Rebuild spillway on bedrock for the Division of Safety of Dams (DSOD) approval of long term water impoundment in the basin for stormwater capture and diversion to spreading grounds.	5	

Table H-1 Potential Regional Projects

ID	Project Name	Jurisdiction	Location	Description	Sources[1]	Notes
R19	Station Square	Monrovia	Myrtle Avenue and Duarte Road	Variety of on-site improvements at the new Metro Gold Line Station including the creation of a trail network, create shade by adding vegetation, promote environmental education through exposed stormwater management facilities and vegetation.	7	Anticipated completion in 2015
R20	Todd Avenue Bike Trail Network	Azusa	See project description	Connect an existing City of Azusa bike path at the south end of the San Gabriel Canyon Spreading Grounds with the San Gabriel River Bike Trail.	1	
R21	West Riverbank Tree Planting Project at the San Gabriel Valley Gun Club	Azusa	Off of Encanta Parkway near San Gabriel River	Planting 200+ trees on the west levee of the San Gabriel River to provide shade, as well as to dampen the sounds that echo up the canyon from the Gun Club activities.	1	
R22	Wright-Romvary Properties	Duarte	North Duarte	Acquire a total of 3,365 acres of land for open space protection, trails, and habitat restoration. The property is adjacent to the Van Tassel Creek, a tributary of the San Gabriel River.	1	
Outside the RH/SGRWQG EWMP Area						
R23	Baldwin Park	Baldwin Park	Patritti Avenue and Bess Avenue	Upgrade an existing 2-acre right-of-way with landscaping and trails to connect Barnes Park, the San Gabriel River Bike Trail, and neighborhood schools.	1	Downstream of project area.
R24	Indirect Reuse Replenishment Project	Irwindale	Arrow Highway and Rivergrade Road	Provide additional treatment of tertiary treated recycled water prior to reuse for groundwater replenishment.	5	Downstream of project area.
R25	Miller Pit Spreading Basins	Irwindale	Santa Fe Dam near Interstate 710 and Interstate 605	Existing deep pits will be converted to spreading basins and an intake structure and pipeline will be constructed to divert stormwater from the San Gabriel River. The pits will recharge water and serve as a sediment placement site until enough material is imported.	5	Downstream of project area.
R26	Olive Pit Water Conservation Park	Irwindale	Azusa Canyon Road and Olive Street	Divide Olive Pit into sediment placement, water conservation, and future areas. Construct an inlet from Big Dalton Wash into Olive Pit to divert water. Construct a drain from the Santa Fe Dam headworks to Olive Pit.	5	Downstream of project area.
R27	San Gabriel River Discovery Center	South El Monte	Durfee Avenue and Santa Anita Avenue	Present the story of the San Gabriel River Watershed, emphasize the importance of water resources, and provide educational and outdoor experiences to people of all ages.	2	Downstream of project area. In planning phase - looking for funding
R28	Whittier Narrows Park	South El Monte	Durfee Avenue and Santa Anita Avenue	Divert stormwater flows into a constructed infiltration basin at a County Park facility	2	Downstream of project area.

[1] Sources: 1: (San Gabriel River Corridor Master Plan, 2006), 2: (Clean Water, Clean Beaches), 3: (Amigos de los Rios), 4: (Multi-Pollutant TMDL Implementation Plan, 2010), 5: (Opti.com/IRWMP, 2013), 6: (Green Street, 2013), and 7: (City of Monrovia)

Attachment I

Detailed List of Distributed BMP Projects Identified in Planning Documents

This attachment includes tables summarizing the distributed Best Management Practices (BMPs) identified in planning documents in the Rio Hondo/San Gabriel River Water Quality Management Group (RH/SGRWQG) area, corresponding with **Section 3.1.3** of the RH/SGRWQG Enhanced Watershed Management Program (EWMP) Work Plan. The projects listed in the table are illustrated in **Figure 3-10** in the Work Plan.

Table I-1 Detailed List of Planned Distributed BMPs in RH / SGRWQG EWMP Area

ID	Jurisdiction	Data Source	BMP Subcategory	BMP	Latitude	Longitude	Install Date	Comments
D75	Arcadia	IRWMP	Unk	Santa Anita Park and Shopping Mall Parking Lot BMP	34.138431	-118.04611		Large privately owned shopping mall to be retrofit with BMPs.
D76	Monrovia	NOI	Unk	Monrovia Station Square/Transit Village Multi-Benefit Park and Greenway Project	34.133716	-118.00361	4/1/2015	Design and develop a 2.5 acre multi-benefit green space along the future Metro Gold Line multi-use trail, native trees and shrubs, runoff storage and infiltration systems prior to discharging into Sawpit Wash and Peck Road Water Conservation Park to the south.
D77	Monrovia	City	GS	Duarte Avenue Green Street	34.132191	-118.00366	4/1/2015	Green streets will be designed and incorporated adjacent to the Monrovia Square/Transit Village.
D78	Monrovia	City	GS	Myrtle Avenue Green Street	34.133583	-118.00366	4/1/2015	Green streets will be designed and incorporated adjacent to the Monrovia Square/Transit Village.
D79	Monrovia	City	Unk	Gold Line Maintenance Yard	34.133625	-17.99286		On Duarte Avenue between California and Shamrock. BMPs will be implemented based on SUSMP requirements.
D80	Azusa	DR, WCA	Bio	Azusa River Wilderness Park	34.161121	-117.89261		Develop LID stormwater BMPs for new parking lot and developments
D81	Azusa	DR, WCA	PP	Azusa River Wilderness Park	34.161121	-117.89261		Develop LID stormwater BMPs for new parking lot and developments
D82	Azusa	NOI	Inf	Metro Gold Line Infiltration Project	Unknown		4/1/2015	The City of Azusa in coordination with the Foothill Construction Authority for the Gold Line Project has constructed infiltration systems at some of the major crossings in town. Infiltration will occur at the catch basins which are soft bottom. Anticipated tributary areas are approximately 17 acres and will include the rail corridor. The 10 year storm event is to be infiltrated.
D83	Monrovia	DR	SC	CPS Installation	City-wide			In response to trash TMDL requirements set forth by the MS4 Permit.

Notes Bio = Bioretention/Biofiltration, DR = Data Request, GS = Green Streets, Inf = Infiltration, PP = Permeable Pavement, RH = Rainfall Harvest, SC = Source Control Structural BMP, Unk = Unknown, WCA = Watershed Conservation Authority Website

Attachment J

Potential Regional BMP Projects Worksheet

This attachment includes a worksheet that can be used to identify the most beneficial regional BMP projects within the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG), corresponding with **Section 3.1.4** of the RH/SGRWQG Enhanced Watershed Management Program (EWMP) Work Plan. The ranking criteria and corresponding scoring system is outlined in the table below. 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. Regional projects with the highest score will be considered most beneficial, and those with lower scores will most likely not be considered viable. This approach may easily be modified by developing a weight for each of the ranking criteria. If this method is utilized, weights may be assigned to 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 determine the most beneficial projects.

Table J-1 Potential Regional BMP Projects Ranking Criteria

Ranking Criteria	Scoring System	Notes
General Criteria		
Proximity to receiving water/MS4 infrastructure	10 being near; 1 being far	Location must be downstream of stormwater conveyance systems
Ownership	10 being publically owned; 1 being privately owned	This score is either a 10 or a 1
Size of opportunity site	10 being large; 1 being small	Large site are considered to be greater than one acre
Size of catchment area	10 being large; 1 being small	Large catchment areas are greater than 100 acres and small areas are in the range of 10 acres
Catchment area land use and likely pollutants	10 being land uses that contribute to relevant water quality priorities; 1 being those that do not contribute	Projects that treat areas that contribute to exceedances would be most beneficial
Multi-use opportunities and connectivity	10 being in a location that allows multi-use and connectivity; 1 being a location that does not	Often BMP trains can be utilized to increase capacity
Underlying Soil Conditions		
Seasonal high groundwater table depth	10 being deep; 1 being shallow	High groundwater will inhibit infiltration type BMPs. Less than 50 feet to groundwater is considered shallow
Proximity to groundwater production wells	10 being far; 1 being close	Infiltration infeasible if within 100 feet of production well
Pollutants in soil or groundwater	10 being none; 1 being many	Many is classified as a Superfund type location
Geotechnical hazards	10 being none; 1 being many	Many is classified as having a landslide potential or soils subject to liquefaction
Soil type	10 being sand; 1 being clay	Sandy soils ideal for infiltration
Infiltration rates	10 being high; 1 being low	Infiltration BMPs are generally most cost effective. High is considered A soils (greater than 4 in/hr) and low is D soils (0.5 in/hr or less)

Table J-2 Potential Regional BMP Projects Worksheet

	General Criteria						**Underlying Soil Conditions**						
Ranking 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	Seasonal high groundwater table depth	Proximity to groundwater production wells	Pollutants in soil or groundwater	Geotechnical hazards	Soil type	Infiltration rates	**Total: Σ (weight x score)**
Scoring System	10 being near; 1 being far	10 being publically owned; 1 being privately owned	10 being large; 1 being small	10 being large; 1 being small	10 being land uses that contribute to relevant water quality priorities; 1 being those that do not contribute	10 being in a location that allows multiuse and connectivity; 1 being a location that does not	10 being deep; 1 being shallow	10 being far; 1 being close	10 being none; 1 being many	10 being none; 1 being many	10 being sand; 1 being clay	10 being high; 1 being low	
Assigned Weight													
Potential Project													
Potential Project													
Potential Project													
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Potential Project													

Attachment K

Detailed Summary Statistics for BMP Inflow and Outflow for all 23 Constituents

This attachment includes summary tables created to compare statistics for pollutants in each pollutant category (metals, solids, bacteria, nutrients) among each of the Best Management Practice (BMP) subcategories (site scale detention, flow-through treatment, catch basin inserts, and constructed wetlands) for Southern California. The BMP performance data will be used by the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) during the BMP selection process required in the Enhanced Watershed Management Program (EWMP) development. This attachment corresponds with **Section 3.2** of the RH/SGRWQG EWMP Work Plan. The tables presented can be summarized as follows:

- **Tables K-1** through **K-8** represent metals for each BMP subcategory.
- **Tables K-9** through **K-11** represent solids for each BMP subcategory.
- **Tables K-12** through **K-13** represent bacteria for each BMP subcategory.
- **Tables K-14** through **K-22** represent nutrients for each BMP subcategory.

Attachment K List of Tables

Table K-1 Influent/Effluent Summary Statistics for Total Arsenic (ug/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25^{th} Percentile		Median (50^{th} Percentile)		75^{th} Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	5	5	41	39	1.80	1.50	2.50	1.90	3.25	2.50
Flow Through Treatment BMP	11	11	94	91	0.90	0.78	1.35	1.10	3.05	2.50
Constructed Wetland	2	2	8	9	1.28	0.50	1.80	0.63	2.93	1.03
Catch Basin Insert	0	6	---	27	---	2.2	---	3.05	---	5.8
Bioswale (non-Caltrans)	12	12	63	44	1.60	1.10	4.30	2.40	11	4.65
Bioswale (combined)	31	31	118	76	1.14	1.16	2.85	2.23	7.15	4.28
Bioswale (Caltrans only)	19	19	55	32	0.92	1.21	1.71	2.22	3.19	4.04

Table K-2 Influent/Effluent Summary Statistics for Total Cadmium (ug/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25^{th} Percentile		Median (50^{th} Percentile)		75^{th} Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	5	5	41	39	3.65	1.80	6.20	3.10	9.20	3.90
Flow Through Treatment BMP	11	11	95	91	0.30	0.20	0.50	0.26	0.90	0.60
Constructed Wetland	2	2	16	17	0.22	0.15	0.47	0.18	1.00	0.21
Catch Basin Insert	0	6	---	27	---	0.3	---	0.6	---	0.8
Bioswale (non-Caltrans)	12	12	100	75	0.24	0.10	0.56	0.19	1.30	0.36
Bioswale (combined)	31	31	119	76	0.49	0.19	0.82	0.34	1.35	0.60
Bioswale (Caltrans only)	19	19	55	32	0.41	0.14	0.66	0.33	1.07	0.82

Table K-3 Influent/Effluent Summary Statistics for Total Chromium (ug/L)										
BMP Category	**Number of BMP Sampling Locations**		**Number of Samples Analyzed**		**25th Percentile**		**Median (50th Percentile)**		**75th Percentile**	
	Inflow	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**
Site Scale Detention	5	5	76	68	26.25	15.00	39.45	20.50	63.75	28.00
Flow Through Treatment BMP	11	11	95	91	1.50	1.00	2.70	1.70	4.00	2.90
Constructed Wetland	2	2	8	9	3.78	1.00	8.55	1.00	9.93	1.60
Catch Basin Insert	0	6	---	27	---	2.1	---	3.5	---	5.3
Bioswale (non-Caltrans)	12	12	64	44	2.83	1.40	5.65	2.20	9.95	4.55
Bioswale (combined)	31	31	119	76	3.50	1.73	6.90	4.00	9.60	6.20
Bioswale (Caltrans only)	19	19	55	32	5.70	3.78	7.40	5.30	9.20	7.13

Table K-4 Influent/Effluent Summary Statistics for Total Copper (ug/L)										
BMP Category	**Number of BMP Sampling Locations**		**Number of Samples Analyzed**		**25th Percentile**		**Median (50th Percentile)**		**75th Percentile**	
	Inflow	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**
Site Scale Detention	5	5	76	68	26.25	15.00	39.45	20.50	63.75	28.00
Flow Through Treatment BMP	11	11	150	146	11.98	6.20	18.00	11.00	33.00	21.25
Constructed Wetland	2	2	21	22	11.15	5.55	62.00	8.80	110.00	14.75
Catch Basin Insert	0	6	---	88	---	5.95	---	13	---	22
Bioswale (non-Caltrans)	12	12	131	99	11.00	5.40	25.20	10.00	64.0	16.0
Bioswale (combined)	31	31	150	100	22.00	8.23	41.00	13.00	70.50	19.90
Bioswale (Caltrans only)	19	19	55	32	24.00	9.95	41.00	16.00	60.00	26.00

Table K-5 Influent/Effluent Summary Statistics for Total Iron (ug/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	---	---	---	---	---	---	---	---	---	---
Flow Through Treatment BMP	---	---	---	---	---	---	---	---	---	---
Constructed Wetland	---	---	---	---	---	---	---	---	---	---
Catch Basin Insert	---	---	---	---	---	---	---	---	---	---
Bioswale (non-Caltrans)	---	---	---	---	---	---	---	---	---	---
Bioswale (combined)	8	8	9	7	1060	690	2500	970	3400	1500
Bioswale (Caltrans only)	8	8	8	7	990	690	1850	970	3175	1500

Table K-6 Influent/Effluent Summary Statistics for Total Lead (ug/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	5	5	76	69	34.40	13.00	54.00	22.00	108.25	36.50
Flow Through Treatment BMP	11	11	149	146	6.50	1.00	13.00	3.10	25.50	7.10
Constructed Wetland	2	2	21	22	3.32	2.70	170.00	4.40	315.00	8.32
Catch Basin Insert	0	6	---	88	---	2.3	---	6	---	12.45
Bioswale (non-Caltrans)	12	12	131	99	9.67	3.60	21.85	7.06	73.0	18.26
Bioswale (combined)	31	31	150	100	13.92	3.53	32.89	7.55	77.75	21.50
Bioswale (Caltrans only)	19	19	55	32	11.16	2.95	26.02	6.50	60.68	15.00

Table K-7 Influent/Effluent Summary Statistics for Total Nickel (ug/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	5	5	41	39	4.75	2.70	7.30	4.00	13.00	5.20
Flow Through Treatment BMP	11	11	95	91	2.90	2.00	4.90	3.50	8.50	6.40
Constructed Wetland	2	2	8	9	5.90	3.70	8.70	5.50	16.50	6.65
Catch Basin Insert	0	6	---	27	---	3	---	4.7	---	9.8
Bioswale (non-Caltrans)	12	12	64	44	4.43	2.00	9.25	2.50	15.75	4.15
Bioswale (combined)	31	31	119	76	4.50	2.10	8.00	2.85	13.00	5.08
Bioswale (Caltrans only)	19	19	55	32	4.50	2.53	7.30	3.90	10.00	6.40

Table K-8 Influent/Effluent Summary Statistics for Total Zinc (ug/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	5	5	76	68	152.75	68.25	280.00	99.00	504.75	150.00
Flow Through Treatment BMP	11	11	150	146	110	23.00	221	55.5	400	131
Constructed Wetland	2	2	21	22	109.00	28.53	270.00	39.00	450.00	84.35
Catch Basin Insert	0	6	---	88	---	50.5	---	107	---	220
Bioswale (non-Caltrans)	12	12	131	99	90.00	29.00	160	50.16	313	76
Bioswale (combined)	31	31	150	100	110	29.5	228	55.5	360	82.5
Bioswale (Caltrans only)	19	19	55	32	110	24.75	220	52.50	350	84.50

Table K-9 Influent/Effluent Summary Statistics for Total Suspended Solids (TSS, mg/L)										
BMP Category	**Number of BMP Sampling Locations**		**Number of Samples Analyzed**		**25th Percentile**		**Median (50th Percentile)**		**75th Percentile**	
	Inflow	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**
Site Scale Detention	5	5	76	69	75	23	100	38	169	59
Flow Through Treatment BMP	13	13	230	218	8.875	2.875	39.5	7.00	89.25	22.25
Constructed Wetland	1	1	13	14	140	3.50	230	11.0	255	13.5
Catch Basin Insert	0	6	---	88	---	20	---	37.5	---	71
Bioswale (non-Caltrans)	12	12	104	71	47.3	18.0	72.0	30.0	134	50.0
Bioswale (combined)	31	31	159	103	45.0	18.0	76.0	31.0	130	54
Bioswale (Caltrans only)	19	19	55	32	39	20.5	78	38	124	81.75

Table K-10 Influent/Effluent Summary Statistics for Total Dissolved Solids (mg/L)										
BMP Category	**Number of BMP Sampling Locations**		**Number of Samples Analyzed**		**25th Percentile**		**Median (50th Percentile)**		**75th Percentile**	
	Inflow	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**
Site Scale Detention	5	5	49	37	65	66	88	88	135	120
Flow Through Treatment BMP	10	11	85	90	32.0	44.0	48.0	56.0	96.0	98.25
Constructed Wetland	1	1	8	9	63	940	87	1600	178	1850
Catch Basin Insert	0	6	---	27	---	38	---	58	---	76
Bioswale (non-Caltrans)	12	12	71	45	42.0	57.0	80.0	78.0	154	120
Bioswale (combined)	31	31	126	77	47.5	61.0	82.0	88.0	126.75	120
Bioswale (Caltrans only)	19	19	55	32	56	77.5	89	100	112	128.5

Table K-11 Influent/Effluent Summary Statistics for Turbidity (NTU)										
BMP Category	**Number of BMP Sampling Locations**		**Number of Samples Analyzed**		**25th Percentile**		**Median (50th Percentile)**		**75th Percentile**	
	Inflow	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**
Site Scale Detention	0	0	---	---	---	---	---	---	---	---
Flow Through Treatment BMP	1	1	3	3	---	2.69	---	6.29	---	6.30
Constructed Wetland	0	0	---	---	---	---	---	---	---	---
Catch Basin Insert	0	0	---	---	---	---	---	---	---	---
Bioswale (non-Caltrans)	0	0	---	---	---	---	---	---	---	---
Bioswale (combined)	11	11	16	11	29.0	18.0	75.0	37.0	140	42
Bioswale (Caltrans only)	11	11	16	11	29	18	75	37	140	42

Table K-12 Influent/Effluent Summary Statistics for Fecal Coliform (#/100ml)										
BMP Category	**Number of BMP Sampling Locations**		**Number of Samples Analyzed**		**25th Percentile**		**Median (50th Percentile)**		**75th Percentile**	
	Inflow	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**
Site Scale Detention	9	9	34	30	300	475	600	850	1700	3075
Flow Through Treatment BMP	11	11	172	152	300	7.47	900	77.1	3000	797
Constructed Wetland	2	2	13	14	230	20.0	1300	95.0	3800	255
Catch Basin Insert	0	6	---	---	---	---	---	---	---	---
Bioswale (non-Caltrans)	8	8	33	19	500	130	5000	900	16500	5000
Bioswale (combined)	8	8	33	19	500	130	5000	900	16500	5000
Bioswale (Caltrans only)	0	0	---	---	---	---	---	---	---	---

Table K-13 Influent/Effluent Summary Statistics for Total Coliform (#/100ml)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25^{th} Percentile		Median (50^{th} Percentile)		75^{th} Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	0	0	---	---	---	---	---	---	---	---
Flow Through Treatment BMP	1	1	64	64	5000	3.86	20000	20.0	90000	40.0
Constructed Wetland	1	1	8	8	1875	278	3700	1370	50000	24750
Catch Basin Insert	0	0	---	---	---	---	---	---	---	---
Bioswale (non-Caltrans)	0	0	---	---	---	---	---	---	---	---
Bioswale (combined)	0	0	---	---	---	---	---	---	---	---
Bioswale (Caltrans only)	0	0	---	---	---	---	---	---	---	---

Table K-14 Influent/Effluent Summary Statistics for Kjeldahl Nitrogen, TKN (mg/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25^{th} Percentile		Median (50^{th} Percentile)		75^{th} Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	5	5	76	68	1.33	1.10	1.88	1.50	2.70	2.17
Flow Through Treatment BMP	11	11	149	146	1.2	0.6675	1.76	1.215	2.8	2.415
Constructed Wetland	2	2	21	22	1.15	1.48	1.80	1.95	3.86	2.36
Catch Basin Insert		6	---	78	---	1.37	---	1.70	---	2.39
Bioswale (non-Caltrans)	12	12	105	72	1.43	1.035	2.1	1.57	3.39	2.3425
Bioswale (combined)	31	31	160	102	1.17	0.97	1.80	1.53	2.98	2.22
Bioswale (Caltrans only)	19	19	55	30	0.79	0.80	1.20	1.40	2.00	2.22

Table K-15 Influent/Effluent Summary Statistics for Nitrogen, ammonia as N (mg/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention			---	---	---	---	---	---	---	---
Flow Through Treatment BMP	2	1	8	9	0.2	0.575	0.8	1.2	2	3.45
Constructed Wetland	1	2	13	21	0.13	0.052	0.28	0.12	0.47	0.20
Catch Basin Insert			---	---	---	---	---	---	---	---
Bioswale (non-Caltrans)	1		10	---	0.65	---	0.91	---	1.15	---
Bioswale (combined)	20	19	58	30	0.20	0.12	0.38	0.29	0.74	0.71
Bioswale (Caltrans only)	19	19	48	30	0.16	0.12	0.31	0.29	0.61	0.71

Table K-16 Influent/Effluent Summary Statistics for Nitrogen, Nitrate (NO3) as N (mg/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	5	5	75	68	0.52	0.51	0.85	0.76	1.20	1.16
Flow Through Treatment BMP	11	11	150	145	0.29	0.45	0.495	0.7	0.8075	1.105
Constructed Wetland	2	2	26	24	0.75	0.057	1.74	0.21	3.00	0.78
Catch Basin Insert		6	---	78	---	0.43	---	0.67	---	1.148
Bioswale (non-Caltrans)	12	12	104	71	0.435	0.30	0.73	0.56	1.375	0.9
Bioswale (combined)	31	31	159	103	0.42	0.29	0.79	0.62	1.48	1.10
Bioswale (Caltrans only)	19	19	55	32	0.46	0.24	0.79	0.78	1.36	1.75

Table K-17 Influent/Effluent Summary Statistics for Nitrogen, Nitrite (NO2) as N (mg/L)										
BMP Category	**Number of BMP Sampling Locations**		**Number of Samples Analyzed**		**25th Percentile**		**Median (50th Percentile)**		**75th Percentile**	
	Inflow	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**
Site Scale Detention	---	---	---	---	---	---	---	---	---	---
Flow Through Treatment BMP	---	---	---	---	---	---	---	---	---	---
Constructed Wetland	1	1	8	8	0.017	---	0.05	---	0.16	---
Catch Basin Insert	---	---	---	---	---	---	---	---	---	---
Bioswale (non-Caltrans)	---	---	---	---	---	---	---	---	---	---
Bioswale (combined)	19	11	16	11	0.03	0.03	0.06	0.07	0.12	0.20
Bioswale (Caltrans only)	19	11	16	11	0.03	0.03	0.06	0.07	0.12	0.20

Table K-18 Influent/Effluent Summary Statistics for Organic carbon, Dissolved (mg/L)										
BMP Category	**Number of BMP Sampling Locations**		**Number of Samples Analyzed**		**25th Percentile**		**Median (50th Percentile)**		**75th Percentile**	
	Inflow	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**	**Inflow**	**Outflow**
Site Scale Detention	5	5	41	38	9.55	8.65	11.00	12.00	20.50	19.75
Flow Through Treatment BMP	11	11	95	91	8.4	8.7	14	13	26	24
Constructed Wetland	1	1	7	9	10.00	10.00	22.00	13.00	30.00	16.50
Catch Basin Insert	---	6	---	27	---	8.3	---	14.1	---	23.0
Bioswale (non-Caltrans)	9	9	58	42	9.875	8.15	14.5	12.45	31.5	22
Bioswale (combined)	28	28	113	74	7.00	8.55	12.00	12.90	23.50	22.00
Bioswale (Caltrans only)	19	19	55	32	6.20	8.68	9.70	13.00	19.00	21.75

Table K-19 Influent/Effluent Summary Statistics for Organic carbon, Total (mg/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	5	5	41	39	10.00	10.00	13.20	14.00	23.50	20.00
Flow Through Treatment BMP	11	11	95	91	11	10	17.2	15	31	26
Constructed Wetland	1	1	7	9	11.00	12.00	15.00	14.00	33.00	20.50
Catch Basin Insert	---	6	---	27	---	8.8	---	19.0	---	31.0
Bioswale (non-Caltrans)	9	9	59	42	12	11	18	17	33	23.25
Bioswale (combined)	28	28	114	74	7.98	11.00	15.00	15.00	28.00	23.00
Bioswale (Caltrans only)	19	19	55	32	7.40	10.25	11.00	13.00	21.00	23.00

Table K-20 Influent/Effluent Summary Statistics for Phosphorus as P, Dissolved (mg/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	5	5	41	39	0.06	0.07	0.09	0.11	0.17	0.18
Flow Through Treatment BMP	11	11	85	91	-0.03	-0.03	0.09	0.08	0.155	0.14
Constructed Wetland	1	1	8	8	0.071	0.075	0.08	0.16	0.18	0.36
Catch Basin Insert	---	6	---	27	---	-0.03	---	0.07	---	0.1
Bioswale (non-Caltrans)	9	9	58	41	0.058	0.175	0.08	0.28	0.14	0.5
Bioswale (combined)	9	9	58	41	0.06	0.18	0.08	0.28	0.14	0.50
Bioswale (Caltrans only)	---	---	---	---	---	---	---	---	---	---

Table K-21 Influent/Effluent Summary Statistics for Phosphorus as P, Total (mg/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	5	5	74	69	0.24	0.20	0.36	0.29	0.66	0.40
Flow Through Treatment BMP	11	11	147	146	0.17	0.1	0.24	0.18	0.42	0.28
Constructed Wetland	2	2	20	21	0.28	0.26	0.46	0.39	0.76	1.10
Catch Basin Insert	---	6	---	77	---	0.07	---	0.10	---	0.18
Bioswale (non-Caltrans)	11	11	105	72	0.12	0.26	0.22	0.37	0.4	0.5825
Bioswale (combined)	30	30	160	102	0.11	0.25	0.20	0.40	0.36	0.67
Bioswale (Caltrans only)	19	19	55	30	0.08	0.18	0.15	0.57	0.29	0.92

Table K-22 Influent/Effluent Summary Statistics for Phosphorus, orthophosphate as P (mg/L)

BMP Category	Number of BMP Sampling Locations		Number of Samples Analyzed		25th Percentile		Median (50th Percentile)		75th Percentile	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Site Scale Detention	1	1	---	---	---	---	---	---	---	---
Flow Through Treatment BMP	2	2	20		0.049		0.07		0.315	
Constructed Wetland	1	1	---	---	---	---	---	---	---	---
Catch Basin Insert	---	---	---	---	---	---	---	---	---	---
Bioswale (non-Caltrans)	3	3	12	4	0.0725	0.09	0.235	0.31	0.3325	0.65
Bioswale (combined)	21	22	67	34	0.03	0.09	0.06	0.39	0.13	0.67
Bioswale (Caltrans only)	18	19	55	30	0.02	0.09	0.05	0.42	0.10	0.67

Attachment L

Detailed Performance Metrics for all BMP Categories and Constituents

This attachment includes summary tables and box plots to show Best Management Practice (BMP) effectiveness based on statistics for each common pollutant of concern (Total Suspended Solids [TSS], fecal coliform, total copper, total lead, and total zinc) for each BMP subcategory (site scale detention, flow-through treatment, catch basin inserts, and constructed wetlands) for Southern California. The BMP performance data will be used by the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) during the BMP selection process required in the Enhanced Watershed Management Program (EWMP) development. This attachment corresponds with **Section 3.2** of the RH/SGRWQG EWMP Work Plan. The tables presented can be summarized as follows:

- **Tables L-1** through **L-5** represent site scale detention
- **Tables L-6** through **L-10** represent bioswales
- **Tables L-11** through **L-15** represent flow through treatment BMPs
- **Tables L-16** through **L-19** represent catch basin inserts
- **Tables L-20** through **L-24** represent constructed wetlands
- **Tables L-25** through **L-29** represent non-Caltrans bioswales
- **Tables L-30** through **L-33** represent Caltrans only bioswales

The following tables were created to show statistics for all pollutants category (metals, bacteria, nutrients, and solids) and each BMP subcategory (site scale detention, bioswales, flow-through treatment, catch basin inserts, and constructed wetlands) for Southern California.

- **Tables L-34** through **L-37** represent site scale detention.
- **Tables L-38** through **L-41** represent bioswales.
- **Tables L-42** through **L-45** represent flow through treatment BMPs.
- **Tables L-46** through **L-48** represent catch basin inserts.
- **Tables L-49** through **L-52** represent constructed wetlands.
- **Tables L-53** through **L-56** represent non-Caltrans bioswales.
- **Tables L-57** through **L-59** represent Caltrans only bioswales.

Attachment L List of Tables

Table L-1 Site Scale Detention – TSS

Run ID	Total suspended solids, Inflow (mg/L)	Total suspended solids, Outflow (mg/L)	Change, Total suspended solids, Inflow to Outflow
n	**76**	**69**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**133**	**50**	**-62.82%**
Standard Deviation	**94**	**46**	**---**
Coefficient of Variation	**0.71**	**0.94**	**---**
Lower 95% Confidence Limit about Mean	**112**	**39**	**---**
Upper 95% Confidence Limit about Mean	**154**	**60**	**---**
Lower Quartile (25th percentile)	**75**	**23**	**-69.80%**
Median (50th percentile)	**100**	**38**	**-62.00%**
Upper Quartile (75th percentile)	**169**	**59**	**-65.33%**
Inter Quartile Range	**94**	**36**	**---**
Minimum Detected Value	**19**	**9**	**---**
Maximum Detected Value	**500**	**260**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 4.686 + 0.667*z	ln(y) = 3.637 + 0.722*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

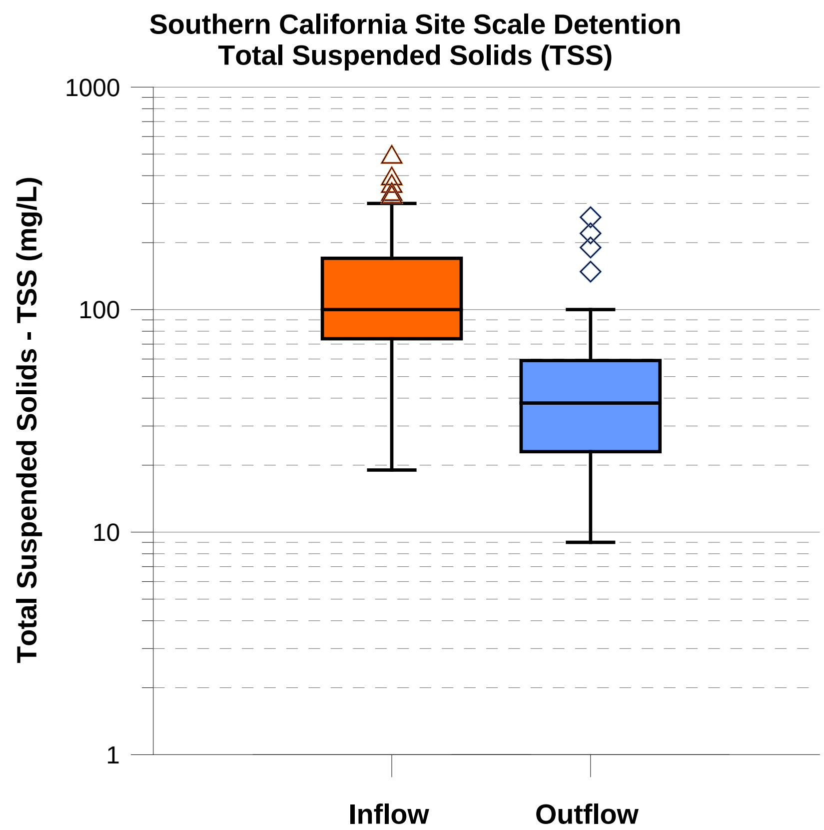

Table L-2 Site Scale Detention – Fecal Coliform

Run ID	Fecal Coliform, Inflow (#/100mL)	Fecal Coliform, Outflow (#/100mL)	Change, Fecal Coliform, Inflow to Outflow
n	**34**	**30**	---
Percent detected	**100.0%**	**100.0%**	---
Mean	**2504**	**4987**	**99.1%**
Standard Deviation	**6023**	**21843**	---
Coefficient of Variation	**2.4**	**4.4**	---
Lower 95% Confidence Limit about Mean	**479**	**-2830**	---
Upper 95% Confidence Limit about Mean	**4529**	**12803**	---
Lower Quartile (25th percentile)	**300**	**475**	**58.3%**
Median (50th percentile)	**600**	**850**	**41.7%**
Upper Quartile (75th percentile)	**1700**	**3075**	**80.9%**
Inter Quartile Range	**1400**	**2600**	---
Minimum Detected Value	**110**	**2**	---
Maximum Detected Value	**28000**	**90000**	---
Minimum Reporting Limit	---	---	---
Maximum Reporting Limit	---	---	---
Regression Equation	ln(y) = 6.703 + 1.447*z	ln(y) = 6.955 + 1.811*z	---
Note:	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.

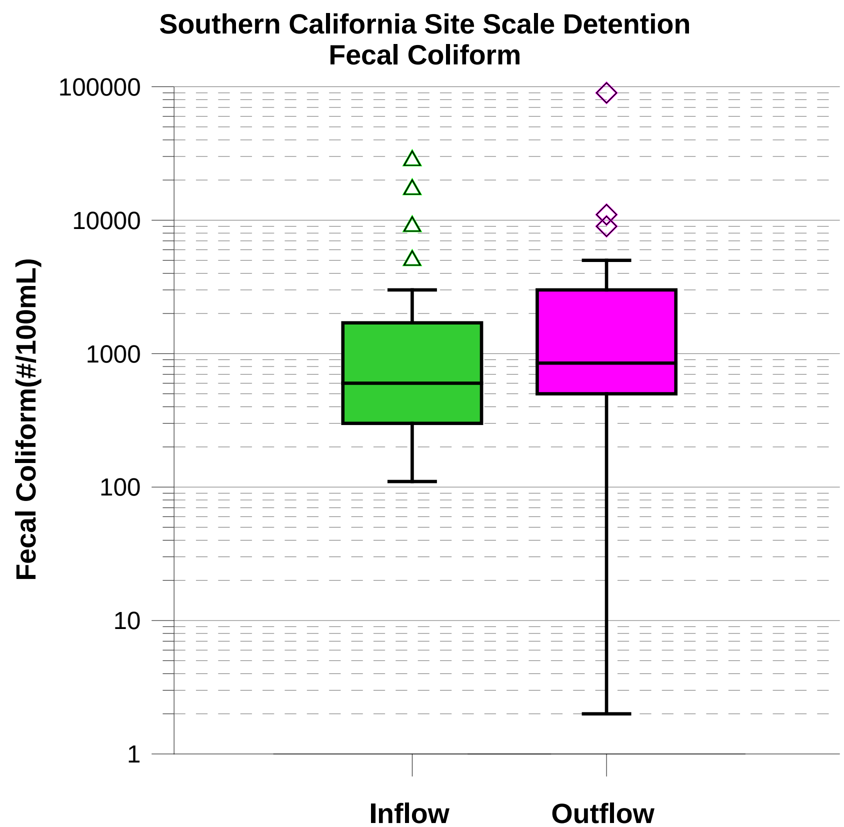

Table L-3 Site Scale Detention – Total Copper			
Run ID	**Total Copper, Inflow (ug/L)**	**Total Copper, Outflow (ug/L)**	**Change, Total Copper, Inflow to Outflow**
n	**76**	**68**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**48.69**	**23.45**	**-51.83%**
Standard Deviation	**35.12**	**13.93**	**---**
Coefficient of Variation	**0.72**	**0.59**	**---**
Lower 95% Confidence Limit about Mean	**40.80**	**20.14**	**---**
Upper 95% Confidence Limit about Mean	**56.59**	**26.76**	**---**
Lower Quartile (25th percentile)	**26.25**	**15.00**	**-42.86%**
Median (50th percentile)	**39.45**	**20.50**	**-48.04%**
Upper Quartile (75th percentile)	**63.75**	**28.00**	**-56.08%**
Inter Quartile Range	**37.50**	**13.00**	**---**
Minimum Detected Value	**6.3**	**6.7**	**---**
Maximum Detected Value	**230**	**82**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 3.682 + 0.670*z	ln(y) = 3.014 + 0.549*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

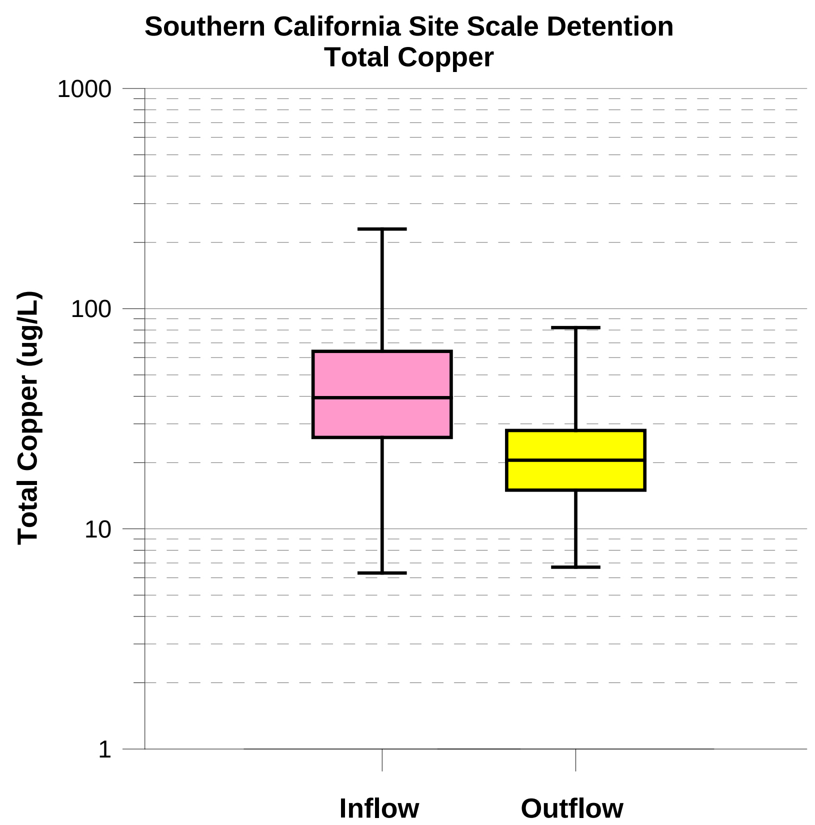

Table L-4 Site Scale Detention – Total Lead			
Run ID	**Total Lead, Inflow (ug/L)**	**Total Lead, Outflow (ug/L)**	**Change, Total Lead, Inflow to Outflow**
n	**76**	**69**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**83.02**	**28.03**	**-66.23%**
Standard Deviation	**80.13**	**24.39**	**---**
Coefficient of Variation	**0.97**	**0.87**	**---**
Lower 95% Confidence Limit about Mean	**65.00**	**22.28**	**---**
Upper 95% Confidence Limit about Mean	**101.03**	**33.79**	**---**
Lower Quartile (25th percentile)	**34.40**	**13.00**	**-62.21%**
Median (50th percentile)	**54.00**	**22.00**	**-59.26%**
Upper Quartile (75th percentile)	**108.25**	**36.50**	**-66.28%**
Inter Quartile Range	**73.85**	**23.50**	**---**
Minimum Detected Value	**5.1**	**5.3**	**---**
Maximum Detected Value	**440**	**140**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 4.066 + 0.886*z	ln(y) = 3.061 + 0.766*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

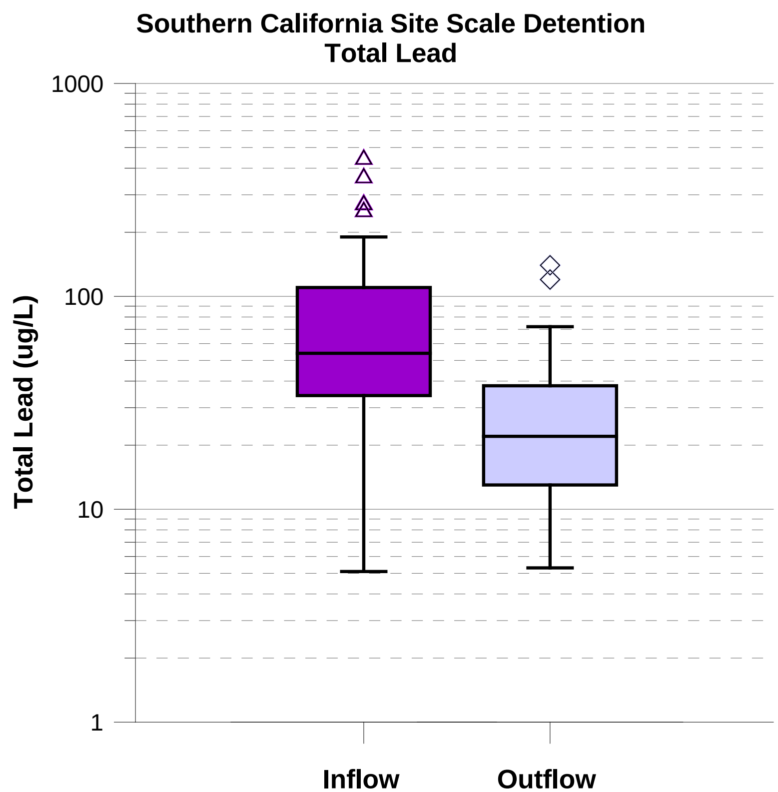

Table L-5 Site Scale Detention – Total Zinc

Run ID	Total Zinc, Inflow (ug/L)	Total Zinc, Outflow (ug/L)	Change, Total Zinc, Inflow to Outflow
n	**76**	**68**	---
Percent detected	**100.0%**	**100.0%**	---
Mean	**378.89**	**117.54**	**-68.98%**
Standard Deviation	**357.12**	**69.82**	---
Coefficient of Variation	**0.94**	**0.59**	---
Lower 95% Confidence Limit about Mean	**298.60**	**100.95**	---
Upper 95% Confidence Limit about Mean	**459.18**	**134.14**	---
Lower Quartile (25th percentile)	**152.75**	**68.25**	**-55.32%**
Median (50th percentile)	**280.00**	**99.00**	**-64.64%**
Upper Quartile (75th percentile)	**504.75**	**150.00**	**-70.28%**
Inter Quartile Range	**352.00**	**81.75**	---
Minimum Detected Value	**4.6**	**29**	---
Maximum Detected Value	**2100**	**390**	---
Minimum Reporting Limit	---	---	---
Maximum Reporting Limit	---	---	---
Regression Equation	ln(y) = 5.591 + 0.904*z	ln(y) = 4.608 + 0.596*z	---
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

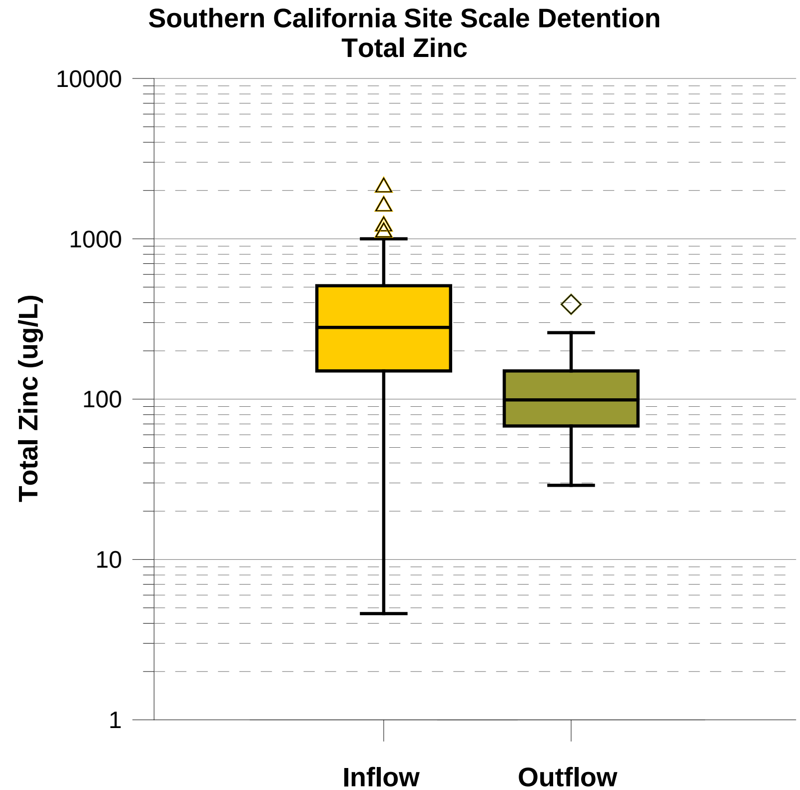

Table L-6 Bioswales – TSS

Run ID	Total suspended solids, Inflow (mg/L)	Total suspended solids, Outflow (mg/L)	Change, Total suspended solids, Inflow to Outflow
n	**159**	**103**	---
Percent detected	**100.0%**	**100.0%**	---
Mean	**98.9**	**49.0**	**-50.46%**
Standard Deviation	**80.5**	**55.1**	---
Coefficient of Variation	**0.81**	**1.12**	---
Lower 95% Confidence Limit about Mean	**86.3**	**38.3**	---
Upper 95% Confidence Limit about Mean	**111.4**	**59.6**	---
Lower Quartile (25th percentile)	**45.0**	**18.0**	**-60.00%**
Median (50th percentile)	**76.0**	**31.0**	**-59.21%**
Upper Quartile (75th percentile)	**130**	**54**	**-58.46%**
Inter Quartile Range	**85**	**36**	---
Minimum Detected Value	**2**	**1**	---
Maximum Detected Value	**474**	**330**	---
Minimum Reporting Limit	---	---	---
Maximum Reporting Limit	---	---	---
Regression Equation	ln(y) = 4.290 + 0.842*z	ln(y) = 3.472 + 0.948*z	---
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

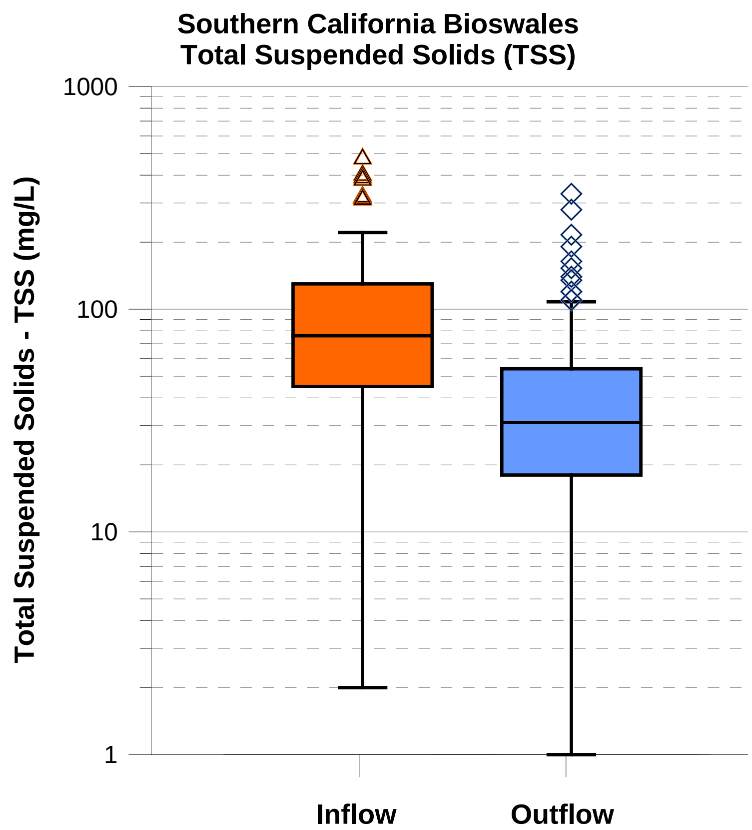

Table L-7 Bioswales – Fecal Coliform			
Run ID	**Fecal Coliform, Inflow (# / 100mL)**	**Fecal Coliform, Outflow (# / 100mL)**	**Change, Fecal Coliform, Inflow to Outflow**
n	**33**	**19**	**---**
Percent detected	**97.0%**	**100.0%**	**---**
Mean	12725	**10982**	**-13.70%**
Standard Deviation	22363	**49927**	**---**
Coefficient of Variation	1.76	**4.55**	**---**
Lower 95% Confidence Limit about Mean	5095	**-11468**	**---**
Upper 95% Confidence Limit about Mean	20355	**33432**	**---**
Lower Quartile (25th percentile)	**500**	**130**	**-74.00%**
Median (50th percentile)	**5000**	**900**	**-82.00%**
Upper Quartile (75th percentile)	**16500**	**5000**	**-69.70%**
Inter Quartile Range	**16000**	**4870**	**---**
Minimum Detected Value	**17**	**17**	**---**
Maximum Detected Value	**90000**	**160000**	**---**
Minimum Reporting Limit	**1**	**---**	**---**
Maximum Reporting Limit	**1**	**---**	**---**
Regression Equation	ln(y) = 7.667 + 2.695*z	ln(y) = 6.585 + 2.773*z	**---**
Note:	3	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

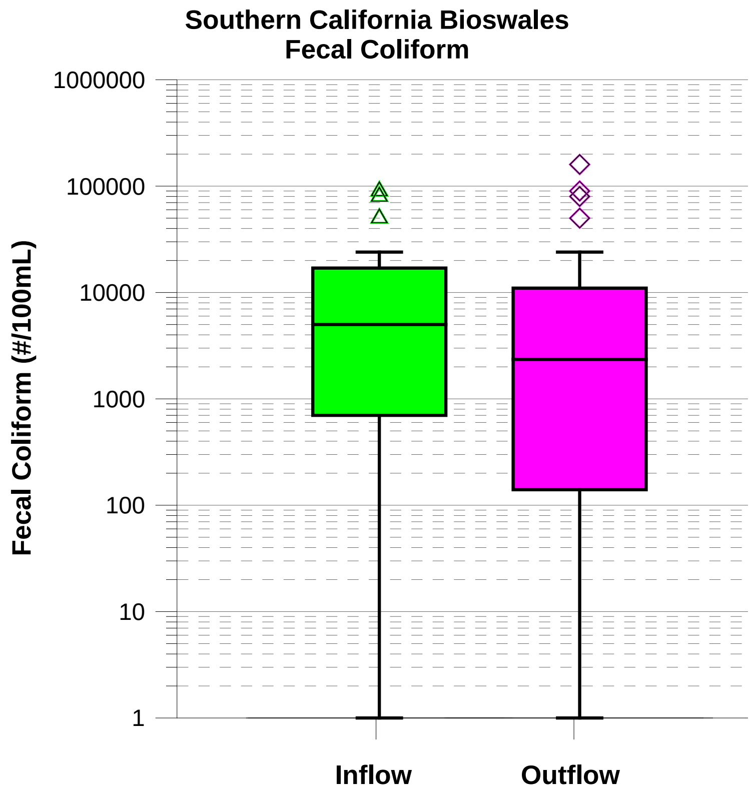

Table L-8 Bioswales – Copper

Run ID	Total Copper, Inflow (ug/L)	Total Copper, Outflow (ug/L)	Change, Total Copper, Inflow to Outflow
n	**150**	**100**	---
Percent detected	**100.0%**	**100.0%**	---
Mean	**49.82**	**15.43**	**-69.02%**
Standard Deviation	**37.27**	**11.07**	---
Coefficient of Variation	**0.75**	**0.72**	---
Lower 95% Confidence Limit about Mean	**43.86**	**13.26**	---
Upper 95% Confidence Limit about Mean	**55.79**	**17.60**	---
Lower Quartile (25th percentile)	**22.00**	**8.23**	**-62.61%**
Median (50th percentile)	**41.00**	**13.00**	**-68.29%**
Upper Quartile (75th percentile)	**70.50**	**19.90**	**-71.77%**
Inter Quartile Range	**48.50**	**11.68**	---
Minimum Detected Value	**1.1**	**1**	---
Maximum Detected Value	**232**	**73**	---
Minimum Reporting Limit	---	---	---
Maximum Reporting Limit	---	---	---
Regression Equation	ln(y) = 3.593 + 0.894*z	ln(y) = 2.484 + 0.786*z	---
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

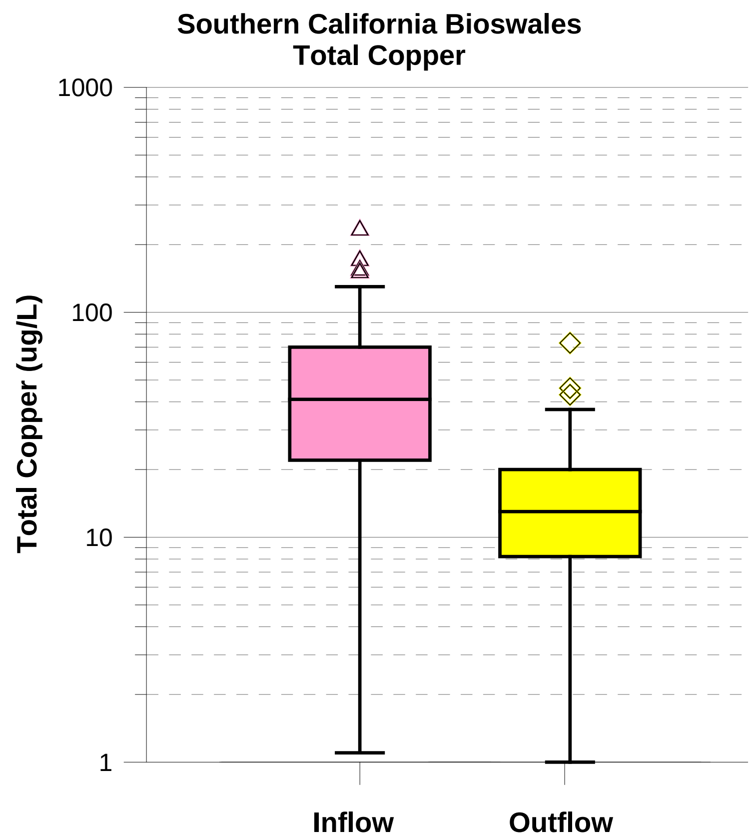

Table L-9 Bioswales – Lead

Run ID	Total Lead, Inflow (ug/L)	Total Lead, Outflow (ug/L)	Change, Total Lead, Inflow to Outflow
n	**150**	**100**	---
Percent detected	**98.7%**	**99.0%**	---
Mean	73.08	17.93	**-75.46%**
Standard Deviation	213	27.42	---
Coefficient of Variation	2.91	1.53	---
Lower 95% Confidence Limit about Mean	39.00	12.56	---
Upper 95% Confidence Limit about Mean	107	23.31	---
Lower Quartile (25th percentile)	13.92	**3.53**	**-74.67%**
Median (50th percentile)	32.89	**7.55**	**-77.05%**
Upper Quartile (75th percentile)	77.75	**21.50**	**-72.35%**
Inter Quartile Range	63.83	**17.98**	---
Minimum Detected Value	**1.3**	**1**	---
Maximum Detected Value	**2086**	**189**	---
Minimum Reporting Limit	**0.7**	**0.03**	---
Maximum Reporting Limit	**0.8**	**0.03**	---
Regression Equation	ln(y) = 3.493 + 1.275*z	ln(y) = 2.161 + 1.240*z	---
Note:	3	3	2

Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

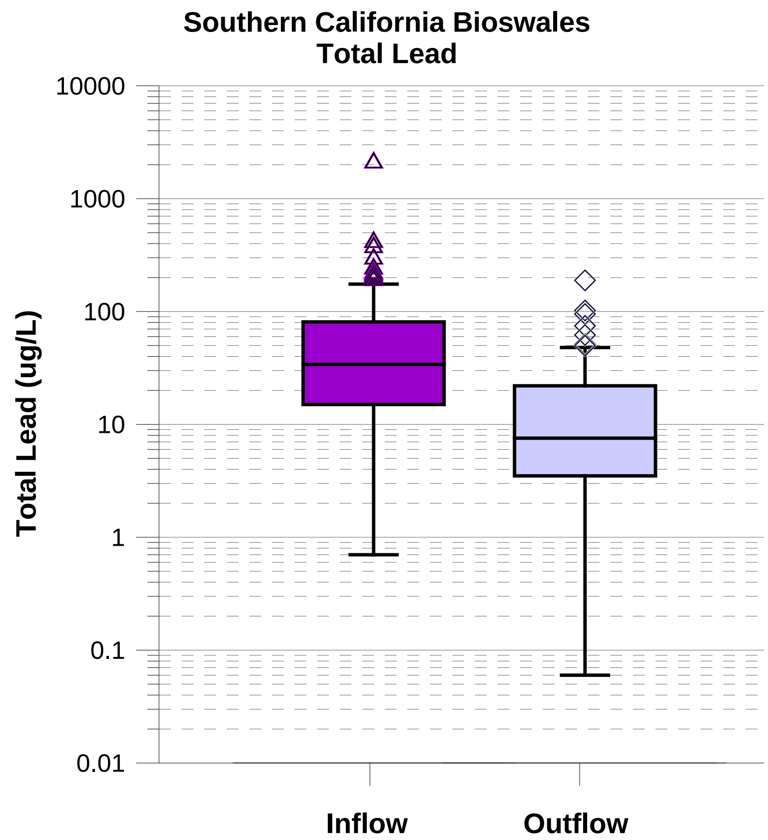

Table L-10 Bioswales – Zinc			
Run ID	**Total Zinc, Inflow (ug/L)**	**Total Zinc, Outflow (ug/L)**	**Change, Total Zinc, Inflow to Outflow**
n	**150**	**100**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**275**	**71.4**	**-74.08%**
Standard Deviation	**225**	**78.7**	**---**
Coefficient of Variation	**0.82**	**1.10**	**---**
Lower 95% Confidence Limit about Mean	**239**	**56.0**	**---**
Upper 95% Confidence Limit about Mean	**311**	**86.8**	**---**
Lower Quartile (25th percentile)	**110**	**29.5**	**-73.20%**
Median (50th percentile)	**228**	**55.5**	**-75.66%**
Upper Quartile (75th percentile)	**360**	**82.5**	**-77.09%**
Inter Quartile Range	**250**	**53.0**	**---**
Minimum Detected Value	**13**	**4.2**	**---**
Maximum Detected Value	**1542**	**501**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 5.297 + 0.877*z	ln(y) = 3.932 + 0.819*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

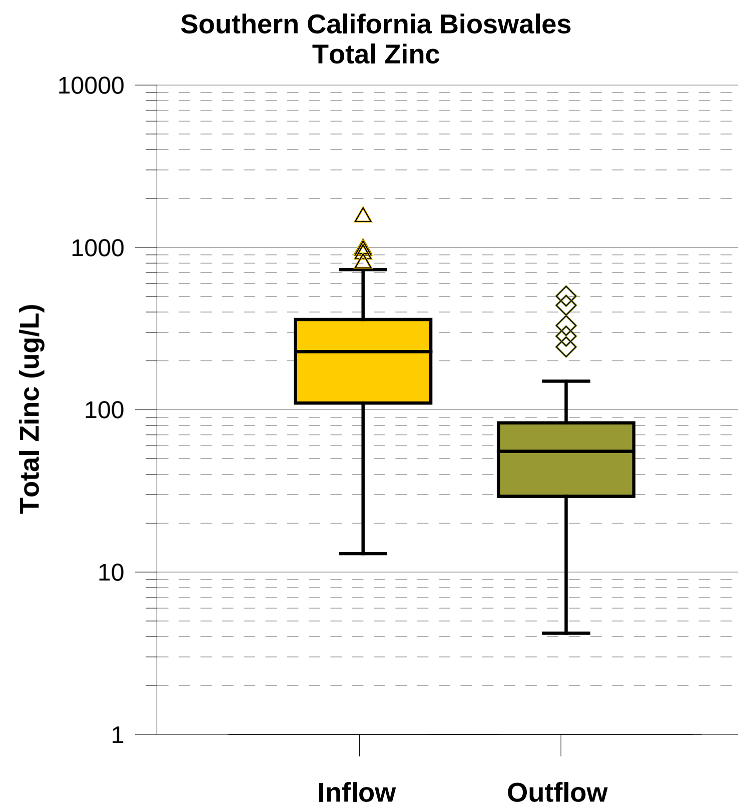

Table L-11 Flow Through BMPs – TSS			
Run ID	**Total suspended solids, Inflow (mg/L)**	**Total suspended solids, Outflow (mg/L)**	**Change, Total suspended solids, Inflow to Outflow**
n	**230**	**218**	**---**
Percent detected	**98.3%**	**88.1%**	**---**
Mean	65.6	23.0	**-65.0%**
Standard Deviation	80.9	42.0	**---**
Coefficient of Variation	1.23	1.83	**---**
Lower 95% Confidence Limit about Mean	55.1	17.4	**---**
Upper 95% Confidence Limit about Mean	76.1	28.6	**---**
Lower Quartile (25th percentile)	**8.875**	**2.875**	**-67.61%**
Median (50th percentile)	**39.5**	**7.00**	**-82.28%**
Upper Quartile (75th percentile)	**89.25**	**22.25**	**-75.07%**
Inter Quartile Range	**80.375**	**19.375**	**---**
Minimum Detected Value	**2**	**1**	**---**
Maximum Detected Value	**629**	**280**	**---**
Minimum Reporting Limit	**1**	**1**	**---**
Maximum Reporting Limit	**1**	**1**	**---**
Regression Equation	ln(y) = 3.419 + 1.425*z	ln(y) = 1.959 + 1.657*z	**---**
Note:	3	3	2

Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

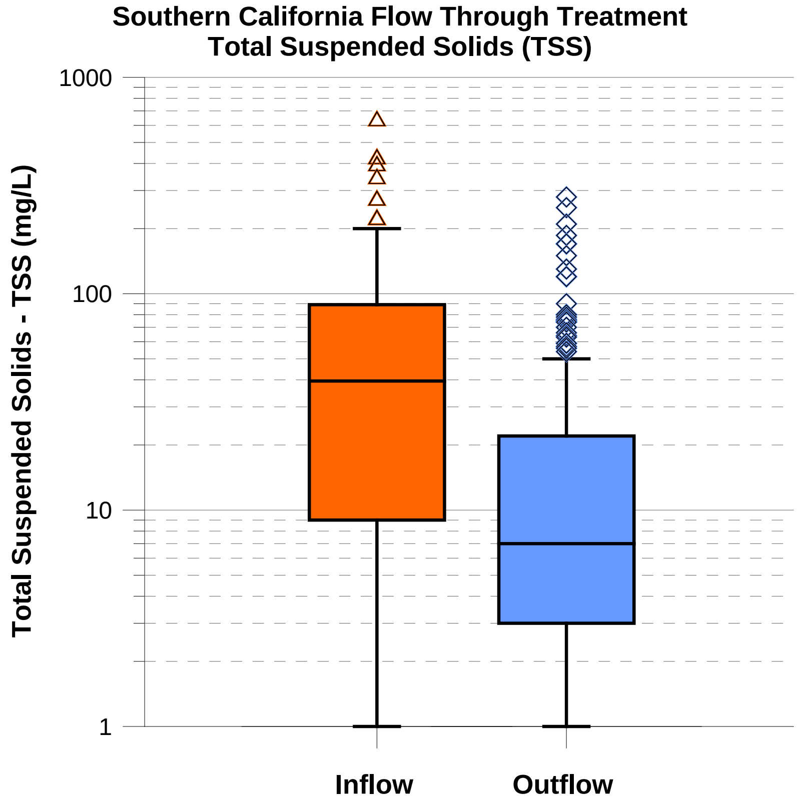

Table L-12 Flow Through BMPs – Fecal Coliform

Run ID	Fecal Coliform, Inflow (#/100mL)	Fecal Coliform, Outflow (#/100mL)	Change, Fecal Coliform, Inflow to Outflow
n	**172**	**152**	---
Percent detected	**100.0%**	**73.7%**	---
Mean	**6450**	4750	**-26.36%**
Standard Deviation	**19225**	21431	---
Coefficient of Variation	**2.98**	4.51	---
Lower 95% Confidence Limit about Mean	**3577**	1343	---
Upper 95% Confidence Limit about Mean	**9324**	8157	---
Lower Quartile (25th percentile)	**300**	7.47	**-97.51%**
Median (50th percentile)	**900**	77.1	**-91.43%**
Upper Quartile (75th percentile)	**3000**	797	**-73.44%**
Inter Quartile Range	**2700**	789	---
Minimum Detected Value	**8**	**2**	---
Maximum Detected Value	**160000**	**160000**	---
Minimum Reporting Limit	---	**2**	---
Maximum Reporting Limit	---	**10**	---
Regression Equation	ln(y) = 6.984 + 1.871*z	ln(y) = 4.345 + 3.463*z	---
Note:	1	3	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

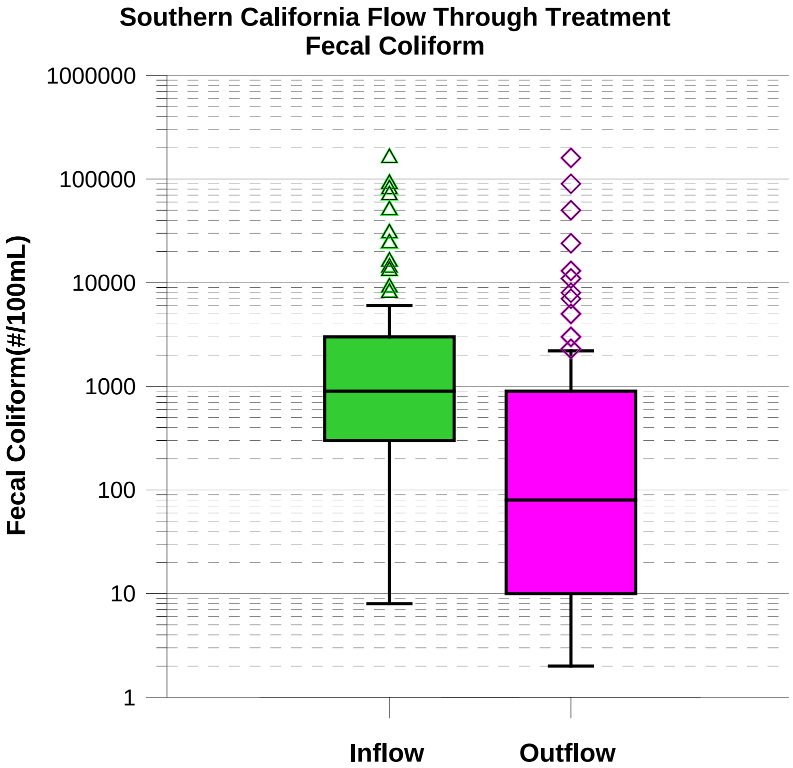

Table L-13 Flow Through BMPs – Copper			
Run ID	**Total Copper, Inflow (ug/L)**	**Total Copper, Outflow (ug/L)**	**Change, Total Copper, Inflow to Outflow**
n	**150**	**146**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**41.89**	**18.84**	**-55.03%**
Standard Deviation	**144**	**21.81**	**---**
Coefficient of Variation	**3.43**	**1.16**	**---**
Lower 95% Confidence Limit about Mean	**18.89**	**15.30**	**---**
Upper 95% Confidence Limit about Mean	**64.88**	**22.38**	**---**
Lower Quartile (25th percentile)	**11.98**	**6.20**	**-48.27%**
Median (50th percentile)	**18.00**	**11.00**	**-38.89%**
Upper Quartile (75th percentile)	**33.00**	**21.25**	**-35.61%**
Inter Quartile Range	**21.03**	**15.06**	**---**
Minimum Detected Value	**2.7**	**1.56**	**---**
Maximum Detected Value	**1400**	**150**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 3.040 + 0.943*z	ln(y) = 2.477 + 0.965*z	**---**
Note:	1	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.

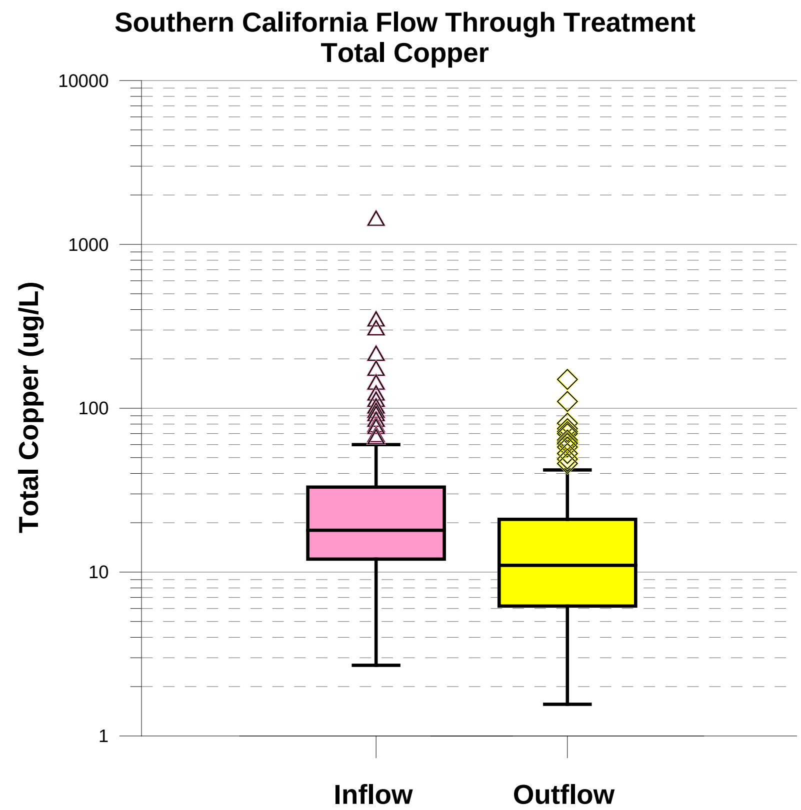

Table L-14 Flow Through BMPs – Lead

Run ID	Total Lead, Inflow (ug/L)	Total Lead, Outflow (ug/L)	Change, Total Lead, Inflow to Outflow
n	**149**	**146**	---
Percent detected	**100.0%**	**100.0%**	---
Mean	**20.70**	**7.51**	**-63.71%**
Standard Deviation	**23.57**	**13.49**	---
Coefficient of Variation	**1.14**	**1.80**	---
Lower 95% Confidence Limit about Mean	**16.92**	**5.32**	---
Upper 95% Confidence Limit about Mean	**24.49**	**9.70**	---
Lower Quartile (25th percentile)	**6.50**	**1.00**	**-84.62%**
Median (50th percentile)	**13.00**	**3.10**	**-76.15%**
Upper Quartile (75th percentile)	**25.50**	**7.10**	**-72.16%**
Inter Quartile Range	**19.00**	**6.10**	---
Minimum Detected Value	**1**	**1**	---
Maximum Detected Value	**140**	**110**	---
Minimum Reporting Limit	---	---	---
Maximum Reporting Limit	---	---	---
Regression Equation	ln(y) = 2.558 + 1.032*z	ln(y) = 1.253 + 1.128*z	---
Note:	1	1	**2**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

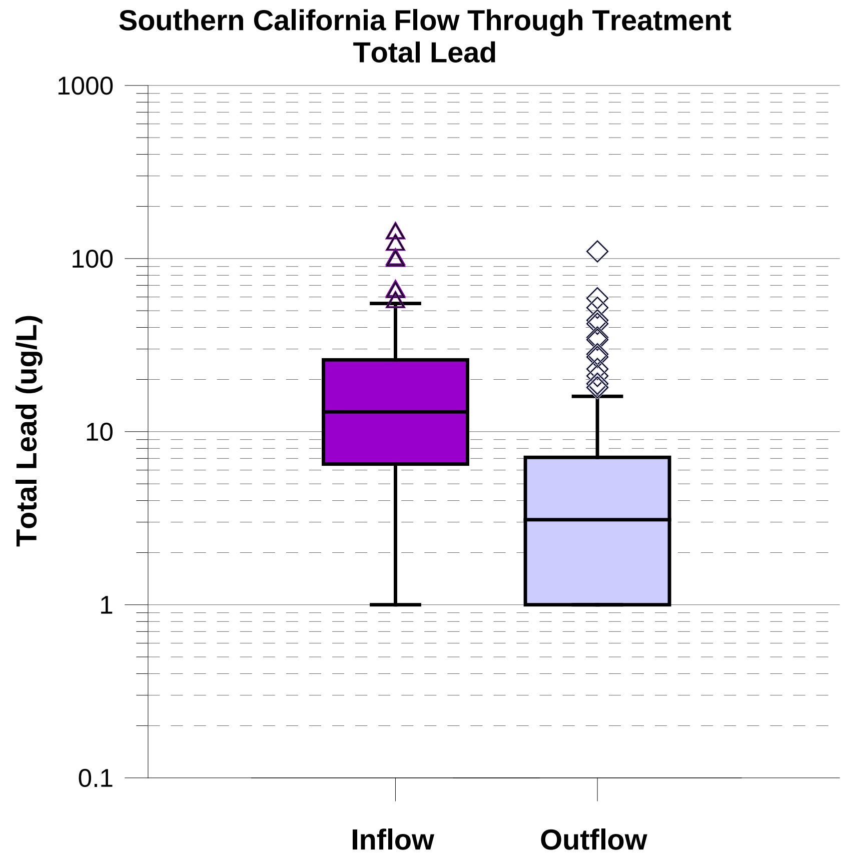

Table L-15 Flow Through BMPs – Zinc			
Run ID	**Total Zinc, Inflow (ug/L)**	**Total Zinc, Outflow (ug/L)**	**Change, Total Zinc, Inflow to Outflow**
n	**150**	**146**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**311**	**117**	**-62.40%**
Standard Deviation	**309**	**183**	**---**
Coefficient of Variation	**0.99**	**1.57**	**---**
Lower 95% Confidence Limit about Mean	**262**	**87.3**	**---**
Upper 95% Confidence Limit about Mean	**361**	**147**	**---**
Lower Quartile (25th percentile)	**110**	**23.00**	**-79.09%**
Median (50th percentile)	**221**	**55.5**	**-74.89%**
Upper Quartile (75th percentile)	**400**	**131**	**-67.31%**
Inter Quartile Range	**290**	**108**	**---**
Minimum Detected Value	**15**	**1**	**---**
Maximum Detected Value	**1900**	**1400**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 5.361 + 0.903*z	ln(y) = 3.976 + 1.350*z	**---**
Note:	1	1	**2**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

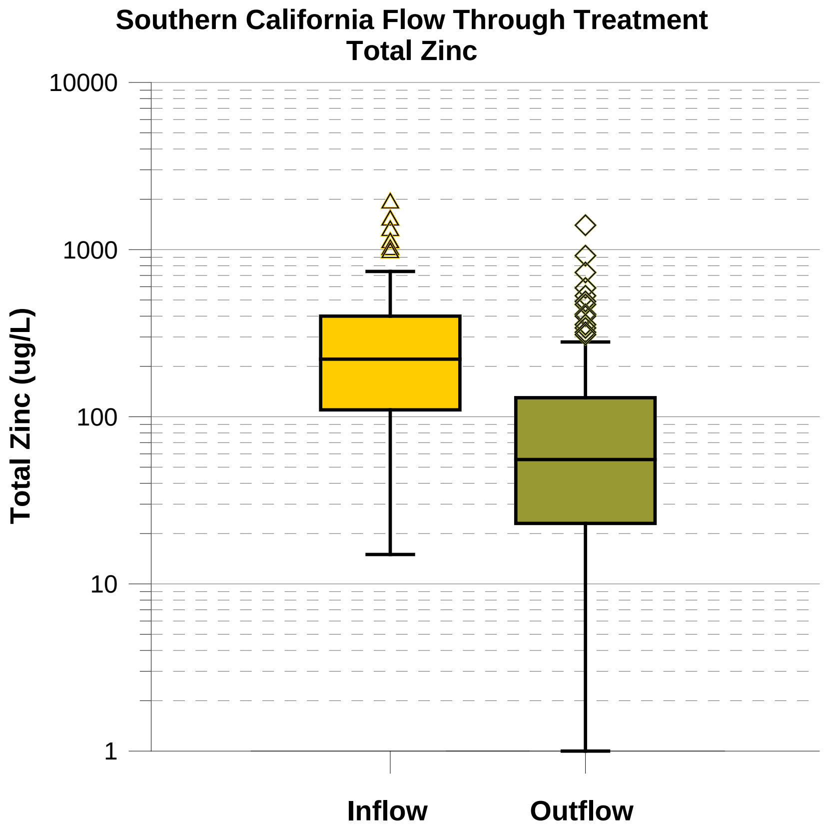

Table L-16 Catch Basin Inserts –TSS	
Run ID	**Total suspended solids, Outflow (mg/L)**
n	**88**
Percent detected	**100.0%**
Mean	**52.9**
Standard Deviation	**55.7**
Coefficient of Variation	**1.05**
Lower 95% Confidence Limit about Mean	**41.3**
Upper 95% Confidence Limit about Mean	**64.6**
Lower Quartile (25th percentile)	**20**
Median (50th percentile)	**37.5**
Upper Quartile (75th percentile)	**71**
Inter Quartile Range	**51**
Minimum Detected Value	**4**
Maximum Detected Value	**320**
Minimum Reporting Limit	**---**
Maximum Reporting Limit	**---**
Regression Equation	ln(y) = 3.552 + 0.972*z
Note:	1

Note 1: All data reported as detected. Bolded values are exact calculations.

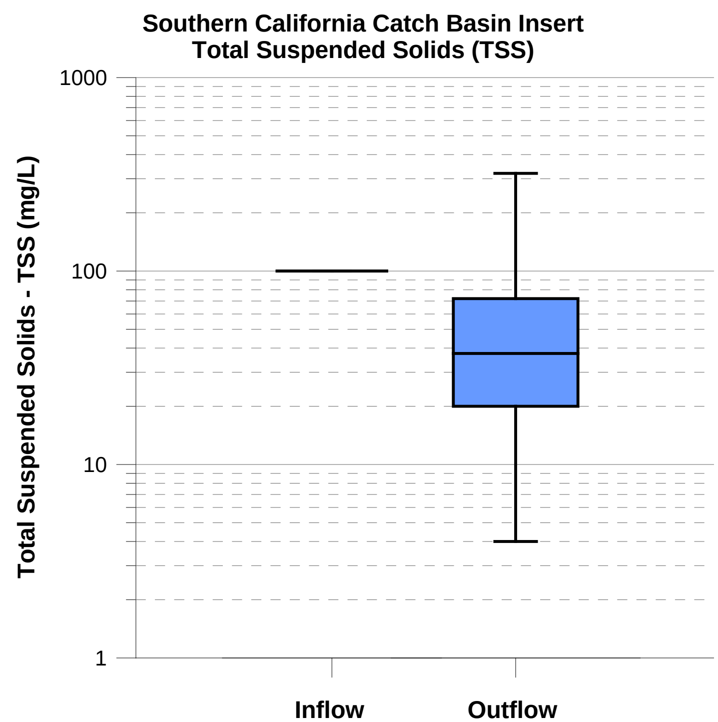

Table L-17 Catch Basin Inserts – Copper	
Run ID	**Total Copper, Outflow (ug/L)**
n	**88**
Percent detected	**100.0%**
Mean	**16.80**
Standard Deviation	**16.57**
Coefficient of Variation	**0.99**
Lower 95% Confidence Limit about Mean	**13.34**
Upper 95% Confidence Limit about Mean	**20.27**
Lower Quartile (25th percentile)	**5.95**
Median (50th percentile)	**13**
Upper Quartile (75th percentile)	**22**
Inter Quartile Range	**16.05**
Minimum Detected Value	**1.2**
Maximum Detected Value	**90**
Minimum Reporting Limit	
Maximum Reporting Limit	
Regression Equation	ln(y) = 2.387 + 1.041*z
Note:	1

Note 1: All data reported as detected. Bolded values are exact calculations.

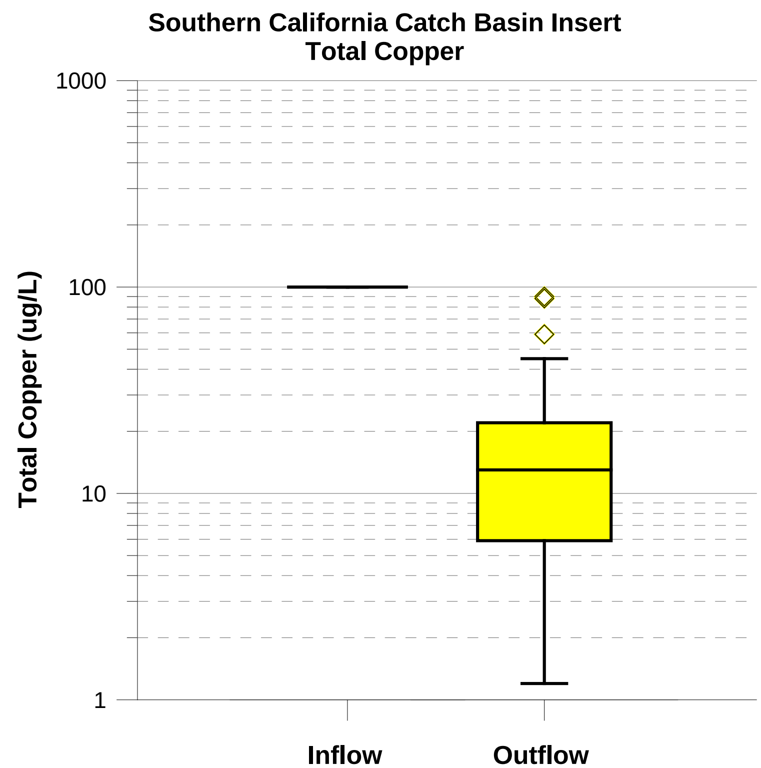

Table L-18 Catch Basin Inserts – Lead	
Run ID	**Total Lead, Outflow (ug/L)**
n	**88**
Percent detected	**100.0%**
Mean	**12.45**
Standard Deviation	**19.61**
Coefficient of Variation	**1.58**
Lower 95% Confidence Limit about Mean	**8.35**
Upper 95% Confidence Limit about Mean	**16.54**
Lower Quartile (25th percentile)	**2.3**
Median (50th percentile)	**6**
Upper Quartile (75th percentile)	**12.45**
Inter Quartile Range	**10.15**
Minimum Detected Value	**1**
Maximum Detected Value	**110**
Minimum Reporting Limit	
Maximum Reporting Limit	
Regression Equation	ln(y) = 1.798 + 1.223*z
Note:	1

Note 1: All data reported as detected. Bolded values are exact calculations.

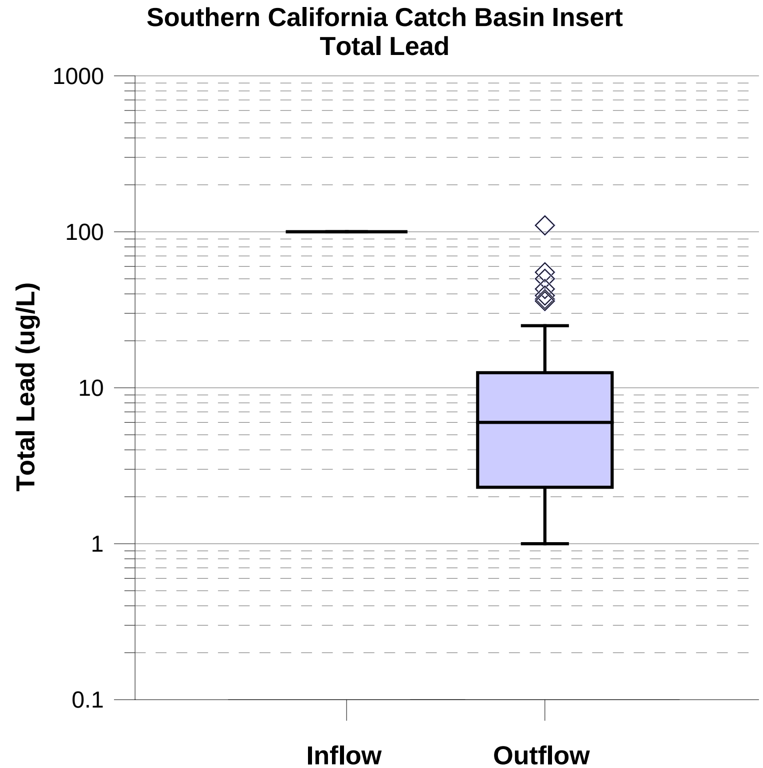

Table L-19 Catch Basin Inserts – Zinc	
Run ID	**Total Zinc, Outflow (ug/L)**
n	**88**
Percent detected	**100.0%**
Mean	**173**
Standard Deviation	**215**
Coefficient of Variation	**1.24**
Lower 95% Confidence Limit about Mean	**128**
Upper 95% Confidence Limit about Mean	**218**
Lower Quartile (25th percentile)	**50.5**
Median (50th percentile)	**107**
Upper Quartile (75th percentile)	**220**
Inter Quartile Range	**169**
Minimum Detected Value	**9.4**
Maximum Detected Value	**1250**
Minimum Reporting Limit	
Maximum Reporting Limit	
Regression Equation	ln(y) = 4.582 + 1.162*z
Note:	1

Note 1: All data reported as detected. Bolded values are exact calculations.

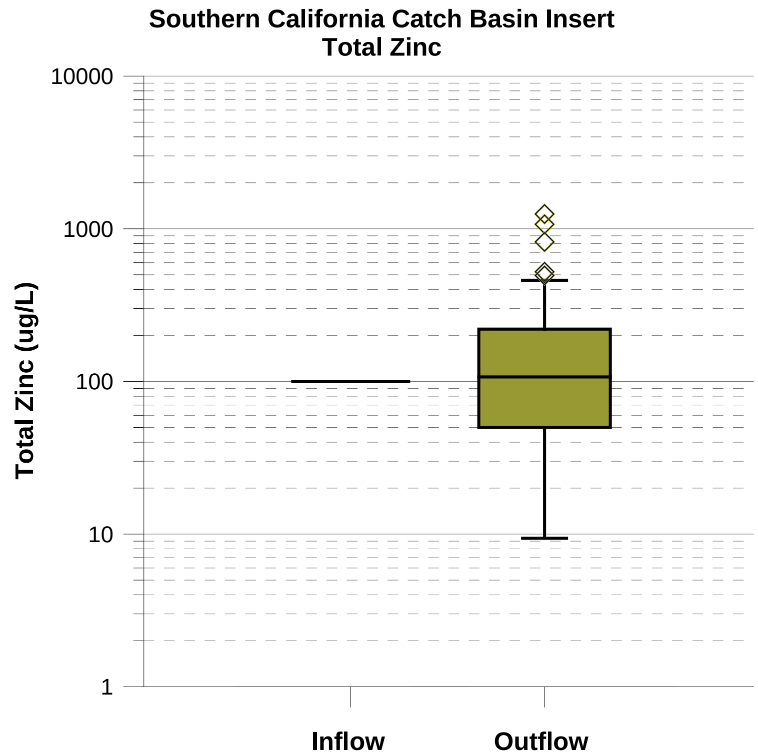

Table L-20 Constructed Wetlands – TSS			
Run ID	**Total suspended solids, Inflow (mg/L)**	**Total suspended solids, Outflow (mg/L)**	**Change, Total suspended solids, Inflow to Outflow**
n	**13**	**14**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**203**	**11.1**	**-94.55%**
Standard Deviation	**88**	**8.9**	**---**
Coefficient of Variation	**0.43**	**0.81**	**---**
Lower 95% Confidence Limit about Mean	**155**	**6.38**	**---**
Upper 95% Confidence Limit about Mean	**251**	**15.7**	**---**
Lower Quartile (25th percentile)	**140**	**3.50**	**-97.50%**
Median (50th percentile)	**230**	**11.0**	**-95.22%**
Upper Quartile (75th percentile)	**255**	**13.5**	**-94.71%**
Inter Quartile Range	**115**	**10.0**	**---**
Minimum Detected Value	**60**	**1.00**	**---**
Maximum Detected Value	**350**	**28**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 5.197 + 0.595*z	ln(y) = 2.014 + 1.142*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

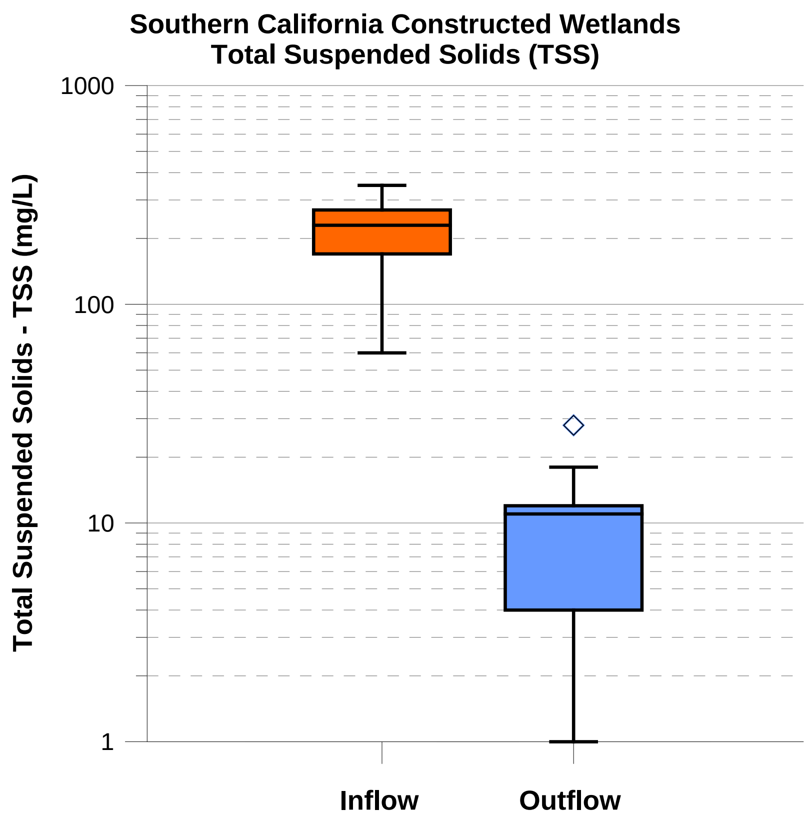

Table L-21 Constructed Wetlands – Fecal Coliform

Run ID	Fecal Coliform, Inflow (# / 100mL)	Fecal Coliform, Outflow (# / 100mL)	Change, Fecal Coliform, Inflow to Outflow
n	**13**	**14**	---
Percent detected	**92.3%**	**100.0%**	---
Mean	5407	**295**	**-94.54%**
Standard Deviation	18323	**795**	---
Coefficient of Variation	3.39	**2.69**	---
Lower 95% Confidence Limit about Mean	-4554	**-121**	---
Upper 95% Confidence Limit about Mean	15368	**712**	---
Lower Quartile (25th percentile)	**230**	**20.0**	**-91.30%**
Median (50th percentile)	**1300**	**95.0**	**-92.69%**
Upper Quartile (75th percentile)	**3800**	**255**	**-93.29%**
Inter Quartile Range	**3570**	**235**	---
Minimum Detected Value	**20**	**8**	---
Maximum Detected Value	**50000**	**2400**	---
Minimum Reporting Limit	**10**		---
Maximum Reporting Limit	**10**		---
Regression Equation	ln(y) = 6.794 + 2.447*z	ln(y) = 4.484 + 1.786*z	---
Note:	3	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.

Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

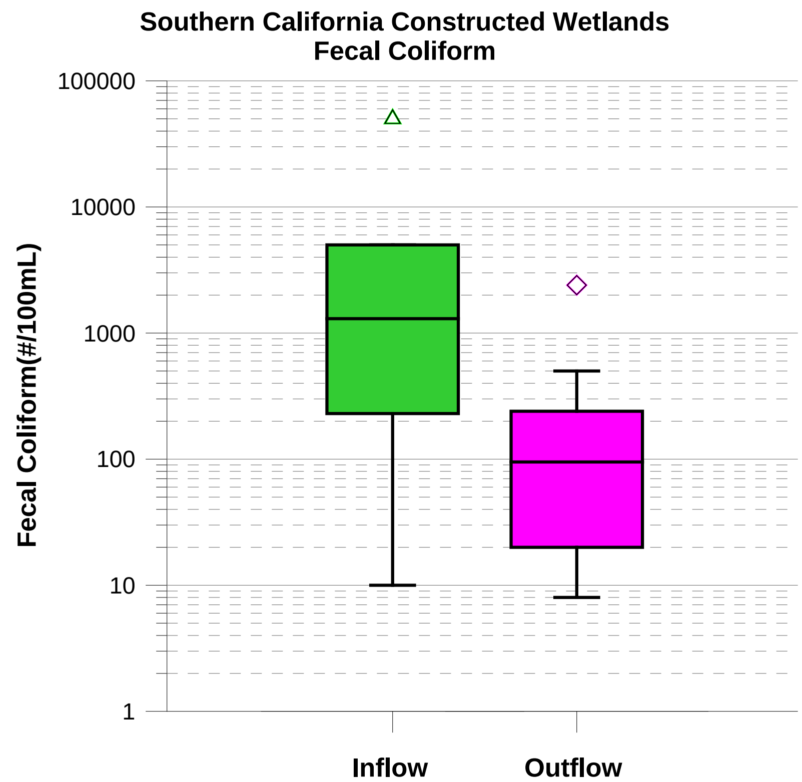

Table L-22 Constructed Wetlands – Total Copper			
Run ID	**Total Copper, Inflow (ug/L)**	**Total Copper, Outflow (ug/L)**	**Change, Total Copper, Inflow to Outflow**
n	**21**	**22**	**---**
Percent detected	**90.5%**	**95.5%**	**---**
Mean	543.94	10.78	**-98.02%**
Standard Deviation	2890.84	7.17	**---**
Coefficient of Variation	5.31	0.66	**---**
Lower 95% Confidence Limit about Mean	-692.50	7.79	**---**
Upper 95% Confidence Limit about Mean	1780.37	13.78	**---**
Lower Quartile (25th percentile)	**11.15**	**5.55**	**-50.22%**
Median (50th percentile)	**62.00**	**8.80**	**-85.81%**
Upper Quartile (75th percentile)	**110.00**	**14.75**	**-86.59%**
Inter Quartile Range	**98.85**	**9.20**	**---**
Minimum Detected Value	**3.23**	**3.4**	**---**
Maximum Detected Value	**9500**	**31**	**---**
Minimum Reporting Limit	**0.25**	**0.25**	**---**
Maximum Reporting Limit	**0.25**	**0.25**	**---**
Regression Equation	ln(y) = 3.738 + 2.215*z	ln(y) = 2.185 + 0.717*z	**---**
Note:	3	3	**---**

Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

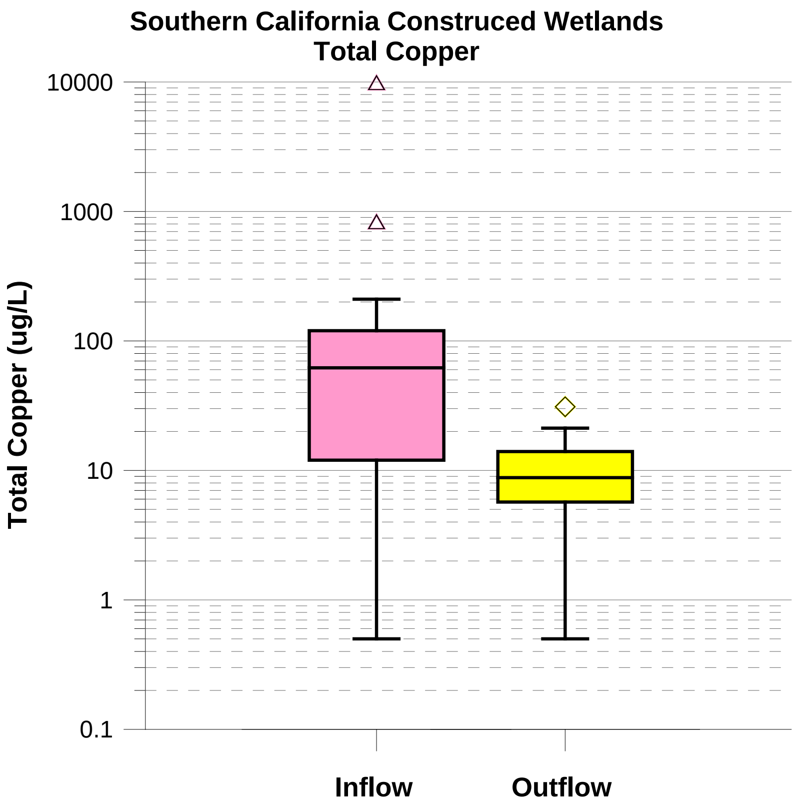

Table L-23 Constructed Wetlands – Total Lead

Run ID	Total Lead, Inflow (ug/L)	Total Lead, Outflow (ug/L)	Change, Total Lead, Inflow to Outflow
n	**21**	**22**	**---**
Percent detected	**90.5%**	**95.5%**	**---**
Mean	277.65	5.23	**-98.11%**
Standard Deviation	593.03	3.50	**---**
Coefficient of Variation	2.14	0.67	**---**
Lower 95% Confidence Limit about Mean	24.01	3.77	**---**
Upper 95% Confidence Limit about Mean	531.30	6.69	**---**
Lower Quartile (25th percentile)	**3.32**	**2.70**	**-18.55%**
Median (50th percentile)	**170.00**	**4.40**	**-97.41%**
Upper Quartile (75th percentile)	**315.00**	**8.32**	**-97.36%**
Inter Quartile Range	**311.69**	**5.62**	**---**
Minimum Detected Value	**1.25**	**1**	**---**
Maximum Detected Value	**2300**	**14**	**---**
Minimum Reporting Limit	**0.25**	**0.25**	**---**
Maximum Reporting Limit	**0.25**	**0.25**	**---**
Regression Equation	ln(y) = 3.918 + 2.654*z	ln(y) = 1.426 + 0.804*z	**---**
Note:	3	3	---

Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

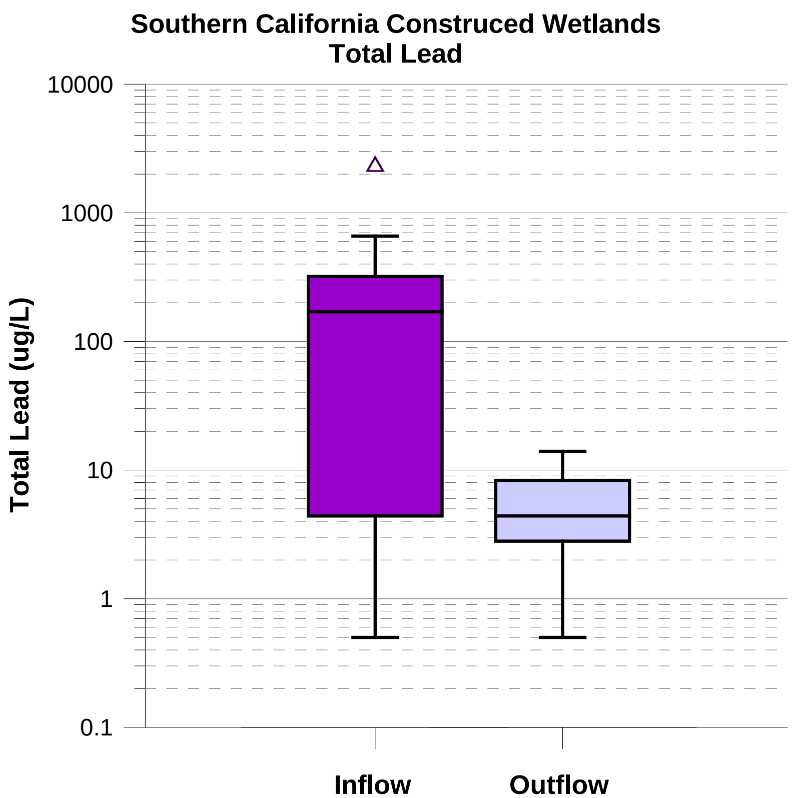

Table L-24 Constructed Wetlands – Total Zinc			
Run ID	**Total Zinc, Inflow (ug/L)**	**Total Zinc, Outflow (ug/L)**	**Change, Total Zinc, Inflow to Outflow**
n	**21**	**22**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**363.79**	**56.46**	**-84.48%**
Standard Deviation	**483.79**	**43.15**	**---**
Coefficient of Variation	**1.33**	**0.76**	**---**
Lower 95% Confidence Limit about Mean	**156.87**	**38.43**	**---**
Upper 95% Confidence Limit about Mean	**570.71**	**74.50**	**---**
Lower Quartile (25th percentile)	**109.00**	**28.53**	**-73.83%**
Median (50th percentile)	**270.00**	**39.00**	**-85.56%**
Upper Quartile (75th percentile)	**450.00**	**84.35**	**-81.26%**
Inter Quartile Range	**341.00**	**55.83**	**---**
Minimum Detected Value	**35.7**	**18**	**---**
Maximum Detected Value	**2000**	**165**	**---**
Minimum Reporting Limit			**---**
Maximum Reporting Limit			**---**
Regression Equation	ln(y) = 5.403 + 1.142*z	ln(y) = 3.812 + 0.702*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

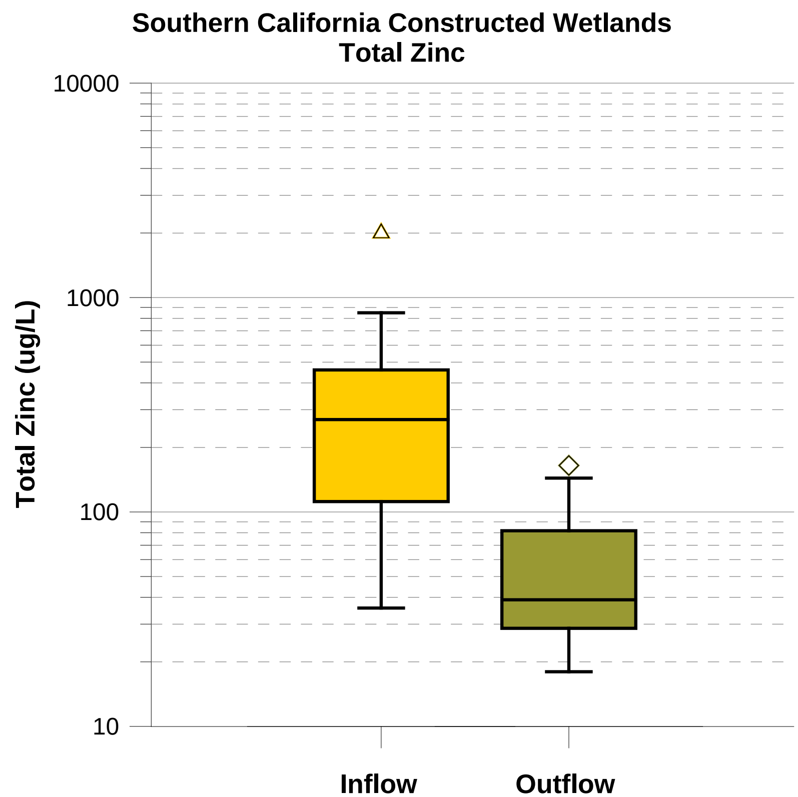

Table L-25 Non-Caltrans Bioswales –TSS

Run ID	Total suspended solids, Inflow (mg/L)	Total suspended solids, Outflow (mg/L)	Change, Total suspended solids, Inflow to Outflow
n	**104**	**71**	---
Percent detected	**100.0%**	**100.0%**	---
Mean	**102**	**39.5**	**-61.37%**
Standard Deviation	**85.8**	**35.6**	---
Coefficient of Variation	**0.84**	**0.90**	---
Lower 95% Confidence Limit about Mean	**85.9**	**31.3**	---
Upper 95% Confidence Limit about Mean	**119**	**47.8**	---
Lower Quartile (25th percentile)	**47.3**	**18.0**	**-61.90%**
Median (50th percentile)	**72.0**	**30.0**	**-58.33%**
Upper Quartile (75th percentile)	**134**	**50.0**	**-62.76%**
Inter Quartile Range	**87**	**32**	---
Minimum Detected Value	**2**	**1**	---
Maximum Detected Value	**474**	**191**	---
Minimum Reporting Limit	---	---	---
Maximum Reporting Limit	---	---	---
Regression Equation	ln(y) = 4.319 + 0.853*z	ln(y) = 3.343 + 0.898*z	---
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

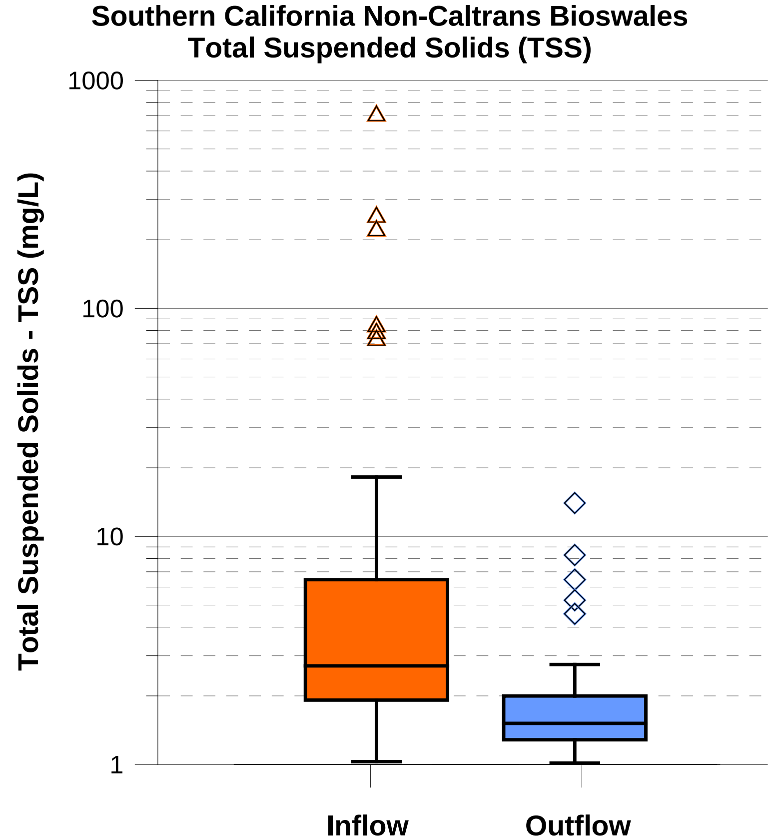

Table L-26 Non-Caltrans Bioswales –Fecal Coliform

Run ID	Fecal Coliform, Inflow (#/100mL)	Fecal Coliform, Outflow (#/100mL)	Change, Fecal Coliform, Inflow to Outflow
n	**33**	**19**	---
Percent detected	**97.0%**	**100.0%**	---
Mean	12725	**10982**	**-13.70%**
Standard Deviation	22363	**49927**	---
Coefficient of Variation	1.76	**4.55**	---
Lower 95% Confidence Limit about Mean	5095	**-11468**	---
Upper 95% Confidence Limit about Mean	20355	**33432**	---
Lower Quartile (25th percentile)	**500**	**130**	**-74.00%**
Median (50th percentile)	**5000**	**900**	**-82.00%**
Upper Quartile (75th percentile)	**16500**	**5000**	**-69.70%**
Inter Quartile Range	**16000**	**4870**	---
Minimum Detected Value	**17**	**17**	---
Maximum Detected Value	**90000**	**160000**	---
Minimum Reporting Limit	**1**	---	---
Maximum Reporting Limit	**1**	---	---
Regression Equation	ln(y) = 7.667 + 2.695*z	ln(y) = 6.585 + 2.773*z	---
Note:	3	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

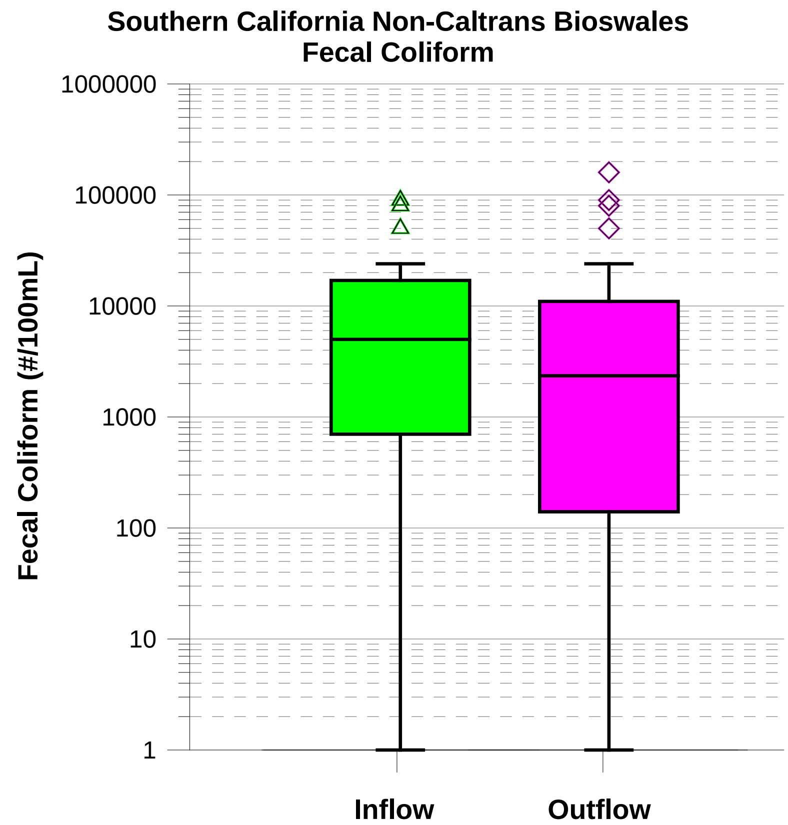

Table L-27 Non-Caltrans Bioswales – Copper			
Run ID	**Total Copper, Inflow (ug/L)**	**Total Copper, Outflow (ug/L)**	**Change, Total Copper, Inflow to Outflow**
n	**131**	**99**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**41.20**	**12.20**	**-70.39%**
Standard Deviation	**40.59**	**10.35**	**---**
Coefficient of Variation	**0.99**	**0.85**	**---**
Lower 95% Confidence Limit about Mean	**34.25**	**10.16**	**---**
Upper 95% Confidence Limit about Mean	**48.15**	**14.24**	**---**
Lower Quartile (25th percentile)	**11.00**	**5.40**	**-50.91%**
Median (50th percentile)	**25.20**	**10.00**	**-60.32%**
Upper Quartile (75th percentile)	**64.0**	**16.0**	**-75.00%**
Inter Quartile Range	**53**	**10.6**	**---**
Minimum Detected Value	**1.1**	**1**	**---**
Maximum Detected Value	**232**	**73**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 3.205 + 1.128*z	ln(y) = 2.207 + 0.828*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

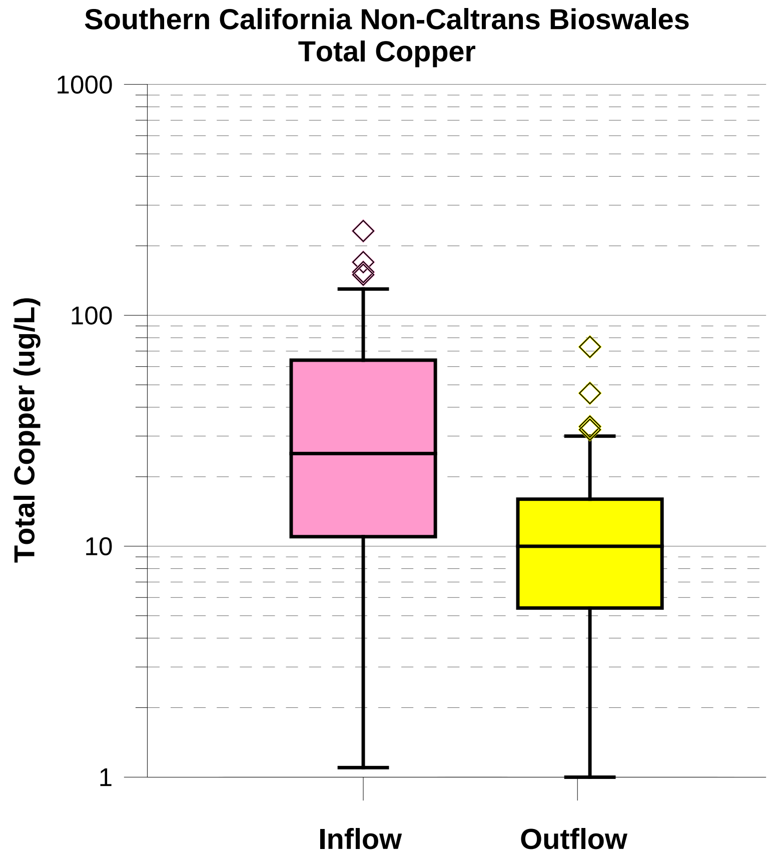

Table L-28 Non-Caltrans Bioswales – Lead			
Run ID	**Total Lead, Inflow (ug/L)**	**Total Lead, Outflow (ug/L)**	**Change, Total Lead, Inflow to Outflow**
n	**131**	**99**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**66.47**	**15.88**	**-76.11%**
Standard Deviation	**229**	**26.28**	**---**
Coefficient of Variation	**3.45**	**1.65**	**---**
Lower 95% Confidence Limit about Mean	**27.20**	**10.70**	**---**
Upper 95% Confidence Limit about Mean	**106**	**21.06**	**---**
Lower Quartile (25th percentile)	**9.67**	**3.60**	**-62.78%**
Median (50th percentile)	**21.85**	**7.06**	**-67.68%**
Upper Quartile (75th percentile)	**73.0**	**18.26**	**-74.99%**
Inter Quartile Range	**63.3**	**14.66**	**---**
Minimum Detected Value	**0.55585**	**0.755025**	**---**
Maximum Detected Value	**2086**	**189**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 3.222 + 1.374*z	ln(y) = 2.085 + 1.168*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

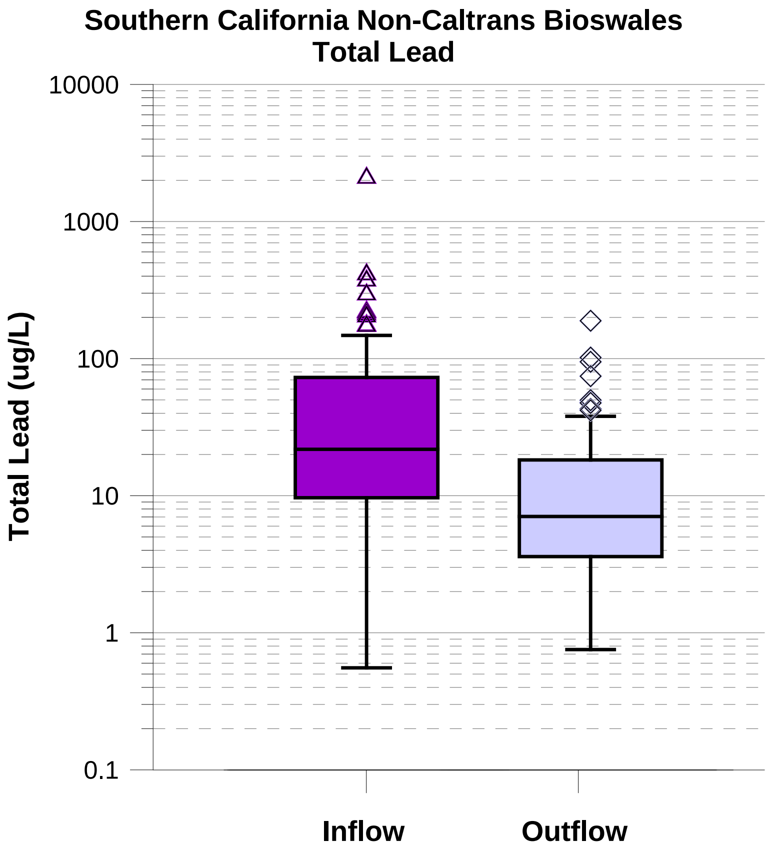

Table L-29 Non-Caltrans Bioswales – Zinc			
Run ID	**Total Zinc, Inflow (ug/L)**	**Total Zinc, Outflow (ug/L)**	**Change, Total Zinc, Inflow to Outflow**
n	**131**	**99**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**228**	**65.07**	**-71.42%**
Standard Deviation	**223**	**66.77**	**---**
Coefficient of Variation	**0.98**	**1.03**	**---**
Lower 95% Confidence Limit about Mean	**190**	**51.92**	**---**
Upper 95% Confidence Limit about Mean	**266**	**78.23**	**---**
Lower Quartile (25th percentile)	**90.00**	**29.00**	**-67.78%**
Median (50th percentile)	**160**	**50.16**	**-68.65%**
Upper Quartile (75th percentile)	**313**	**76**	**-75.72%**
Inter Quartile Range	**223**	**47**	**---**
Minimum Detected Value	**13**	**4.2**	**---**
Maximum Detected Value	**1542**	**501**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 5.007 + 0.995*z	ln(y) = 3.866 + 0.811*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

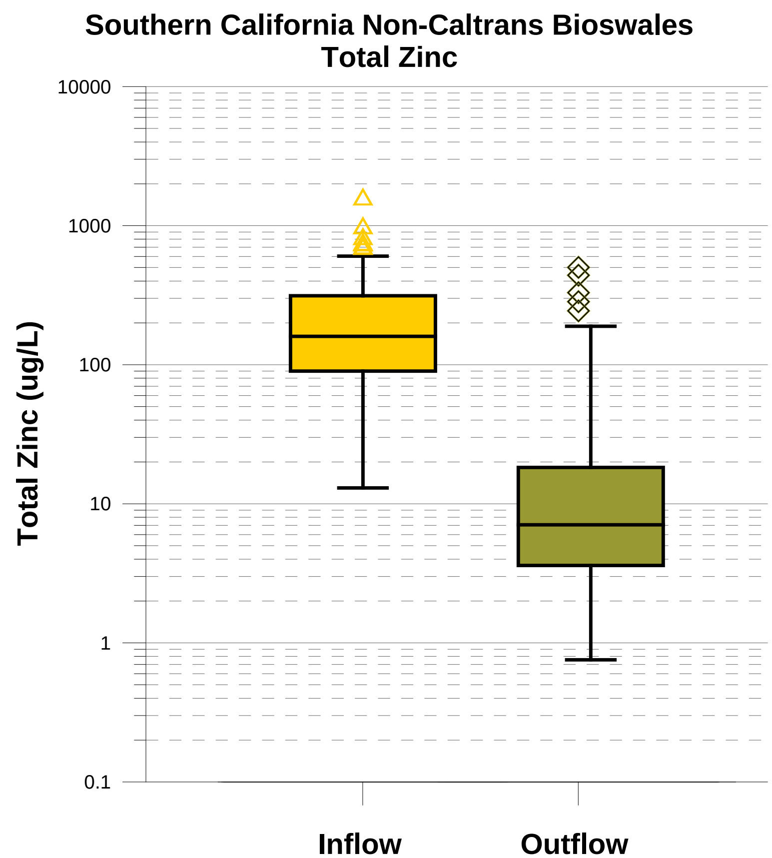

Table L-30 Caltrans Only Bioswales – TSS

Run ID	Total suspended solids, Inflow (mg/L)	Total suspended solids, Outflow (mg/L)	Change, Total suspended solids, Inflow to Outflow
n	**55**	**32**	---
Percent detected	**100.0%**	**100.0%**	---
Mean	**92.2**	**69.9**	**-24.21%**
Standard Deviation	**70.8**	**81.0**	---
Coefficient of Variation	**0.77**	**1.16**	---
Lower 95% Confidence Limit about Mean	**73.5**	**41.8**	---
Upper 95% Confidence Limit about Mean	**110.9**	**97.9**	---
Lower Quartile (25th percentile)	**39**	**20.5**	**-47.44%**
Median (50th percentile)	**78**	**38**	**-51.28%**
Upper Quartile (75th percentile)	**124**	**81.75**	**-34.07%**
Inter Quartile Range	**85**	**61.25**	---
Minimum Detected Value	**12**	**7**	---
Maximum Detected Value	**380**	**330**	---
Minimum Reporting Limit	---	---	---
Maximum Reporting Limit	---	---	---
Regression Equation	ln(y) = 4.234 + 0.852*z	ln(y) = 3.758 + 1.056*z	---
Note:	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.

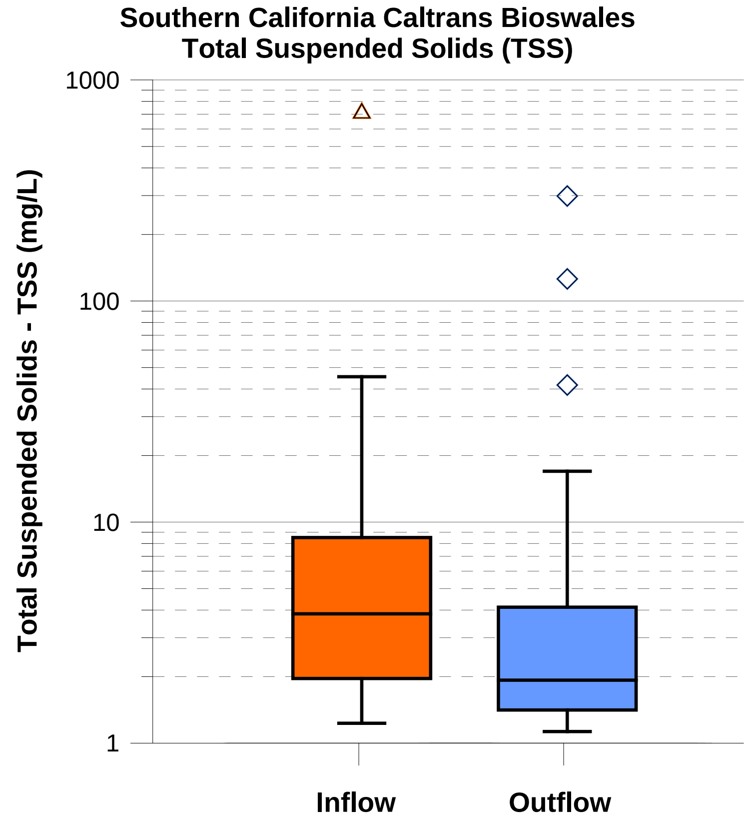

Table L-31 Caltrans Only Bioswales – Copper			
Run ID	**Total Copper, Inflow (ug/L)**	**Total Copper, Outflow (ug/L)**	**Change, Total Copper, Inflow to Outflow**
n	**55**	**32**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**44.99**	**18.34**	**-59.24%**
Standard Deviation	**26.58**	**9.99**	**---**
Coefficient of Variation	**0.59**	**0.55**	**---**
Lower 95% Confidence Limit about Mean	**37.97**	**14.87**	**---**
Upper 95% Confidence Limit about Mean	**52.01**	**21.80**	**---**
Lower Quartile (25th percentile)	**24.00**	**9.95**	**-58.54%**
Median (50th percentile)	**41.00**	**16.00**	**-60.98%**
Upper Quartile (75th percentile)	**60.00**	**26.00**	**-56.67%**
Inter Quartile Range	**36.00**	**16.05**	**---**
Minimum Detected Value	**10**	**5**	**---**
Maximum Detected Value	**130**	**43**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 3.617 + 0.683*z	ln(y) = 2.762 + 0.606*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

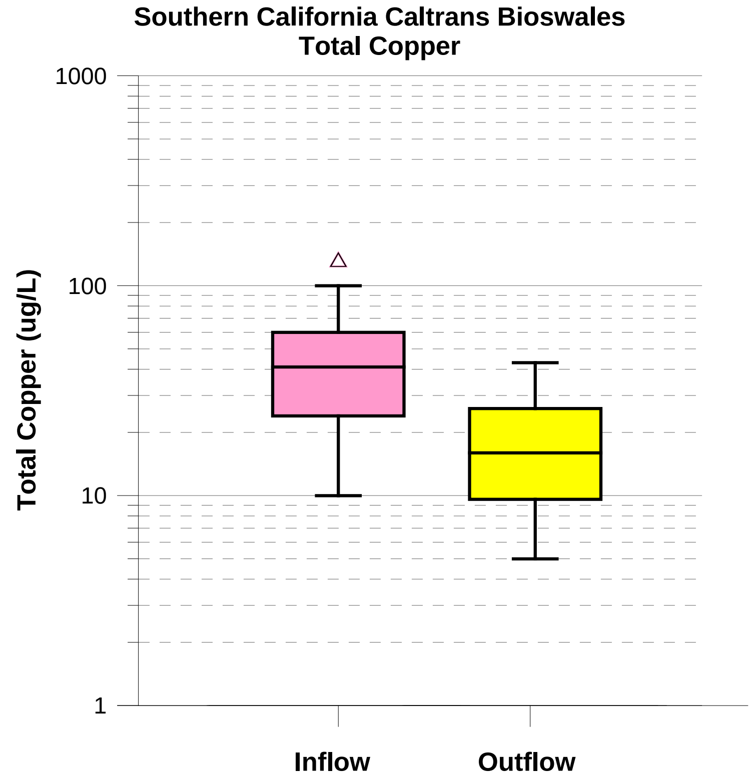

Table L-32 Caltrans Only Bioswales – Lead			
Run ID	**Total Lead, Inflow (ug/L)**	**Total Lead, Outflow (ug/L)**	**Change, Total Lead, Inflow to Outflow**
n	**55**	**32**	**---**
Percent detected	**96.4%**	**96.9%**	**---**
Mean	48.42	14.57	**-69.92%**
Standard Deviation	56.49	19.68	**---**
Coefficient of Variation	1.17	1.35	**---**
Lower 95% Confidence Limit about Mean	33.49	7.75	**---**
Upper 95% Confidence Limit about Mean	63.35	21.39	**---**
Lower Quartile (25th percentile)	11.16	**2.95**	**-73.56%**
Median (50th percentile)	26.02	**6.50**	**-75.02%**
Upper Quartile (75th percentile)	60.68	**15.00**	**-75.28%**
Inter Quartile Range	49.52	**12.05**	**---**
Minimum Detected Value	**2.9**	**1.8**	**---**
Maximum Detected Value	**240**	**75**	**---**
Minimum Reporting Limit	**0.7**	**0.03**	**---**
Maximum Reporting Limit	**0.8**	**0.03**	**---**
Regression Equation	ln(y) = 3.258 + 1.255*z	ln(y) = 1.986 + 1.252*z	**---**
Note:	3	3	2

Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

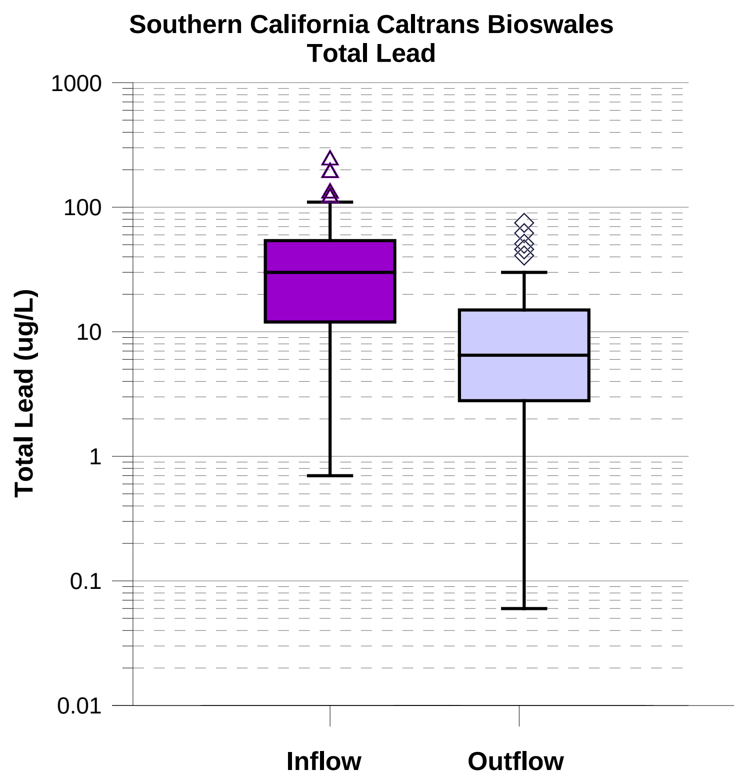

Table L-33 Caltrans Only Bioswales – Zinc			
Run ID	**Total Zinc, Inflow (ug/L)**	**Total Zinc, Outflow (ug/L)**	**Change, Total Zinc, Inflow to Outflow**
n	**55**	**32**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**260**	**74**	**-71.53%**
Standard Deviation	**207**	**94**	**---**
Coefficient of Variation	**0.80**	**1.27**	**---**
Lower 95% Confidence Limit about Mean	**205**	**41.6**	**---**
Upper 95% Confidence Limit about Mean	**315**	**107**	**---**
Lower Quartile (25th percentile)	**110**	**24.75**	**-77.50%**
Median (50th percentile)	**220**	**52.50**	**-76.14%**
Upper Quartile (75th percentile)	**350**	**84.50**	**-75.86%**
Inter Quartile Range	**240**	**59.75**	**---**
Minimum Detected Value	**32**	**19**	**---**
Maximum Detected Value	**980**	**440**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 5.247 + 0.890*z	ln(y) = 3.947 + 0.805*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

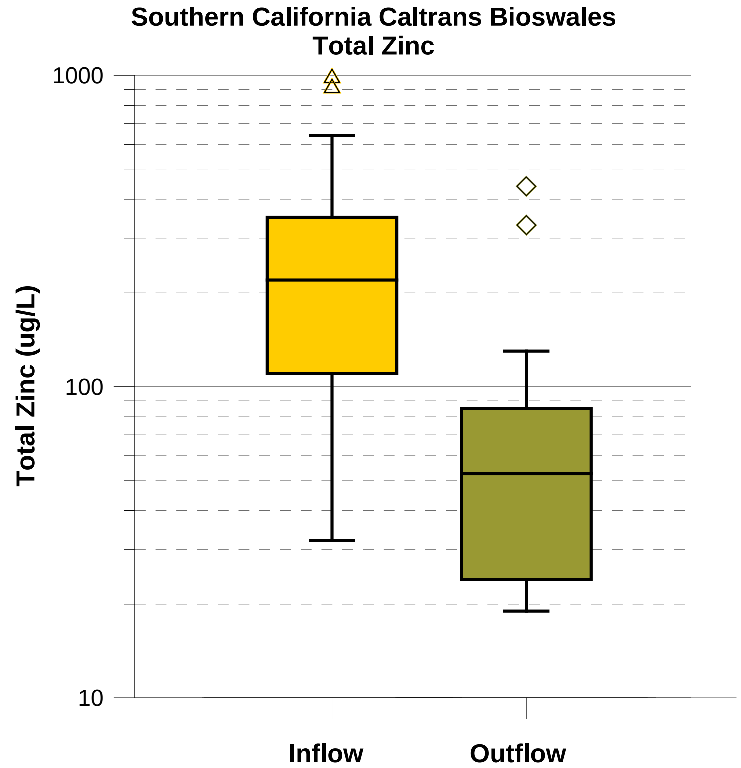

Table L-34 Site Scale Detention – Solids

Run ID	Total dissolved solids, Inflow (mg/L)	Total dissolved solids, Outflow (mg/L)	Change, Total dissolved solids, Inflow to Outflow	Total suspended solids, Inflow (mg/L)	Total suspended solids, Outflow (mg/L)	Change, Total suspended solids, Inflow to Outflow
n	**49**	**37**	**---**	**76**	**69**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**100**	**100**	**-0.292%**	**133**	**50**	**-62.817%**
Standard Deviation	**47**	**57**	**---**	**94**	**46**	**---**
Coefficient of Variation	**0.47**	**0.57**	**---**	**0.71**	**0.94**	**---**
Lower 95% Confidence Limit about Mean	**87**	**82**	**---**	**112**	**39**	**---**
Upper 95% Confidence Limit about Mean	**114**	**118**	**---**	**154**	**60**	**---**
Lower Quartile (25th percentile)	**65**	**66**	**1.538%**	**75**	**23**	**-69.799%**
Median (50th percentile)	**88**	**88**	**0.000%**	**100**	**38**	**-62.000%**
Upper Quartile (75th percentile)	**135**	**120**	**-11.111%**	**169**	**59**	**-65.333%**
Inter Quartile Range	**70**	**54**	**---**	**94**	**36**	**---**
Minimum Detected Value	**22**	**23**	**---**	**19**	**9**	**---**
Maximum Detected Value	**208**	**286**	**---**	**500**	**260**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = 4.497 + 0.517*z	ln(y) = 4.464 + 0.586*z	**---**	ln(y) = 4.686 + 0.667*z	ln(y) = 3.637 + 0.722*z	**---**
Note:	1	1	---	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-35 Site Scale Detention – Bacteria

Run ID	Fecal Coliform, Inflow (#/100mL)	Fecal Coliform, Outflow (#/100mL)	Change, Fecal Coliform, Inflow to Outflow
n	**34**	**30**	---
Percent detected	**100.0%**	**100.0%**	---
Mean	**2504**	**4987**	**99.1%**
Standard Deviation	**6023**	**21843**	---
Coefficient of Variation	**2.4**	**4.4**	---
Lower 95% Confidence Limit about Mean	**479**	**-2830**	---
Upper 95% Confidence Limit about Mean	**4529**	**12803**	---
Lower Quartile (25th percentile)	**300**	**475**	**58.3%**
Median (50th percentile)	**600**	**850**	**41.7%**
Upper Quartile (75th percentile)	**1700**	**3075**	**80.9%**
Inter Quartile Range	**1400**	**2600**	---
Minimum Detected Value	**110**	**2**	---
Maximum Detected Value	**28000**	**90000**	---
Minimum Reporting Limit	---	---	---
Maximum Reporting Limit	---	---	---
Regression Equation	ln(y) = 6.703 + 1.447*z	ln(y) = 6.955 + 1.811*z	---
Note:	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-36 Site Scale Detention – Nutrients

Run ID	Kjeldahl nitrogen (TKN), Inflow (mg/L)	Kjeldahl nitrogen (TKN), Outflow (mg/L)	Change, Kjeldahl nitrogen (TKN), Inflow to Outflow	Nitrogen, Nitrate (NO3) as N, Inflow (mg/L)	Nitrogen, Nitrate (NO3) as N, Outflow (mg/L)	Change, Nitrogen, Nitrate (NO3) as N, Inflow to Outflow
n	**76**	**68**	---	**75**	**68**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**2.24**	**1.91**	**-14.86%**	**1.14**	**0.98**	**-13.89%**
Standard Deviation	**1.52**	**1.52**	---	**1.34**	**0.80**	---
Coefficient of Variation	**0.68**	**0.80**	---	**1.18**	**0.82**	---
Lower 95% Confidence Limit about Mean	**1.90**	**1.55**	---	**0.84**	**0.79**	---
Upper 95% Confidence Limit about Mean	**2.58**	**2.27**	---	**1.45**	**1.17**	---
Lower Quartile (25th percentile)	**1.33**	**1.10**	**-16.98%**	**0.52**	**0.51**	**-2.40%**
Median (50th percentile)	**1.88**	**1.50**	**-20.21%**	**0.85**	**0.76**	**-10.59%**
Upper Quartile (75th percentile)	**2.70**	**2.17**	**-19.72%**	**1.20**	**1.16**	**-3.33%**
Inter Quartile Range	**1.38**	**1.07**	---	**0.68**	**0.65**	---
Minimum Detected Value	**0.52**	**0.45**	---	**0.18**	**0.17**	---
Maximum Detected Value	**8.78**	**8.9**	---	**9.5**	**4.2**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = 0.634 + 0.604*Z	ln(y) = 0.436 + 0.654*Z	---	ln(y) = -0.150 + 0.711*Z	ln(y) = -0.262 + 0.727*Z	---
Note:	1	1	---	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-36 Site Scale Detention – Nutrients (cont.)						
Run ID	**Organic carbon, Dissolved, Inflow (mg/L)**	**Organic carbon, Dissolved, Outflow (mg/L)**	**Change, Organic carbon, Dissolved, Inflow to Outflow**	**Organic carbon, Total, Inflow (mg/L)**	**Organic carbon, Total, Outflow (mg/L)**	**Change, Organic carbon, Total, Inflow to Outflow**
n	**41**	**38**	---	**41**	**39**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**14.24**	**15.23**	**6.92%**	**16.62**	**16.73**	**0.68%**
Standard Deviation	**7.96**	**8.77**	---	**9.07**	**8.84**	---
Coefficient of Variation	**0.56**	**0.58**	---	**0.55**	**0.53**	---
Lower 95% Confidence Limit about Mean	**11.80**	**12.44**	---	**13.84**	**13.96**	---
Upper 95% Confidence Limit about Mean	**16.68**	**18.01**	---	**19.39**	**19.50**	---
Lower Quartile (25th percentile)	**9.55**	**8.65**	**-9.42%**	**10.00**	**10.00**	**0.00%**
Median (50th percentile)	**11.00**	**12.00**	**9.09%**	**13.20**	**14.00**	**6.06%**
Upper Quartile (75th percentile)	**20.50**	**19.75**	**-3.66%**	**23.50**	**20.00**	**-14.89%**
Inter Quartile Range	**10.95**	**11.10**	---	**13.50**	**10.00**	---
Minimum Detected Value	**3.1**	**4.4**	---	**4.1**	**6.5**	---
Maximum Detected Value	**37**	**35**	---	**38**	**39**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = 2.505 + 0.597*Z	ln(y) = 2.572 + 0.588*Z	---	ln(y) = 2.670 + 0.571*Z	ln(y) = 2.697+ 0.516*Z	---
Note:	1	1	---	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-36 Site Scale Detention – Nutrients

Run ID	Phosphorus as P, Dissolved, Inflow (mg/L)	Phosphorus as P, Dissolved, Outflow (mg/L)	Change, Phosphorus as P, Dissolved, Inflow to Outflow	Phosphorus as P, Total, Inflow (mg/L)	Phosphorus as P, Total, Outflow (mg/L)	Change, Phosphorus as P, Total, Inflow to Outflow
n	**41**	**39**	---	**74**	**69**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**0.14**	**0.14**	**-3.15%**	**0.51**	**0.33**	**-35.61%**
Standard Deviation	**0.17**	**0.11**	---	**0.44**	**0.21**	---
Coefficient of Variation	**1.21**	**0.79**	---	**0.86**	**0.63**	---
Lower 95% Confidence Limit about Mean	**0.09**	**0.11**	---	**0.41**	**0.28**	---
Upper 95% Confidence Limit about Mean	**0.20**	**0.17**	---	**0.61**	**0.38**	---
Lower Quartile (25th percentile)	**0.06**	**0.07**	**11.11%**	**0.24**	**0.20**	**-15.79%**
Median (50th percentile)	**0.09**	**0.11**	**22.22%**	**0.36**	**0.29**	**-19.44%**
Upper Quartile (75th percentile)	**0.17**	**0.18**	**9.09%**	**0.66**	**0.40**	**-39.39%**
Inter Quartile Range	**0.10**	**0.11**	---	**0.42**	**0.20**	---
Minimum Detected Value	**0.03**	**0.03**	---	**0.029**	**0.03**	---
Maximum Detected Value	**0.96**	**0.51**	---	**2.62**	**0.86**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = -2.262 + 0.785*Z	ln(y) = -2.220 + 0.767*Z	---	ln(y) = -0.943 + 0.741*Z	ln(y) = -1.322 + 0.700*Z	---
Note:	1	1	---	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-37 Site Scale Detention – Metals

Run ID	Total Arsenic, Inflow (ug/L)	Total Arsenic, Outflow (ug/L)	Change, Total Arsenic, Inflow to Outflow	Total Cadmium, Inflow (ug/L)	Total Cadmium, Outflow (ug/L)	Change, Total Cadmium, Inflow to Outflow
n	**41**	**39**	---	**41**	**39**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**97.4%**	---
Mean	**2.53**	**2.03**	**-19.56%**	**1.17**	0.54	**-53.72%**
Standard Deviation	**0.98**	**0.75**	---	**0.83**	0.33	---
Coefficient of Variation	**0.39**	**0.37**	---	**0.71**	0.61	---
Lower 95% Confidence Limit about Mean	**2.23**	**1.80**	---	**0.92**	0.44	---
Upper 95% Confidence Limit about Mean	**2.83**	**2.27**	---	**1.43**	0.65	---
Lower Quartile (25th percentile)	**1.80**	**1.50**	**-16.67%**	**0.58**	**0.30**	**-47.83%**
Median (50th percentile)	**2.50**	**1.90**	**-24.00%**	**0.89**	**0.45**	**-49.44%**
Upper Quartile (75th percentile)	**3.25**	**2.50**	**-23.08%**	**1.55**	**0.73**	**-52.90%**
Inter Quartile Range	**1.45**	**1.00**	---	**0.98**	**0.43**	---
Minimum Detected Value	**0.5**	**0.5**	---	**0.2**	**0.2**	---
Maximum Detected Value	**5.3**	**3.5**	---	**3**	**1.6**	---
Minimum Reporting Limit	---	---	---	---	**0.1**	---
Maximum Reporting Limit	---	---	---	---	**0.1**	---
Regression Equation	ln(y) = 0.846 + 0.445*z	ln(y) = 0.637 + 0.422*z	---	ln(y) = -0.102 + 0.809*z	ln(y) = -0.777 + 0.630*z	---
Note:	1	1	---	1	3	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-37 Site Scale Detention – Metals (cont.)

Run ID	Total Chromium, Inflow (ug/L)	Total Chromium, Outflow (ug/L)	Change, Total Chromium, Inflow to Outflow	Total Copper, Inflow (ug/L)	Total Copper, Outflow (ug/L)	Change, Total Copper, Inflow to Outflow
n	**41**	**39**	---	**76**	**68**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**8.38**	**3.29**	**-60.67%**	**48.69**	**23.45**	**-51.83%**
Standard Deviation	**16.35**	**2.02**	---	**35.12**	**13.93**	---
Coefficient of Variation	**1.95**	**0.61**	---	**0.72**	**0.59**	---
Lower 95% Confidence Limit about Mean	**3.37**	**2.66**	---	**40.80**	**20.14**	---
Upper 95% Confidence Limit about Mean	**13.38**	**3.93**	---	**56.59**	**26.76**	---
Lower Quartile (25th percentile)	**3.65**	**1.80**	**-50.68%**	**26.25**	**15.00**	**-42.86%**
Median (50th percentile)	**6.20**	**3.10**	**-50.00%**	**39.45**	**20.50**	**-48.04%**
Upper Quartile (75th percentile)	**9.20**	**3.90**	**-57.61%**	**63.75**	**28.00**	**-56.08%**
Inter Quartile Range	**5.55**	**2.10**	---	**37.50**	**13.00**	---
Minimum Detected Value	**1.5**	**1**	---	**6.3**	**6.7**	---
Maximum Detected Value	**86**	**10**	---	**230**	**82**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = 1.786 + 0.712*z	ln(y) = 1.042 + 0.578*z	---	ln(y) = 3.682 + 0.670*z	ln(y) = 3.014 + 0.549*z	---
Note:	1	1	---	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-37 Site Scale Detention – Metals (cont.)

Run ID	Total Lead, Inflow (ug/L)	Total Lead, Outflow (ug/L)	Change, Total Lead, Inflow to Outflow	Total Nickel, Inflow (ug/L)	Total Nickel, Outflow (ug/L)	Change, Total Nickel, Inflow to Outflow
n	**76**	**69**	---	**41**	**39**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**97.4%**	---
Mean	**83.02**	**28.03**	**-66.23%**	**11.82**	4.43	**-62.53%**
Standard Deviation	**80.13**	**24.39**	---	**21.41**	2.46	---
Coefficient of Variation	**0.97**	**0.87**	---	**1.81**	0.56	---
Lower 95% Confidence Limit about Mean	**65.00**	**22.28**	---	**5.27**	3.66	---
Upper 95% Confidence Limit about Mean	**101.03**	**33.79**	---	**18.38**	5.20	---
Lower Quartile (25th percentile)	**34.40**	**13.00**	**-62.21%**	**4.75**	**2.70**	**-43.16%**
Median (50th percentile)	**54.00**	**22.00**	**-59.26%**	**7.30**	**4.00**	**-45.21%**
Upper Quartile (75th percentile)	**108.25**	**36.50**	**-66.28%**	**13.00**	**5.20**	**-60.00%**
Inter Quartile Range	**73.85**	**23.50**	---	**8.25**	**2.50**	---
Minimum Detected Value	**5.1**	**5.3**	---	**2**	**2**	---
Maximum Detected Value	**440**	**140**	---	**116**	**12**	---
Minimum Reporting Limit	---	---	---	---	**1**	---
Maximum Reporting Limit	---	---	---	---	**1**	---
Regression Equation	ln(y) = 4.066 + 0.886*z	ln(y) = 3.061 + 0.766*z	---	ln(y) = 2.066 + 0.816*z	ln(y) = 1.362 + 0.537*z	---
Note:	1	1	2	1	3	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-37 Site Scale Detention – Metals (cont.)			
Run ID	**Total Zinc, Inflow (ug/L)**	**Total Zinc, Outflow (ug/L)**	**Change, Total Zinc, Inflow to Outflow**
n	**76**	**68**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**378.89**	**117.54**	**-68.98%**
Standard Deviation	**357.12**	**69.82**	**---**
Coefficient of Variation	**0.94**	**0.59**	**---**
Lower 95% Confidence Limit about Mean	**298.60**	**100.95**	**---**
Upper 95% Confidence Limit about Mean	**459.18**	**134.14**	**---**
Lower Quartile (25th percentile)	**152.75**	**68.25**	**-55.32%**
Median (50th percentile)	**280.00**	**99.00**	**-64.64%**
Upper Quartile (75th percentile)	**504.75**	**150.00**	**-70.28%**
Inter Quartile Range	**352.00**	**81.75**	**---**
Minimum Detected Value	**4.6**	**29**	**---**
Maximum Detected Value	**2100**	**390**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 5.591 + 0.904*z	ln(y) = 4.608 + 0.596*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-38 Bioswales – Solids						
Run ID	**Total dissolved solids, Inflow (mg/L)**	**Total dissolved solids, Outflow (mg/L)**	**Change, Total dissolved solids, Inflow to Outflow**	**Total suspended solids, Inflow (mg/L)**	**Total suspended solids, Outflow (mg/L)**	**Change, Total suspended solids, Inflow to Outflow**
n	**126**	**77**	---	**159**	**103**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**99.5**	**95.8**	**-3.72%**	**98.9**	**49.0**	**-50.46%**
Standard Deviation	**70.1**	**49.8**	---	**80.5**	**55.1**	---
Coefficient of Variation	**0.70**	**0.52**	---	**0.81**	**1.12**	---
Lower 95% Confidence Limit about Mean	**87.2**	**84.7**	---	**86.3**	**38.3**	---
Upper 95% Confidence Limit about Mean	**111.7**	**106.9**	---	**111.4**	**59.6**	---
Lower Quartile (25th percentile)	**47.5**	**61.0**	**28.42%**	**45.0**	**18.0**	**-60.00%**
Median (50th percentile)	**82.0**	**88.0**	**7.32%**	**76.0**	**31.0**	**-59.21%**
Upper Quartile (75th percentile)	**126.75**	**120**	**-5.33%**	**130**	**54**	**-58.46%**
Inter Quartile Range	**79.25**	**59**	---	**85**	**36**	---
Minimum Detected Value	**1**	**1**	---	**2**	**1**	---
Maximum Detected Value	**350**	**264**	---	**474**	**330**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = 4.301 + 0.887*z	ln(y) = 4.386 + 0.670*z	---	ln(y) = 4.290 + 0.842*z	ln(y) = 3.472 + 0.948*z	---
Note:	1	1	---	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-38 Bioswales – Solids (cont.)			
Run ID	**Turbidity, Inflow (NTU)**	**Turbidity, Outflow (NTU)**	**Change, Turbidity, Inflow to Outflow**
n	**16**	**11**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**93.1**	**34.8**	**-62.65%**
Standard Deviation	**77.2**	**22.0**	**---**
Coefficient of Variation	**0.83**	**0.63**	**---**
Lower 95% Confidence Limit about Mean	**55.3**	**21.8**	**---**
Upper 95% Confidence Limit about Mean	**131.0**	**47.8**	**---**
Lower Quartile (25th percentile)	**29.0**	**18.0**	**-37.93%**
Median (50th percentile)	**75.0**	**37.0**	**-50.67%**
Upper Quartile (75th percentile)	**140**	**42**	**-70.00%**
Inter Quartile Range	**111**	**24**	**---**
Minimum Detected Value	**3.3**	**8.4**	**---**
Maximum Detected Value	**249**	**74**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 4.008 + 1.397*z	ln(y) = 3.341 + 0.835*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-39 Bioswales – Bacteria

Run ID	Fecal Coliform, Inflow (#/100mL)	Fecal Coliform, Outflow (#/100mL)	Change, Fecal Coliform, Inflow to Outflow
n	**33**	**19**	**---**
Percent detected	**97.0%**	**100.0%**	**---**
Mean	12725	**10982**	**-13.70%**
Standard Deviation	22363	**49927**	**---**
Coefficient of Variation	1.76	**4.55**	**---**
Lower 95% Confidence Limit about Mean	5095	**-11468**	**---**
Upper 95% Confidence Limit about Mean	20355	**33432**	**---**
Lower Quartile (25th percentile)	**500**	**130**	**-74.00%**
Median (50th percentile)	**5000**	**900**	**-82.00%**
Upper Quartile (75th percentile)	**16500**	**5000**	**-69.70%**
Inter Quartile Range	**16000**	**4870**	**---**
Minimum Detected Value	**17**	**17**	**---**
Maximum Detected Value	**90000**	**160000**	**---**
Minimum Reporting Limit	**1**	**---**	**---**
Maximum Reporting Limit	**1**	**---**	**---**
Regression Equation	ln(y) = 7.667 + 2.695*z	ln(y) = 6.585 + 2.773*z	**---**
Note:	3	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-40 Bioswales – Nutrients

Run ID	Kjeldahl nitrogen (TKN), Inflow (mg/L)	Kjeldahl nitrogen (TKN), Outflow (mg/L)	Change, Kjeldahl nitrogen (TKN), Inflow to Outflow	Nitrogen, ammonia as N, Inflow (mg/L)	Nitrogen, ammonia as N, Outflow (mg/L)	Change, Nitrogen, ammonia as N, Inflow to Outflow
n	**160**	**102**	---	**58**	**30**	---
Percent detected	**100.0%**	**100.0%**	---	**86.2%**	**76.7%**	---
Mean	**2.44**	**1.99**	**-18.52%**	0.57	0.66	**15.93%**
Standard Deviation	**2.07**	**1.88**	---	0.55	1.44	---
Coefficient of Variation	**0.85**	**0.94**	---	0.96	2.18	---
Lower 95% Confidence Limit about Mean	**2.12**	**1.63**	---	0.43	0.15	---
Upper 95% Confidence Limit about Mean	**2.76**	**2.35**	---	0.71	1.18	---
Lower Quartile (25th percentile)	**1.17**	**0.97**	**-17.31%**	0.20	0.12	**-41.73%**
Median (50th percentile)	**1.80**	**1.53**	**-15.00%**	0.38	0.29	**-25.50%**
Upper Quartile (75th percentile)	**2.98**	**2.22**	**-25.48%**	0.74	0.71	**-4.73%**
Inter Quartile Range	**1.81**	**1.26**	---	0.54	0.59	---
Minimum Detected Value	**0.11**	**0.08**	---	**0.11**	**0.12**	---
Maximum Detected Value	**11**	**13**	---	**2.8**	**6.6**	---
Minimum Reporting Limit			---	**0.04**	**0.05**	---
Maximum Reporting Limit			---	**0.07**	**0.055**	---
Regression Equation	ln(y) = 0.553 + 0.896*z	ln(y) = 0.375 + 0.841*z	---	ln(y) = -0.958 + 0.975*z	ln(y) = -1.252 + 1.339*z	---
Note:	1	1	---	3	3	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-40 Bioswales – Nutrients (cont.)						
Run ID	**Nitrogen, Nitrate (NO3) as N, Inflow (mg/L)**	**Nitrogen, Nitrate (NO3) as N, Outflow (mg/L)**	**Change, Nitrogen, Nitrate (NO3) as N, Inflow to Outflow**	**Nitrogen, Nitrite (NO2) as N, Inflow (mg/L)**	**Nitrogen, Nitrite (NO2) as N, Outflow (mg/L)**	**Change, Nitrogen, Nitrite (NO2) as N, Inflow to Outflow**
n	**159**	**103**	**---**	**16**	**11**	**---**
Percent detected	**98.7%**	**99.0%**	**---**	**25.0%**	**54.5%**	**---**
Mean	1.18	1.04	**-12.14%**	0.09	0.16	**89.01%**
Standard Deviation	1.18	2.05	**---**	0.13	0.32	**---**
Coefficient of Variation	1.00	1.98	**---**	1.50	1.93	**---**
Lower 95% Confidence Limit about Mean	0.99	0.64	**---**	0.023	-0.023	**---**
Upper 95% Confidence Limit about Mean	1.36	1.43	**---**	0.15	0.35	**---**
Lower Quartile (25th percentile)	0.42	**0.29**	**-30.98%**	0.03	0.03	**-0.69%**
Median (50th percentile)	0.79	**0.62**	**-21.25%**	0.06	0.07	**31.91%**
Upper Quartile (75th percentile)	1.48	**1.10**	**-25.44%**	0.12	0.20	**75.21%**
Inter Quartile Range	1.06	**0.81**	**---**	0.09	0.18	**---**
Minimum Detected Value	**0.01**	**0.01**	**---**	**0.1**	**0.1**	**---**
Maximum Detected Value	**5.62**	**16.9**	**---**	**0.28**	**0.89**	**---**
Minimum Reporting Limit	**0.05**	**0.025**	**---**	**0.005**	**0.005**	**---**
Maximum Reporting Limit	**0.09**	**0.025**	**---**	**0.09**	**0.08**	**---**
Regression Equation	ln(y) = -0.239 + 0.931*z	ln(y) = -0.555 + 1.100*z	**---**	ln(y) = -2.888 + 1.090*z	ln(y) = -2.611 + 1.511*z	**---**
Note:	3	3	**---**	3	3	**---**

Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-40 Bioswales – Nutrients (cont.)						
Run ID	**Nitrogen, unionized ammonia (NH3) as N, Inflow (mg/L)**	**Nitrogen, unionized ammonia (NH3) as N, Outflow (mg/L)**	**Change, Nitrogen, unionized ammonia (NH3) as N, Inflow to Outflow**	**Organic carbon, Dissolved, Inflow (mg/L)**	**Organic carbon, Dissolved, Outflow (mg/L)**	**Change, Organic carbon, Dissolved, Inflow to Outflow**
n	**10**	**1**	**---**	**113**	**74**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**1.05**		**-100.00%**	**18.22**	**16.22**	**-10.96%**
Standard Deviation	**0.78**		**---**	**16.13**	**10.65**	**---**
Coefficient of Variation	**0.74**		**---**	**0.89**	**0.66**	**---**
Lower 95% Confidence Limit about Mean	**0.57**		**---**	**15.24**	**13.80**	**---**
Upper 95% Confidence Limit about Mean	**1.53**		**---**	**21.19**	**18.65**	**---**
Lower Quartile (25th percentile)	**0.66**		**-100.00%**	**7.00**	**8.55**	**22.14%**
Median (50th percentile)	**0.89**		**-100.00%**	**12.00**	**12.90**	**7.50%**
Upper Quartile (75th percentile)	**1.15**		**-100.00%**	**23.50**	**22.00**	**-6.38%**
Inter Quartile Range	**0.49**		**---**	**16.50**	**13.45**	**---**
Minimum Detected Value	**0.46**	**100**	**---**	**2.5**	**3.5**	**---**
Maximum Detected Value	**2.8**	**100**	**---**	**75**	**49**	**---**
Minimum Reporting Limit			**---**			**---**
Maximum Reporting Limit			**---**			**---**
Regression Equation	ln(y) = -0.077 + 0.569*z	#VALUE!	**---**	ln(y) = 2.568 + 0.840*z	ln(y) = 2.591 + 0.657*z	**---**
Note:	1	1	**---**	1	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-40 Bioswales – Nutrients (cont.)						
Run ID	**Organic carbon, Total, Inflow (mg/L)**	**Organic carbon, Total, Outflow (mg/L)**	**Change, Organic carbon, Total, Inflow to Outflow**	**Phosphorus as P, Dissolved, Inflow (mg/L)**	**Phosphorus as P, Dissolved, Outflow (mg/L)**	**Change, Phosphorus as P, Dissolved, Inflow to Outflow**
n	**114**	**74**	---	**58**	**41**	---
Percent detected	**100.0%**	**100.0%**	---	**96.6%**	**100.0%**	---
Mean	**21.22**	**18.43**	**-13.17%**	0.14	**0.51**	**263%**
Standard Deviation	**18.66**	**11.35**	---	0.22	**0.65**	---
Coefficient of Variation	**0.88**	**0.62**	---	1.59	**1.28**	---
Lower 95% Confidence Limit about Mean	**17.80**	**15.84**	---	0.08	**0.31**	---
Upper 95% Confidence Limit about Mean	**24.65**	**21.01**	---	0.20	**0.70**	---
Lower Quartile (25th percentile)	**7.98**	**11.00**	**37.93%**	**0.06**	**0.18**	**202%**
Median (50th percentile)	**15.00**	**15.00**	**0.00%**	**0.08**	**0.28**	**250%**
Upper Quartile (75th percentile)	**28.00**	**23.00**	**-17.86%**	**0.14**	**0.50**	**257%**
Inter Quartile Range	**20.03**	**12.00**	---	**0.08**	**0.33**	---
Minimum Detected Value	**3**	**3.5**	---	**0.014**	**0.06**	---
Maximum Detected Value	**90**	**53**	---	**1.39**	**2.98**	---
Minimum Reporting Limit			---	**0.03**		---
Maximum Reporting Limit			---	**0.03**		---
Regression Equation	ln(y) = 2.726 + 0.834*z	ln(y) = 2.743 + 0.615*z	---	ln(y) = -2.420 + 0.906*z	ln(y) = -1.123 + 0.901*z	---
Note:	1	1	---	3	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-40 Bioswales – Nutrients (cont.)

Run ID	Phosphorus as P, Total, Inflow (mg/L)	Phosphorus as P, Total, Outflow (mg/L)	Change, Phosphorus as P, Total, Inflow to Outflow	Phosphorus, orthophosphate as P, Inflow (mg/L)	Phosphorus, orthophosphate as P, Outflow (mg/L)	Change, Phosphorus, orthophos-phate as P, Inflow to Outflow
n	**160**	**102**	---	**67**	**34**	---
Percent detected	**96.9%**	**99.0%**	---	**76.1%**	**97.1%**	---
Mean	0.28	0.63	**125%**	0.11	0.51	**369%**
Standard Deviation	0.25	0.66	---	0.13	0.55	---
Coefficient of Variation	0.90	1.05	---	1.16	1.07	---
Lower 95% Confidence Limit about Mean	0.24	0.50	---	0.08	0.33	---
Upper 95% Confidence Limit about Mean	0.32	0.76	---	0.14	0.70	---
Lower Quartile (25th percentile)	0.11	**0.25**	**123%**	0.03	**0.09**	**248%**
Median (50th percentile)	0.20	**0.40**	**100%**	0.06	**0.39**	**553%**
Upper Quartile (75th percentile)	0.36	**0.67**	**85.4%**	0.13	**0.67**	**401%**
Inter Quartile Range	0.25	**0.42**	---	0.11	**0.58**	---
Minimum Detected Value	**0.02**	**0.07**	---	**0.02**	**0.03**	---
Maximum Detected Value	**1.83**	**2.97**	---	**0.52**	**2.3**	---
Minimum Reporting Limit	**0.004**	**0.004**	---	**0.0015**	**0.0015**	---
Maximum Reporting Limit	**0.015**	**0.004**	---	**0.1**	**0.0015**	---
Regression Equation	ln(y) = -1.610 + 0.873*z	ln(y) = -0.847 + 0.873*z	---	ln(y) = -2.818 + 1.200*z	ln(y) = -1.301 + 1.372*z	---
Note:	3	3	---	3	3	---

Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-41 Bioswales – Metals						
Run ID	**Total Arsenic, Inflow (ug/L)**	**Total Arsenic, Outflow (ug/L)**	**Change, Total Arsenic, Inflow to Outflow**	**Total Cadmium, Inflow (ug/L)**	**Total Cadmium, Outflow (ug/L)**	**Change, Total Cadmium, Inflow to Outflow**
n	**118**	**76**	**---**	**119**	**76**	**---**
Percent detected	**93.2%**	**93.4%**	**---**	**93.3%**	**94.7%**	**---**
Mean	8.19	4.00	**-51.14%**	1.06	0.52	**-51.15%**
Standard Deviation	15.38	11.35	**---**	0.98	0.67	**---**
Coefficient of Variation	1.88	2.84	**---**	0.92	1.30	**---**
Lower 95% Confidence Limit about Mean	5.41	1.45	**---**	0.88	0.37	**---**
Upper 95% Confidence Limit about Mean	10.96	6.55	**---**	1.24	0.67	**---**
Lower Quartile (25th percentile)	1.14	1.16	**2.02%**	0.49	0.19	**-61.01%**
Median (50th percentile)	2.85	2.23	**-21.85%**	0.82	0.34	**-58.47%**
Upper Quartile (75th percentile)	7.15	4.28	**-40.13%**	1.35	0.60	**-55.77%**
Inter Quartile Range	6.01	3.12	**---**	0.85	0.40	**---**
Minimum Detected Value	**0.6**	**0.5**	**---**	**0.2**	**0.1**	**---**
Maximum Detected Value	**66**	**79**	**---**	**8.3**	**3.9**	**---**
Minimum Reporting Limit	**0.3**	**0.03**	**---**	**0.005**	**0.005**	**---**
Maximum Reporting Limit	**0.61**	**0.98**	**---**	**0.14**	**0.11**	**---**
Regression Equation	ln(y) = 1.047 + 1.363*z	ln(y) = 0.801 + 0.967*z	**---**	ln(y) = -0.202 + 0.742*z	ln(y) = -1.081 + 0.835*z	**---**
Note:	3	3	**---**	3	3	2

Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-41 Bioswales – Metals (cont.)						
Run ID	**Total Chromium, Inflow (ug/L)**	**Total Chromium, Outflow (ug/L)**	**Change, Total Chromium, Inflow to Outflow**	**Total Copper, Inflow (ug/L)**	**Total Copper, Outflow (ug/L)**	**Change, Total Copper, Inflow to Outflow**
n	**119**	**76**	**---**	**150**	**100**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**7.43**	**5.59**	**-24.85%**	**49.82**	**15.43**	**-69.02%**
Standard Deviation	**5.18**	**13.07**	**---**	**37.27**	**11.07**	**---**
Coefficient of Variation	**0.70**	**2.34**	**---**	**0.75**	**0.72**	**---**
Lower 95% Confidence Limit about Mean	**6.50**	**2.65**	**---**	**43.86**	**13.26**	**---**
Upper 95% Confidence Limit about Mean	**8.36**	**8.52**	**---**	**55.79**	**17.60**	**---**
Lower Quartile (25th percentile)	**3.50**	**1.73**	**-50.71%**	**22.00**	**8.23**	**-62.61%**
Median (50th percentile)	**6.90**	**4.00**	**-42.03%**	**41.00**	**13.00**	**-68.29%**
Upper Quartile (75th percentile)	**9.60**	**6.20**	**-35.42%**	**70.50**	**19.90**	**-71.77%**
Inter Quartile Range	**6.10**	**4.48**	**---**	**48.50**	**11.68**	**---**
Minimum Detected Value	**1**	**1**	**---**	**1.1**	**1**	**---**
Maximum Detected Value	**39**	**92**	**---**	**232**	**73**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = 1.783 + 0.717*z	ln(y) = 1.276 + 0.839*z	**---**	ln(y) = 3.593 + 0.894*z	ln(y) = 2.484 + 0.786*z	**---**
Note:	1	1	**---**	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-41 Bioswales – Metals (cont.)						
Run ID	**Total Iron, Inflow (ug/L)**	**Total Iron, Outflow (ug/L)**	**Change, Total Iron, Inflow to Outflow**	**Total Lead, Inflow (ug/L)**	**Total Lead, Outflow (ug/L)**	**Change, Total Lead, Inflow to Outflow**
n	**9**	**7**	**---**	**150**	**100**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**98.7%**	**99.0%**	**---**
Mean	**2416**	**1031**	**-57.30%**	73.08	17.93	**-75.46%**
Standard Deviation	**1672**	**491**	**---**	213	27.42	**---**
Coefficient of Variation	**0.69**	**0.48**	**---**	2.91	1.53	**---**
Lower 95% Confidence Limit about Mean	**1323**	**667**	**---**	39.00	12.56	**---**
Upper 95% Confidence Limit about Mean	**3508**	**1395**	**---**	107	23.31	**---**
Lower Quartile (25th percentile)	**1060**	**690**	**-34.91%**	13.92	**3.53**	**-74.67%**
Median (50th percentile)	**2500**	**970**	**-61.20%**	32.89	**7.55**	**-77.05%**
Upper Quartile (75th percentile)	**3400**	**1500**	**-55.88%**	77.75	**21.50**	**-72.35%**
Inter Quartile Range	**2340**	**810**	**---**	63.83	**17.98**	**---**
Minimum Detected Value	**920**	**420**	**---**	**1.3**	**1**	**---**
Maximum Detected Value	**5700**	**1800**	**---**	**2086**	**189**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**0.7**	**0.03**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**0.8**	**0.03**	**---**
Regression Equation	ln(y) = 7.598 + 0.775*z	ln(y) = 6.843 + 0.599*z	**---**	ln(y) = 3.493 + 1.275*z	ln(y) = 2.161 + 1.240*z	**---**
Note:	1	1	**---**	3	3	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-41 Bioswales – Metals (cont.)

Run ID	Total Nickel, Inflow (ug/L)	Total Nickel, Outflow (ug/L)	Change, Total Nickel, Inflow to Outflow	Total Zinc, Inflow (ug/L)	Total Zinc, Outflow (ug/L)	Change, Total Zinc, Inflow to Outflow
n	**119**	**76**	---	**150**	**100**	---
Percent detected	**99.2%**	**98.7%**	---	**100.0%**	**100.0%**	---
Mean	10.94	4.48	**-59.02%**	**275**	**71.4**	**-74.08%**
Standard Deviation	11.87	5.62	---	**225**	**78.7**	---
Coefficient of Variation	1.08	1.25	---	**0.82**	**1.10**	---
Lower 95% Confidence Limit about Mean	8.80	3.22	---	**239**	**56.0**	---
Upper 95% Confidence Limit about Mean	13.07	5.74	---	**311**	**86.8**	---
Lower Quartile (25th percentile)	**4.50**	**2.10**	**-53.33%**	**110**	**29.5**	**-73.20%**
Median (50th percentile)	**8.00**	**2.85**	**-64.38%**	**228**	**55.5**	**-75.66%**
Upper Quartile (75th percentile)	**13.00**	**5.08**	**-60.96%**	**360**	**82.5**	**-77.09%**
Inter Quartile Range	**8.50**	**2.98**	---	**250**	**53.0**	---
Minimum Detected Value	**2**	**1.8**	---	**13**	**4.2**	---
Maximum Detected Value	**89**	**40**	---	**1542**	**501**	---
Minimum Reporting Limit	**1.5**	**1.59**	---	---	---	---
Maximum Reporting Limit	**1.5**	**1.59**	---	---	---	---
Regression Equation	ln(y) = 2.072 + 0.789*z	ln(y) = 1.238 + 0.606*z	---	ln(y) = 5.297 + 0.877*z	ln(y) = 3.932 + 0.819*z	---
Note:	3	3	2	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-42 Flow Through Treatment BMPs – Solids

Run ID	Total dissolved solids, Inflow (mg/L)	Total dissolved solids, Outflow (mg/L)	Change, Total dissolved solids, Inflow to Outflow	Total suspended solids, Inflow (mg/L)	Total suspended solids, Outflow (mg/L)	Change, Total suspended solids, Inflow to Outflow
n	**85**	**90**	---	**230**	**218**	---
Percent detected	**100.0%**	**100.0%**	---	**98.3%**	**88.1%**	---
Mean	**74.5**	**83.6**	**12.12%**	65.6	23.0	**-65.0%**
Standard Deviation	**73.6**	**74.1**	---	80.9	42.0	---
Coefficient of Variation	**0.99**	**0.89**	---	1.23	1.83	---
Lower 95% Confidence Limit about Mean	**58.9**	**68.3**	---	55.1	17.4	---
Upper 95% Confidence Limit about Mean	**90.2**	**98.9**	---	76.1	28.6	---
Lower Quartile (25th percentile)	**32.0**	**44.0**	**37.50%**	**8.875**	**2.875**	**-67.61%**
Median (50th percentile)	**48.0**	**56.0**	**16.67%**	**39.5**	**7.00**	**-82.28%**
Upper Quartile (75th percentile)	**96.0**	**98.25**	**2.34%**	**89.25**	**22.25**	**-75.07%**
Inter Quartile Range	**64.0**	**54.25**	---	**80.375**	**19.375**	---
Minimum Detected Value	**1**	**1**	---	**2**	**1**	---
Maximum Detected Value	**400**	**390**	---	**629**	**280**	---
Minimum Reporting Limit	---	---	---	**1**	**1**	---
Maximum Reporting Limit	---	---	---	**1**	**1**	---
Regression Equation	ln(y) = 3.900 + 1.004*z	ln(y) = 4.121 + 0.811*z	---	ln(y) = 3.419 + 1.425*z	ln(y) = 1.959 + 1.657*z	---
Note:	1	1	---	3	3	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-42 Flow Through Treatment BMPs – Solids (cont.)

Run ID	Turbidity, Inflow (NTU)	Turbidity, Outflow (NTU)	Change, Total suspended solids, Inflow to Outflow
n	**3**	**3**	---
Percent detected	**33.3%**	**100.0%**	---
Mean	**---**	**5.09**	---
Standard Deviation	**---**	**2.84**	---
Coefficient of Variation	**---**	**0.56**	---
Lower 95% Confidence Limit about Mean	**---**	**1.88**	---
Upper 95% Confidence Limit about Mean	**---**	**8.31**	---
Lower Quartile (25th percentile)	**---**	**2.69**	---
Median (50th percentile)	**---**	**6.29**	---
Upper Quartile (75th percentile)	**---**	**6.30**	---
Inter Quartile Range	**---**	**3.61**	---
Minimum Detected Value	**8.64**	**2.69**	---
Maximum Detected Value	**8.64**	**6.3**	---
Minimum Reporting Limit	**1.65**	**---**	---
Maximum Reporting Limit	**1**	**---**	---
Regression Equation	**---**	ln(y) = 1.556 + 0.631*z	---
Note:	3	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-43 Flow Through Treatment BMPs – Bacteria						
Run ID	**Fecal Coliform, Inflow (#/100mL)**	**Fecal Coliform, Outflow (#/100mL)**	**Change, Fecal Coliform, Inflow to Outflow**	**Total Coliform, Inflow (#/100mL)**	**Total Coliform, Outflow (#/100mL)**	**Change, Total Coliform, Inflow to Outflow**
n	**172**	**152**	---	**64**	**64**	---
Percent detected	**100.0%**	**73.7%**	---	**100.0%**	**53.1%**	---
Mean	**6450**	4750	**-26.36%**	**59854**	53.6	**-99.91%**
Standard Deviation	**19225**	21431	---	**77332**	108	---
Coefficient of Variation	**2.98**	4.51	---	**1.29**	2.01	---
Lower 95% Confidence Limit about Mean	**3577**	1343	---	**40908**	27	---
Upper 95% Confidence Limit about Mean	**9324**	8157	---	**78800**	80	---
Lower Quartile (25th percentile)	**300**	7.47	**-97.51%**	**5000**	3.86	**-99.92%**
Median (50th percentile)	**900**	77.1	**-91.43%**	**20000**	**20.0**	**-99.90%**
Upper Quartile (75th percentile)	**3000**	797	**-73.44%**	**90000**	**40.0**	**-99.96%**
Inter Quartile Range	**2700**	789	---	**85000**	36.1	---
Minimum Detected Value	**8**	**2**	---	**230**	**20**	---
Maximum Detected Value	**160000**	**160000**	---	**240000**	**500**	---
Minimum Reporting Limit	---	**2**	---	---	**10**	---
Maximum Reporting Limit	---	**10**	---	---	**10**	---
Regression Equation	ln(y) = 6.984 + 1.871*z	ln(y) = 4.345 + 3.463*z	---	ln(y) = 9.744 + 1.915*z	ln(y) = 2.583 + 1.830*z	---
Note:	1	3	---	1	3	**2**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-44 Flow Through Treatment BMPs – Nutrients						
Run ID	**Kjeldahl nitrogen (TKN), Inflow (mg/L)**	**Kjeldahl nitrogen (TKN), Outflow (mg/L)**	**Change, Kjeldahl nitrogen (TKN), Inflow to Outflow**	**Nitrogen, ammonia as N, Inflow (mg/L)**	**Nitrogen, ammonia as N, Outflow (mg/L)**	**Change, Nitrogen, ammonia as N, Inflow to Outflow**
n	**149**	**146**	**---**	**8**	**9**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**2.58**	**1.96**	**-24.22%**	**1.45**	**1.86**	**28.35%**
Standard Deviation	**2.55**	**2.42**	**---**	**2.16**	**1.70**	**---**
Coefficient of Variation	**0.99**	**1.24**	**---**	**1.49**	**0.91**	**---**
Lower 95% Confidence Limit about Mean	**2.18**	**1.57**	**---**	**-0.046**	**0.75**	**---**
Upper 95% Confidence Limit about Mean	**2.99**	**2.35**	**---**	**2.95**	**2.97**	**---**
Lower Quartile (25th percentile)	**1.2**	**0.6675**	**-44.38%**	**0.2**	**0.575**	**187.50%**
Median (50th percentile)	**1.76**	**1.215**	**-30.97%**	**0.8**	**1.2**	**50.00%**
Upper Quartile (75th percentile)	**2.8**	**2.415**	**-13.75%**	**2**	**3.45**	**72.50%**
Inter Quartile Range	**1.6**	**1.7475**	**---**	**1.8**	**2.875**	**---**
Minimum Detected Value	**0.01**	**0.01**	**---**	**0.1**	**0.4**	**---**
Maximum Detected Value	**17.7**	**21**	**---**	**5.7**	**4.9**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = 0.577 + 0.922*z	ln(y) = 0.218 + 1.009*z	**---**	ln(y) = -0.431 + 1.723*z	ln(y) = 0.251 + 1.094*z	**---**
Note:	1	1	**---**	1	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-44 Flow Through Treatment BMPs – Nutrients (cont.)

Run ID	Nitrogen, Nitrate (NO3) as N, Inflow (mg/L)	Nitrogen, Nitrate (NO3) as N, Outflow (mg/L)	Change, Nitrogen, Nitrate (NO3) as N, Inflow to Outflow	Nitrogen, unionized ammonia (NH3) as N, Inflow (mg/L)	Nitrogen, unionized ammonia (NH3) as N, Outflow (mg/L)	Change, Nitrogen, unionized ammonia (NH3) as N, Inflow to Outflow
n	**150**	**145**	---	**57**	**45**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**0.82**	**1.01**	**24.13%**	**1.09**	**0.48**	**-56.11%**
Standard Deviation	**1.25**	**1.23**	---	**0.98**	**0.49**	---
Coefficient of Variation	**1.53**	**1.21**	---	**0.90**	**1.03**	---
Lower 95% Confidence Limit about Mean	**0.62**	**0.81**	---	**0.84**	**0.33**	---
Upper 95% Confidence Limit about Mean	**1.02**	**1.21**	---	**1.34**	**0.62**	---
Lower Quartile (25th percentile)	**0.29**	**0.45**	**55.17%**	**0.5**	**0.155**	**-69.00%**
Median (50th percentile)	**0.495**	**0.7**	**41.41%**	**0.8**	**0.3**	**-62.50%**
Upper Quartile (75th percentile)	**0.8075**	**1.105**	**36.84%**	**1.2**	**0.575**	**-52.08%**
Inter Quartile Range	**0.5175**	**0.655**	---	**0.7**	**0.42**	---
Minimum Detected Value	**0.01**	**0.01**	---	**0.1**	**0.1**	---
Maximum Detected Value	**11**	**9.82**	---	**4.9**	**2.1**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = -0.702 + 0.996*z	ln(y) = -0.370 + 0.916*z	---	ln(y) = -0.191 + 0.761*z	ln(y) = -1.142 + 0.926*z	---
Note:	1	1	---	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-44 Flow Through Treatment BMPs – Nutrients (cont.)

Run ID	Organic carbon, Dissolved, Inflow (mg/L)	Organic carbon, Dissolved, Outflow (mg/L)	Change, Organic carbon, Dissolved, Inflow to Outflow	Organic carbon, Total, Inflow (mg/L)	Organic carbon, Total, Outflow (mg/L)	Change, Organic carbon, Total, Inflow to Outflow
n	**95**	**91**	---	**95**	**91**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**22.14**	**21.83**	**-1.43%**	**25.65**	**24.42**	**-4.78%**
Standard Deviation	**22.75**	**23.95**	---	**24.83**	**24.38**	---
Coefficient of Variation	**1.03**	**1.10**	---	**0.97**	**1.00**	---
Lower 95% Confidence Limit about Mean	**17.57**	**16.91**	---	**20.65**	**19.41**	---
Upper 95% Confidence Limit about Mean	**26.72**	**26.75**	---	**30.64**	**29.43**	---
Lower Quartile (25th percentile)	**8.4**	**8.7**	**3.57%**	**11**	**10**	**-9.09%**
Median (50th percentile)	**14**	**13**	**-7.14%**	**17.2**	**15**	**-12.79%**
Upper Quartile (75th percentile)	**26**	**24**	**-7.69%**	**31**	**26**	**-16.13%**
Inter Quartile Range	**17.6**	**15.3**	---	**20**	**16**	---
Minimum Detected Value	**2.2**	**3.4**	---	**4**	**3.9**	---
Maximum Detected Value	**113**	**128**	---	**122**	**134**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = 2.720 + 0.874*z	ln(y) = 2.712 + 0.824*z	---	ln(y) = 2.909 + 0.821*z	ln(y) = 2.875 + 0.776*z	---
Note:	1	1	---	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-44 Flow Through Treatment BMPs – Nutrients (cont.)							
Run ID	**Phosphorus as P, Dissolved, Inflow (mg/L)**	**Phosphorus as P, Dissolved, Outflow (mg/L)**	**Change, Phosphorus as P, Dissolved, Inflow to Outflow**	**Phosphorus as P, Total, Inflow (mg/L)**	**Phosphorus as P, Total, Outflow (mg/L)**	**Change, Phosphorus as P, Total, Inflow to Outflow**	**Phosphorus, orthophosphate as P, Inflow (mg/L)**
n	**85**	**91**	**---**	**147**	**146**	**---**	**20**
Percent detected	**97.6%**	**94.5%**	**---**	**100.0%**	**100.0%**	**---**	**100.0%**
Mean	0.14	0.13	**-7.14%**	**0.36**	**0.24**	**-34.10%**	**0.23**
Standard Deviation	0.17	0.19	**---**	**0.35**	**0.20**	**---**	**0.34**
Coefficient of Variation	1.24	1.45	**---**	**0.97**	**0.84**	**---**	**1.47**
Lower 95% Confidence Limit about Mean	0.10	0.09	**---**	**0.30**	**0.20**	**---**	**0.08**
Upper 95% Confidence Limit about Mean	0.18	0.17	**---**	**0.42**	**0.27**	**---**	**0.38**
Lower Quartile (25th percentile)	**-0.03**	**-0.03**	**0.00%**	**0.17**	**0.1**	**-41.18%**	**0.049**
Median (50th percentile)	**0.09**	**0.08**	**-11.11%**	**0.24**	**0.18**	**-25.00%**	**0.07**
Upper Quartile (75th percentile)	**0.155**	**0.14**	**-9.68%**	**0.42**	**0.28**	**-33.33%**	**0.315**
Inter Quartile Range	**0.185**	**0.17**	**---**	**0.25**	**0.18**	**---**	**0.266**
Minimum Detected Value	**0.03**	**0.03**	**---**	**0.02**	**0.002**	**---**	**0.016**
Maximum Detected Value	**0.95**	**1.3**	**---**	**2.3**	**1.3**	**---**	**1.3**
Minimum Reporting Limit	**0.03**	**0.03**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**0.03**	**0.03**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = -2.470 + 0.988*z	ln(y) = -2.572 + 1.016*z	**---**	ln(y) = -1.331 + 0.786*z	ln(y) = -1.735 + 0.818*z	**---**	ln(y) = -2.169 + 1.320*z
Note:	3	3	**---**	1	1	2	1

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-45 Flow Through Treatment BMPs – Metals

Run ID	Total Arsenic, Inflow (ug/L)	Total Arsenic, Outflow (ug/L)	Change, Total Arsenic, Inflow to Outflow	Total Cadmium, Inflow (ug/L)	Total Cadmium, Outflow (ug/L)	Change, Total Cadmium, Inflow to Outflow
n	**94**	**91**	---	**95**	**91**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**8.00**	**7.08**	**-11.57%**	**0.71**	**0.72**	**1.22%**
Standard Deviation	**19.82**	**16.52**	---	**0.57**	**3.52**	---
Coefficient of Variation	**2.48**	**2.33**	---	**0.80**	**4.88**	---
Lower 95% Confidence Limit about Mean	**4.00**	**3.68**	---	**0.60**	**0.00**	---
Upper 95% Confidence Limit about Mean	**12.01**	**10.47**	---	**0.83**	**1.45**	---
Lower Quartile (25th percentile)	**0.90**	**0.78**	**-13.33%**	**0.30**	**0.20**	**-33.33%**
Median (50th percentile)	**1.35**	**1.10**	**-18.52%**	**0.50**	**0.26**	**-48.00%**
Upper Quartile (75th percentile)	**3.05**	**2.50**	**-18.03%**	**0.90**	**0.60**	**-33.33%**
Inter Quartile Range	**2.15**	**1.72**	---	**0.60**	**0.40**	---
Minimum Detected Value	**0.5**	**0.5**	---	**0.2**	**0.2**	---
Maximum Detected Value	**91**	**78**	---	**2.7**	**25**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = 0.679 + 1.281*z	ln(y) = 0.605 + 1.255*z	---	ln(y) = -0.596 + 0.724*z	ln(y) = -1.014 + 0.718*z	---
Note:	1	1	---	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-45 Flow Through Treatment BMPs – Metals (cont.)						
Run ID	**Total Chromium, Inflow (ug/L)**	**Total Chromium, Outflow (ug/L)**	**Change, Total Chromium, Inflow to Outflow**	**Total Copper, Inflow (ug/L)**	**Total Copper, Outflow (ug/L)**	**Change, Total Copper, Inflow to Outflow**
n	**95**	**91**	**---**	**150**	**146**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**3.50**	**2.27**	**-35.10%**	**41.89**	**18.84**	**-55.03%**
Standard Deviation	**3.51**	**1.73**	**---**	**144**	**21.81**	**---**
Coefficient of Variation	**1.00**	**0.76**	**---**	**3.43**	**1.16**	**---**
Lower 95% Confidence Limit about Mean	**2.79**	**1.92**	**---**	**18.89**	**15.30**	**---**
Upper 95% Confidence Limit about Mean	**4.21**	**2.63**	**---**	**64.88**	**22.38**	**---**
Lower Quartile (25th percentile)	**1.50**	**1.00**	**-33.33%**	**11.98**	**6.20**	**-48.27%**
Median (50th percentile)	**2.70**	**1.70**	**-37.04%**	**18.00**	**11.00**	**-38.89%**
Upper Quartile (75th percentile)	**4.00**	**2.90**	**-27.50%**	**33.00**	**21.25**	**-35.61%**
Inter Quartile Range	**2.50**	**1.90**	**---**	**21.03**	**15.06**	**---**
Minimum Detected Value	**1**	**1**	**---**	**2.7**	**1.56**	**---**
Maximum Detected Value	**27**	**9.6**	**---**	**1400**	**150**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = 0.990 + 0.699*z	ln(y) = 0.601 + 0.612*z	**---**	ln(y) = 3.040 + 0.943*z	ln(y) = 2.477 + 0.965*z	**---**
Note:	1	1	**2**	1	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-45 Flow Through Treatment BMPs – Metals (cont.)						
Run ID	**Total Lead, Inflow (ug/L)**	**Total Lead, Outflow (ug/L)**	**Change, Total Lead, Inflow to Outflow**	**Total Nickel, Inflow (ug/L)**	**Total Nickel, Outflow (ug/L)**	**Change, Total Nickel, Inflow to Outflow**
n	**149**	**146**	**---**	**95**	**91**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**20.70**	**7.51**	**-63.71%**	**7.11**	**5.61**	**-21.04%**
Standard Deviation	**23.57**	**13.49**	**---**	**6.28**	**5.34**	**---**
Coefficient of Variation	**1.14**	**1.80**	**---**	**0.88**	**0.95**	**---**
Lower 95% Confidence Limit about Mean	**16.92**	**5.32**	**---**	**5.85**	**4.52**	**---**
Upper 95% Confidence Limit about Mean	**24.49**	**9.70**	**---**	**8.37**	**6.71**	**---**
Lower Quartile (25th percentile)	**6.50**	**1.00**	**-84.62%**	**2.90**	**2.00**	**-31.03%**
Median (50th percentile)	**13.00**	**3.10**	**-76.15%**	**4.90**	**3.50**	**-28.57%**
Upper Quartile (75th percentile)	**25.50**	**7.10**	**-72.16%**	**8.50**	**6.40**	**-24.71%**
Inter Quartile Range	**19.00**	**6.10**	**---**	**5.60**	**4.40**	**---**
Minimum Detected Value	**1**	**1**	**---**	**2**	**2**	**---**
Maximum Detected Value	**140**	**110**	**---**	**29**	**24**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = 2.558 + 1.032*z	ln(y) = 1.253 + 1.128*z	**---**	ln(y) = 1.679 + 0.731*z	ln(y) = 1.417 + 0.715*z	**---**
Note:	1	1	**2**	1	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-45 Flow Through Treatment BMPs – Metals (cont.)			
Run ID	**Total Zinc, Inflow (ug/L)**	**Total Zinc, Outflow (ug/L)**	**Change, Total Zinc, Inflow to Outflow**
n	**150**	**146**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**311**	**117**	**-62.40%**
Standard Deviation	**309**	**183**	**---**
Coefficient of Variation	**0.99**	**1.57**	**---**
Lower 95% Confidence Limit about Mean	**262**	**87.3**	**---**
Upper 95% Confidence Limit about Mean	**361**	**147**	**---**
Lower Quartile (25th percentile)	**110**	**23.00**	**-79.09%**
Median (50th percentile)	**221**	**55.5**	**-74.89%**
Upper Quartile (75th percentile)	**400**	**131**	**-67.31%**
Inter Quartile Range	**290**	**108**	**---**
Minimum Detected Value	**15**	**1**	**---**
Maximum Detected Value	**1900**	**1400**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 5.361 + 0.903*z	ln(y) = 3.976 + 1.350*z	**---**
Note:	1	1	**2**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-46 Catch Basin Inlets – Solids		
Run ID	**Total dissolved solids, Outflow (mg/L)**	**Total suspended solids, Outflow (mg/L)**
n	**27**	**88**
Percent detected	**100.0%**	**100.0%**
Mean	**60.8**	**52.9**
Standard Deviation	**30.0**	**55.7**
Coefficient of Variation	**0.49**	**1.05**
Lower 95% Confidence Limit about Mean	**49.5**	**41.3**
Upper 95% Confidence Limit about Mean	**72.1**	**64.6**
Lower Quartile (25th percentile)	**38**	**20**
Median (50th percentile)	**58**	**37.5**
Upper Quartile (75th percentile)	**76**	**71**
Inter Quartile Range	**38**	**51**
Minimum Detected Value	**14**	**4**
Maximum Detected Value	**134**	**320**
Minimum Reporting Limit	**---**	**---**
Maximum Reporting Limit	**---**	**---**
Regression Equation	$\ln(y) = 3.979 + 0.587*z$	$\ln(y) = 3.552 + 0.972*z$
Note:	1	1

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-47 Catch Basin Inlets – Nutrients

Run ID	Kjeldahl nitrogen (TKN), Outflow (mg/L)	Nitrogen, Nitrate (NO3) as N, Outflow (mg/L)	Organic carbon, Dissolved, Outflow (mg/L)	Organic carbon, Total, Outflow (mg/L)	Phosphorus as P, Dissolved, Outflow (mg/L)	Phosphorus as P, Total, Outflow (mg/L)
n	**78**	**78**	**27**	**27**	**27**	**77**
Percent detected	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**92.6%**	**100.0%**
Mean	**2.26**	**1.07**	**18.2**	**21.7**	0.08	**0.14**
Standard Deviation	**2.47**	**1.28**	**17.0**	**17.6**	0.07	**0.12**
Coefficient of Variation	**1.09**	**1.20**	**0.94**	**0.81**	0.83	**0.85**
Lower 95% Confidence Limit about Mean	**1.71**	**0.78**	**11.7**	**15.1**	0.06	**0.11**
Upper 95% Confidence Limit about Mean	**2.81**	**1.35**	**24.6**	**28.4**	0.11	**0.16**
Lower Quartile (25th percentile)	**1.37**	**0.43**	**8.3**	**8.8**	**-0.03**	**0.07**
Median (50th percentile)	**1.70**	**0.67**	**14.1**	**19.0**	**0.07**	**0.10**
Upper Quartile (75th percentile)	**2.39**	**1.148**	**23.0**	**31.0**	**0.1**	**0.18**
Inter Quartile Range	**1.02**	**0.723**	**14.7**	**22.2**	**0.13**	**0.11**
Minimum Detected Value	**0.24**	**0.03**	**2.3**	**3.4**	**0.03**	**0.002**
Maximum Detected Value	**18.2**	**7.02**	**79**	**84**	**0.26**	**0.66**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**0.03**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**0.03**	**---**
Regression Equation	ln(y) = 0.594 + 0.601*z	ln(y) = -0.313 + 0.849*z	ln(y) = 2.587 + 0.887*z	ln(y) = 2.813 + 0.833*z	ln(y) = -2.788 + 0.856*z	ln(y) = -2.455 + 1.174*z
Note:	1	1	1	1	3	1

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-48 Catch Basin Inlets – Metals

Run ID	Total Arsenic, Outflow (ug/L)	Total Cadmium, Outflow (ug/L)	Total Chromium, Outflow (ug/L)	Total Copper, Outflow (ug/L)	Total Lead, Outflow (ug/L)	Total Nickel, Outflow (ug/L)	Total Zinc, Outflow (ug/L)
n	**27**	**27**	**27**	**88**	**88**	**27**	**88**
Percent detected	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Mean	**4.48**	**0.80**	**4.24**	**16.80**	**12.45**	**7.44**	**173**
Standard Deviation	**3.39**	**0.87**	**2.96**	**16.57**	**19.61**	**7.69**	**215**
Coefficient of Variation	**0.76**	**1.09**	**0.70**	**0.99**	**1.58**	**1.03**	**1.24**
Lower 95% Confidence Limit about Mean	**3.20**	**0.47**	**3.13**	**13.34**	**8.35**	**4.54**	**128**
Upper 95% Confidence Limit about Mean	**5.76**	**1.12**	**5.36**	**20.27**	**16.54**	**10.35**	**218**
Lower Quartile (25th percentile)	**2.2**	**0.3**	**2.1**	**5.95**	**2.3**	**3**	**50.5**
Median (50th percentile)	**3.05**	**0.6**	**3.5**	**13**	**6**	**4.7**	**107**
Upper Quartile (75th percentile)	**5.8**	**0.8**	**5.3**	**22**	**12.45**	**9.8**	**220**
Inter Quartile Range	**3.6**	**0.5**	**3.2**	**16.05**	**10.15**	**6.8**	**169**
Minimum Detected Value	**1**	**0.2**	**1**	**1.2**	**1**	**2**	**9.4**
Maximum Detected Value	**14.1**	**4.1**	**13.6**	**90**	**110**	**35**	**1250**
Minimum Reporting Limit							
Maximum Reporting Limit							
Regression Equation	ln(y) = 1.259 + 0.773*z	ln(y) = -0.542 + 0.826*z	ln(y) = 1.246 + 0.706*z	ln(y) = 2.387 + 1.041*z	ln(y) = 1.798 + 1.223*z	ln(y) = 1.725 + 0.746*z	ln(y) = 4.582 + 1.162*z
Note:	1	1	1	1	1	1	1

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-49 Constructed Wetlands – Solids						
Run ID	**Total dissolved solids, Inflow (mg/L)**	**Total dissolved solids, Outflow (mg/L)**	**Change, Total dissolved solids, Inflow to Outflow**	**Total suspended solids, Inflow (mg/L)**	**Total suspended solids, Outflow (mg/L)**	**Change, Total suspended solids, Inflow to Outflow**
n	**8**	**9**	**---**	**13**	**14**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**111**	**1412**	**1169%**	**203**	**11.1**	**-94.55%**
Standard Deviation	**58.9**	**534**	**---**	**88**	**8.9**	**---**
Coefficient of Variation	**0.53**	**0.38**	**---**	**0.43**	**0.81**	**---**
Lower 95% Confidence Limit about Mean	**70**	**1063**	**---**	**155**	**6.38**	**---**
Upper 95% Confidence Limit about Mean	**152**	**1761**	**---**	**251**	**15.7**	**---**
Lower Quartile (25th percentile)	**63**	**940**	**1404%**	**140**	**3.50**	**-97.50%**
Median (50th percentile)	**87**	**1600**	**1739%**	**230**	**11.0**	**-95.22%**
Upper Quartile (75th percentile)	**178**	**1850**	**942%**	**255**	**13.5**	**-94.71%**
Inter Quartile Range	**115**	**910**	**---**	**115**	**10.0**	**---**
Minimum Detected Value	**60**	**530**	**---**	**60**	**1.00**	**---**
Maximum Detected Value	**200**	**1900**	**---**	**350**	**28**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = 4.599 + 0.584*z	ln(y) = 7.169 + 0.519*z	**---**	ln(y) = 5.197 + 0.595*z	ln(y) = 2.014 + 1.142*z	**---**
Note:	1	1	**2**	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-50 Constructed Wetlands – Bacteria						
Run ID	**Fecal Coliform, Inflow (#/100mL)**	**Fecal Coliform, Outflow (#/100mL)**	**Change, Fecal Coliform, Inflow to Outflow**	**Total Coliform, Inflow (#/100mL)**	**Total Coliform, Outflow (#/100mL)**	**Change, Total Coliform, Inflow to Outflow**
n	**13**	**14**	---	**8**	**8**	---
Percent detected	**92.3%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	5407	**295**	**-94.54%**	**25350**	**25305**	**-0.18%**
Standard Deviation	18323	**795**	---	**35414**	**71666**	---
Coefficient of Variation	3.39	**2.69**	---	**1.40**	**2.83**	---
Lower 95% Confidence Limit about Mean	-4554	**-121**	---	**810**	**-24357**	---
Upper 95% Confidence Limit about Mean	15368	**712**	---	**49890**	**74967**	---
Lower Quartile (25th percentile)	**230**	**20.0**	**-91.30%**	**1875**	**278**	**-85.20%**
Median (50th percentile)	**1300**	**95.0**	**-92.69%**	**3700**	**1370**	**-62.97%**
Upper Quartile (75th percentile)	**3800**	**255**	**-93.29%**	**50000**	**24750**	**-50.50%**
Inter Quartile Range	**3570**	**235**	---	**48125**	**24473**	---
Minimum Detected Value	**20**	**8**	---	**1300**	**130**	---
Maximum Detected Value	**50000**	**2400**	---	**90000**	**160000**	---
Minimum Reporting Limit	**10**		---			---
Maximum Reporting Limit	**10**		---			---
Regression Equation	ln(y) = 6.794 + 2.447*z	ln(y) = 4.484 + 1.786*z	---	ln(y) = 8.967 + 2.010*z	ln(y) = 7.647 + 3.076*z	---
Note:	3	1	---	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-51 Constructed Wetlands – Nutrients

Run ID	Kjeldahl nitrogen (TKN), Inflow (mg/L)	Kjeldahl nitrogen (TKN), Outflow (mg/L)	Change, Kjeldahl nitrogen (TKN), Inflow to Outflow	Nitrogen, ammonia as N, Inflow (mg/L)	Nitrogen, ammonia as N, Outflow (mg/L)	Change, Nitrogen, ammonia as N, Inflow to Outflow
n	**21**	**22**	---	**13**	**21**	---
Percent detected	**100.0%**	**100.0%**	---	**84.6%**	**66.7%**	---
Mean	**2.56**	**1.97**	**-22.91%**	0.52	0.20	**-61.86%**
Standard Deviation	**1.93**	**0.88**	---	0.78	0.39	---
Coefficient of Variation	**0.75**	**0.45**	---	1.48	1.94	---
Lower 95% Confidence Limit about Mean	**1.74**	**1.61**	---	0.10	0.034	---
Upper 95% Confidence Limit about Mean	**3.39**	**2.34**	---	0.95	0.37	---
Lower Quartile (25th percentile)	**1.15**	**1.48**	**28.82%**	**0.13**	0.052	**-59.75%**
Median (50th percentile)	**1.80**	**1.95**	**8.33%**	**0.28**	**0.12**	**-57.14%**
Upper Quartile (75th percentile)	**3.86**	**2.36**	**-38.99%**	**0.47**	**0.20**	**-56.99%**
Inter Quartile Range	**2.72**	**0.88**	---	**0.34**	0.15	---
Minimum Detected Value	**0.83**	**0.52**	---	**0.13**	**0.1**	---
Maximum Detected Value	**8.1**	**4.1**	---	**2.34**	**1.5**	---
Minimum Reporting Limit	---	---	---	**0.05**	**0.05**	---
Maximum Reporting Limit	---	---	---	**0.05**	**0.05**	---
Regression Equation	ln(y) = 0.721 + 0.726*z	ln(y) = 0.572 + 0.542*z	---	ln(y) = -1.375 + 1.400*z	ln(y) = -2.190 + 1.126*z	---
Note:	1	1	---	3	3	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-51 Constructed Wetlands – Nutrients (cont.)

Run ID	Nitrogen, Nitrate (NO3) as N, Inflow (mg/L)	Nitrogen, Nitrate (NO3) as N, Outflow (mg/L)	Change, Nitrogen, Nitrate (NO3) as N, Inflow to Outflow	Nitrogen, Nitrite (NO2) as N, Inflow (mg/L)	Nitrogen, Nitrite (NO2) as N, Outflow (mg/L)	Change, Nitrogen, Nitrite (NO2) as N, Inflow to Outflow
n	**26**	**24**	---	**8**	**8**	---
Percent detected	**100.0%**	**66.7%**	---	**62.5%**	**12.5%**	---
Mean	**2.54**	0.84	**-66.90%**	0.07		**-100.00%**
Standard Deviation	**2.64**	2.00	---	0.081		---
Coefficient of Variation	**1.04**	2.39	---	1.10		---
Lower 95% Confidence Limit about Mean	**1.52**	0.038	---	0.018		---
Upper 95% Confidence Limit about Mean	**3.55**	1.64	---	0.13		---
Lower Quartile (25th percentile)	**0.75**	0.057	**-92.38%**	0.017		**-100.00%**
Median (50th percentile)	**1.74**	0.21	**-87.87%**	**0.05**		**-100.00%**
Upper Quartile (75th percentile)	**3.00**	0.78	**-74.12%**	**0.16**		**-100.00%**
Inter Quartile Range	**2.25**	0.72	---	0.14		---
Minimum Detected Value	**0.011**	**0.01**	---	**0.04**	**0.0419**	---
Maximum Detected Value	**11.4**	**8.2**	---	**0.209**	**0.0419**	---
Minimum Reporting Limit	---	**0.25**	---	**0.015**	**0.015**	---
Maximum Reporting Limit	---	**0.5**	---	**0.015**	**0.015**	---
Regression Equation	ln(y) = 0.424 + 1.260*z	ln(y) = -1.558 + 1.933*z	---	ln(y) = -3.172 + 1.378*z	---	---
Note:	1	3	---	3	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-51 Constructed Wetlands – Nutrients (cont.)							
Run ID	**Nitrogen, unionized ammonia (NH3) as N, Inflow (mg/L)**	**Organic carbon, Dissolved, Inflow (mg/L)**	**Organic carbon, Dissolved, Outflow (mg/L)**	**Change, Organic carbon, Dissolved, Inflow to Outflow**	**Organic carbon, Total, Inflow (mg/L)**	**Organic carbon, Total, Outflow (mg/L)**	**Change, Organic carbon, Total, Inflow to Outflow**
n	**8**	**7**	**9**	---	**7**	**9**	---
Percent detected	**100.0%**	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**1.08**	**20.69**	**13.96**	**-32.54%**	**21.17**	**16.11**	**-23.90%**
Standard Deviation	**1.46**	**12.77**	**6.42**	---	**14.87**	**5.92**	---
Coefficient of Variation	**1.35**	**0.62**	**0.46**	---	**0.70**	**0.37**	---
Lower 95% Confidence Limit about Mean	**0.07**	**11.23**	**9.76**	---	**10.16**	**12.25**	---
Upper 95% Confidence Limit about Mean	**2.09**	**30.14**	**18.15**	---	**32.18**	**19.98**	---
Lower Quartile (25th percentile)	**0.46**	**10.00**	**10.00**	**0.00%**	**11.00**	**12.00**	**9.09%**
Median (50th percentile)	**0.61**	**22.00**	**13.00**	**-40.91%**	**15.00**	**14.00**	**-6.67%**
Upper Quartile (75th percentile)	**1.18**	**30.00**	**16.50**	**-45.00%**	**33.00**	**20.50**	**-37.88%**
Inter Quartile Range	**0.72**	**20.00**	**6.50**	---	**22.00**	**8.50**	---
Minimum Detected Value	**0.33**	**6.8**	**7.6**	---	**7.2**	**11**	---
Maximum Detected Value	**3.9**	**41**	**27**	---	**46**	**27**	---
Minimum Reporting Limit	---	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---	---
Regression Equation	ln(y) = -0.256 + 0.915*z	ln(y) = 2.857 + 0.813*z	ln(y) = 2.567 + 0.439*z	---	ln(y) = 2.860 + 0.834*z	ln(y) = 2.731 + 0.368*z	---
Note:	1	1	1	---	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-51 Constructed Wetlands – Nutrients (cont.)						
Run ID	**Phosphorus as P, Dissolved, Inflow (mg/L)**	**Phosphorus as P, Dissolved, Outflow (mg/L)**	**Change, Phosphorus as P, Dissolved, Inflow to Outflow**	**Phosphorus as P, Total, Inflow (mg/L)**	**Phosphorus as P, Total, Outflow (mg/L)**	**Change, Phosphorus as P, Total, Inflow to Outflow**
n	**8**	**8**	---	**20**	**21**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**0.12**	**0.33**	**186.92%**	**0.78**	**0.63**	**-19.33%**
Standard Deviation	**0.06**	**0.61**	---	**0.79**	**0.50**	---
Coefficient of Variation	**0.52**	**1.83**	---	**1.02**	**0.80**	---
Lower 95% Confidence Limit about Mean	**0.074**	**-0.089**	---	**0.43**	**0.41**	---
Upper 95% Confidence Limit about Mean	**0.16**	**0.75**	---	**1.13**	**0.84**	---
Lower Quartile (25th percentile)	**0.071**	**0.075**	**5.61%**	**0.28**	**0.26**	**-7.27%**
Median (50th percentile)	**0.08**	**0.16**	**90.18%**	**0.46**	**0.39**	**-14.29%**
Upper Quartile (75th percentile)	**0.18**	**0.36**	**97.22%**	**0.76**	**1.10**	**45.70%**
Inter Quartile Range	**0.11**	**0.28**	---	**0.48**	**0.85**	---
Minimum Detected Value	**0.067**	**0.011**	---	**0.16**	**0.16**	---
Maximum Detected Value	**0.21**	**1.5**	---	**2.6**	**1.9**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = -2.260 + 0.539*z	ln(y) = -1.892 + 1.717*z	---	ln(y) = -0.619 + 0.911*z	ln(y) = -0.737 + 0.802*z	---
Note:	1	1	---	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-52 Constructed Wetlands – Metals						
Run ID	**Total Arsenic, Inflow (ug/L)**	**Total Arsenic, Outflow (ug/L)**	**Change, Total Arsenic, Inflow to Outflow**	**Total Cadmium, Inflow (ug/L)**	**Total Cadmium, Outflow (ug/L)**	**Change, Total Cadmium, Inflow to Outflow**
n	**8**	**9**	**---**	**16**	**17**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**68.8%**	**52.9%**	**---**
Mean	**2.10**	**0.75**	**-64.23%**	0.72	0.18	**-74.50%**
Standard Deviation	**1.01**	**0.37**	**---**	0.64	0.06	**---**
Coefficient of Variation	**0.48**	**0.49**	**---**	0.89	0.35	**---**
Lower 95% Confidence Limit about Mean	**1.40**	**0.51**	**---**	0.41	0.15	**---**
Upper 95% Confidence Limit about Mean	**2.80**	**0.99**	**---**	1.04	0.22	**---**
Lower Quartile (25th percentile)	**1.28**	**0.50**	**-60.78%**	0.22	0.15	**-33.95%**
Median (50th percentile)	**1.80**	**0.63**	**-65.00%**	0.47	0.18	**-62.40%**
Upper Quartile (75th percentile)	**2.93**	**1.03**	**-64.96%**	1.00	0.21	**-78.60%**
Inter Quartile Range	**1.65**	**0.53**	**---**	0.78	0.07	**---**
Minimum Detected Value	**1**	**0.5**	**---**	**0.28**	**0.2**	**---**
Maximum Detected Value	**3.8**	**1.4**	**---**	**1.9**	**0.35**	**---**
Minimum Reporting Limit			**---**	**0.125**	**0.1**	**---**
Maximum Reporting Limit			**---**	**0.21**	**0.17**	**---**
Regression Equation	ln(y) = 0.647 + 0.573*z	ln(y) = -0.367 + 0.448*z	**---**	ln(y) = -0.750 + 1.114*z	ln(y) = -1.728 + 0.278*z	**---**
Note:	1	1	2	3	3	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-52 Constructed Wetlands – Metals (cont.)

Run ID	Total Chromium, Inflow (ug/L)	Total Chromium, Outflow (ug/L)	Change, Total Chromium, Inflow to Outflow	Total Copper, Inflow (ug/L)	Total Copper, Outflow (ug/L)	Change, Total Copper, Inflow to Outflow
n	**8**	**9**	---	**21**	**22**	---
Percent detected	**100.0%**	**100.0%**	---	**90.5%**	**95.5%**	---
Mean	**7.53**	**1.39**	**-81.54%**	543.94	10.78	**-98.02%**
Standard Deviation	**3.34**	**0.91**	---	2890.84	7.17	---
Coefficient of Variation	**0.44**	**0.65**	---	5.31	0.66	---
Lower 95% Confidence Limit about Mean	**5.21**	**0.80**	---	-692.50	7.79	---
Upper 95% Confidence Limit about Mean	**9.84**	**1.98**	---	1780.37	13.78	---
Lower Quartile (25th percentile)	**3.78**	**1.00**	**-73.51%**	**11.15**	**5.55**	**-50.22%**
Median (50th percentile)	**8.55**	**1.00**	**-88.30%**	**62.00**	**8.80**	**-85.81%**
Upper Quartile (75th percentile)	**9.93**	**1.60**	**-83.88%**	**110.00**	**14.75**	**-86.59%**
Inter Quartile Range	**6.15**	**0.60**	---	**98.85**	**9.20**	---
Minimum Detected Value	**3.7**	**1**	---	**3.23**	**3.4**	---
Maximum Detected Value	**12**	**3.3**	---	**9500**	**31**	---
Minimum Reporting Limit			---	**0.25**	**0.25**	---
Maximum Reporting Limit			---	**0.25**	**0.25**	---
Regression Equation	ln(y) = 1.917 + 0.572*z	ln(y) = 0.225 + 0.409*z	---	ln(y) = 3.738 + 2.215*z	ln(y) = 2.185 + 0.717*z	---
Note:	1	1	2	3	3	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-52 Constructed Wetlands – Metals (cont.)

Run ID	Total Lead, Inflow (ug/L)	Total Lead, Outflow (ug/L)	Change, Total Lead, Inflow to Outflow	Total Nickel, Inflow (ug/L)	Total Nickel, Outflow (ug/L)	Change, Total Nickel, Inflow to Outflow
n	**21**	**22**	**---**	**8**	**9**	**---**
Percent detected	**90.5%**	**95.5%**	**---**	**100.0%**	**100.0%**	**---**
Mean	277.65	5.23	**-98.11%**	**10.81**	**5.61**	**-48.11%**
Standard Deviation	593.03	3.50	**---**	**6.04**	**2.68**	**---**
Coefficient of Variation	2.14	0.67	**---**	**0.56**	**0.48**	**---**
Lower 95% Confidence Limit about Mean	24.01	3.77	**---**	**6.63**	**3.86**	**---**
Upper 95% Confidence Limit about Mean	531.30	6.69	**---**	**15.00**	**7.36**	**---**
Lower Quartile (25th percentile)	**3.32**	**2.70**	**-18.55%**	**5.90**	**3.70**	**-37.29%**
Median (50th percentile)	**170.00**	**4.40**	**-97.41%**	**8.70**	**5.50**	**-36.78%**
Upper Quartile (75th percentile)	**315.00**	**8.32**	**-97.36%**	**16.50**	**6.65**	**-59.70%**
Inter Quartile Range	**311.69**	**5.62**	**---**	**10.60**	**2.95**	**---**
Minimum Detected Value	**1.25**	**1**	**---**	**5.1**	**2.5**	**---**
Maximum Detected Value	**2300**	**14**	**---**	**21**	**11**	**---**
Minimum Reporting Limit	**0.25**	**0.25**	**---**			**---**
Maximum Reporting Limit	**0.25**	**0.25**	**---**			**---**
Regression Equation	ln(y) = 3.918 + 2.654*z	ln(y) = 1.426 + 0.804*z	**---**	ln(y) = 2.259 + 0.630*z	ln(y) = 1.639 + 0.525*z	**---**
Note:	3	3	---	1	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-52 Constructed Wetlands – Metals (cont.)			
Run ID	**Total Zinc, Inflow (ug/L)**	**Total Zinc, Outflow (ug/L)**	**Change, Total Zinc, Inflow to Outflow**
n	**21**	**22**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**363.79**	**56.46**	**-84.48%**
Standard Deviation	**483.79**	**43.15**	**---**
Coefficient of Variation	**1.33**	**0.76**	**---**
Lower 95% Confidence Limit about Mean	**156.87**	**38.43**	**---**
Upper 95% Confidence Limit about Mean	**570.71**	**74.50**	**---**
Lower Quartile (25th percentile)	**109.00**	**28.53**	**-73.83%**
Median (50th percentile)	**270.00**	**39.00**	**-85.56%**
Upper Quartile (75th percentile)	**450.00**	**84.35**	**-81.26%**
Inter Quartile Range	**341.00**	**55.83**	**---**
Minimum Detected Value	**35.7**	**18**	**---**
Maximum Detected Value	**2000**	**165**	**---**
Minimum Reporting Limit			**---**
Maximum Reporting Limit			**---**
Regression Equation	ln(y) = 5.403 + 1.142*z	ln(y) = 3.812 + 0.702*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-53 Non-Caltrans Bioswales – Solids						
Run ID	**Total dissolved solids, Inflow (mg/L)**	**Total dissolved solids, Outflow (mg/L)**	**Change, Total dissolved solids, Inflow to Outflow**	**Total suspended solids, Inflow (mg/L)**	**Total suspended solids, Outflow (mg/L)**	**Change, Total suspended solids, Inflow to Outflow**
n	**71**	**45**	**---**	**104**	**71**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**105**	**87.1**	**-17.36%**	**102**	**39.5**	**-61.37%**
Standard Deviation	**82.0**	**44.9**	**---**	**85.8**	**35.6**	**---**
Coefficient of Variation	**0.78**	**0.51**	**---**	**0.84**	**0.90**	**---**
Lower 95% Confidence Limit about Mean	**86.3**	**74.0**	**---**	**85.9**	**31.3**	**---**
Upper 95% Confidence Limit about Mean	**124**	**100**	**---**	**119**	**47.8**	**---**
Lower Quartile (25th percentile)	**42.0**	**57.0**	**35.71%**	**47.3**	**18.0**	**-61.90%**
Median (50th percentile)	**80.0**	**78.0**	**-2.50%**	**72.0**	**30.0**	**-58.33%**
Upper Quartile (75th percentile)	**154**	**120**	**-22.08%**	**134**	**50.0**	**-62.76%**
Inter Quartile Range	**112**	**63**	**---**	**87**	**32**	**---**
Minimum Detected Value	**1**	**1**	**---**	**2**	**1**	**---**
Maximum Detected Value	**350**	**200**	**---**	**474**	**191**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = 4.260 + 1.075*z	ln(y) = 4.272 + 0.729*z	**---**	ln(y) = 4.319 + 0.853*z	ln(y) = 3.343 + 0.898*z	**---**
Note:	1	1	**---**	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-54 Non-Caltrans Bioswales – Bacteria			
Run ID	**Fecal Coliform, Inflow (#/100mL)**	**Fecal Coliform, Outflow (#/100mL)**	**Change, Fecal Coliform, Inflow to Outflow**
n	**33**	**19**	**---**
Percent detected	**97.0%**	**100.0%**	**---**
Mean	12725	**10982**	**-13.70%**
Standard Deviation	22363	**49927**	**---**
Coefficient of Variation	1.76	**4.55**	**---**
Lower 95% Confidence Limit about Mean	5095	**-11468**	**---**
Upper 95% Confidence Limit about Mean	20355	**33432**	**---**
Lower Quartile (25th percentile)	**500**	**130**	**-74.00%**
Median (50th percentile)	**5000**	**900**	**-82.00%**
Upper Quartile (75th percentile)	**16500**	**5000**	**-69.70%**
Inter Quartile Range	**16000**	**4870**	**---**
Minimum Detected Value	**17**	**17**	**---**
Maximum Detected Value	**90000**	**160000**	**---**
Minimum Reporting Limit	**1**	**---**	**---**
Maximum Reporting Limit	**1**	**---**	**---**
Regression Equation	ln(y) = 7.667 + 2.695*z	ln(y) = 6.585 + 2.773*z	**---**
Note:	3	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-55 Non-Caltrans Bioswales – Nutrients

Run ID	Kjeldahl nitrogen (TKN), Inflow (mg/L)	Kjeldahl nitrogen (TKN), Outflow (mg/L)	Change, Kjeldahl nitrogen (TKN), Inflow to Outflow	Nitrogen, ammonia as N, Inflow (mg/L)	Nitrogen, Nitrate (NO3) as N, Inflow (mg/L)	Nitrogen, Nitrate (NO3) as N, Outflow (mg/L)	Change, Nitrogen, Nitrate (NO3) as N, Inflow to Outflow
n	**105**	**72**	---	**10**	**104**	**71**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	**100.0%**	---
Mean	**2.91**	**1.99**	**-31.7%**	**1.05**	**1.26**	**0.98**	**-22.5%**
Standard Deviation	**2.27**	**1.61**	---	**0.78**	**1.37**	**2.47**	---
Coefficient of Variation	**0.78**	**0.81**	---	**0.74**	**1.08**	**2.53**	---
Lower 95% Confidence Limit about Mean	**2.48**	**1.62**	---	**0.57**	**1.00**	**0.40**	---
Upper 95% Confidence Limit about Mean	**3.35**	**2.36**	---	**1.53**	**1.52**	**1.55**	---
Lower Quartile (25th percentile)	**1.43**	**1.04**	**-27.6%**	**0.65**	**0.435**	**0.30**	**-31.0%**
Median (50th percentile)	**2.1**	**1.57**	**-25.2%**	**0.91**	**0.73**	**0.56**	**-23.3%**
Upper Quartile (75th percentile)	**3.39**	**2.34**	**-30.9%**	**1.15**	**1.375**	**0.9**	**-34.5%**
Inter Quartile Range	**1.96**	**1.31**	---	**0.5**	**0.94**	**0.6**	---
Minimum Detected Value	**0.11**	**0.08**	---	**0.45**	**0.01**	**0.01**	---
Maximum Detected Value	**11**	**9.58**	---	**2.8**	**5.62**	**16.9**	---
Minimum Reporting Limit	---	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---	---
Regression Equation	ln(y) = 0.756 + 0.874*z	ln(y) = 0.393 + 0.850*z	---	ln(y) = -8.324 + 0.584*z	ln(y) = -0.231 + 0.983*z	ln(y) = -0.630 + 1.058*z	---
Note:	1	1	2	1	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-55 Non-Caltrans Bioswales – Nutrients (cont.)

Run ID	Nitrogen, unionized ammonia (NH3) as N, Inflow (mg/L)	Organic carbon, Dissolved, Inflow (mg/L)	Organic carbon, Dissolved, Outflow (mg/L)	Change, Organic carbon, Dissolved, Inflow to Outflow	Organic carbon, Total, Inflow (mg/L)	Organic carbon, Total, Outflow (mg/L)	Change, Organic carbon, Total, Inflow to Outflow
n	**10**	**58**	**42**	**---**	**59**	**42**	**---**
Percent detected	**100.0%**	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**1.05**	**21.84**	**15.67**	**-28.3%**	**25.79**	**18.13**	**-29.7%**
Standard Deviation	**0.78**	**18.86**	**9.68**	**---**	**21.28**	**10.18**	**---**
Coefficient of Variation	**0.74**	**0.86**	**0.62**	**---**	**0.83**	**0.56**	**---**
Lower 95% Confidence Limit about Mean	**0.57**	**16.99**	**12.74**	**---**	**20.36**	**15.05**	**---**
Upper 95% Confidence Limit about Mean	**1.53**	**26.70**	**18.60**	**---**	**31.23**	**21.21**	**---**
Lower Quartile (25th percentile)	**0.66**	**9.875**	**8.15**	**-17.5%**	**12**	**11**	**-8.3%**
Median (50th percentile)	**0.89**	**14.5**	**12.45**	**-14.1%**	**18**	**17**	**-5.6%**
Upper Quartile (75th percentile)	**1.15**	**31.5**	**22**	**-30.2%**	**33**	**23.25**	**-29.5%**
Inter Quartile Range	**0.49**	**21.63**	**13.85**	**---**	**21**	**12.25**	**---**
Minimum Detected Value	**0.46**	**2.5**	**3.5**	**---**	**3**	**3.5**	**---**
Maximum Detected Value	**2.8**	**75**	**44**	**---**	**90**	**48**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = -0.077 + 0.569*z	ln(y) = 2.732 + 0.912*z	ln(y) = 2.559 + 0.688*z	**---**	ln(y) = 2.917 + 0.901*z	ln(y) = 2.736 + 0.636*z	**---**
Note:	1	1	1	**---**	1	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-55 Non-Caltrans Bioswales – Nutrients (cont.)

Run ID	Phosphorus as P, Dissolved, Inflow (mg/L)	Phosphorus as P, Dissolved, Outflow (mg/L)	Change, Phosphorus as P, Dissolved, Inflow to Outflow	Phosphorus as P, Total, Inflow (mg/L)	Phosphorus as P, Total, Outflow (mg/L)	Change, Phosphorus as P, Total, Inflow to Outflow
n	**58**	**41**	---	**105**	**72**	---
Percent detected	**96.6%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	0.14	**0.51**	**263%**	**0.31**	**0.61**	**92.9%**
Standard Deviation	0.22	**0.65**	---	**0.28**	**0.66**	---
Coefficient of Variation	1.59	**1.28**	---	**0.90**	**1.08**	---
Lower 95% Confidence Limit about Mean	0.082	**0.31**	---	**0.26**	**0.45**	---
Upper 95% Confidence Limit about Mean	0.20	**0.70**	---	**0.37**	**0.76**	---
Lower Quartile (25th percentile)	**0.058**	**0.175**	**202%**	**0.12**	**0.26**	**116.7%**
Median (50th percentile)	**0.08**	**0.28**	**250%**	**0.22**	**0.37**	**68.2%**
Upper Quartile (75th percentile)	**0.14**	**0.5**	**257%**	**0.4**	**0.58**	**45.6%**
Inter Quartile Range	**0.082**	**0.325**	---	**0.28**	**0.32**	---
Minimum Detected Value	**0.014**	**0.06**	---	**0.002**	**0.15**	---
Maximum Detected Value	**1.39**	**2.98**	---	**1.83**	**2.97**	---
Minimum Reporting Limit	**0.03**	---	---	---	---	---
Maximum Reporting Limit	**0.03**	---	---	---	---	---
Regression Equation	ln(y) = -2.420 + 0.906*z	ln(y) = -1.123 + 0.901*z	---	ln(y) = -1.497 + 0.895*z	ln(y) = -0.840 + 0.737*z	---
Note:	3	1	---	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-55 Non-Caltrans Bioswales – Nutrients (cont.)			
Run ID	**Phosphorus, orthophosphate as P, Inflow (mg/L)**	**Phosphorus, orthophosphate as P, Outflow (mg/L)**	**Change, Phosphorus, orthophosphate as P, Inflow to Outflow**
n	**12**	**4**	---
Percent detected	**100.0%**	**100.0%**	---
Mean	**0.22**	**0.35**	**59.1%**
Standard Deviation	**0.15**	**0.33**	---
Coefficient of Variation	**0.67**	**0.95**	---
Lower 95% Confidence Limit about Mean	**0.14**	**0.02**	---
Upper 95% Confidence Limit about Mean	**0.30**	**0.68**	---
Lower Quartile (25th percentile)	**0.073**	**0.09**	**24.1%**
Median (50th percentile)	**0.235**	**0.31**	**31.9%**
Upper Quartile (75th percentile)	**0.333**	**0.65**	**95.5%**
Inter Quartile Range	**0.26**	**0.56**	---
Minimum Detected Value	**0.03**	**0.03**	---
Maximum Detected Value	**0.49**	**0.75**	---
Minimum Reporting Limit	---	---	---
Maximum Reporting Limit	---	---	---
Regression Equation	ln(y) = -1.837 + 1.066*z	ln(y) = -1.538 + 1.796*z	---
Note:	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-56 Non-Caltrans Bioswales – Metals						
Run ID	**Total Arsenic, Inflow (ug/L)**	**Total Arsenic, Outflow (ug/L)**	**Change, Total Arsenic, Inflow to Outflow**	**Total Cadmium, Inflow (ug/L)**	**Total Cadmium, Outflow (ug/L)**	**Change, Total Cadmium, Inflow to Outflow**
n	**63**	**44**	**---**	**100**	**75**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**94.7%**	**---**
Mean	**11.94**	**3.47**	**-70.90%**	**0.88**	0.28	**-68.14%**
Standard Deviation	**17.53**	**3.42**	**---**	**1.10**	0.28	**---**
Coefficient of Variation	**1.47**	**0.98**	**---**	**1.24**	0.99	**---**
Lower 95% Confidence Limit about Mean	**7.61**	**2.46**	**---**	**0.67**	0.22	**---**
Upper 95% Confidence Limit about Mean	**16.27**	**4.48**	**---**	**1.10**	0.34	**---**
Lower Quartile (25th percentile)	**1.60**	**1.10**	**-31.25%**	**0.24**	0.10	**-59.48%**
Median (50th percentile)	**4.30**	**2.40**	**-44.19%**	**0.56**	0.19	**-66.32%**
Upper Quartile (75th percentile)	**11**	**4.65**	**-57.73%**	**1.30**	0.36	**-72.08%**
Inter Quartile Range	**9.4**	**3.55**	**---**	**1.06**	0.26	**---**
Minimum Detected Value	**0.6**	**0.5**	**---**	**0.015626**	**0.025377**	**---**
Maximum Detected Value	**66**	**15**	**---**	**8.3**	**1.4**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**0.011498**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**0.019875**	**---**
Regression Equation	ln(y) = 1.577 + 1.371*z	ln(y) = 0.849 + 0.965*z	**---**	ln(y) = -0.699 + 1.219*z	ln(y) = -1.668 + 0.970*z	**---**
Note:	1	1	2	1	3	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-56 Non-Caltrans Bioswales – Metals (cont.)

Run ID	Total Chromium, Inflow (ug/L)	Total Chromium, Outflow (ug/L)	Change, Total Chromium, Inflow to Outflow	Total Copper, Inflow (ug/L)	Total Copper, Outflow (ug/L)	Change, Total Copper, Inflow to Outflow
n	**64**	**44**	---	**131**	**99**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**7.18**	**5.21**	**-27.37%**	**41.20**	**12.20**	**-70.39%**
Standard Deviation	**6.34**	**18.06**	---	**40.59**	**10.35**	---
Coefficient of Variation	**0.88**	**3.47**	---	**0.99**	**0.85**	---
Lower 95% Confidence Limit about Mean	**5.62**	**-0.12**	---	**34.25**	**10.16**	---
Upper 95% Confidence Limit about Mean	**8.73**	**10.55**	---	**48.15**	**14.24**	---
Lower Quartile (25th percentile)	**2.83**	**1.40**	**-50.44%**	**11.00**	**5.40**	**-50.91%**
Median (50th percentile)	**5.65**	**2.20**	**-61.06%**	**25.20**	**10.00**	**-60.32%**
Upper Quartile (75th percentile)	**9.95**	**4.55**	**-54.27%**	**64.0**	**16.0**	**-75.00%**
Inter Quartile Range	**7.125**	**3.15**	---	**53**	**10.6**	---
Minimum Detected Value	**1**	**1**	---	**1.1**	**1**	---
Maximum Detected Value	**39**	**92**	---	**232**	**73**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = 1.651 + 0.858*z	ln(y) = 0.975 + 0.887*z	---	ln(y) = 3.205 + 1.128*z	ln(y) = 2.207 + 0.828*z	---
Note:	1	1	---	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-56 Non-Caltrans Bioswales – Metals (cont.)

Run ID	Total Iron, Inflow (ug/L)	Total Lead, Inflow (ug/L)	Total Lead, Outflow (ug/L)	Change, Total Lead, Inflow to Outflow	Total Nickel, Inflow (ug/L)	Total Nickel, Outflow (ug/L)	Change, Total Nickel, Inflow to Outflow
n	**1**	**131**	**99**	**---**	**64**	**44**	**---**
Percent detected	**100.0%**	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**---**	**66.47**	**15.88**	**-76.11%**	**12.32**	**3.76**	**-69.50%**
Standard Deviation	**---**	**229**	**26.28**	**---**	**11.44**	**4.07**	**---**
Coefficient of Variation	**---**	**3.45**	**1.65**	**---**	**0.93**	**1.08**	**---**
Lower 95% Confidence Limit about Mean	**---**	**27.20**	**10.70**	**---**	**9.52**	**2.56**	**---**
Upper 95% Confidence Limit about Mean	**---**	**106**	**21.06**	**---**	**15.13**	**4.96**	**---**
Lower Quartile (25th percentile)	**---**	**9.67**	**3.60**	**-62.78%**	**4.43**	**2.00**	**-54.80%**
Median (50th percentile)	**---**	**21.85**	**7.06**	**-67.68%**	**9.25**	**2.50**	**-72.97%**
Upper Quartile (75th percentile)	**---**	**73.0**	**18.26**	**-74.99%**	**15.75**	**4.15**	**-73.65%**
Inter Quartile Range	**---**	**63.3**	**14.66**	**---**	**11.325**	**2.15**	**---**
Minimum Detected Value	**5700**	**0.55585**	**0.755025**	**---**	**2**	**1.8**	**---**
Maximum Detected Value	**5700**	**2086**	**189**	**---**	**69**	**23**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	**---**	ln(y) = 3.222 + 1.374*z	ln(y) = 2.085 + 1.168*z	**---**	ln(y) = 2.190 + 0.842*z	ln(y) = 1.108 + 0.518*z	**---**
Note:	1	1	1	2	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-56 Non-Caltrans Bioswales – Metals (cont.)			
Run ID	**Total Zinc, Inflow (ug/L)**	**Total Zinc, Outflow (ug/L)**	**Change, Total Zinc, Inflow to Outflow**
n	**131**	**99**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**228**	**65.07**	**-71.42%**
Standard Deviation	**223**	**66.77**	**---**
Coefficient of Variation	**0.98**	**1.03**	**---**
Lower 95% Confidence Limit about Mean	**190**	**51.92**	**---**
Upper 95% Confidence Limit about Mean	**266**	**78.23**	**---**
Lower Quartile (25th percentile)	**90.00**	**29.00**	**-67.78%**
Median (50th percentile)	**160**	**50.16**	**-68.65%**
Upper Quartile (75th percentile)	**313**	**76**	**-75.72%**
Inter Quartile Range	**223**	**47**	**---**
Minimum Detected Value	**13**	**4.2**	**---**
Maximum Detected Value	**1542**	**501**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 5.007 + 0.995*z	ln(y) = 3.866 + 0.811*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-57 Caltrans Only Bioswales – Solids						
Run ID	**Total dissolved solids, Inflow (mg/L)**	**Total dissolved solids, Outflow (mg/L)**	**Change, Total dissolved solids, Inflow to Outflow**	**Total suspended solids, Inflow (mg/L)**	**Total suspended solids, Outflow (mg/L)**	**Change, Total suspended solids, Inflow to Outflow**
n	**55**	**32**	**---**	**55**	**32**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**91.9**	**108.0**	**17.58%**	**92.2**	**69.9**	**-24.21%**
Standard Deviation	**51.0**	**54.9**	**---**	**70.8**	**81.0**	**---**
Coefficient of Variation	**0.55**	**0.51**	**---**	**0.77**	**1.16**	**---**
Lower 95% Confidence Limit about Mean	**78.4**	**89.0**	**---**	**73.5**	**41.8**	**---**
Upper 95% Confidence Limit about Mean	**105.3**	**127.0**	**---**	**110.9**	**97.9**	**---**
Lower Quartile (25th percentile)	**56**	**77.5**	**38.39%**	**39**	**20.5**	**-47.44%**
Median (50th percentile)	**89**	**100**	**12.36%**	**78**	**38**	**-51.28%**
Upper Quartile (75th percentile)	**112**	**128.5**	**14.73%**	**124**	**81.75**	**-34.07%**
Inter Quartile Range	**56**	**51**	**---**	**85**	**61.25**	**---**
Minimum Detected Value	**16**	**14**	**---**	**12**	**7**	**---**
Maximum Detected Value	**260**	**264**	**---**	**380**	**330**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = 4.355 + 0.639*z	ln(y) = 4.548 + 0.587*z	**---**	ln(y) = 4.234 + 0.852*z	ln(y) = 3.758 + 1.056*z	**---**
Note:	1	1	**---**	1	1	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-57 Caltrans Only Bioswales – Solids (cont.)			
Run ID	**Turbidity, Inflow (NTU)**	**Turbidity, Outflow (NTU)**	**Change, Turbidity, Inflow to Outflow**
n	**16**	**11**	**---**
Percent detected	**100.0%**	**100.0%**	**---**
Mean	**93.1**	**34.8**	**-62.65%**
Standard Deviation	**77.2**	**22.0**	**---**
Coefficient of Variation	**0.83**	**0.63**	**---**
Lower 95% Confidence Limit about Mean	**55.3**	**21.8**	**---**
Upper 95% Confidence Limit about Mean	**131.0**	**47.8**	**---**
Lower Quartile (25th percentile)	**29**	**18**	**-37.93%**
Median (50th percentile)	**75**	**37**	**-50.67%**
Upper Quartile (75th percentile)	**140**	**42**	**-70.00%**
Inter Quartile Range	**111**	**24**	**---**
Minimum Detected Value	**3.3**	**8.4**	**---**
Maximum Detected Value	**249**	**74**	**---**
Minimum Reporting Limit	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**
Regression Equation	ln(y) = 4.008 + 1.397*z	ln(y) = 3.341 + 0.835*z	**---**
Note:	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-58 Caltrans Only Bioswales – Nutrients						
Run ID	**Kjeldahl nitrogen (TKN), Inflow (mg/L)**	**Kjeldahl nitrogen (TKN), Outflow (mg/L)**	**Change, Kjeldahl nitrogen (TKN), Inflow to Outflow**	**Nitrogen, ammonia as N, Inflow (mg/L)**	**Nitrogen, ammonia as N, Outflow (mg/L)**	**Change, Nitrogen, ammonia as N, Inflow to Outflow**
n	**55**	**30**	**---**	**48**	**30**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**83.3%**	**76.7%**	**---**
Mean	**1.55**	**2.00**	**29.02%**	0.47	0.66	**40.91%**
Standard Deviation	**1.23**	**2.67**	**---**	0.46	1.44	**---**
Coefficient of Variation	**0.79**	**1.34**	**---**	0.98	2.18	**---**
Lower 95% Confidence Limit about Mean	**1.22**	**1.04**	**---**	0.34	0.15	**---**
Upper 95% Confidence Limit about Mean	**1.87**	**2.95**	**---**	0.60	1.18	**---**
Lower Quartile (25th percentile)	**0.79**	**0.80**	**0.63%**	0.16	0.12	**-28.92%**
Median (50th percentile)	**1.20**	**1.40**	**16.67%**	0.31	0.29	**-9.04%**
Upper Quartile (75th percentile)	**2.00**	**2.22**	**11.13%**	0.61	0.71	**16.41%**
Inter Quartile Range	**1.21**	**1.43**	**---**	0.44	0.59	**---**
Minimum Detected Value	**0.25**	**0.19**	**---**	**0.11**	**0.12**	**---**
Maximum Detected Value	**5.9**	**13**	**---**	**2.1**	**6.6**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**0.04**	**0.05**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**0.07**	**0.055**	**---**
Regression Equation	ln(y) = 0.166 + 0.794*z	ln(y) = 0.332 + 0.861*z	**---**	ln(y) = -1.157 + 0.973*z	ln(y) = -1.252 + 1.339*z	**---**
Note:	1	1	**---**	3	3	**---**

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-58 Caltrans Only Bioswales – Nutrients (cont.)						
Run ID	**Nitrogen, Nitrate (NO3) as N, Inflow (mg/L)**	**Nitrogen, Nitrate (NO3) as N, Outflow (mg/L)**	**Change, Nitrogen, Nitrate (NO3) as N, Inflow to Outflow**	**Nitrogen, Nitrite (NO2) as N, Inflow (mg/L)**	**Nitrogen, Nitrite (NO2) as N, Outflow (mg/L)**	**Change, Nitrogen, Nitrite (NO2) as N, Inflow to Outflow**
n	**55**	**32**	**---**	**16**	**11**	**---**
Percent detected	**96.4%**	**96.9%**	**---**	**25.0%**	**54.5%**	**---**
Mean	1.02	1.17	**13.77%**	0.09	0.16	**89.01%**
Standard Deviation	0.71	1.19	**---**	0.13	0.32	**---**
Coefficient of Variation	0.69	1.02	**---**	1.50	1.93	**---**
Lower 95% Confidence Limit about Mean	0.84	0.75	**---**	0.02	-0.02	**---**
Upper 95% Confidence Limit about Mean	1.21	1.58	**---**	0.15	0.35	**---**
Lower Quartile (25th percentile)	0.46	**0.24**	**-47.10%**	0.03	0.03	**-0.69%**
Median (50th percentile)	0.79	**0.78**	**-1.31%**	0.06	0.07	**31.91%**
Upper Quartile (75th percentile)	1.36	**1.75**	**28.42%**	0.12	0.20	**75.21%**
Inter Quartile Range	0.90	**1.51**	**---**	0.09	0.18	**---**
Minimum Detected Value	**0.17**	**0.13**	**---**	**0.1**	**0.1**	**---**
Maximum Detected Value	**3.2**	**4.4**	**---**	**0.28**	**0.89**	**---**
Minimum Reporting Limit	**0.05**	**0.025**	**---**	**0.005**	**0.005**	**---**
Maximum Reporting Limit	**0.09**	**0.025**	**---**	**0.09**	**0.08**	**---**
Regression Equation	ln(y) = -0.235 + 0.808*z	ln(y) = -0.392 + 1.221*z	**---**	ln(y) = -2.888 + 1.090*z	ln(y) = -2.611 + 1.511*z	**---**
Note:	3	3	**---**	3	3	**---**

Note 3. Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-58 Caltrans Only Bioswales – Nutrients (cont.)

Run ID	Organic carbon, Dissolved, Inflow (mg/L)	Organic carbon, Dissolved, Outflow (mg/L)	Change, Organic carbon, Dissolved, Inflow to Outflow	Organic carbon, Total, Inflow (mg/L)	Organic carbon, Total, Outflow (mg/L)	Change, Organic carbon, Total, Inflow to Outflow
n	**55**	**32**	---	**55**	**32**	---
Percent detected	**100.0%**	**100.0%**	---	**100.0%**	**100.0%**	---
Mean	**14.40**	**16.95**	**17.74%**	**16.32**	**18.82**	**15.30%**
Standard Deviation	**11.74**	**12.05**	---	**14.16**	**13.03**	---
Coefficient of Variation	**0.82**	**0.71**	---	**0.87**	**0.69**	---
Lower 95% Confidence Limit about Mean	**11.29**	**12.77**	---	**12.58**	**14.30**	---
Upper 95% Confidence Limit about Mean	**17.50**	**21.13**	---	**20.06**	**23.33**	---
Lower Quartile (25th percentile)	**6.20**	**8.68**	**39.92%**	**7.40**	**10.25**	**38.51%**
Median (50th percentile)	**9.70**	**13.00**	**34.02%**	**11.00**	**13.00**	**18.18%**
Upper Quartile (75th percentile)	**19.00**	**21.75**	**14.47%**	**21.00**	**23.00**	**9.52%**
Inter Quartile Range	**12.80**	**13.08**	---	**13.6**	**12.75**	---
Minimum Detected Value	**2.7**	**5.6**	---	**3.8**	**5.8**	---
Maximum Detected Value	**54**	**49**	---	**72**	**53**	---
Minimum Reporting Limit	---	---	---	---	---	---
Maximum Reporting Limit	---	---	---	---	---	---
Regression Equation	ln(y) = 2.394 + 0.752*z	ln(y) = 2.633 + 0.657*z	---	ln(y) = 2.522 + 0.739*z	ln(y) = 2.753 + 0.622*z	---
Note:	1	1	---	1	1	---

Note 1: All data reported as detected. Bolded values are exact calculations.

Table L-58 Caltrans Only Bioswales – Nutrients (cont.)

Run ID	Phosphorus as P, Total, Inflow (mg/L)	Phosphorus as P, Total, Outflow (mg/L)	Change, Phosphorus as P, Total, Inflow to Outflow	Phosphorus, orthophosphate as P, Inflow (mg/L)	Phosphorus, orthophosphate as P, Outflow (mg/L)	Change, Phosphorus, orthophosphate as P, Inflow to Outflow
n	**55**	**30**	---	**55**	**30**	---
Percent detected	**90.9%**	**96.7%**	---	**72.7%**	**96.7%**	---
Mean	0.21	0.68	**219%**	0.08	0.53	**531%**
Standard Deviation	0.16	0.68	---	0.11	0.57	---
Coefficient of Variation	0.77	1.00	---	1.31	1.08	---
Lower 95% Confidence Limit about Mean	0.17	0.44	---	0.06	0.33	---
Upper 95% Confidence Limit about Mean	0.26	0.93	---	0.11	0.74	---
Lower Quartile (25th percentile)	0.08	**0.18**	**112%**	0.02	**0.09**	**334%**
Median (50th percentile)	0.15	**0.57**	**269%**	0.05	**0.42**	**795%**
Upper Quartile (75th percentile)	0.29	**0.92**	**221%**	0.10	**0.67**	**551%**
Inter Quartile Range	0.202	**0.738**	---	0.082	**0.58**	---
Minimum Detected Value	**0.02**	**0.07**	---	**0.02**	**0.03**	---
Maximum Detected Value	**0.81**	**2.8**	---	**0.52**	**2.3**	---
Minimum Reporting Limit	**0.004**	**0.004**	---	**0.0015**	**0.0015**	---
Maximum Reporting Limit	**0.015**	**0.004**	---	**0.02**	**0.0015**	---
Regression Equation	ln(y) = -1.868 + 0.910*z	ln(y) = -0.870 + 1.168*z	---	ln(y) = -3.059 + 1.170*z	ln(y) = -1.267 + 1.392*z	---
Note:	3	3	---	3	3	---

Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-59 Caltrans Only Bioswales – Metals						
Run ID	**Total Arsenic, Inflow (ug/L)**	**Total Arsenic, Outflow (ug/L)**	**Change, Total Arsenic, Inflow to Outflow**	**Total Cadmium, Inflow (ug/L)**	**Total Cadmium, Outflow (ug/L)**	**Change, Total Cadmium, Inflow to Outflow**
n	**55**	**32**	**---**	**55**	**32**	**---**
Percent detected	**81.8%**	**84.4%**	**---**	**90.9%**	**78.1%**	**---**
Mean	3.92	4.75	**21.19%**	0.82	0.69	**-15.99%**
Standard Deviation	11.90	19.07	**---**	0.54	0.96	**---**
Coefficient of Variation	3.03	4.01	**---**	0.66	1.40	**---**
Lower 95% Confidence Limit about Mean	0.78	-1.85	**---**	0.68	0.35	**---**
Upper 95% Confidence Limit about Mean	7.07	11.36	**---**	0.96	1.02	**---**
Lower Quartile (25th percentile)	0.92	1.21	**32.01%**	0.41	0.14	**-66.63%**
Median (50th percentile)	1.71	2.22	**29.33%**	0.66	0.33	**-49.52%**
Upper Quartile (75th percentile)	3.19	4.04	**26.71%**	1.07	0.82	**-23.66%**
Inter Quartile Range	2.27	2.83	**---**	0.66	0.68	**---**
Minimum Detected Value	**1**	**1.2**	**---**	**0.2**	**0.2**	**---**
Maximum Detected Value	**61**	**79**	**---**	**3**	**3.9**	**---**
Minimum Reporting Limit	**0.03**	**0.03**	**---**	**0.005**	**0.005**	**---**
Maximum Reporting Limit	**0.61**	**0.98**	**---**	**0.14**	**0.11**	**---**
Regression Equation	ln(y) = 0.538 + 0.921*z	ln(y) = 0.795 + 0.891*z	**---**	ln(y) = -0.410 + 0.710*z	ln(y) = -1.094 + 1.324*z	**---**
Note:	3	3	**---**	3	3	**---**

Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-59 Caltrans Only Bioswales – Metals (cont.)						
Run ID	**Total Chromium, Inflow (ug/L)**	**Total Chromium, Outflow (ug/L)**	**Change, Total Chromium, Inflow to Outflow**	**Total Copper, Inflow (ug/L)**	**Total Copper, Outflow (ug/L)**	**Change, Total Copper, Inflow to Outflow**
n	**55**	**32**	**---**	**55**	**32**	**---**
Percent detected	**100.0%**	**100.0%**	**---**	**100.0%**	**100.0%**	**---**
Mean	**7.73**	**6.10**	**-21.11%**	**44.99**	**18.34**	**-59.24%**
Standard Deviation	**3.55**	**3.31**	**---**	**26.58**	**9.99**	**---**
Coefficient of Variation	**0.46**	**0.54**	**---**	**0.59**	**0.55**	**---**
Lower 95% Confidence Limit about Mean	**6.79**	**4.95**	**---**	**37.97**	**14.87**	**---**
Upper 95% Confidence Limit about Mean	**8.67**	**7.25**	**---**	**52.01**	**21.80**	**---**
Lower Quartile (25th percentile)	**5.70**	**3.78**	**-33.77%**	**24.00**	**9.95**	**-58.54%**
Median (50th percentile)	**7.40**	**5.30**	**-28.38%**	**41.00**	**16.00**	**-60.98%**
Upper Quartile (75th percentile)	**9.20**	**7.13**	**-22.55%**	**60.00**	**26.00**	**-56.67%**
Inter Quartile Range	**3.50**	**3.35**	**---**	**36.00**	**16.05**	**---**
Minimum Detected Value	**1.1**	**1.8**	**---**	**10**	**5**	**---**
Maximum Detected Value	**19**	**16**	**---**	**130**	**43**	**---**
Minimum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**---**	**---**	**---**	**---**	**---**	**---**
Regression Equation	ln(y) = 1.937 + 0.508*z	ln(y) = 1.689 + 0.527*z	**---**	ln(y) = 3.617 + 0.683*z	ln(y) = 2.762 + 0.606*z	**---**
Note:	1	1	**---**	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.

Table L-59 Caltrans Only Bioswales – Metals (cont.)						
Run ID	**Total Iron, Inflow (ug/L)**	**Total Iron, Outflow (ug/L)**	**Change, Total Iron, Inflow to Outflow**	**Total Lead, Inflow (ug/L)**	**Total Lead, Outflow (ug/L)**	**Change, Total Lead, Inflow to Outflow**
n	**8**	**7**	---	**55**	**32**	---
Percent detected	**100.0%**	**100.0%**	---	**96.4%**	**96.9%**	---
Mean	**2005**	**1031**	**-48.56%**	48.42	14.57	**-69.92%**
Standard Deviation	**1082**	**491**	---	56.49	19.68	---
Coefficient of Variation	**0.54**	**0.48**	---	1.17	1.35	---
Lower 95% Confidence Limit about Mean	**1255**	**667**	---	33.49	7.75	---
Upper 95% Confidence Limit about Mean	**2755**	**1395**	---	63.35	21.39	---
Lower Quartile (25th percentile)	**990**	**690**	**-30.30%**	11.16	**2.95**	**-73.56%**
Median (50th percentile)	**1850**	**970**	**-47.57%**	26.02	**6.50**	**-75.02%**
Upper Quartile (75th percentile)	**3175**	**1500**	**-52.76%**	60.68	**15.00**	**-75.28%**
Inter Quartile Range	**2185**	**810**	---	49.52	**12.05**	---
Minimum Detected Value	**920**	**420**	---	**2.9**	**1.8**	---
Maximum Detected Value	**3400**	**1800**	---	**240**	**75**	---
Minimum Reporting Limit	---		---	**0.7**	**0.03**	---
Maximum Reporting Limit	---		---	**0.8**	**0.03**	---
Regression Equation	ln(y) = 7.467 + 0.660*z	ln(y) = 6.843 + 0.599*z	---	ln(y) = 3.258 + 1.255*z	ln(y) = 1.986 + 1.252*z	---
Note:	1	1	---	3	3	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Table L-59 Caltrans Only Bioswales – Metals (cont.)						
Run ID	**Total Nickel, Inflow (ug/L)**	**Total Nickel, Outflow (ug/L)**	**Change, Total Nickel, Inflow to Outflow**	**Total Zinc, Inflow (ug/L)**	**Total Zinc, Outflow (ug/L)**	**Change, Total Zinc, Inflow to Outflow**
n	**55**	**32**	**---**	**55**	**32**	**---**
Percent detected	**98.2%**	**96.9%**	**---**	**100.0%**	**100.0%**	**---**
Mean	9.33	5.48	**-41.24%**	**260**	**74**	**-71.53%**
Standard Deviation	14.06	8.16	**---**	**207**	**94**	**---**
Coefficient of Variation	1.51	1.49	**---**	**0.80**	**1.27**	**---**
Lower 95% Confidence Limit about Mean	5.61	2.65	**---**	**205**	**41.6**	**---**
Upper 95% Confidence Limit about Mean	13.04	8.31	**---**	**315**	**107**	**---**
Lower Quartile (25th percentile)	**4.50**	**2.53**	**-43.89%**	**110**	**24.75**	**-77.50%**
Median (50th percentile)	**7.30**	**3.90**	**-46.58%**	**220**	**52.50**	**-76.14%**
Upper Quartile (75th percentile)	**10.00**	**6.40**	**-36.00%**	**350**	**84.50**	**-75.86%**
Inter Quartile Range	**5.50**	**3.88**	**---**	**240**	**59.75**	**---**
Minimum Detected Value	**2.1**	**2**	**---**	**32**	**19**	**---**
Maximum Detected Value	**89**	**40**	**---**	**980**	**440**	**---**
Minimum Reporting Limit	**1.5**	**1.59**	**---**	**---**	**---**	**---**
Maximum Reporting Limit	**1.5**	**1.59**	**---**	**---**	**---**	**---**
Regression Equation	$\ln(y) = 1.940 + 0.713*z$	$\ln(y) = 1.425 + 0.667*z$	**---**	$\ln(y) = 5.247 + 0.890*z$	$\ln(y) = 3.947 + 0.805*z$	**---**
Note:	3	3	**---**	1	1	2

Note 1: All data reported as detected. Bolded values are exact calculations.
Note 2: Statistically different inflow and outflow concentrations based on 95% confidence intervals.
Note 3: Bolded values are exact calculations. Unbolded values are estimated using regression on ordered statistics (ROS).

Attachment M

Current MCM Implementation based on Unified Annual Stormwater Reports

This attachment includes tables summarizing the existing Minimum Control Measures (MCMs) implemented by the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG), corresponding with **Section 3.3.2** of the RH/SGRWQG Enhanced Watershed Management Program (EWMP) Work Plan.

Attachment M List of Tables

Table M-1 RH/SGRWQG Existing Minimum Control Measures Reported during Permit Year 2010-2011

Program Tasks and Milestones	2001 MS4 Permit Part	Due Date	Arcadia	Azusa	Bradbury	Duarte	Monrovia	Sierra Madre	Los Angeles County[1]
General Permit Requirements									
Prohibit non-stormwater discharges into the MS4 and watercourses	1	Feb-02	NA	NA	NA	I	NA	NA	NA
Comply with Receiving Water Limitations (RWL) requirements	2	Feb-02	NA	NA	NA	I	NA	NA	I
Implement the Stormwater Quality Management Plan (SQMP)	3.A.1	Feb-02	NA	NA	NA	I	NA	NA	NA
Revise the SQMP	3.A.4	Aug-02	NA	NA	NA	NA	NA	NA	NA
Implement the most effective combination of BMPs for storm water/ urban runoff pollution	3.B	Feb-02	NA	NA	NA	D	NA	NA	I
Prepare and submit Annual Budget Summary as part of the annual report to the RWQCB	3.E.5	Oct-02	NA	NA	NA	NA	NA	NA	NA
Conduct quarterly watershed management committee meetings	3.F.3.g	Mar-02	NA	NA	NA	NA	NA	NA	I
Amend and adopt county ordinance to enforce all requirements of the permit, if needed	3.G.3	Nov-02	NA	NA	NA	**	NA	NA	NA
Submit to RWQCB a legal statement demonstrating the necessary legal authority	3.G.4	Dec-02	NA	NA	NA	NA	NA	NA	NA
Prepare and submit to the RQWCB individual annual reports	1.B	Aug-02	NA	NA	NA	NA	NA	NA	NA
Special Provisions									
Public Information and Participation - Permit Requirements									
Implement public information and participation program	4.B	Feb-02	I	NA	NA	I	NA	NA	I
Convene an Advisory Committee	4.B	ASAP	NA	NA	NA	I	NA	NA	NA
Mark all storm drain inlets with a "no dumping" message	4.B.1.a	Feb-04	NA	NA	NA	NA	NA	NA	NA
Maintain the (888) CLEAN-LA hotline	4.B.1.b	Feb-02	NA	NA	NA	I	NA	NA	I
Provide a list of reporting contacts to public through www.888CleanLA.com	4.B.1.b	Mar-02	NA	NA	NA	NA	NA	NA	NA
Media campaign for Storm Water Pollution Prevention (SPP)	4.B.1.c.1	Feb-02	NA	NA	NA	NA	NA	NA	I
Strategy to educate ethnic communities about SPP	4.B.1.c.2	Feb-03	NA	NA	NA	NA	NA	NA	I
Enhance outreach for proper disposal of cigarette butts	4.B.1.c.3	Feb-02	NA	NA	NA	NA	NA	I	I

Table M-1 RH/SGRWQG Existing Minimum Control Measures Reported during Permit Year 2010-2011

Program Tasks and Milestones	2001 MS4 Permit Part	Due Date	Arcadia	Azusa	Bradbury	Duarte	Monrovia	Sierra Madre	Los Angeles County[1]
Conduct educational activities within jurisdiction and participate in county-wide events	4.B.1.c.4	Feb-02	NA	NA	NA	NA	NA	NA	I
Organize Public Outreach Strategy meetings quarterly	4.B.1.c.5	May-02	NA	NA	NA	NA	NA	NA	I
Conduct Media Outreach to 35 million impressions per year	4.B.1.c.6	Annually	NA	NA	NA	NA	NA	NA	I
Distribute SPP information to K-12 schools	4.B.1.c.7	-	NA	NA	NA	NA	NA	NA	I
Coordinate and provide contact information for public education activities	4.B.1.c.8	Apr-02	NA	NA	NA	NA	NA	NA	NA
Strategy to measure effectiveness of in-school programs	4.B.c.9	May-02	NA	NA	NA	NA	NA	NA	NA
Behavioral change assessment strategy towards SPP	4.B.c.10	May-02	NA	NA	NA	**	NA	NA	NA
Coordinate watershed-specific pollution prevention outreach programs	4.B.1.d	Feb-03	NA	NA	NA	**	NA	NA	I
Corporate Outreach Program to target retail gas outlets and restaurant chains	4.B.2.a	Feb-03	NA	NA	NA	NA	**	NA	NA
Coordinate an SPP program for a Business Assistance Program	4.B.2.b	Optional	I	NA	NA	NA	NA	NA	I
Industrial/Commercial Facilities Control - Permit Requirements									
Maintain a list of industrial/commercial facilities to be inspected	4.C.1	Aug-02	NA	NA		NA	NA	NA	I
Inspect/visit industrial/commercial facilities appropriately	4.C.2	Aug-04	NA	NA		NA	NA	NA	I
Initiate progressive enforcement for facilities failing to implement BMP's	4.C.3	-	NA	NA		NA	I	NA	I
Inspect restaurants twice during Permit cycle	4.C.2	Aug-04	NA	NA		NA	NA	NA	NA
Development Planning - Permit Requirements									
Implement development planning program that requires SUSMP	4.D	Feb-02	NA	NA	NA	I	NA	NA	I
Develop peak flow control criteria	4.D.1	Feb-05	NA	NA	NA	**	NA	NA	NA
Amend codes and ordinances to give legal effect to SUSMP changes in permit	4.D.2.a	Aug-02	NA	NA	NA	NA	NA	NA	NA
Implement revised SUSMP	4.D.2.b	Sep-02	NA	NA	NA	I	NA	NA	I
Submit an Environmentally Sensitive Areas (ESAs) Delineation map to RWQCB	4.D.2.d	Jun-02	NA	NA	NA	I	NA	NA	NA

Table M-1 RH/SGRWQG Existing Minimum Control Measures Reported during Permit Year 2010-2011

Program Tasks and Milestones	2001 MS4 Permit Part	Due Date	Arcadia	Azusa	Bradbury	Duarte	Monrovia	Sierra Madre	Los Angeles County[1]
Implement SUSMP requirements for industrial/commercial projects >1 acre	4.D.5	Mar-03	NA	NA	NA	I	NA	NA	I
Update CEQA guidelines to include specific storm water related issues	4.D.11	Feb-02	NA	NA	NA	NA	NA	NA	NA
Update General Plan to include specific storm water related issues	4.D.12	-	NA	NA	NA	NA	NA	D	I
Train targeted employees in permit requirements for Development Planning	4.D.13	Varies	NA	NA	NA	NA	NA	NA	I
Develop and make SUSMP guidelines available to the developer	4.D.14.a	Feb-02	NA	NA	NA	NA	NA	NA	NA
Develop a technical manual for the siting and design of BMPs	4.D.14.b	Feb-04	NA	NA	NA	NA	NA	NA	NA
Development Construction - Permit Requirements									
Implement a development construction program	4.E.1 &2	Feb-02	NA	NA	NA	NA	NA	NA	I
Require proof of a Waste Discharger ID (WDID) number prior to filing Notice of Intent (NOI)	4.E.2.c	Mar-03	NA	NA	NA	NA	NA	NA	I
Require proof of an NOI and a copy of SWPPP for a transfer of ownership	4.E.3	Feb-02	NA	NA	NA	NA	NA	NA	I
Track the number of issued building and grading permits	4.E.3.c	Feb-02	NA	NA	NA	NA	NA	NA	I
Refer General Construction Activities Stormwater Permit (GCASP) violations to RWQCB	4.E.4	Feb-02	NA	NA	NA	D	NA	NA	I
Train targeted employees in permit requirements for Development Construction	4.E.5	Varies	NA	NA	NA	NA	NA	NA	I
Public Agency Activities - Permit Requirements									
Implement a sewer overflow prevention and response program	4.F.1	Aug-02	NA	NA	NA	NA	I	NA	I
Implement Development Planning Program at Permittee-owned construction projects	4.F.2.a	Aug-02	NA	NA	NA	I	I	NA	I
Implement Development Construction Program at Permittee-owned construction projects	4.F.2.b	Feb-02	NA	NA	NA	I	I	NA	I
Develop, if needed, and implement SWPPPs for field facilities	4.F.3	Feb-02	NA	NA	NA	I	I	NA	I
Equip wash areas with a clarifier, pre-treatment device, or be connected to sewer	4.F.3.c	Feb-02	NA	NA	NA	NA	NA	NA	NA
Store pesticides/herbicides/fertilizers indoors and apply only in accordance	4.F.4.c&g	Feb-02	NA	NA	NA	NA	NA	NA	I
Designate Catch Basins as priority A, B, or C	4.F.5.a	Feb-02	NA	NA	NA	NA	NA	NA	NA

Table M-1 RH/SGRWQG Existing Minimum Control Measures Reported during Permit Year 2010-2011

Program Tasks and Milestones	2001 MS4 Permit Part	Due Date	Arcadia	Azusa	Bradbury	Duarte	Monrovia	Sierra Madre	Los Angeles County[1]
Ensure that Catch Basins (CBs) are cleaned appropriately	4.F.5.c.1	Feb-02	NA	NA	NA	NA	NA	NA	I
Place temporary screens on CBs prior to special events or cleanout immediately afterwards	4.F.5.c.2	Feb-02	I	NA	NA	NA	I	NA	I
Place and maintain trash receptacles at all transit stops with shelters	4.F.5.c.3	Feb-02	NA	NA	NA	NA	NA	NA	I
Inspect the legibility of CB stencils and re-label within 180 days if necessary	4.F.5.d	-	I	NA	NA	NA	NA	NA	I
Visually monitor and clean all open channels annually for debris	4.F.5.e.1	Feb-02	I	NA	NA	NA	I	NA	I
Designate curbed streets as priority A, B, or C based on liter accumulation	4.F.6.a.b	Feb-02	NA	NA	NA	NA	I	NA	NA
Recover saw cutting waste and dispose it offsite	4.F.6.c	Feb-02	I	NA	NA	NA	I	NA	I
Train targeted employees in permit requirements for Public Agency Activities	4.F.6.d	Varies	NA	NA	NA	NA	NA	NA	I
Inspect and, if needed, clean Permittee owned parking lots twice per month, but at least once	4.F.7	Feb-02	I	NA	NA	NA	I	NA	I
Conduct a dry weather diversion study and create a priority list of drains for diversion	4.F.10	Jul-03	NA	NA	NA	NA	NA	NA	NA
Illicit Connections / Illicit Discharges - Permit Requirements									
Develop an Implementation Program which specifies how revisions of the IC/ID SQMP are implemented	4.G.1.a	-	I	NA	NA	I	I	NA	C
Create a database for permitted storm drain connections and map IC/ID	4.G.1.b	Feb-03	D	NA	NA	NA	NA	NA	C
Perform IC/ID Trend Analysis	4.G.1.b	Feb-03	NA	NA	NA	**	NA	NA	I
Train targeted employees in the permit requirements for IC/ID	4.G.1.c	Varies	NA	NA	NA	NA	NA	NA	I
Field screen the storm drain system for illicit connections in open channels	4.G.2.a	Feb-03	NA	NA	NA	NA	NA	NA	I
Field screen the storm drain system for illicit connections in underground storm drains in priority areas	4.G.2.a	Feb-05	NA	NA	NA	NA	NA	NA	I
Field screen the storm drain system for illicit connections in underground s/d larger than 36 inch diameter	4.G.2.a	Dec-06	NA	NA	NA	NA	NA	NA	I
Review all permitted connections to the storm drain system for compliance	4.G.2.a	Dec-06	NA	NA	NA	NA	NA	NA	I
Investigate illicit connections 21 days after discovery	4.G.2.b	-	I	NA	NA	I	NA	NA	I

Table M-1 RH/SGRWQG Existing Minimum Control Measures Reported during Permit Year 2010-2011										
Program Tasks and Milestones	**2001 MS4 Permit Part**	**Due Date**	**Arcadia**	**Azusa**	**Bradbury**	**Duarte**	**Monrovia**	**Sierra Madre**	**Los Angeles County[1]**
Terminate illicit connections 180 days after confirmation	4.G.2.b	-	I	NA	NA	I	NA	NA	I
Respond to illicit discharges within one business day of discovery	4.G.3.a	-	I	NA	NA	I	I	NA	I
Investigate illicit discharges as soon as practicable	4.G.3.a	-	I	NA	NA	I	I	NA	I

[1] Data is a combination of Los Angeles County and Los Angeles County Flood Control District
** - Not Scheduled
NA - Not Applicable or Completed
D - Developed
I - Program Implemented/Completed

Table M-2 RH/SGRWQG Existing Minimum Control Measures Reported during Permit Year 2011-2012										
Program Tasks and Milestones	**2001 MS4 Permit Part**	**Due Date**	**Arcadia**	**Azusa**	**Bradbury**	**Duarte**	**Monrovia**	**Sierra Madre**	**Los Angeles County[1]**
General Permit Requirements									
Prohibit non-stormwater discharges into the MS4 and watercourses	1	Feb-02	NA	NA	NA	NA	NA	NA	NA
Comply with Receiving Water Limitations (RWL) requirements	2	Feb-02	NA	NA	NA	NA	NA	NA	I
Implement the Stormwater Quality Management Plan (SQMP)	3.A.1	Feb-02	I	NA	NA	NA	NA	NA	NA
Revise the SQMP	3.A.4	Aug-02	NA	NA	NA	NA	NA	NA	NA
Implement the most effective combination of BMPs for storm water/ urban runoff pollution	3.B	Feb-02	I	NA	NA	NA	NA	NA	I
Prepare and submit Annual Budget Summary as part of the annual report to the RWQCB	3.E.5	Oct-02	NA	NA	NA	NA	NA	NA	NA
Conduct quarterly watershed management committee meetings	3.F.3.g	Mar-02	NA	NA	NA	NA	NA	NA	I
Amend and adopt county ordinance to enforce all requirements of the permit, if needed	3.G.3	Nov-02	NA	NA	NA	NA	NA	NA	NA
Submit to RWQCB a legal statement demonstrating the necessary legal authority	3.G.4	Dec-02	NA	NA	NA	NA	NA	NA	NA
Prepare and submit to the RQWCB individual annual reports	1.B	Aug-02	NA	NA	NA	NA	NA	NA	NA
Special Provisions									
Public Information and Participation - Permit Requirements									
Implement public information and participation program	4.B	Feb-02	I	NA	NA	I	NA	NA	I
Convene an Advisory Committee	4.B	ASAP	NA	NA	NA	I	NA	NA	NA
Mark all storm drain inlets with a "no dumping" message	4.B.1.a	Feb-04	NA	NA	NA	NA	NA	NA	NA
Maintain the (888) CLEAN-LA hotline	4.B.1.b	Feb-02	NA	NA	NA	NA	NA	NA	I
Provide a list of reporting contacts to public through www.888CleanLA.com	4.B.1.b	Mar-02	NA	NA	NA	NA	NA	NA	NA
Media campaign for Storm Water Pollution Prevention (SPP)	4.B.1.c.1	Feb-02	I	NA	NA	NA	NA	I	NA
Strategy to educate ethnic communities about SPP	4.B.1.c.2	Feb-03	NA	NA	NA	NA	NA	I	NA
Enhance outreach for proper disposal of cigarette butts	4.B.1.c.3	Feb-02	NA	NA	NA	NA	NA	NA	I

Table M-2 RH/SGRWQG Existing Minimum Control Measures Reported during Permit Year 2011-2012

Program Tasks and Milestones	2001 MS4 Permit Part	Due Date	Arcadia	Azusa	Bradbury	Duarte	Monrovia	Sierra Madre	Los Angeles County[1]
Conduct educational activities within jurisdiction and participate in county-wide events	4.B.1.c.4	Feb-02	NA	NA	NA	NA	NA	I	I
Organize Public Outreach Strategy meetings quarterly	4.B.1.c.5	May-02	NA	NA	NA	NA	NA	I	NA
Conduct Media Outreach to 35 million impressions per year	4.B.1.c.6	Annually	NA	NA	NA	NA	NA	D	NA
Distribute SPP information to K-12 schools	4.B.1.c.7	-	NA	NA	NA	NA	NA	I	NA
Coordinate and provide contact information for public education activities	4.B.1.c.8	Apr-02	NA	NA	NA	NA	NA	NA	NA
Strategy to measure effectiveness of in-school programs	4.B.c.9	May-02	NA	NA	NA	NA	NA	I	NA
Behavioral change assessment strategy towards SPP	4.B.c.10	May-02	NA	NA	NA	NA	NA	I	NA
Coordinate watershed-specific pollution prevention outreach programs	4.B.1.d	Feb-03	NA	NA	NA	NA	NA	I	I
Corporate Outreach Program to target retail gas outlets and restaurant chains	4.B.2.a	Feb-03	NA	NA	NA	NA	**	I	NA
Coordinate an SPP program for a Business Assistance Program	4.B.2.b	Optional	I	NA	NA	**	NA	I	NA
Industrial/Commercial Facilities Control - Permit Requirements									
Maintain a list of industrial/commercial facilities to be inspected	4.C.1	Aug-02	NA	NA	NA	NA	NA	I	I
Inspect/visit industrial/commercial facilities appropriately	4.C.2	Aug-04	NA	NA	NA	NA	NA	I	I
Initiate progressive enforcement for facilities failing to implement BMP's	4.C.3	-	NA	NA	NA	NA	I	I	I
Inspect restaurants twice during Permit cycle	4.C.2	Aug-04	NA	NA	NA	NA	NA	NA	NA
Development Planning - Permit Requirements									
Implement development planning program that requires SUSMP	4.D	Feb-02	I	NA	NA	I	NA	I	I
Develop peak flow control criteria	4.D.1	Feb-05	NA	NA	NA	NA	NA	I	NA
Amend codes and ordinances to give legal effect to SUSMP changes in permit	4.D.2.a	Aug-02	NA	NA	NA	NA	NA	I	NA
Implement revised SUSMP	4.D.2.b	Sep-02	I	NA	NA	NA	NA	I	I
Submit an Environmentally Sensitive Areas (ESAs) Delineation map to RWQCB	4.D.2.d	Jun-02	NA	NA	NA	NA	NA	NA	NA

Table M-2 RH/SGRWQG Existing Minimum Control Measures Reported during Permit Year 2011-2012

Program Tasks and Milestones	2001 MS4 Permit Part	Due Date	Arcadia	Azusa	Bradbury	Duarte	Monrovia	Sierra Madre	Los Angeles County[1]
Implement SUSMP requirements for industrial/commercial projects >1 acre	4.D.5	Mar-03	I	NA	NA	NA	NA	I	I
Update CEQA guidelines to include specific storm water related issues	4.D.11	Feb-02	NA	NA	NA	NA	NA	NA	NA
Update General Plan to include specific storm water related issues	4.D.12	-	NA	NA	NA	NA	NA	NA	I
Train targeted employees in permit requirements for Development Planning	4.D.13	Varies	NA	NA	NA	NA	NA	I	I
Develop and make SUSMP guidelines available to the developer	4.D.14.a	Feb-02	NA	NA	NA	NA	NA	I	NA
Develop a technical manual for the siting and design of BMPs	4.D.14.b	Feb-04	NA	NA	NA	NA	NA	NA	NA
Development Construction - Permit Requirements									
Implement a development construction program	4.E.1 &2	Feb-02	I	NA	NA	I	NA	I	I
Require proof of a Waste Discharger ID (WDID) number prior to filing Notice of Intent (NOI)	4.E.2.c	Mar-03	I	NA	NA	NA	NA	I	I
Require proof of an NOI and a copy of SWPPP for a transfer of ownership	4.E.3	Feb-02	I	NA	NA	NA	NA	I	I
Track the number of issued building and grading permits	4.E.3.c	Feb-02	I	NA	NA	NA	NA	I	I
Refer General Construction Activities Stormwater Permit (GCASP) violations to RWQCB	4.E.4	Feb-02	NA	NA	NA	NA	NA	I	I
Train targeted employees in permit requirements for Development Construction	4.E.5	Varies	NA	NA	NA	NA	NA	I	I
Public Agency Activities - Permit Requirements									
Implement a sewer overflow prevention and response program	4.F.1	Aug-02	I	NA	NA	I	I	I	I
Implement Development Planning Program at Permittee-owned construction projects	4.F.2.a	Aug-02	I	NA	NA	I	I	I	I
Implement Development Construction Program at Permittee-owned construction projects	4.F.2.b	Feb-02	I	NA	NA	I	I	I	I
Develop, if needed, and implement SWPPPs for field facilities	4.F.3	Feb-02	I	NA	NA	I	I	I	I
Equip wash areas with a clarifier, pre-treatment device, or be connected to sewer	4.F.3.c	Feb-02	NA	NA	NA	NA	NA	NA	NA
Store pesticides/herbicides/fertilizers indoors and apply only in accordance	4.F.4.c&g	Feb-02	I	NA	NA	NA	NA	I	I
Designate Catch Basins as priority A, B, or C	4.F.5.a	Feb-02	NA	NA	NA	NA	NA	NA	NA

Table M-2 RH/SGRWQG Existing Minimum Control Measures Reported during Permit Year 2011-2012									
Program Tasks and Milestones	**2001 MS4 Permit Part**	**Due Date**	**Arcadia**	**Azusa**	**Bradbury**	**Duarte**	**Monrovia**	**Sierra Madre**	**Los Angeles County[1]**
Ensure that Catch Basins (CBs) are cleaned appropriately	4.F.5.c.1	Feb-02	NA	NA	NA	NA	NA	I	I
Place temporary screens on CBs prior to special events or cleanout immediately afterwards	4.F.5.c.2	Feb-02	I	NA	NA	NA	I	I	I
Place and maintain trash receptacles at all transit stops with shelters	4.F.5.c.3	Feb-02	I	NA	NA	NA	NA	I	I
Inspect the legibility of CB stencils and re-label within 180 days if necessary	4.F.5.d	-	I	NA	NA	NA	NA	I	I
Visually monitor and clean all open channels annually for debris	4.F.5.e.1	Feb-02	NA	NA	NA	NA	I	I	I
Designate curbed streets as priority A, B, or C based on liter accumulation	4.F.6.a.b	Feb-02	NA	NA	NA	NA	I	NA	NA
Recover saw cutting waste and dispose it offsite	4.F.6.c	Feb-02	I	NA	NA	NA	I	I	I
Train targeted employees in permit requirements for Public Agency Activities	4.F.6.d	Varies	NA	NA	NA	NA	NA	I	I
Inspect and, if needed, clean Permittee owned parking lots twice per month, but at least once	4.F.7	Feb-02	NA	NA	NA	NA	I	I	I
Conduct a dry weather diversion study and create a priority list of drains for diversion	4.F.10	Jul-03	**	NA	NA	NA	NA	NA	NA
Illicit Connections / Illicit Discharges - Permit Requirements									
Develop an Implementation Program which specifies how revisions of the IC/ID SQMP are implemented	4.G.1.a	-	I	NA	NA	I	I	NA	NA
Create a database for permitted storm drain connections and map IC/ID	4.G.1.b	Feb-03	D	NA	NA	NA	NA	I	NA
Perform IC/ID Trend Analysis	4.G.1.b	Feb-03	NA	NA	NA	NA	NA	I	I
Train targeted employees in the permit requirements for IC/ID	4.G.1.c	Varies	NA	NA	NA	I	NA	I	I
Field screen the storm drain system for illicit connections in open channels	4.G.2.a	Feb-03	NA	NA	NA	NA	NA	NA	I
Field screen the storm drain system for illicit connections in underground storm drains in priority areas	4.G.2.a	Feb-05	NA	NA	NA	NA	NA	NA	I
Field screen the storm drain system for illicit connections in underground s/d larger than 36 inch diameter	4.G.2.a	Dec-06	NA	NA	NA	NA	NA	NA	I
Review all permitted connections to the storm drain system for compliance	4.G.2.a	Dec-06	NA	NA	NA	NA	NA	NA	I
Investigate illicit connections 21 days after discovery	4.G.2.b	-	I	NA	NA	NA	NA	I	I

Table M-2 RH/SGRWQG Existing Minimum Control Measures Reported during Permit Year 2011-2012									
Program Tasks and Milestones	**2001 MS4 Permit Part**	**Due Date**	**Arcadia**	**Azusa**	**Bradbury**	**Duarte**	**Monrovia**	**Sierra Madre**	**Los Angeles County[1]**
Terminate illicit connections 180 days after confirmation	4.G.2.b	-	I	NA	NA	NA	NA	I	I
Respond to illicit discharges within one business day of discovery	4.G.3.a	-	I	NA	NA	NA	I	I	I
Investigate illicit discharges as soon as practicable	4.G.3.a	-	I	NA	NA	NA	I	I	I

[1] Data is a combination of Los Angeles County and Los Angeles County Flood Control District
** - Not Scheduled
NA - Not Applicable or Completed
D - Developed
I - Program Implemented/Completed

Attachment N

Comparison of 2001 and 2012 MS4 Permit MCM Requirements

The table presented in this attachment compares the Minimum Control Measure (MCM) requirements per the 2001 MS4 Permit (Order No. 01-182) and the current 2012 MS4 Permit (Order No. R4-2012-0175), and corresponds with **Section 3.3.2** of the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) Enhanced Watershed Management Program (EWMP) Work Plan.

Table L-1 Comparison of 2001 MS4 Permit MCMs to 2012 MS4 Permit MCMs

2012 MS4 Permit Requirement	2001 MS4 Permit Requirement
D.2 Progressive Enforcement (Applies D.6, D.7, D.8, and D.10)	
Develop and maintain a Progressive Enforcement Policy	
Conduct follow-up inspection within 4 weeks of date of initial inspection	
Take progressive enforcement	
Retain records	
Refer violations to Regional Board	
Investigate complaints from Regional Board (RB)	
Assist RB with Enforcement Actions	
D.5 Public Information and Participation Program (PIPP)	
Participate in a Countywide PIPP, WMP PIPP, or individual PIPP that measurably increases knowledge and changes behavior, and involves a diversity of socio economic and ethnic communities	Implement public information and participation program
	Media campaign for Storm Water Pollution Prevention (SPP)
Use effective strategies to educate and involve ethnic communities in SPP through culturally effective methods	Strategy to educate ethnic communities about SPP
	Enhance outreach for proper disposal of cigarette butts
	Conduct educational activities within jurisdiction and participate in county-wide events
	Organize Public Outreach Strategy meetings quarterly
	Conduct Media Outreach to 35 million impressions per year
	Coordinate watershed-specific pollution prevention outreach programs
	Corporate Outreach Program to target retail gas outlets and restaurant chains
Moved to Industrial/Commercial Facilities Program	Coordinate an SPP program for a Business Assistance Program
	Behavioral change assessment strategy towards SPP
Maintain reporting hotline	Maintain the (888) CLEAN-LA hotline
Publish hotline info on web, telephone book	
ID staff/department that serve as the contact (publish this info)	Provide a list of reporting contacts to public through www.888CleanLA.com

Table L-1 Comparison of 2001 MS4 Permit MCMs to 2012 MS4 Permit MCMs	
2012 MS4 Permit Requirement	**2001 MS4 Permit Requirement**
	Coordinate and provide contact information for public education activities
Organize events (e.g., clean ups)	
Residential Outreach (Individually or with group):	
➢ Public Service Announcements	
➢ (Develop) Public education materials on: vehicle fluids; household waste; construction waste; pesticides, fertilizers, and integrated pest management (IPM); green wastes; and animal wastes	
➢ Distribute public education materials at points of purchase	
➢ Maintain stormwater website	
➢ Provide schools with materials to educate children (K-12); can use state produced materials	Distribute SPP information to K-12 schools
	Strategy to measure effectiveness of in-school programs
	Convene an Advisory Committee
Moved to IC/ID Program	Mark all storm drain inlets with a "no dumping" message
D.6 Industrial/Commercial	
Track Critical Sources - maintain inventory (watershed based or lat/long recorded)	Maintain a list of industrial/commercial facilities to be inspected
Educate - notify critical sources of BMP requirements	
Implement a Business Assistance Program for select sectors or small businesses - technical assistance, and distribute materials to specific sectors	
Inspect Commercial Sources	Inspect restaurants twice during Permit cycle
Inspect Industrial Sources - initial mandatory inspection	Inspect/visit industrial/commercial facilities appropriately
➢ Secondary mandatory inspection	
➢ No Exposure - evaluate and conduct 2nd inspection at 25% of facilities	
As needed conduct Progressive Enforcement follow-up inspections (see D.2)	Initiate progressive enforcement for facilities failing to implement BMP's
D.7 Planning and Land Development	
	Implement development planning program that requires SUSMP
	Develop peak flow control criteria
	Amend codes and ordinances to give legal effect to SUSMP changes in permit
	Implement revised SUSMP
	Submit an Environmentally Sensitive Areas (ESAs) Delineation map to RWQCB

Table L-1 Comparison of 2001 MS4 Permit MCMs to 2012 MS4 Permit MCMs	
2012 MS4 Permit Requirement	**2001 MS4 Permit Requirement**
	Implement SUSMP requirements for industrial/commercial projects >1 acre
	Update CEQA guidelines to include specific storm water related issues
	Update General Plan to include specific stormwater related issues
	Train targeted employees in permit requirements for Development Planning
	Develop and make SUSMP guidelines available to the developer
	Develop a technical manual for the siting and design of BMPs
Update ordinance/design standards to conform with new requirements (LID and Hydromod)	
Optional: Establish alternative compliance for technical infeasibility, e.g., allow onsite biofiltration or offsite infiltration or GW replenishment or retrofit	
Optional if allowing offsite mitigation: Develop a prioritized list of offsite mitigation projects	
Optional if allowing offsite mitigation: Develop a schedule for completion of offsite projects (must be with 4 yrs of the Certificate of Occupancy of the first project that contributed funds)	
Optional if allowing offsite mitigation: Notice offsite projects to RB website	
Optional if allowing offsite mitigation: List of mitigation projects descriptions and estimated pollutant and flow reductions	
Optional if allowing offsite mitigation: Provide aggregated comparison of alternative compliance to results that would have been expected with on site retention of the stormwater quality design volume (SWQDv)	
Optional: Submit documentation that a previously adopted LID ordinance provides equivalent pollutant loading and flow reduction	
Plan Review process - check LID and BMP sizing, etc.,	
Establish internal agreements with structure for communication and authority for departments overseeing plan approval and project construction	
Require O&M plan for LID, treatment and hydromod BMPs	
Implement tracking and enforcement program for LID, treatment and hydromod BMPs	
Inspect all development sites upon completion and prior to occupancy certificates	

Table L-1 Comparison of 2001 MS4 Permit MCMs to 2012 MS4 Permit MCMs	
2012 MS4 Permit Requirement	**2001 MS4 Permit Requirement**
Verify O&M of BMPs operated by Permittee through inspection	
Develop maintenance inspection checklist	
Require private parties that operate BMPs to submit verification of O&M; enforce as needed	
As needed conduct Progressive Enforcement follow-up inspections (see D.2)	
D.8 Construction	
	Implement a development construction program
	Require proof of a Waste Discharger ID (WDID) number prior to filing Notice of Intent (NOI)
	Require proof of an NOI and a copy of SWPPP for a transfer of ownership
	Track the number of issued building and grading permits
Update erosion and sediment control ordinance/procedures to conform with new requirements	
Sites < 1 acre; inspect based upon water quality threat	
➢ Establish priority inspection process	
Site < 1 acre; Require sites with soil disturbing activities to implement minimum BMPs	
Require construction sites to prepare erosion sediment control plan(ESCP); review and approve (≥ 1 acre)	
Verify construction sites coverage under the CGP and 401 cert	Refer General Construction Activities Stormwater Permit (GCASP) violations to RWQCB
Develop/implement ESCP review checklist	
Require construction sites to adhere to standards and make standards readily available	
Conduct inspections at public and private sites (at least 1x/2 weeks for high threat sites (more frequently when rain is predicted or occurs; at least monthly for lower threat; also must inspect during all phases of construction - at least 3 times)	
Develop/implement Standard Operating Procedures (SOPs)/inspection checklist	
Track number of inspections for inventoried sites and verify minimum inspections are completed	
As needed conduct Progressive Enforcement follow-up inspections (see D.2)	
Train plan review staff and inspectors	Train targeted employees in permit requirements for Development Construction
➢ Staff must be knowledgeable in QSD/P key objectives, local BMPs standards	

Table L-1 Comparison of 2001 MS4 Permit MCMs to 2012 MS4 Permit MCMs	
2012 MS4 Permit Requirement	**2001 MS4 Permit Requirement**
D.9 Public Agency Activities	
Require public construction sites to implement Planning and Land Development requirements, implement Erosion and Sediment Control BMPs, and obtain Construction General Permit coverage	Implement Development Planning Program at Permittee-owned construction projects
	Implement Development Construction Program at Permittee-owned construction projects
	Develop, if needed, and implement SWPPPs for field facilities
Maintain inventory of Permittee owned facilities (including parks and recreation facilities,)	
Update inventory	
Develop retrofit opportunity inventory; evaluate and rank	
"Cooperate with private land owners to encourage site specific retrofitting"; includes pilot projects and outreach	
Obtain IGP coverage for public facilities where appropriate	
Develop procedures to assess impact of flood mgt projects on water quality of receiving waters; evaluate to determine if retrofitting is feasible	
Evaluate existing structural flood control facilities to determine if retrofitting facility to provide additional pollutant removal is feasible	
Implement source control BMPs at Permittee owned facilities/activities	
Require city-hired contractors to implement source control BMPs	
Prevent vehicle/equipment washing discharges to the MS4, including fire fighting and emergency response vehicles	
Ensure new/redeveloped/replaced wash facilities are plumbed to the sanitary sewer or self contained.	Equip wash areas with a clarifier, pre-treatment device, or be connected to sewer
Implement IPM program	
Ordinances, policies, and procedures reflect IPM techniques and include commitments and schedules to reduce the use of pesticides that cause impairments	
Annually update in inventory of pesticides used by agency; quantify pesticides used by staff and contractors; demonstrate IPM alternatives to reduce pesticide use	
Use SOPs for pesticide application	Store pesticides/herbicides/fertilizers indoors and apply only in accordance with label directions

Table L-1 Comparison of 2001 MS4 Permit MCMs to 2012 MS4 Permit MCMs	
2012 MS4 Permit Requirement	**2001 MS4 Permit Requirement**
Ensure no application of pesticides or fertilizers when two or more days with a 50% chance of rain is predicted by NOAA; within 48 hrs of 1/2-inch of rain; or when water is flowing off the site	
Ensure staff applying pesticides are certified or working under supervision of a certified applicator in the appropriate category	
Update catch basin map add GPS locations and update priority	
Inspect/Clean catch basin in areas not subject to Trash TMDL- Priority A: 3x during wet season, 1x during dry 1x; PriorityB:1x during wet 1x and 1x during dry; Priority C: 1x per yr. Maintain records.	Designate Catch Basins as priority A, B, or C
Required trash management at public events	Ensure that Catch Basins (CBs) are cleaned appropriately
Place and maintain trash receptacles/capture devices at newly identified high trash generating areas	Place temporary screens on CBs prior to special events or cleanout immediately afterwards
	Place and maintain trash receptacles at all transit stops with shelters
	Designate curbed streets as priority A, B, or C based on liter accumulation
Label storm drains	(Required under PIPP in 2001)
Inspect labels prior to each wet season	Inspect the legibility of CB stencils and re-label within 180 days if necessary
Record and re-label illegible labels within 180 days of inspection	
Post signs at access points to water bodies (open channels, creeks; lakes)	
In areas not subject to the Trash TMDL, install trash excluders on catch basins or outfalls in areas defined as Priority A, or implement substantially equivalent BMPs	
Inspect and Remove trash and debris from open channels and other drainage structures 1x/yr before rainy season.	Visually monitor and clean all open channels annually for debris
Eliminate discharge of contaminants during MS4 maintenance	
Implement controls to limit infiltration of seepage from sanitary sewers to the storm drains	Implement a sewer overflow prevention and response program
Implement routine preventative maintenance for both systems, survey sanitary sewer and MS4. May use sanitary sewer overflow (SSO) General WDR to fulfill this requirement.	
Implement inspection and maintenance program for Permittee owned BMPs	
Manage residual water in treatment control BMPs removed during maintenance	

Table L-1 Comparison of 2001 MS4 Permit MCMs to 2012 MS4 Permit MCMs	
2012 MS4 Permit Requirement	**2001 MS4 Permit Requirement**
Street sweeping - Priority A: 2x/mo; B: 1x/mo; C: as needed, not less than 1x/yr	
Implement road construction maintenance BMPs (e.g., restrict paving activity to exclude periods of rain)	
Inspect and/or clean Permittee owned parking lots 2x/mo	Inspect and, if needed, clean Permittee owned parking lots twice per month, but at least once
Train employees and contractors on stormwater requirements	Train targeted employees in permit requirements for Public Agency Activities
Train employees and contractors on pesticide use	
	Recover saw cutting waste and dispose it offsite
	Conduct a dry weather diversion study and create a priority list of drains for diversion
D.10 Illicit Connections (IC) and Illicit Discharges (ID) Elimination	
Continue IC/ID program	Develop an Implementation Program which specifies how revisions of the IC/ID SQMP are implemented
	Create a database for permitted storm drain connections and map IC/ID
	Field screen the storm drain system for illicit connections in open channels
	Field screen the storm drain system for illicit connections in underground storm drains in priority areas
	Field screen the storm drain system for illicit connections in underground s/d larger than 36 inch diameter
	Review all permitted connections to the storm drain system for compliance
Written procedures for conducting investigations and eliminations	
Initiate investigation within 72 hours from becoming aware of the discharge	Respond to illicit discharges within one business day of discovery
	Investigate illicit discharges as soon as practicable
Implement solutions to eliminate discharge; conduct follow-up investigation to verify elimination; follow Progressive Enforcement Plan (see D.2)	
When discharge originates upstream of jurisdiction, notify the upstream jurisdiction and Regional Board within 30 days	
Initiate investigation within 21 days for illicit connection	Investigate illicit connections 21 days after discovery
Permit or document illicit connection that only discharge stormwater or allowed non-stormwater	
Eliminate illicit connection within 180 days of investigation	Terminate illicit connections 180 days after confirmation
Facilitate public reporting via hotline	

Table L-1 Comparison of 2001 MS4 Permit MCMs to 2012 MS4 Permit MCMs	
2012 MS4 Permit Requirement	**2001 MS4 Permit Requirement**
Signage adjacent to open channels provide info re: public reporting	
Document calls and actions associated with hotline	
Implement procedures on responding to complaints; evaluate and update procedures	
Implement a spill response plan	
Train staff and contractors on ID/IC	Train targeted employees in the permit requirements for IC/ID
Create a list of positions and contractors that require ID/IC training	
	Perform IC/ID Trend Analysis

Attachment O

LACFCD Background

This attachment provides background information pertaining to the Los Angeles County Flood Control District (LACFCD), and their involvement in the Rio Hondo/San Gabriel River Water Quality Group (RH/SGRWQG) Enhanced Watershed Management Program (EWMP), supplemental to the EWMP Work Plan.

In 1915, the Los Angeles County Flood Control Act established the LACFCD and empowered it to manage flood risk and conserve stormwater for groundwater recharge. In coordination with the United States Army Corps of Engineers the LACFCD developed and constructed a comprehensive system that provides for the regulation and control of flood waters through the use of reservoirs and flood channels. The system also controls debris, collects surface storm water from streets, and replenishes groundwater with stormwater and imported and recycled waters. The LACFCD covers the 2,753 square-mile portion of Los Angeles County south of the east-west projection of Avenue S, excluding Catalina Island. It is a special district governed by the County of Los Angeles Board of Supervisors, and its functions are carried out by the Los Angeles County Department of Public Works. The LACFCD service area is shown in **Figure O-1**.

Unlike cities and counties, the LACFCD does not own or operate any municipal sanitary sewer systems, public streets, roads, or highways. The LACFCD operates and maintains storm drains and other appurtenant drainage infrastructure within its service area. The LACFCD has no planning, zoning, development permitting, or other land use authority within its service area. The Permittees that have such land use authority are responsible under the MS4 Permit for inspecting and controlling pollutants from industrial and commercial facilities, development projects, and development construction sites. (MS4 Permit, Part II.E, page 17.)

The MS4 Permit language clarifies the unique role of the LACFCD in storm water management programs: "[g]iven the LACFCD's limited land use authority, it is appropriate for the LACFCD to have a separate and uniquely-tailored storm water management program. Accordingly, the storm water management program minimum control measures imposed on the LACFCD in Part VI.D of this Order differ in some ways from the minimum control measures imposed on other Permittees. Namely, aside from its own properties and facilities, the LACFCD is not subject to the Industrial/Commercial Facilities Program, the Planning and Land Development Program, and the Development Construction Program. However, as a discharger of storm and non-storm water, the LACFCD remains subject to the Public Information and Participation Program and the Illicit Connections and Illicit Discharges Elimination Program. Further, as the owner and operator of certain properties, facilities and infrastructure, the LACFCD remains subject to requirements of a Public Agency Activities Program." (MS4 Permit, Part II.F, page 18).

Consistent with the role and responsibilities of the LACFCD under the MS4 Permit, the EWMPs and Coordinated Integrated Monitoring Programs (CIMPs) reflect the opportunities that are available for the LACFCD to collaborate with Permittees having land use authority over the subject watershed area. In some instances, the opportunities are minimal, however the LACFCD remains responsible for compliance with certain aspects of the MS4 Permit as discussed above.

In some instances, in recognition of the increased efficiency of implementing certain programs regionally, the LACFCD has committed to responsibilities above and beyond its obligations under the 2012 MS4 Permit. For example, although under the 2012 MS4 Permit the Public Information and Participation Program (PIPP) is a responsibility of each Permittee, the LACFCD is committed to implementing certain regional elements of the PIPP on behalf of all Permittees at no cost to the Permittees. These regional elements include:

- Maintaining a countywide hotline (888-CLEAN-LA) and website (www.888cleanla.com) for public reporting and general stormwater management information at an estimated annual cost of $250,000. Each Permittee can utilize this hotline and website for public reporting within its jurisdiction.

- Broadcasting public service announcements and conducting regional advertising campaigns at an estimated annual cost of $750,000.
- Facilitating the dissemination of public education and activity specific stormwater pollution prevention materials at an estimated annual cost of $100,000.
- Maintaining a stormwater website at an estimated annual cost of $10,000.

The LACFCD will implement these elements on behalf of all Permittees starting July 2015 and through the MS4 Permit term. With the LACFCD handling these elements regionally, Permittees can better focus on implementing local or watershed-specific programs, including student education and community events, to fully satisfy the PIPP requirements of the 2012 MS4 Permit.

Similarly, although water quality monitoring is a responsibility of each Permittee under the 2012 MS4 Permit, the LACFCD is committed to implement certain regional elements of the monitoring program. Specifically, the LACFCD will continue to conduct monitoring at the seven existing mass emissions stations required under the previous Permit. The LACFCD will also participate in the Southern California Stormwater Monitoring Coalition's Regional Bioassessment Program on behalf of all Permittees. By taking on these additional responsibilities, the LACFCD wishes to increase the efficiency and effectiveness of these programs.

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