COORDINATED INTEGRATED MONITORING PROGRAM (CIMP)

FOR THE BEACH CITIES WATERSHED MANAGEMENT GROUP

Submitted to

The Los Angeles Regional Water Quality Control Board

Prepared by

Beach Cities Watershed Management Group

(Cities of Hermosa Beach, Manhattan Beach, Redondo Beach, and Torrance and the Los Angeles County Flood Control District)

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List of Acronyms

AL	Action Levels
AMP	Adaptive Management Process
BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFU	(Microbial) Colony Forming Unit
CIMP	Coordinated Integrated Monitoring Program
CTR	California Toxics Rule
CWA	Clean Water Act
DO	Dissolved Oxygen
EO	Executive Officer
EWMP	Enhanced Watershed Management Program
GIS	Geographic Information System
HUC	Hydrologic Unit Code
IC/ID	Illicit Connection/Illicit Discharge
LACDPW	Los Angeles County Department of Public Works
LACFCD	Los Angeles County Flood Control District
LARWQCB	Los Angeles Regional Water Quality Control Board
LFD	Low Flow Diversion
MAL	Municipal Action Limit
MCM	Minimum Control Measures
MES	Mass Emission Station
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NSWD	Non-stormwater Discharge
NSW	Non-Stormwater
NSWD	Non-Stormwater Discharge
RAA	Reasonable Assurance Analysis
RWL	Receiving Water Limitation
SCCWRP	Southern California Coastal Water Research Project
SMC	Stormwater Monitoring Coalition
SSC	Suspended Sediment Concentration
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
WBPC	Water Body- Pollutant Combination
WDR	Waste Discharge Requirements
WLA	Waste Load Allocation
WMA	Watershed Management Area
WQO	Water Quality Objectives
WQBEL	Water Quality-Based Effluent Limitation

Executive Summary

The Cities of Hermosa Beach, Manhattan Beach, Redondo Beach and Torrance, and the Los Angeles County Flood Control District (LACFCD), collectively known as the Beach Cities Watershed Management Group (Beach Cities WMG), are working jointly to preserve and protect local and regional water resources from adverse impacts associated with pollutants in stormwater and urban runoff.

On November 8, 2012, the Los Angeles Regional Water Quality Control Board (Regional Board) adopted the fourth National Pollutant Discharge Elimination System Permit under the Federal Clean Water Act for discharges from the municipal separate storm sewer system within the coastal watersheds of Los Angeles County (Permit). The Permit became effective on December 28, 2012. The Permit identifies conditions, requirements and programs that municipalities must comply with to protect regional water resources from adverse impacts associated with pollutants in stormwater and urban runoff. In addition, the Permit includes increased and expanded monitoring requirements including applicable TMDL monitoring, receiving water monitoring, stormwater outfall-based monitoring, non-stormwater outfall-based monitoring, and regional monitoring. The Draft Coordinated Integrated Monitoring Program (CIMP) for the Beach Cities WMG was submitted to meet the Permit deadline of June 30, 2014. This Final CIMP incorporates comments received from the Regional Board on the Draft CIMP on May 22, 2015.

The objective of the Permit is to ensure that MS4 discharges in the County of Los Angeles do not cause or contribute to the exceedance of water quality standards in regional water bodies. These standards include receiving water beneficial uses, water quality objectives and criteria that are established at levels sufficient to protect those uses, and the Regional Board anti-degradation policy. The Permit encourages Permittees to develop an Enhanced Watershed Management Program (EWMP) to implement the Permit requirements on a watershed scale through flexible customized strategies, control measures and best management practices (BMPs) to comply with water quality standards.

The Permit encourages watershed management groups (WMGs) collaborating on the development of an EWMP to also coordinate their monitoring efforts through a CIMP. Although the CIMP can be customized by the WMG, it must achieve the 5 primary objectives described in the Permit and have certain required elements. The customization allows a group of agencies to realize efficiencies in terms of cost through coordination and elimination of duplication of effort.

The primary objectives of the CIMP are to:

1. Assess the chemical, physical, and biological impacts of municipal stormwater discharges on receiving waters;
2. Assess compliance with Receiving Water Limitations (RWLs) and Water Quality-Based Effluent Limitations (WQBELs) established to implement Total Maximum Daily Load (TMDL) wet-weather and dry-weather waste load allocations (WLAs);
3. Characterize pollutant loads in municipal stormwater discharges;
4. Identify sources of pollutants in municipal stormwater discharges; and

5. Measure and improve the effectiveness of pollutant controls implemented under the Permit.

The Beach Cities WMG CIMP describes an adaptive management process approach to satisfying the requirements and objectives of the Permit Monitoring and Reporting Program (MRP). This CIMP is designed to assess compliance with RWLs and WQBELs and provide the information necessary to guide water quality management decisions and assess the effectiveness of watershed source control measures in the EWMP. This CIMP addresses the six required Permit MRP elements:

1. Receiving Water Monitoring
2. Stormwater Outfall Monitoring
3. Non-Stormwater Outfall Monitoring
4. New/Redevelopment Effectiveness Tracking
5. Regional Studies
6. Special Studies

Receiving water monitoring is intended to assess water quality relative to water quality objectives, impacts to beneficial uses, and trends in pollutant concentrations. The CIMP proposes two (2) new near-shore monitoring locations in the Santa Monica Bay (approximately 1,000 feet from the shoreline at the 30-foot depth contour) for sampling and analysis of an expanded, Permit-required suite of analytical parameters designed to assess the impacts from the storm drain discharges on water quality in the Santa Monica Bay. Ongoing Coordinated Shoreline Monitoring ankle-deep in the wave wash consistent with the Santa Monica Bay Beaches Bacteria TMDL will continue at the same frequency and at the same eleven (11) locations as specified in the approved Coordinated Shoreline Monitoring Plan consistent with the Santa Monica Bay Beaches Bacteria TMDL.

The CIMP is proposing four (4) Santa Monica Bay and three (3) Dominguez Channel stormwater outfall-based monitoring locations which will be monitored on an alternating annual basis. These monitoring locations were chosen in order to provide a representative outfall monitoring location from each jurisdiction discharging to each watershed. Each monitoring location was chosen based on its drainage being representative of land use from the jurisdiction in which it is located. The resulting monitoring data will be used to assess compliance with TMDL WLAs, expressed as WQBELs or RWLs, and the attainment of water quality objectives.

The Non-Stormwater Program provides an assessment of whether there are dry-weather discharges which may potentially impact receiving waters and defines a process to identify potential sources of those significant non-stormwater discharges. It complements the Permittees' Illicit Connection/Illicit Discharge (IC/ID) Minimum Control Measure (MCM) programs and focuses on any significant discharges from major outfalls to receiving waters in the Beach Cities WMG areas: 1) the Santa Monica Bay shoreline; 2) the Dominguez Channel within the City of Torrance; and 3) the Torrance Carson Lateral near Western Avenue. Along the Santa Monica Bay portion of the WMG, there are seven year-round Low Flow Diversions (LFDs) which divert flows from the storm drains to the sanitary sewer system, or to subsurface infiltration systems, preventing non-stormwater discharges from reaching the receiving water. In the year following

CIMP submittal, major outfalls will be screened over three events for significant and persistent non-stormwater discharges and a GIS inventory summarizing the findings of this screening will be completed. If non-stormwater discharge sources cannot be identified as authorized, or else eliminated or diverted from the MS4, then such discharges will be added to the monitoring program. The number and location of outfalls monitored may vary on an annual basis as non-stormwater discharges are identified, addressed and eliminated.

To address the New Development/Re-Development Effectiveness Tracking Program requirements, the Beach Cities WMG Permittees will individually maintain informational database records for each new development/re-development project subject to their individual adopted Low Impact Development (LID) Ordinances.

To address the Regional Monitoring requirement, the LACFCD will continue to participate in the Regional Watershed Monitoring Program (Bioassessment Program) being managed by the Southern California Stormwater Monitoring Coalition (SMC). The LACFCD will contribute resources to the SMC's bioassessment monitoring program during the current permit cycle. Initiated in 2008, the SMC's Regional Bioassessment Program is designed to run over a five-year cycle. Monitoring under the first cycle concluded in 2013, with reporting of findings and additional special studies planned to occur in 2014. SMC, including LACFCD, is currently working on designing the bioassessment monitoring program for the next five-year cycle, which is scheduled to run from 2015 to 2019.

The Beach Cities WMG does not anticipate additional special studies beyond those approved for Machado Lake, which were provided to the Regional Board and are included as an Appendix to the CIMP. When warranted, future special studies may be implemented through the adaptive management process or as a CIMP or EWMP revision.

Once approved by the Regional Board and implemented by the Beach Cities WMG, the CIMP will provide an expanded set of water quality data and information for use in future assessment of EWMP effectiveness and to guide watershed management decision making. The EWMP and CIMP are expected to undergo revision to reflect changing conditions in the watershed. CIMP programs will be re-evaluated every two years in parallel with the EWMP adaptive management process, and recommended changes will be submitted to the Regional Board for approval. Any proposed CIMP revisions will be implemented upon Regional Board EO approval or within 60 days if no objections are expressed.

Monitoring data will be electronically submitted semi-annually, as required by the MRP. An Integrated Monitoring Compliance Report will be submitted to the Regional Board as part of the Annual Report on December 15th of each year, covering the reporting year which extends from July 1 through June 30th preceding the December 15th submittal.

1.0 Introduction

In December 2013, the Cities of Hermosa Beach, Manhattan Beach, Redondo Beach and Torrance, together with the Los Angeles County Flood Control District (LACFCD), collectively referred to as the Beach Cities Watershed Management Group (Beach Cities WMG), submitted a Revised Notice of Intent (NOI) to develop an Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP). Following receipt of the Regional Water Quality Control Board, Los Angeles Region (Regional Board or LARWQCB) Executive Officer's approval of the Revised NOI on March 27, 2014, the Beach Cities WMG began CIMP development to fulfill the requirements of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. R4-2012-0175 (Permit) for Los Angeles County issued by the Los Angeles Regional Water Quality Control Board (Regional Board). The Permit was adopted on November 8, 2012, by the Regional Board and became effective December 28, 2012. This Permit replaced the previous MS4 permit (Order No. 01-182). The purpose of the Permit is to ensure the MS4s in the County of Los Angeles are not causing or contributing to exceedances of water quality objectives set to protect the beneficial uses in the receiving waters in the Los Angeles region. The Permit allows the Permittees to customize their stormwater programs to achieve Receiving Water Limitations (RWL) and Water Quality-Based Effluent Limits (WQBELs).

The Beach Cities WMG's CIMP addresses the requirements presented in Permit Attachment E, the Monitoring and Reporting Program (MRP). The primary objectives for the MRP are listed in Part II.A of the MRP and are summarized as follows:

1. Assess the chemical, physical, and biological impacts of discharges from the MS4 on receiving waters;
2. Assess compliance with Total Maximum Daily Load (TMDL) wet-weather and dry-weather numeric limit waste load allocations (WLAs);
3. Characterize pollutant loads in MS4 discharges;
4. Identify sources of pollutants in MS4 discharges; and
5. Measure and improve the effectiveness of pollutant controls implemented under the Permit.

The Permit encourages watershed management groups (WMGs) developing and implementing an EWMP to also coordinate their monitoring efforts through a CIMP. Although the CIMP can be customized by the WMG, it must achieve the 5 primary objectives described in the stormwater Permit and have certain required elements. The customization allows a group of agencies to realize efficiencies in terms of cost through coordination and elimination of duplication of effort.

1.1 Beach Cities Watershed Management Group Watershed Management Plan Area Overview

Located in southwest Los Angeles County and including portions of the Santa Monica Bay and Dominguez Channel watersheds, (see **Figure 1**), the 31 square miles of the Beach Cities WMG area occupies just over three and eighteen percent of the total Santa Monica Bay and Dominguez Channel watershed management areas, respectively. The Beach Cities WMG is comprised of the

Cities of Hermosa Beach, Manhattan Beach, Redondo Beach, and Torrance and the Los Angeles County Flood Control District (LACFCD). These Cities, along with the major subwatershed boundaries shown in yellow, are identified in **Figure 2**.

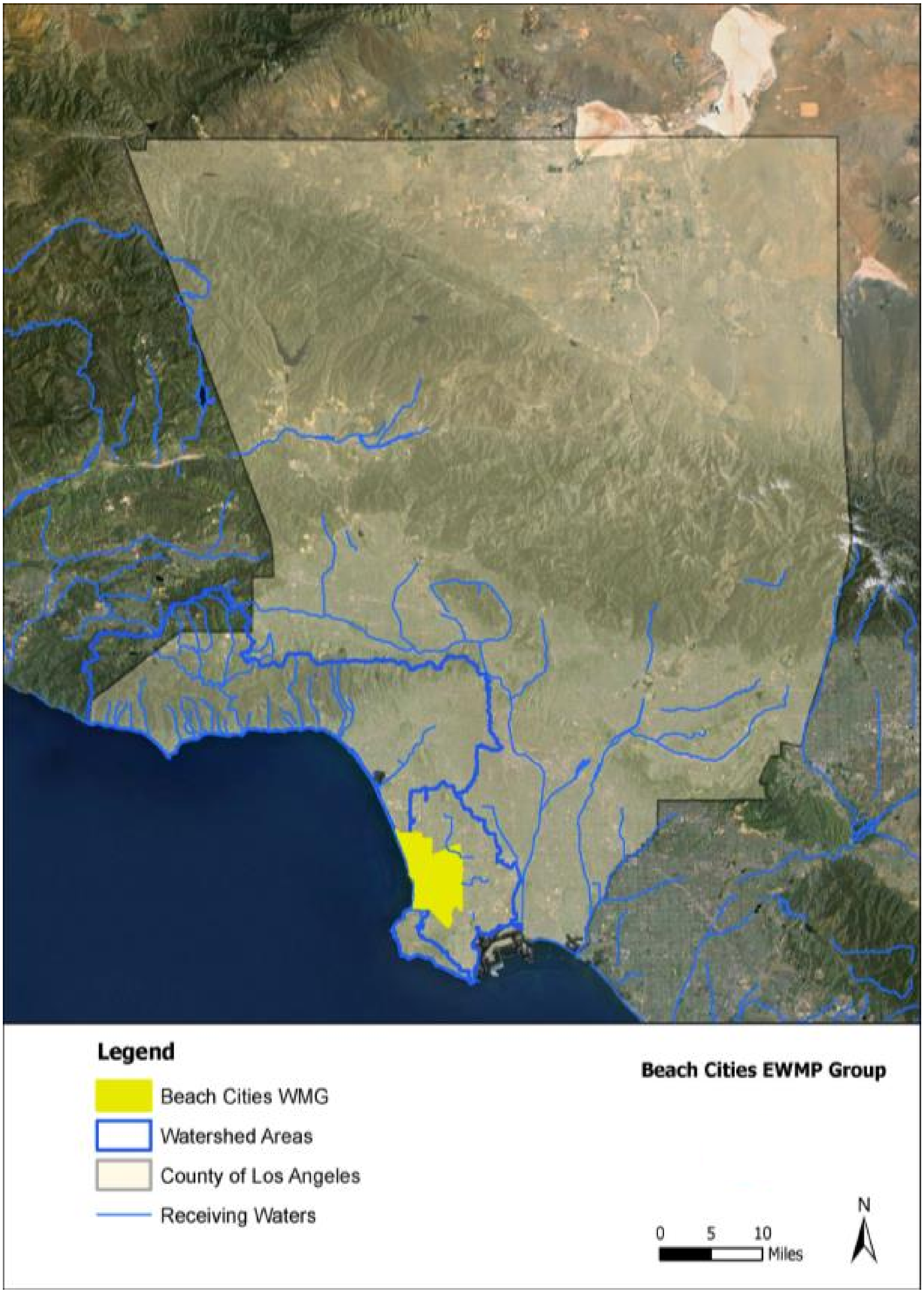

Figure 1 Beach Cities Watershed Management Group Location within Los Angeles County

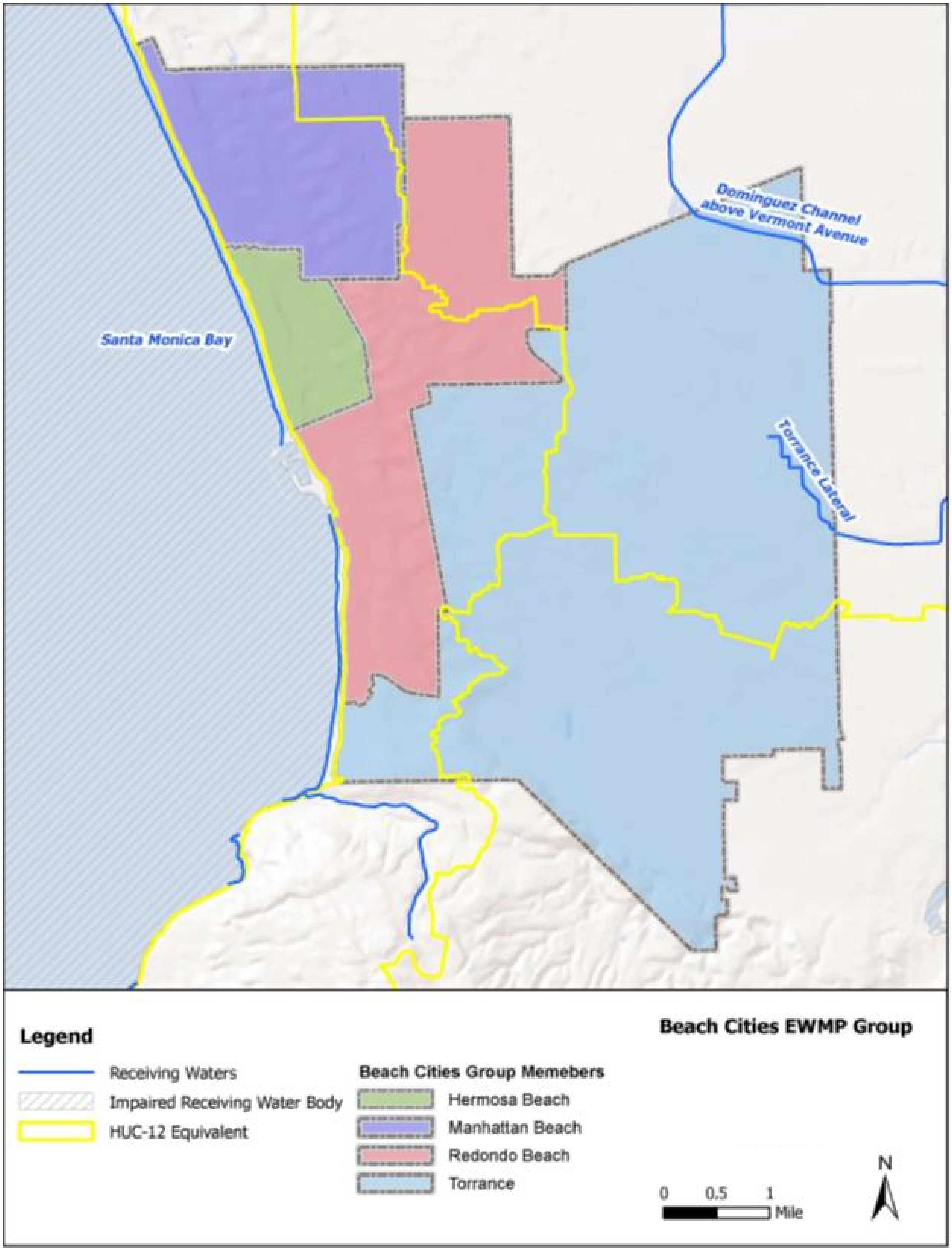

Figure 2 Jurisdictional Boundaries for the Beach Cities WMG

1.1.1 Santa Monica Bay Watershed

As a regional component of the Southern California Bight, the Santa Monica Bay is the largest coastal element of Los Angeles County and extends from Point Dume, in the north near the Ventura County line, to the Palos Verdes Peninsula, in the south. The approximately 414 square mile Santa Monica Bay watershed begins as ridgelines in the south Ventura and Los Angeles County border area that traverse east across the Santa Monica Mountains to Griffith Park, then southwest across the Los Angeles Coastal Plain to include Ballona Creek and the northern side of the Baldwin Hills. South of Ballona Creek, the watershed includes a relatively narrow coastal bluff that extends to the Palos Verdes Peninsula and forms the southern boundary area. Within the greater Santa Monica Bay watershed, the Regional Board identified nine subwatersheds, including the Hermosa and Redondo subwatersheds, which fall into the Beach Cities WMG, with approximate catchment areas of 2,718 and 5,377 acres, respectively.

These two subwatersheds were also designated by the Regional Board as Jurisdictional Groups 5 and 6 (JG5/6) in the Santa Monica Bay Beaches Bacteria TMDL. JG5 includes portions of the Cities of El Segundo, Hermosa Beach, and Manhattan Beach (lead agency) and the California Department of Transportation (Caltrans). JG6 includes portions of the Cities of Hermosa Beach, Manhattan Beach, Redondo Beach (lead agency), and Torrance, and Caltrans. The Beach Cities WMG extends beyond JG5/6 to include areas in the Dominguez Channel, while JG5/6 includes areas, such as the City of El Segundo and Caltrans that are not Beach Cities WMG members.

1.1.2 Dominguez Channel Watershed

The Dominguez Channel watershed is located within southern Los Angeles County and encompasses approximately 133 square miles of land and water which covers the harbor areas. Approximately 81 percent of the watershed area, or 93 percent of the land area, is developed. Residential development covers nearly 40 percent of the watershed, 41 percent is overlaid by industrial, commercial and transportation land uses, 12 percent is educational or open spaces, and 7 percent consists of water. Included within the Dominguez Channel watershed is the Machado Lake subwatershed (20 square miles), along with fresh and estuarine channel areas.

1.1.3 Beach Cities WMG Land Uses

The Beach Cities WMG area is predominately composed of residential areas, with significant commercial land use areas adjacent to major boulevards. Within the Torrance-Carson Lateral subwatershed of the Dominguez Channel watershed portion of the City of Torrance there are significant industrial land use areas, including an extensive refinery complex. Agricultural, education, open space, and transportation land uses typically represent minor fractions within each jurisdiction. For each Hydrologic Unit Code (HUC-12) and agency within the Beach Cities WMG, a summary of approximate area and percent of land use categories is summarized in Table 1 and presented in **Figure 3**.

Table 1 Land Use Summary by HUC-12 Area and Beach Cities WMG Jurisdiction

	Area (Acres)	Percent of Beach Cities EWMP Area[1]							
		Ag	Com	Ind	Edu	Res	Trans	Open	Total
Breakdown by HUC-12									
HUC-12: Long Beach Harbor	**5,180**	**0%**	**5%**	**2%**	**1%**	**14%**	**1%**	**2%**	**26%**
Redondo Beach	1	0%	0%	0%	0%	0%	0%	0%	0%
Torrance	5,178	0%	5%	2%	1%	14%	1%	2%	26%
HUC-12: Lower Dominguez Channel	**7,424**	**1%**	**6%**	**10%**	**1%**	**16%**	**1%**	**2%**	**37%**
Manhattan Beach	361	0%	1%	0%	0%	1%	0%	0%	2%
Redondo Beach	1,251	0%	1%	1%	0%	4%	0%	0%	6%
Torrance	5,812	0%	4%	9%	1%	12%	0%	2%	29%
HUC-12: Manhattan Beach-Frontal Santa Monica	**7,651**	**0%**	**4%**	**1%**	**2%**	**29%**	**0%**	**2%**	**38%**
Hermosa Beach	845	0%	1%	0%	0%	3%	0%	0%	4%
Manhattan Beach	2,086	0%	1%	0%	1%	8%	0%	1%	10%
Redondo Beach	2,607	0%	2%	0%	1%	9%	0%	1%	13%
Torrance	2,113	0%	1%	0%	1%	8%	0%	1%	10%
Breakdown by Agency									
Hermosa Beach	845	0%	15%	2%	2%	75%	0%	6%	100%
Manhattan Beach	2,447	0%	13%	4%	5%	71%	0%	7%	100%
Redondo Beach	3,859	1%	14%	8%	4%	68%	0.5%	4.5%	100%
Torrance	13,104	1%	16%	16%	4%	54%	3%	6%	100%
LACFCD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
Beach Cities WMG Total	**20,255**	**1%**	**15%**	**13%**	**4%**	**59%**	**2%**	**6%**	**100%**

[1] Land use classifications include: agriculture (Ag), commercial (Com), industrial (Ind), education (Edu), residential (Res), transportation (Trans), and open space (Open). Land uses from Southern California Association of Governments (SCAG) data, 2005.

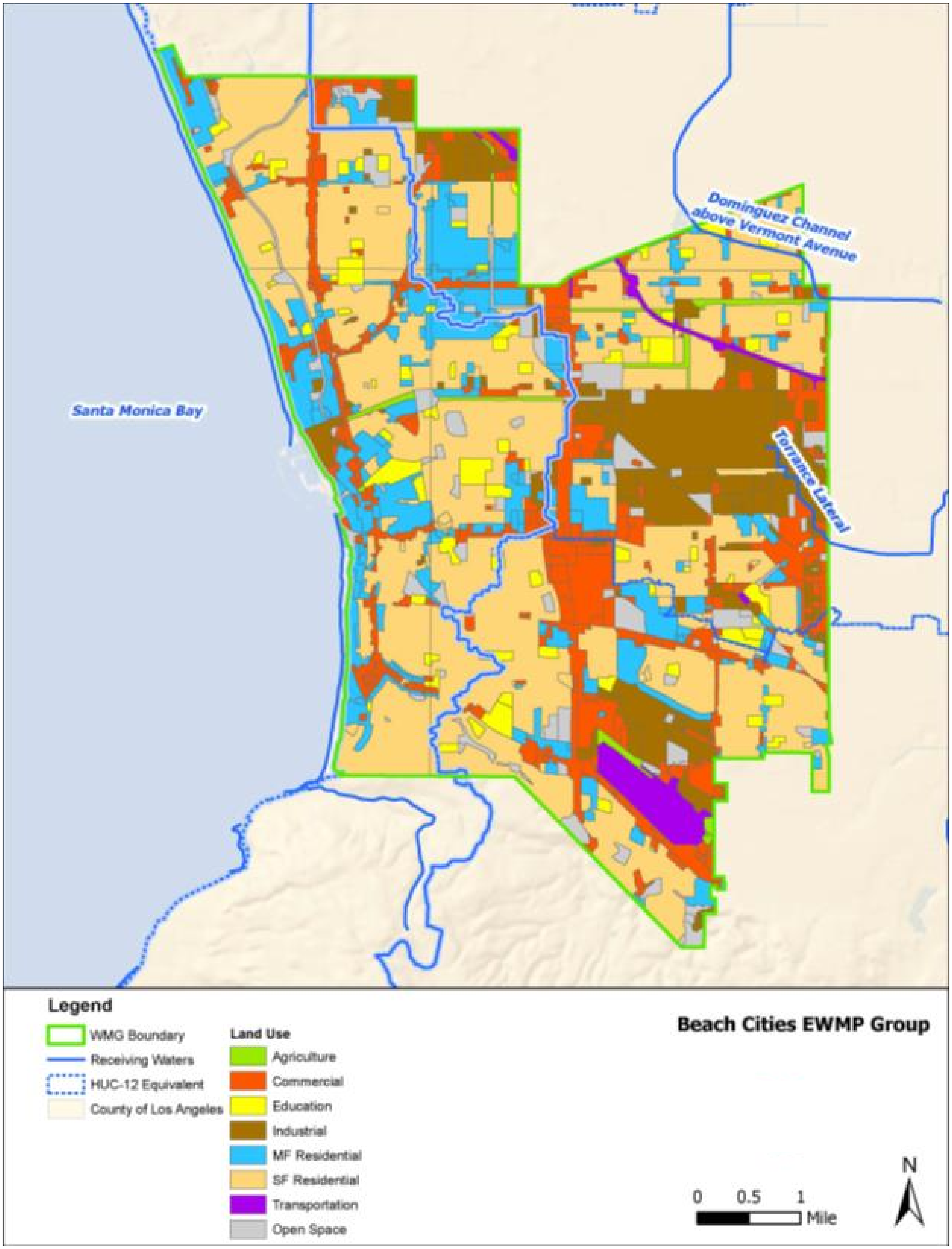

Figure 3 Land Use Categories within the Beach Cities WMG Area

1.1.4 Hydrologic Units

Attachment B, of the MS4 Permit, presents the mapped United States Geological Survey Hydrologic Units, and other features, based on historical Hydrologic Unit Codes (HUC-12) watershed boundaries. In-lieu of these Permit specified hydrologic boundaries, the March 26, 2014 Regional Board Reasonable Assurance Analysis (RAA) Guidelines allow WMGs to use updated "equivalent" HUC-12 watersheds, prepared by the LACFCD. Using the shared HUC-12 nomenclature and numbering conventions, the three "equivalent" HUC-12 boundaries within the Beach Cities WMG shown in **Figure 4**, are as follows:

- Long Beach Harbor (180701060701);
- Lower Dominguez Channel (180701060102); and
- Manhattan Beach – Frontal Santa Monica Bay (180701040500).

Water bodies of primary importance to the Beach Cities WMG and regulated by the State as receiving waters, include:

- Santa Monica Bay;
- Dominguez Channel; and
- Torrance-Carson Lateral (also known as Torrance Carson Channel).

Receiving waters immediately downstream of the WMG and potentially impacted by MS4 discharges from the Beach Cities WMG include:

- Dominguez Channel Estuary;
- Machado Lake;
- Wilmington Drain; and
- Los Angeles and Long Beach Harbors

Identified storm drains and storm drain outfalls within the Beach Cities WMG area are presented in **Figure 5**.

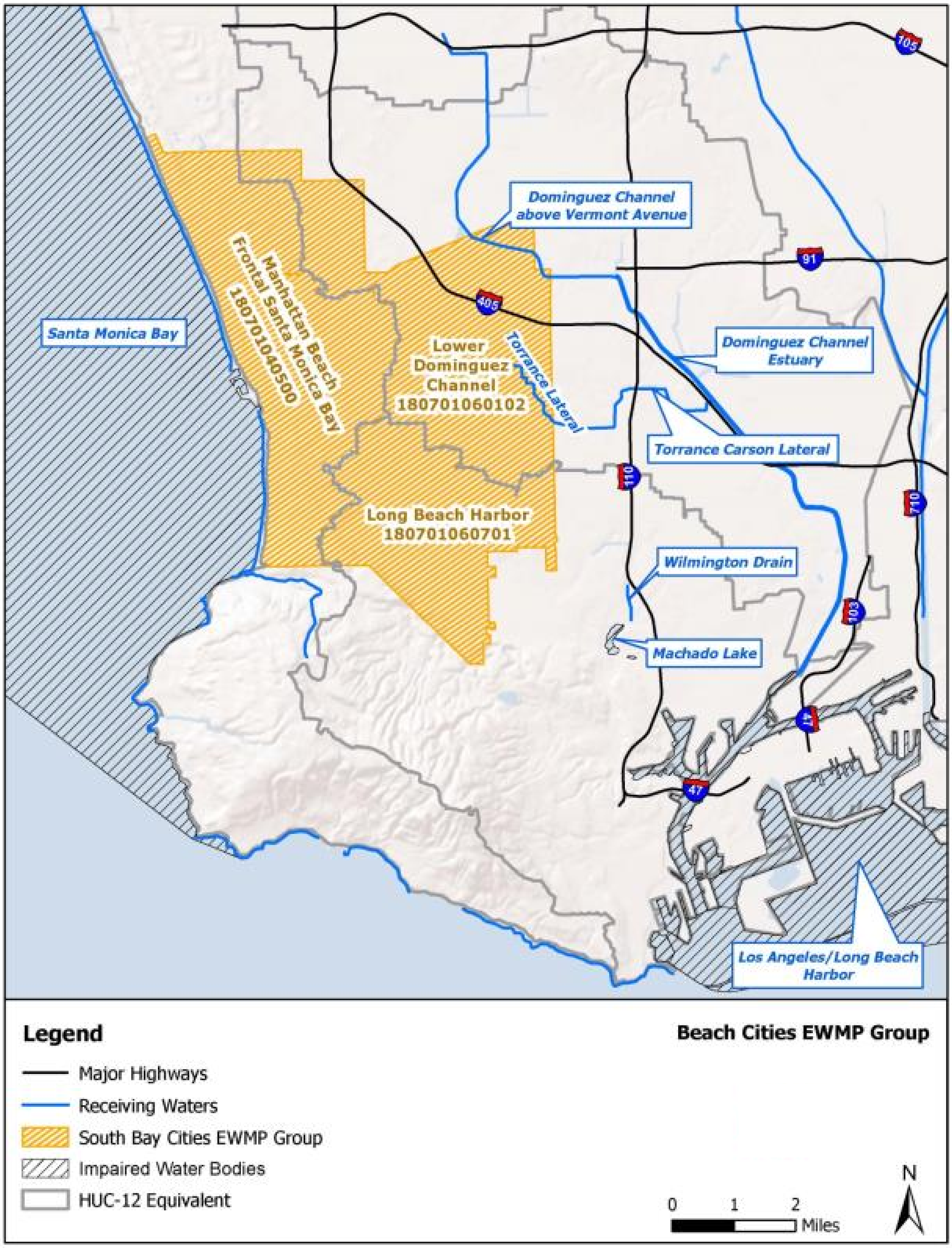

Figure 4 Equivalent HUC-12 Watersheds and Impaired Water Bodies

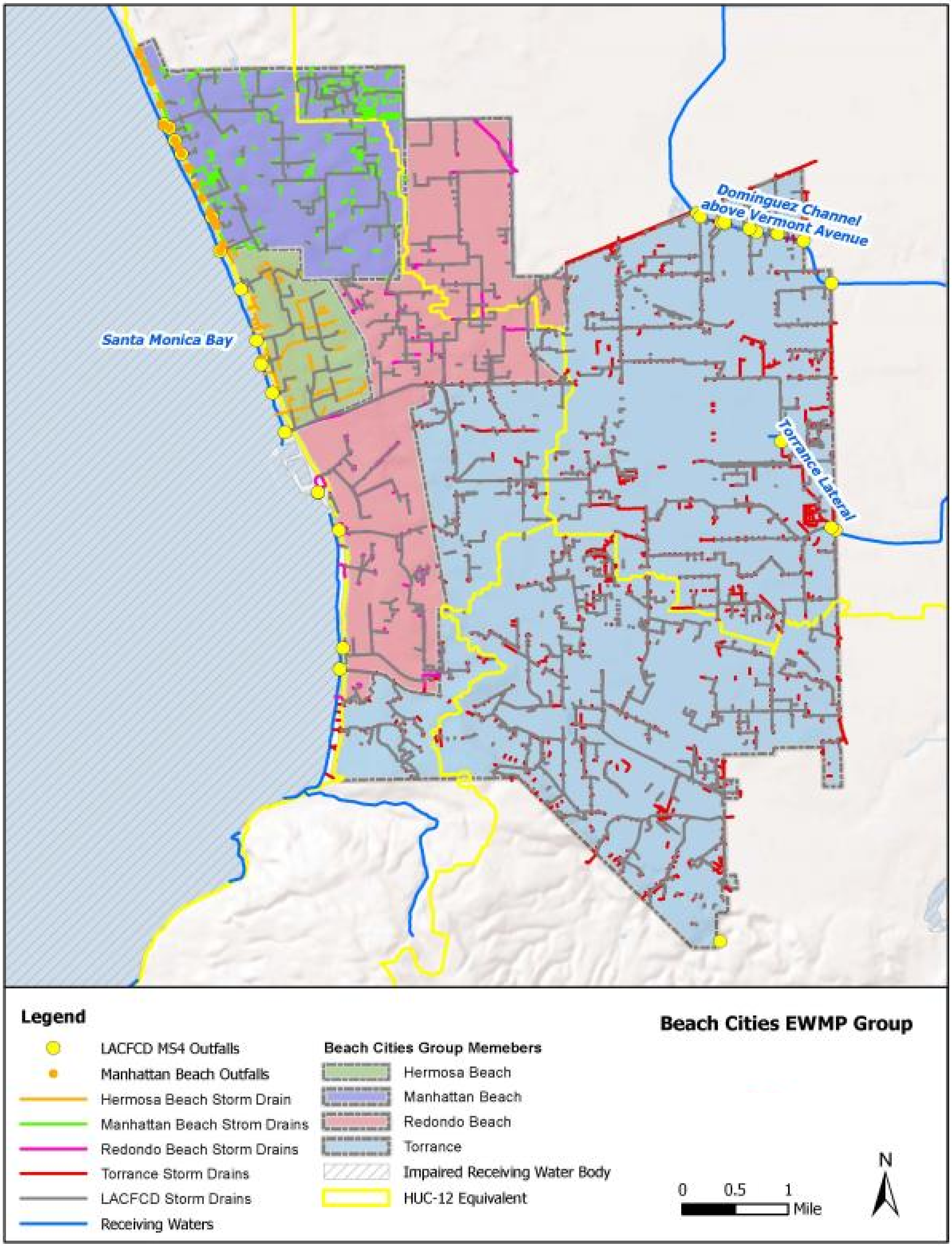

Figure 5 MS4 Drainage System Elements and Outfalls identified by the Beach Cities WMG

1.2 Water Quality Priorities

Based on the water quality characterization conducted as part of the EWMP Work Plan, the water body–pollutant combinations (WBPCs) have been classified into one of three categories in accordance with Section IV.C.5(a)ii of the Permit.

This categorization is intended to guide the implementation of structural and institutional best management practices (BMPs) and monitoring activities in the CIMP. **Table 2** presents the identified water quality priorities for the Beach Cities WMG.

Table 2 Water Body Pollutant Prioritization

Category	Water Body	Pollutant	Compliance Deadline
1: Highest Priority	Santa Monica Bay Beaches	Dry Weather Bacteria	7/15/2006 (Final: Single sample summer AEDs met)
			11/1/2009 (Final: Single sample winter AEDs met)
		Wet Weather Bacteria	7/15/2009 (Interim: 10% Single sample ED reduction)
			7/15/2021 (Final: Single sample AED and GM targets met)[a]
	Santa Monica Bay	Trash/Debris	3/20/2016 (20% reduction)
			3/20/2020 (100% reduction)
		DDTs	No compliance schedule established since Beach Cities discharges are assumed to be in compliance (Final Grouped WLA for entire Santa Monica Bay: 27.08 g/yr)[b]
		PCBs	No compliance schedule established since Beach Cities discharges are assumed to be in compliance (Final Grouped WLA for entire Santa Monica Bay: 140.25 g/yr)[b]
	Dominguez Channel (including Torrance Lateral)[c]	Toxicity	12/28/2012 (Interim wet weather: 2 TUc)
			3/23/2032 (Final wet weather: 1 TUc)
		Total Copper	12/28/2012 (Interim wet weather: 207.51 ug/L)
			3/23/2032 (Final wet weather: 1,300.3 g/day)
			3/23/2032 (Final wet weather, Torrance Lateral: 9.7 ug/L)
		Total Lead	12/28/2012 (Interim wet weather: 122.88 ug/L)
			3/23/2032 (Final wet weather: 5,733.7 g/day)
			3/23/2032 (Final wet weather, Torrance Lateral: 42.7 ug/L)
		Total Zinc	12/28/2012 (Interim wet weather: 898.87 ug/L)
			3/23/2032 (Final wet weather: 9,355.5 g/day)
			3/23/2032 (Final wet weather, Torrance Lateral: 69.7 ug/L)
	Dominguez Channel Estuary	Copper	12/28/2012 (Interim sediment: 220 mg/kg)
			3/23/2032 (Final sediment: 22.4 kg/yr)

Category	Water Body	Pollutant	Compliance Deadline
		Lead	12/28/2012 (Interim sediment: 510 mg/kg)
			3/23/2032 (Final sediment: 54.2 kg/yr)
		Zinc	12/28/2012 (Interim sediment: 789 mg/kg)
			3/23/2032 (Final sediment: 271.8 kg/yr)
		DDT	12/28/2012 (Interim sediment: 1.727 mg/kg)
			3/23/2032 (Final sediment: 0.250 g/yr)
		PAHs	12/28/2012 (Interim sediment: 31.60 mg/kg)
			3/23/2032 (Final sediment: 0.134 kg/yr)
		PCBs	12/28/2012 (Interim sediment 1.490 mg/kg)
			3/23/2032 (Final sediment: 0.207 g/yr)
		Cadmium	3/23/2032 (Final sediment: 1.2 mg/kg)
	Machado Lake	Total Phosphorus[d]	3/11/2014 (Interim: 1.25 mg/L
			9/11/2018 (Final: 0.1 mg/L)
		Total Nitrogen[d]	3/11/2014 (Interim: 2.45 mg/L
			9/11/2018 (Final: 1.0 mg/L)
		Chlordane (tissue)	9/30/2019 (In sediment, wet and dry weather: 3.24 µg/kg dry weight)
		Total DDT (tissue)	9/30/2019 (In sediment, wet and dry weather: 5.28 µg/kg dry weight)
		Dieldrin (tissue)	9/30/2019 (In sediment, wet and dry weather: 1.9 µg/kg dry weight)
		Total PCBs (tissue)	9/30/2019 (In sediment, wet and dry weather: 59.8 µg/kg dry weight)
		Trash	3/6/2012 (20% reduction)
			3/6/2013 (40 % reduction)
			3/6/2014 (60% reduction)
			3/6/2015 (80% reduction)
			3/6/2016 (100% reduction)
2: High Priority	Santa Monica Bay	Mercury	N/A
		Arsenic	N/A
	Dominguez Channel (including Torrance Lateral)	Indicator Bacteria	TBD in EWMP
	Dominguez Channel Estuary	Indicator Bacteria	TBD in EWMP
3: Medium Priority	Dominguez Channel (including Torrance Lateral)	Cyanide	TBD in EWMP
		pH	TBD in EWMP
		Selenium	TBD in EWMP
		Mercury	TBD in EWMP
		Cadmium	TBD in EWMP

[a] TMDL reopened in 2013 and the changes became effective July 2, 2014.
[b] Annual mass-based WLA established for all of Santa Monica Bay, of which the Beach Cities constitute only a portion.
[c] For metals, the TMDL sets a final mass-based WLA for MS4 contributions within Dominguez Channel above Vermont Avenue. For Torrance Lateral, a concentration-based WLA is set for water and sediment (mg/kg dry). Metal WLAs are set based on a hardness of 50 mg/L and 90th percentile flow rates (62.7 cfs in Dominguez Channel).
[d] The City of Torrance submitted a Special Study Work Plan, which was approved the Regional Water Board Executive Officer, and established the following annual mass-based water quality based effluent limitations: interim total phosphorus annual load (by 3/11/2014): 3,760 kg; final total phosphorus annual load (by 9/11/2018): 301 kg; interim total nitrogen annual load (by 3/11/2014): 7,370 kg; final total nitrogen annual load (by 9/11/2018): 3,008 kg.

As part of the adaptive management process (AMP), categorization of WBPCs may be adjusted based on data obtained from monitoring, source evaluations, and BMP implementation. Data collected following CIMP approval may result in the addition of Category 3 designations in instances when receiving water limits are exceeded and MS4 discharges are identified as contributing to such exceedances. Under these conditions, the appropriate agencies will adhere to Section VI.C.2.a.iii of the Permit.

Additional details and supporting information for monitoring to address priorities can be found in the Beach Cities WMG EWMP Work Plan.

1.3 CIMP Overview

The CIMP is designed to provide the information necessary to guide management decisions in addition to providing a means to measure compliance with the Permit. The Beach Cities WMG's CIMP addresses the six required elements:

1. Receiving Water Monitoring
2. Stormwater Outfall Monitoring
3. Non-Stormwater Outfall Monitoring
4. New Development and Redevelopment Effectiveness Tracking
5. Regional Studies
6. Special Studies

Each of the six CIMP elements is briefly discussed below.

1.3.1 Receiving Water Monitoring

Receiving water monitoring is intended to assess whether water quality objectives are being achieved, to determine if beneficial uses are being supported, and to track trends in constituent concentrations over time.

The CIMP proposes two (2) new near-shore monitoring locations in the Santa Monica Bay for sampling and analysis of the MRP-required suite of analytical parameters designed to assess the impacts from the storm drain discharges on water quality in the Santa Monica Bay. Ongoing Coordinated Shoreline Monitoring ankle-deep in the wave wash consistent with the Santa Monica Bay Beaches Bacteria TMDL will continue at the same frequency and at the same eleven (11) locations as specified in the approved Coordinated Shoreline Monitoring Plan consistent with the Santa Monica Bay Beaches Bacteria TMDL. Similarly, mass emissions monitoring at the Dominguez Channel within the Beach Cities WMG will also continue. Receiving water at Torrance Lateral will also be included in this CIMP. **Section 2** discusses the Beach Cities WMG's receiving water monitoring program in further detail.

1.3.2 Stormwater Outfall Monitoring

Stormwater outfall monitoring is intended to assess discharge water quality relative to municipal action limits (MALs), WQBELs derived from TMDL WLAs, as well as the potential to have caused or contributed to exceedances of RWLs derived from TMDL WLAs or receiving water quality objectives.

Seven stormwater outfall monitoring sites were selected. The selected sites are representative of a combination of the HUC-12s, jurisdictions, and/or land uses within each catchment area. A synopsis of each potential outfall catchment area, along with an analysis of its land use/zoning characteristics is summarized in **Section 4**.

1.3.3 Non-Stormwater Outfall Program

To fulfill the Permit requirements, the MRP requires Permittees to implement a non-stormwater outfall-based screening and monitoring program. The Non-Stormwater Outfall Screening and Monitoring Program (Non-Stormwater Program) is focused on non-stormwater discharges to receiving waters from MS4 outfalls.

The Beach Cities WMG has been addressing non-stormwater flow to Santa Monica Bay through the installation of low flow diversions (LFDs). The Beach Cities WMG's Non-Stormwater Program will collect information necessary to identify significant non-stormwater discharges from major outfalls and conduct the screening process and prioritization prior to non-stormwater outfall monitoring. Details of the Non-Stormwater Program are presented in **Section 5**.

1.3.4 New Development and Redevelopment Effectiveness Tracking

The New Development/Re-Development Effectiveness Tracking is required to identify the information necessary for data management and annual compliance reporting. Each jurisdiction will be individually responsible for tracking Permit requirements based on their specific operational procedures and internal processes. Each individual Permittee within the Beach Cities WMG will maintain an informational database record for each new development/re-development project subject to the Permit's Planning and Land Development Program as adopted via each Permittee's Low Impact Development (LID) Ordinance. **Section 6** summarizes the new development and redevelopment effectiveness tracking program to be implemented by the Beach Cities WMG Permittees.

1.3.5 Regional Studies

LACFCD will continue to participate in the Regional Watershed Monitoring Program (Bioassessment Program) being managed by the Southern California Stormwater Monitoring Coalition (SMC). The LACFCD will contribute resources to implement the bioassessment monitoring during the current Permit cycle. **Section 7** presents the regional studies approach for the Beach Cities WMG.

1.3.6 Special Studies

The MRP requires each Permittee to be responsible for conducting special studies if required in an effective TMDL or an approved TMDL Monitoring Plan. The City of Torrance has received approval for a Special Study Work Plan for the Machado Lake Nutrient TMDL (see Appendix B). There are no other required special studies applicable to the Beach Cities WMG. Optional special studies are further discussed in **Section 8**.

2.0 Receiving Water Monitoring Program

While the Permit does not specify a required number of receiving water monitoring sites, The MRP suggests that receiving water monitoring be performed at: (1) previously designated mass emission stations (MES); (2) TMDL receiving water compliance points; and (3) additional receiving water locations representative of the impacts from MS4 discharges. These locations serve to address the receiving water monitoring program objectives described in the MRP introduction, in particular that a robust dataset of past monitoring data can facilitate trends analyses. Receiving water monitoring site locations that were selected and the basis for their selection are addressed in the following subsections.

2.1 Receiving Water Monitoring Objectives

The objectives of the receiving water monitoring include the following (Part II.E.1 of the MRP):

- Determine whether the receiving water limitations are being achieved;
- Assess trends in pollutant concentrations over time, or during specified conditions; and
- Determine whether the designated beneficial uses are fully supported as determined by water chemistry, as well as aquatic toxicity and bioassessment monitoring.

To accomplish these objectives, TMDL receiving water monitoring as specified in approved TMDL monitoring plans will continue and additional Permit receiving water monitoring will be conducted to meet the Permit monitoring objectives to assess the effects of MS4 discharges on receiving water quality.

2.2 Receiving Water Monitoring Sites

As stated above, the primary objective of receiving water monitoring is to assess trends in pollutant concentrations over time, or during specified conditions. For that reason, an important characteristic of an ideal receiving water monitoring site is that it has a large dataset from previously collected monitoring events that covers both a large timespan as well as a range of conditions.

As summarized and presented in **Appendix A** and **Appendix B**, an existing MES within the Beach Cities WMG area along the Dominguez Channel (S28) will serve as the receiving water monitoring location for the Beach Cities WMG on the Dominguez Channel. The County of Los Angeles has committed to maintaining this monitoring station. The CIMP proposes two (2) new near-shore monitoring locations within 1,000 feet from the shoreline in the Santa Monica Bay in line with the two largest outfalls from the Beach Cities WMG for sampling and analysis of an expanded, Permit-required suite of analytical parameters designed to assess the impacts from the storm drain discharges on water quality in the Santa Monica Bay. Ongoing Coordinated Shoreline Monitoring ankle-deep in the wave wash consistent with the Santa Monica Bay Beaches Bacteria TMDL will continue at the same frequency and at the same eleven (11) locations as specified in the approved Coordinated Shoreline Monitoring Plan consistent with the Santa Monica Bay Beaches Bacteria TMDL. While the existing shoreline monitoring sites will achieve monitoring objectives for the existing TMDL monitoring program for water-contact recreational beneficial uses, the nearshore monitoring locations will more accurately assess the overall impact of the MS4 on the other beneficial uses of Santa Monica Bay.

The City of Los Angeles, as lead agency for other WMGs, has agreed to share their CIMP monitoring data from the Torrance Lateral, Dominguez Channel Estuary, Dominguez Channel, and Machado Lake with the Beach Cities WMG (A. Magallanes, 2015). These monitoring data will be incorporated into the Beach Cities WMG annual reports assuming timely receipt of the data from the City of Los Angeles. If data are not received in time for inclusion into the annual report, they will be included in the subsequent year's annual report. Therefore, the Beach Cities WMG is not proposing any receiving water monitoring stations in these waterbodies.

Figure 6 presents the approximate locations of the receiving water monitoring sites RW-BCEG-1 and -2 and the MES site in the Beach Cities WMG. Fact sheets summarizing characteristics of sites RW-BCEG-1 and -2 are presented in **Appendix C.**

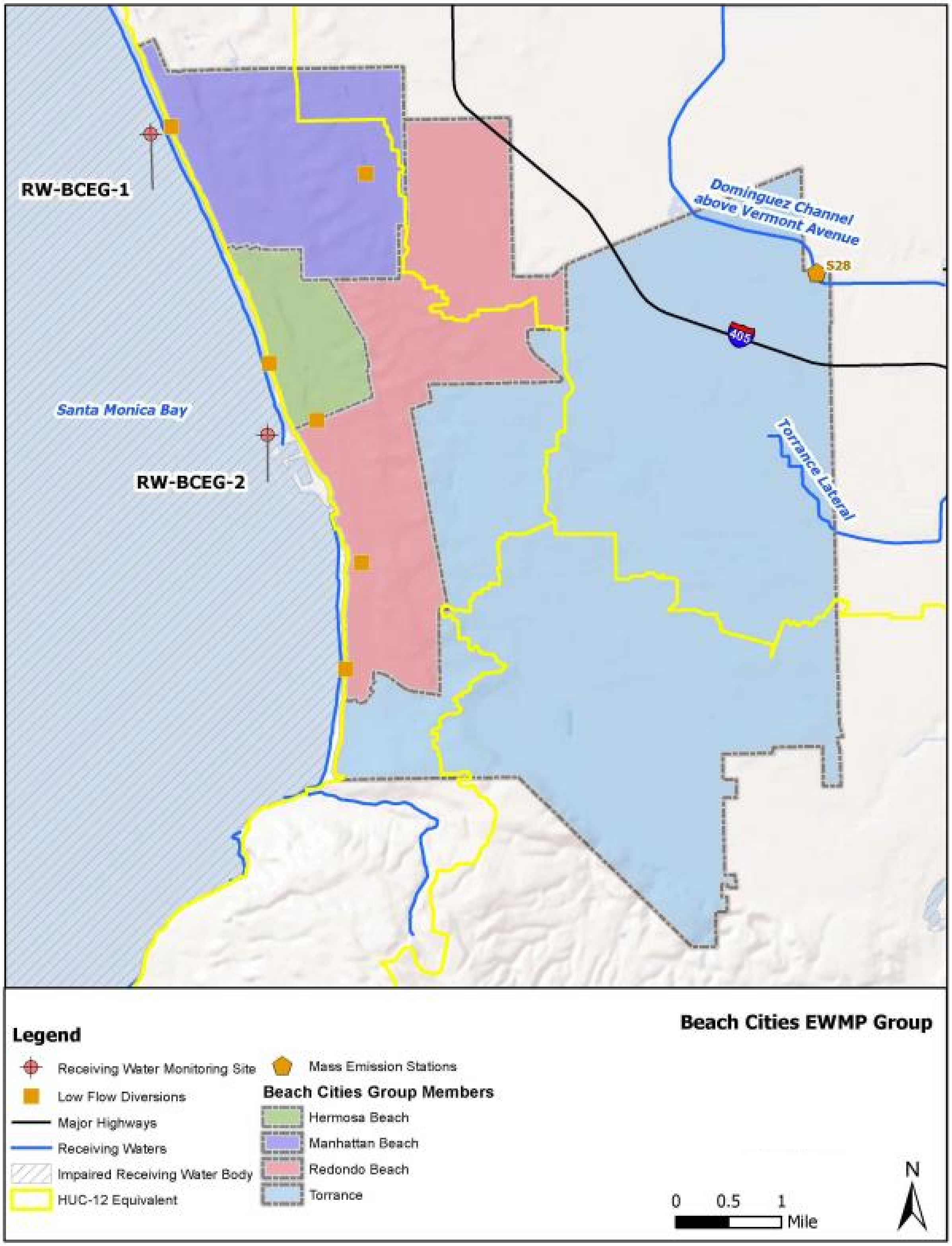

Figure 6 Beach Cities WMG Receiving Water Monitoring Locations

2.2.1 Santa Monica Bay

As described above, the Beach Cities WMG will monitor two receiving water monitoring sites, RW-BCEG-1 and -2, in Santa Monica Bay. Receiving water monitoring site RW-BCEG-1 will be located in the nearshore zone in line with outfall OF-BCEG-1 in the jurisdiction of the City of Manhattan Beach, while RW-BCEG-2 will be located in the nearshore zone in line with the major storm drain outfall at Herondo Street. Samples will be collected at the point of initial dilution of a plume which will be dependent on the intensity of a qualifying storm event and of the current velocity and wave mixing action. Samples will be collected via boat in accordance with the City of Los Angeles Environmental Monitoring Division (EMD) standard operating procedures. The offshore locations were selected to reflect the water quality of the R/W likely to be experienced by aquatic life, within the discharge plume as it mixes with receiving waters. Receiving water monitoring will be performed from a boat in Santa Monica Bay. Per Los Angeles County ordinance, no hard bottom boats can be operation within 300 yards (900 feet) of the beach due to safety concerns. Therefore, the sampling will be conducted 1,000 feet away from the shoreline (approximately the 30 foot bathometric contour), and will be conducted using manual grab sampling methods. **Table 3** identifies the receiving water monitoring locations by latitude and longitude and **Figure 6** presents the site locations.

Table 3 Summary of Receiving Water Monitoring Site

Site ID	Latitude	Longitude	County Equivalent Hydrologic Unit Code (HUC)-12
RW-BCEG-1	33.892541	-118.421732	Manhattan Beach Frontal Santa Monica Bay (1807010406010)
RW-BCEG-2	33.851637	-118.402488	Manhattan Beach Frontal Santa Monica Bay (1807010406010)

2.2.2 Dominguez Channel

Receiving water monitoring in the Dominguez Channel will be coordinated with the LACFCD. The LACFCD has committed to the continued flow-weighted composite monitoring of the existing Dominguez Channel MES S28, located at the intersection of the Dominguez Channel and Artesia Boulevard in the northeast section of the City of Torrance.

2.2.3 TMDL Monitoring

TMDLs applicable to the Beach Cities WMG members are listed in Attachment K of the Permit and presented in Table K-2 for Santa Monica Bay and Table K-4 for the Dominguez Channel watershed. Storm flows from the Beach Cities WMG discharge directly to Santa Monica Bay. Storm flows from the Beach Cities WMG to Machado Lake and the Dominguez Channel Estuary are indirect and comingled with flows from other WMGs. The TMDLs of concern to the Beach Cities WMG are summarized in **Table 4** as follows:

Table 4 Beach Cities TMDLs

<table>
<tr><th colspan="2">Water Body</th><th>Pollutant</th><th>Notes</th></tr>
<tr><td colspan="2" rowspan="3">Santa Monica Bay Beaches[a]</td><td>Coliform Bacteria</td><td>Addressed by Bacteria TMDL, effective July 15, 2003</td></tr>
<tr><td>DDT</td><td rowspan="2">Addressed by PCB/DDT TMDL, effective March 26, 2012</td></tr>
<tr><td>PCBs</td></tr>
<tr><td colspan="2" rowspan="5">Santa Monica Bay Offshore/Nearshore</td><td>Debris</td><td>Addressed by Debris TMDL, effective March 20, 2012</td></tr>
<tr><td>DDT (tissue & sediment)</td><td rowspan="4">Addressed by PCB/DDT TMDL, effective March 26, 2012</td></tr>
<tr><td>PCBs (tissue & sediment)</td></tr>
<tr><td>Sediment Toxicity</td></tr>
<tr><td>Fish Consumption Advisory</td></tr>
<tr><td rowspan="27">Dominguez Channel</td><td rowspan="5">Dominguez Channel (lined portion above Vermont Ave)</td><td>Copper</td><td rowspan="5">Addressed by Dominguez Channel Toxics TMDL, effective December 28, 2012</td></tr>
<tr><td>Diazinon[b]</td></tr>
<tr><td>Lead</td></tr>
<tr><td>Toxicity</td></tr>
<tr><td>Zinc</td></tr>
<tr><td rowspan="10">Machado Lake</td><td>Algae</td><td rowspan="4">Addressed by Machado Lake Nutrient TMDL, effective March 11, 2009</td></tr>
<tr><td>Ammonia</td></tr>
<tr><td>Eutrophic</td></tr>
<tr><td>Odor</td></tr>
<tr><td>ChemA (tissue)</td><td rowspan="5">Addressed by Machado Lake Toxics TMDL, effective March 20, 2012</td></tr>
<tr><td>Chlordane (tissue)</td></tr>
<tr><td>DDT (tissue)</td></tr>
<tr><td>Dieldrin (tissue)</td></tr>
<tr><td>PCBs (tissue)</td></tr>
<tr><td>Trash</td><td>Addressed by Machado Lake Trash TMDL, effective March 6, 2008</td></tr>
<tr><td rowspan="4">Torrance Carson Channel (Torrance Lateral)</td><td>Copper</td><td rowspan="3">Addressed by Dominguez Channel Toxics TMDL, effective December 28, 2012</td></tr>
<tr><td>Lead</td></tr>
<tr><td>Zinc</td></tr>
<tr><td>Coliform Bacteria</td><td>Listed prior to 2006; no listing data available</td></tr>
<tr><td rowspan="7">Dominguez Channel Estuary (unlined portion below Vermont Ave)</td><td>Copper</td><td rowspan="7">Addressed by Dominguez Channel Toxics TMDL, effective December 28, 2012</td></tr>
<tr><td>Lead</td></tr>
<tr><td>Zinc</td></tr>
<tr><td>DDT</td></tr>
<tr><td>PAHs</td></tr>
<tr><td>PCBs</td></tr>
<tr><td>Cadmium</td></tr>
</table>

[a] These beach listings include Manhattan Beach, Hermosa Beach, Redondo Beach, and Torrance Beach for bacteria, as well as Redondo Beach for DDT and PCBs.
[b] EPA banned diazinon on December 31, 2005. Data from 2006-2010 show no diazinon exceedances in Dominguez Channel. Based on these results, no diazinon TMDLs have been developed at this time.

To satisfy the receiving water monitoring requirements for the SMBBB TMDL, eleven existing monitoring sites will continue to be monitored in accordance with the Coordinated Shoreline Monitoring Plan. The eleven existing monitoring sites are listed as follows:

- SMB 5-1
- SMB 5-2
- SMB 5-3
- SMB 5-4
- SMB 5-5
- SMB 6-1
- SMB 6-2
- SMB 6-3
- SMB 6-4
- SMB 6-5
- SMB 6-6

As part of the Coordinated Shoreline Monitoring Plan, qualitative data have also been collected at three observational sites: SMB O-6, O-7, and O-8. Observations include a qualitative description of the amount of flow observed (dry, ponded, low flow, medium flow, or high flow) and whether or not the flow was reaching the surf zone. As defined in Section 5.2 of the CIMP, "significant non-stormwater flows will be designated if non-stormwater flow was observed reaching the wave wash from the particular outfall during two of the three outfall screenings…" Because observations are made on a weekly basis at the observational sites, this definition of significance has been assumed equivalent to observations of dry weather flow reaching the wave wash at a rate greater than 66% over the past three years. On this basis, a review of the past three years' of data (July 2012 – May 2015) indicates that there are no significant non-stormwater discharges at these sites:

- At SMB O-6, 2% of dry weather observation days noted flows reaching the wave wash. The two occasions of flow reaching the surf zone both occurred nearly three years ago, in August of 2012.
- At SMB O-7, 11% of dry weather observation days noted flows reaching the wave wash. Despite weekly observations, there has only been one occasion of flow reaching the surf zone at this site in 2015.
- At SMB O-8, 11% of dry weather observation days noted flows reaching the wave wash. Despite weekly observations, there has only been one occasion of flow reaching the surf zone at this site in 2015. The other most recent notable observations occurred over a year ago, in April of 2014.

A summary of these observational results is provided in Appendix G. Given the lack of significant non-stormwater flows, observational monitoring at SMB O-6 and SMB O-8 will be discontinued upon approval of this CIMP. Monitoring at SMB O-7 will be conducted in accordance with the Non-Stormwater Outfall Screening and Monitoring Program described in Section 5.

Attainment of the SMB DDT and PCB TMDL WLAs for the Beach Cities WMG will be addressed through stormwater outfall monitoring to assess the WMG mean sediment borne loading of DDT and PCBs from the MS4 to SMB, using a three-year average for concentration and flow from the combined group SMB discharges. This is considered to be an appropriate approach for the following reasons:

- The TMDL (page 56) recommended that monitoring be conducted on a coordinated watershed-wide basis, which is what the Beach Cities WMG is proposing (i.e., coordinated and watershed wide within the WMG). USEPA also stated that estimates of mass loading will require extrapolation from a few locations to the entire watershed, so this approach is consistent with that.

- The Beach Cities WMG is providing four outfall monitoring sites to Santa Monica Bay and will be monitoring them in pairs in alternating years so that will create a data set of a total of 18 wet weather outfall monitoring events over the three-year period to provide a data set from which to extrapolate the mass loading from the Beach Cities WMG.
- Since the WLA in the MS4 Permit is an annual mass-based WLA applied to the entire MS4 group of Permittees discharging to Santa Monica Bay, the Beach Cities WMG will evaluate whether their aggregate discharge meets their share of the total WLA on an area share basis. This is consistent with the TMDL (page 50) which states that grouped waste load allocations should be apportioned based on relevant percent area within the watersheds draining to Santa Monica Bay.

The SMB Debris TMDL does not require receiving water monitoring, and the Beach Cities WMG members are not required to conduct any type of monitoring if complying with the WLAs through the implementation of BMPs, such as full capture systems. WMG members are to report compliance strategy through the development of a Trash Monitoring and Reporting Plan (TMRP) and Plastic Pellets Monitoring and Reporting Plan (PMRP), or demonstrate that a PMRP is not required, to be approved by the Regional Board. All Permittees within the Beach Cities WMG required to submit a TMRP and/or PMRP have done so. Submitted TMRPs and PMRPs for each jurisdiction will be implemented individually by the corresponding jurisdiction, once approved by the Regional Board.

The City of Torrance has previously developed and submitted Monitoring Plans required by the Machado Lake Nutrient, Toxics and Trash TMDLs to the Regional Board. This portion of the Beach Cities WMG TMDL requirements, summarized in **Appendix A**, will be addressed by the individual Monitoring Plans submitted for approval to the Regional Board. Copies of the submitted Monitoring Plans are attached in **Appendix B**. **Figure 7** presents TMDL and other existing monitoring sites within the Beach Cities WMG.

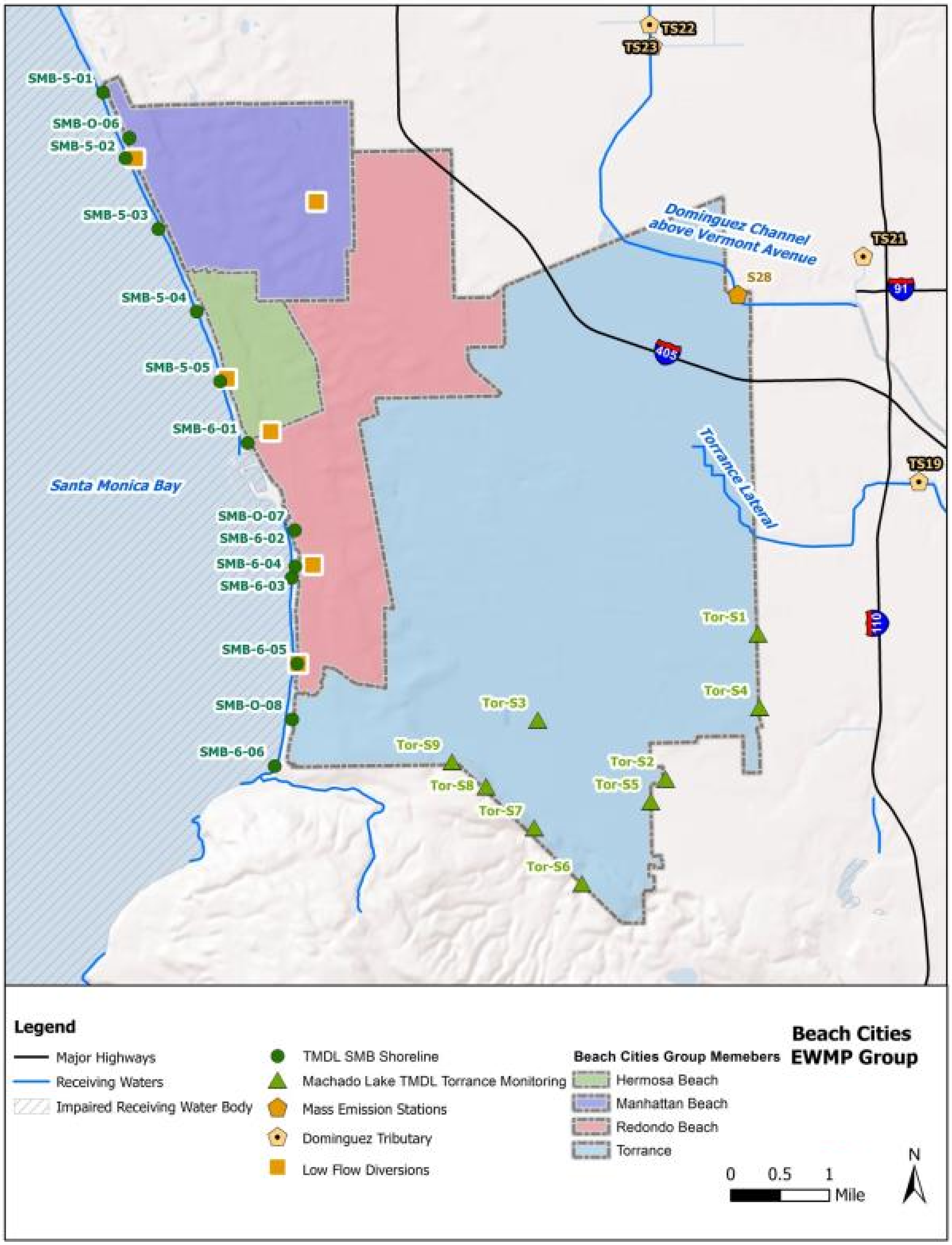

Figure 7 Reported Monitoring Stations within the Beach Cities WMG Area

2.3 Monitored Frequency, Parameters, and Duration of Monitoring

Each constituent required to be monitored by the MRP is addressed by the receiving water monitoring sites RW-BCEG-1 and -2. The frequency, parameters, and duration of monitoring that will be conducted as part of SMB TMDL monitoring, as well as CIMP-specific wet and dry-weather monitoring will be addressed in the following subsections. Parameters for monitoring were based on the water quality priorities, as discussed in **Section 1.2**. Additional analytical and monitoring procedures, including QA/QC, are presented in the Analytical and Monitoring Procedures in **Appendix D**.

2.3.1 SMB TMDLs

The Beach Cities WMG shoreline monitoring schedule currently has nine monitoring sites sampled on a weekly basis and two sampled five times per week. MRP section VI.B.2.c of the MS4 Permit requires all SMBBB TMDL shoreline monitoring sites not subject to the TMDL anti-degradation provision to be monitored on a five times per week schedule in place of the current SMBBB TMDL sampling schedule. This would entail increasing the frequency of monitoring at monitoring sites SMB 6-3 and 6-4. The Beach Cities WMG is proposing to keep the current sampling schedule since each shoreline monitoring site has one or both of the following characteristics:

- The site is located at an open beach with no MS4 discharge; and/or
- An LFD, which diverts all typical dry-weather flow, is located upstream of the site.

Table 5 indicates which of the characteristics listed above apply to each shoreline monitoring site, and includes additional location information for each site.

Table 5 SMBBB TMDL Shoreline Monitoring Sites Sampling Schedule

Site ID	Coordinates		JG	Sampling Point	Description	LFD	Sampling Schedule
	Lat	Long					
SMB-5-1*	33.90390	-118.42250	5	Open Beach	Manhattan Beach at 40th Street (S13)	No	Weekly
SMB-5-2	33.89444	-118.41800	5	Point Zero	28th Street storm drain at Manhattan Beach (DHS113)	Yes	Daily
SMB-5-3*	33.88422	-118.41100	5	Point Zero	36" storm drain under the Manhattan Beach Pier (S14)	Yes	Weekly
SMB-5-4*	33.87146	-118.40663	5	Open Beach	Hermosa Beach at 26th Street (DHS114)	No	Weekly
SMB-5-5*	33.86112	-118.40270	5	Open Beach	Hermosa Beach Pier (S15)	Yes	Weekly
SMB-6-1	33.85199	-118.39800	6	Point Zero	Herondo storm drain (DHS115)	Yes	Daily
SMB-6-2*	33.83908	-118.39000	6	Open Beach	Redondo Beach 100 yards south of the pier (S16)	No	Weekly
SMB-6-3	33.83378	-118.39000	6	Point Zero	4' x 4' box structure at Redondo Beach	Yes	Weekly
SMB-6-4	33.83207	-118.39071	6	Open Beach	Redondo Beach, 120 feet north of Topaz groin (DHS116)	No	Weekly
SMB-6-5*	33.81944	-118.39000	6	Point Zero	Avenue I storm drain at Redondo Beach (S17)	Yes	Weekly
SMB-6-6*	33.80440	-118.39424	6	Open Beach	Malaga Cove (S18)	No	Weekly

* Beach monitoring locations subject to the anti-degradation implementation provision in the TMDL.

Changes in diversion facilities operation, or recurrent significant non-stormwater discharges to receiving waters, will result in a re-evaluation of the monitoring program for these sites. A summary of constituents and monitoring frequencies for each of the receiving water monitoring sites is presented in **Table 6.**

2.3.2 Wet-Weather

For the CIMP receiving water monitoring sites within the Beach Cities WMG, RW-BCEG-1 and -2, wet-weather is defined as a storm event of greater than or equal to 0.1 inches of precipitation, as measured from at least 50 percent of the Los Angeles County controlled rain gauges within the watershed. Wet weather monitoring will be triggered by forecasts of at least 0.25 inches of rainfall at a 70% probability at least 24 hours prior to the event start time. Because a significant storm event is based on predicted rainfall, it is recognized that this monitoring may be triggered without 0.25 inches of rainfall actually occurring. Documentation will be provided showing the predicted rainfall amount. Wet-weather monitoring will be conducted three times a year for all parameters except for aquatic toxicity, which will be performed twice a year, per Part VI.C.1.a of the MRP. Wet-weather monitoring will target the first significant rain event of the storm year following the criteria outlined in Part VI.C.b.iii of the MRP, and at least two additional wet-weather events within the same wet-weather season. Wet-weather receiving water monitoring will be performed contemporaneously with stormwater outfall monitoring to be reflective of potential impacts from MS4 discharges. Parameters to be collected and sampling frequencies to address the receiving water monitoring requirements of the MRP are summarized in **Table 6**. Wet-weather receiving water monitoring will be conducted for the duration of the MS4 permit.

Table 6 Receiving Water Monitoring Sites, Constituents, and Annual Monitoring Frequency

Constituents	Annual Frequency Wet/Dry[(1)]		
	RW-BCEG-1 and RW-BCEG-2	All Shoreline Monitoring Sites	Mass Emissions Station S28
Total Coliform	3/0	Daily/Weekly	
Fecal Coliform	3/0	Daily/Weekly	
Enterococcus	3/0	Daily/Weekly	
Indicator Bacteria			3/2
Copper (total and dissolved)			3/2
Lead (total and dissolved)			3/2
Zinc (total and dissolved)			3/2
Mercury	3/0		
Arsenic	3/0		
Flow and field parameters[(2)]	3/0		3/2
Pollutants identified in Table E-2 of the MRP[(3)]	1[(3,4)]/0		1/1[(3,4)]
Aquatic Toxicity and Toxicity Identification Evaluation (TIE)[5]	2/0		2/1

1. Annual frequency listed as number of wet-weather/dry-weather events per year, respectively (e.g., 3/0 signifies three wet weather and zero dry weather events per year).
2. Field parameters are defined as dissolved oxygen, pH, temperature, and specific conductivity. For ocean monitoring, field parameters will also include salinity.
3. All pollutants identified in Table E-2 of the MRP not already explicitly addressed by monitoring at this site.
4. Monitoring frequency only applies during the first year of monitoring. Table E-2 parameters will be monitored during the first significant rain event of the storm year and during the critical dry weather event where dry weather sampling is conducted. For pollutants identified in Table E-2 of the MRP that are not detected at the Method Detection Limit (MDL) or the result is below the lowest applicable water quality objective, additional monitoring will not be conducted (i.e., the monitoring frequency will become 0/0). For pollutants detected above the lowest applicable water quality objective, future monitoring will be conducted at the frequency specified in the MRP (i.e., the monitoring frequency will become 3/0 at SMB sites and 3/2 at S28).
5. Aquatic toxicity monitoring requirements are summarized in correspondence from the Regional Board to all Permittees which has been provided as Section D.5 of **Appendix D**.

2.3.3 Dry-Weather

Part VI.D.1.a of the MRP states dry-weather receiving water monitoring shall be conducted two times per year. The Beach Cities WMG has installed LFDs to address dry-weather flows. The LFDs are operational year-round and divert dry-weather flows from the storm drains to the sanitary sewer system, keeping dry-weather flows from reaching Santa Monica Bay. Given that the LFDs divert all dry-weather flow from reaching Santa Monica Bay, the Beach Cities WMG has opted not to conduct dry-weather receiving water monitoring for Santa Monica Bay. All LFDs will be closely monitored and maintained to ensure that no dry-weather flow will reach the Santa Monica Bay shoreline. Dry weather monitoring, based on the Los Angeles County Mass Emissions Program protocols, will continue to occur during the historically driest month (August), at MES S28, and be summarized within the WMG annual monitoring report.

3.0 GIS Database

To meet the requirements of Part VII of the MRP, a map(s) and/or database of the MS4 storm drains, channels, and outfalls will be submitted with the CIMP and include the following information (Part VII.A of the MRP):

1. Surface water bodies within the Permittee(s) jurisdiction
2. Sub-watershed (HUC-12) boundaries
3. Land use overlay
4. Effective Impervious Area (EIA) overlay (if available)
5. Jurisdictional boundaries
6. The location and length of all open channel and underground pipes 18 inches in diameter or greater (with the exception of catch basin connector pipes)
7. The location of all dry-weather diversions
8. The location of all major MS4 outfalls within the Permittee's jurisdictional boundary. Each major outfall shall be assigned an alphanumeric identifier, which must be noted on the map
9. Notation of outfalls with significant non-stormwater discharges (to be updated annually)
10. Storm drain outfall catchment areas for each major outfall within the Permittee(s) jurisdiction
11. Each mapped MS4 outfall shall be linked to a database containing descriptive and monitoring data associated with the outfall. The data shall include:

    a. Ownership
    b. Coordinates
    c. Physical description
    d. Photographs of the outfall, where possible, to provide baseline information to track operation and maintenance needs over time
    e. Determination of whether the outfall conveys significant non-stormwater discharges
    f. Stormwater and non-stormwater monitoring data

Attachment A of the MS4 Permit defines a major MS4 outfall (or ''major outfall'') as a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive stormwater from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more) (40 CFR § 122.26(b)(5)).

Available GIS data were reviewed to determine whether components 1 through 11 from the list specified in the MRP were available for submittal. The availability of these components and, if applicable, the schedule for obtaining them are discussed in Sections 3.2 and 3.3.

3.1 Program Objectives

Each year, a storm drain, channel, and outfall map as well as an associated database for the Beach Cities WMG are required to be updated to incorporate the most recent characterization data for outfalls with significant non-stormwater discharge.

3.2 Available Information

The Beach Cities WMG reviewed Part VII.A of the MRP and gathered the available information for the group. The following data are readily available for submittal as a map and/or in a database (Note: the numbering below corresponds to the item number in the Permit list):

1. Surface water bodies within the Permittee(s) jurisdiction
2. Sub-watershed (HUC-12) boundaries
3. Land use overlay
5. Jurisdictional boundaries
6. The location and length of all open channel and underground pipes 18 inches in diameter or greater (with the exception of catch basin connector pipes)
7. The location of all dry-weather diversions
8. The location of all major MS4 outfalls within the Permittee's jurisdictional boundary
10. Storm drain outfall catchment areas for each major outfall within the Permittee(s) jurisdiction
11. Each mapped MS4 outfall shall be linked to a database containing descriptive and monitoring data associated with the outfall. The data shall include:
    a. Ownership
    b. Coordinates
    c. Physical description

Figure 2, 3, 5 and 6 present the information listed above for the Beach Cities WMG.

3.3 Pending Information and Schedule for Completion

From the review, the following data are not currently available for submittal as a map and/or in a database, but are scheduled for completion:

4. Effective Impervious Area (EIA) overlay (if available)
9. Notation of outfalls with significant non-stormwater discharges (to be updated annually)
11. Each mapped MS4 outfall shall be linked to a database containing descriptive and monitoring data associated with the outfall. The data shall include:
    d. Photographs of the outfall, where possible, to provide baseline information to track operation and maintenance needs over time
    e. Determination of whether the outfall conveys significant non-stormwater discharges
    f. Stormwater and non-stormwater monitoring data.

Completion of the data listed above is in progress and will be collected through the implementation of the CIMP, specifically the Non-Stormwater Outfall Monitoring Program. The

EIA overlay will be created as part of the Beach Cities' EWMP and will be based on land use information and assumed impervious values. Each year, the storm drains, channels and outfalls map and associated database will be updated to incorporate the most recent characterization data for outfalls with significant non-stormwater discharge. The updated maps and/or associated database will be submitted each year with the Annual Report.

4.0 Stormwater Outfall Monitoring

Stormwater outfall monitoring is intended to assess discharge water quality relative to municipal action limits (MALs) and WQBELs derived from TMDL WLAs, and evaluates the potential of outfall discharges to have caused or contributed to exceedances of RWLs derived from TMDL WLAs or receiving water quality objectives. Drainage of storm drains within the Beach Cities WMG differs between each equivalent HUC-12 subwatershed. An analysis of land uses within equivalent HUC-12 subwatersheds, jurisdictional areas represented by each outfall site, and each site's drainage area was conducted for each outfall monitoring site.

4.1 Program Objectives

As outlined in the MRP (Part VIII.A of the MRP), stormwater discharges from the MS4 shall be monitored at outfalls and/or alternative access points such as manholes, or in channels representative of the land uses within the Permittee's jurisdiction to support meeting the three objectives of the stormwater outfall monitoring program:

1. Determine the quality of a Permittee's discharge relative to municipal action levels, as described in Attachment G of the MS4 Permit;
2. Determine whether a Permittee's discharge is in compliance with applicable stormwater WQBELs derived from TMDL WLAs; and
3. Determine whether a Permittee's discharge causes or contributes to an exceedance of receiving water limitations.

Each stormwater outfall monitoring site was evaluated with regards to how representative they are of the surrounding land use of the overall Beach Cities WMG, the individual jurisdictions in which their drainage areas are located, and the equivalent HUC-12. Each zoning category provided by the RAA guidance manual was fit into one of the following eight land use categories:

- Agricultural;
- Industrial;
- Single Family Residential;
- Open Space;
- Commercial;
- Education;
- Multi-Family Residential; and
- Transportation.

4.2 Stormwater Outfall Monitoring Sites

The Permit provides monitoring site "default" requirements - one site per HUC-12 per jurisdiction - for achieving stormwater outfall monitoring objectives. The MS4 Permit also allows for an alternative approach to increase the cost efficiency and effectiveness of the monitoring program. The Beach Cities WMG has chosen the default Permit approach within the Santa Monica Bay and Dominguez Channel Watersheds. The previously approved monitoring program addressing the Machado Lake and Long Beach Harbor HUC-12 area is included as Appendix B to this CIMP; therefore, no new outfall monitoring sites in this HUC-12 have been identified in this document. Six stormwater outfall monitoring sites, as shown in **Figure 8**, were selected as part of the approach. As indicated by **Table 7** these monitoring locations together comprise about a third of the total Beach Cities WMG area.

The selected sites are representative of a combination of the “equivalent” HUC-12s, and the represented City’s jurisdictional area. The County subwatershed and equivalent HUC-12 GIS data displayed minor misalignments resulting in shifts of less than 1% between watersheds when the two sources were compared. Outfall land use characteristics were based on subwatershed data then compared to the divergent County equivalent HUC-12 data. The Beach Cities WMG stormwater outfall samples will be collected as grab samples at manholes upstream of the outfalls. One stormwater outfall monitoring site (OF-BCEG-7) will be monitored at each of the three required wet-weather events on an annual basis, while the remaining five stormwater outfall monitoring sites will be monitored on an alternating annual basis. **Table 8** provides a summary for the six stormwater outfall monitoring sites.

Table 7 Beach Cities WMG Outfall Tributary Area Percentages (of 20,254 acre Total)

Monitoring Site	Outfall Drainage Area	Tributary Area Percentage of WMG Total
OF-BCEG-1	1,533 Acres	7.57%
OF-BCEG-2	49 Acres	0.24%
OF-BCEG-4a	2,914 Acres	14.39%
OF-BCEG-5	365 Acres	1.80%
OF-BCEG-6	780 Acres	3.85%
OF-BCEG-7	3,314 Acres	16.36%
Total Tributary Area	8,955 Acres	44.21%

Table 8 Summary of Stormwater Outfall-Based Monitoring Sites

Site ID	Coordinates		Hydrologic Unit Code-12	Drainage System
	Latitude	Longitude		
Alternating Sites				
OF-BCEG-1	33.89430	-118.416645	Manhattan Beach Frontal SMB	28th Street
OF-BCEG-2	33.86234	-118.400135	Manhattan Beach Frontal SMB	Hermosa Beach Pier
OF-BCEG-4a	33.853775	-118.393725	Manhattan Beach Frontal SMB	Herondo Drain
OF-BCEG-5	33.894574	-118.378438	Lower Dominguez Channel	Marine Avenue
OF-BCEG-6	33.887345	-118.360899	Lower Dominguez Channel	BI 569
Fixed Site				
OF-BCEG-7	33.83722	-118.30879	Lower Dominguez Channel	Torrance Carson Lateral

Three stormwater outfall monitoring sites, two along Santa Monica Bay and one in Dominguez Channel watershed, will be monitored for all wet-weather events during one year, and the remaining two stormwater outfall monitoring sites will be monitored the following year. Each group of monitoring sites will be monitored in alternating years. **Table 9** presents the preliminary rotation schedule for the five stormwater outfall monitoring sites. A synopsis of each potential outfall catchment area, along with an analysis of its land use/zoning characteristics is shown below.

Table 9 Stormwater Outfall Monitoring Rotation Schedule

Outfall ID	Storm Year					
	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
Group 1						
OF-BCEG-1	X		X		X	
OF-BCEG-2						
OF-BCEG-6						
Group 2						
OF-BCEG-4a		X		X		X
OF-BCEG-5						

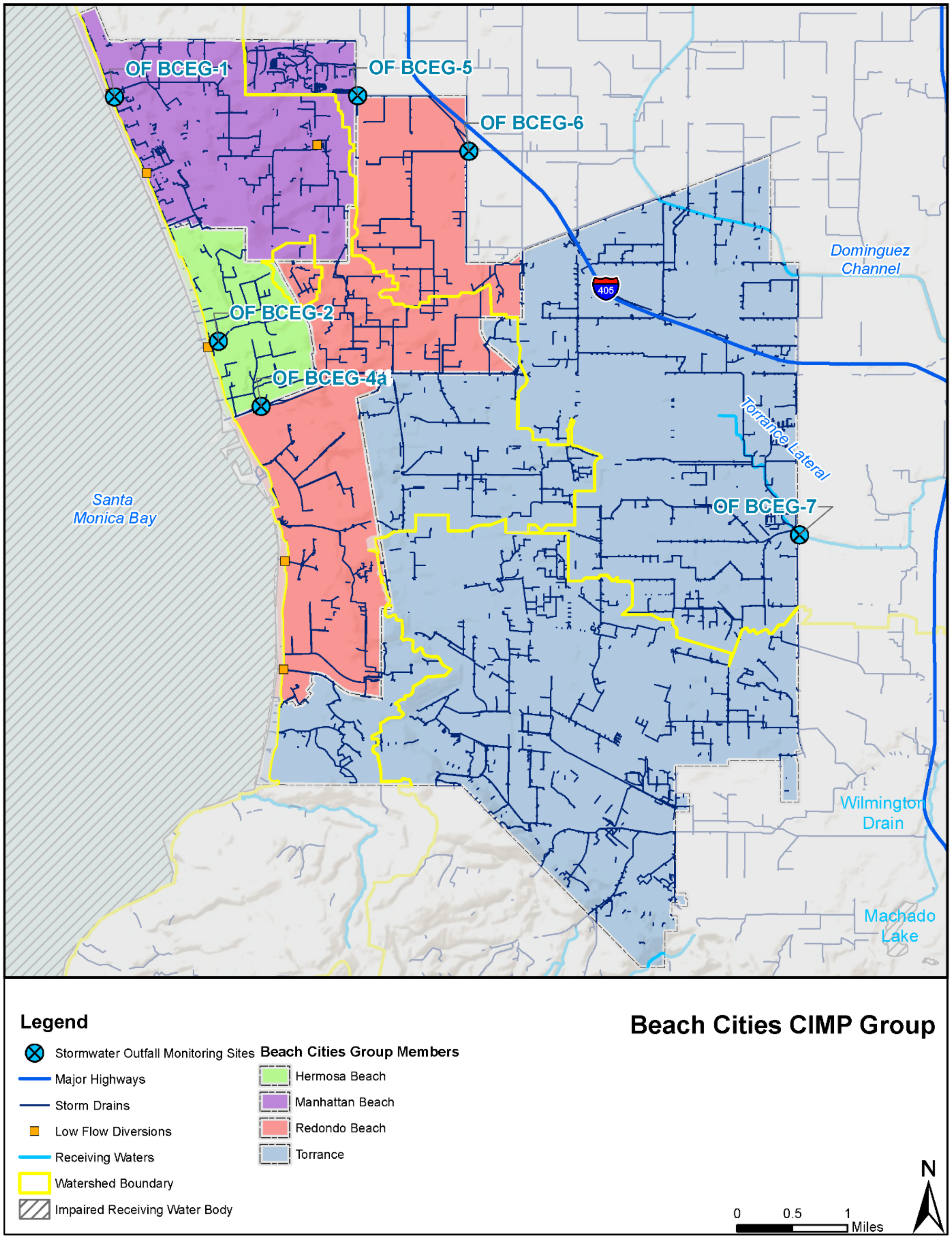

Figure 8 Stormwater Outfalls Monitoring Site Locations

4.2.1 OF-BCEG-1

Stormwater outfall monitoring site OF-BCEG-1, receives discharges from the 28th Street storm drain. The catchment area comprises approximately 74% of the City of Manhattan Beach within the Manhattan Beach Frontal Santa Monica Bay HUC-12 area and 20% of the Beach Cities WMG area within the Manhattan Beach Frontal Santa Monica Bay HUC-12. Land use characteristics of OF-BCEG-1 drainage area are depicted in **Figure 9**. **Table 10** demonstrates that based on the preponderance of single family residential land use area, the OF-BCEG-1 appears to be representative of the City of Manhattan Beach and the Beach Cities WMG area within the Santa Monica Bay Watershed.

Table 10 Stormwater Outfall Monitoring Site OF-BCEG-1 (City of Manhattan Beach)

	OF-BCEG-1 Catchment		Manhattan Beach Portion of SMB MB HUC-12 area		Beach Cities WMG Portion of SMB MB HUC-12 area	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agricultural	0	0%	0	0%	53.44	0.70%
Commercial	129.37	8.44%	207.63	9.98%	791.58	10.36%
Education	91.83	5.99%	120.53	5.80%	403.11	5.28%
Industrial	12.63	0.82%	12.77	0.61%	150.34	1.97%
Multi-Family Residential	100.83	6.58%	208.19	10.01%	1408.86	18.44%
Open Space	68.9	4.49%	107.72	5.18%	375.10	4.91%
Single Family Residential	1129.5	73.68%	1423	68.42%	4456.40	58.34%
Total	1533.1	100%	2079.8	100%	7638.83	100%
Municipal Jurisdiction						
Hermosa Beach	0	0%	0	0%	848.37	11.11%
Manhattan Beach	1533	99.99%	2079.8	100%	2079.79	27.23%
Redondo Beach	0.1	0.01%	0	0%	2599.58	34.03%
Torrance	0	0%	0	0%	2111.09	27.64%
Total	1533.1	100%	2079.8	100%	7638.83	100%

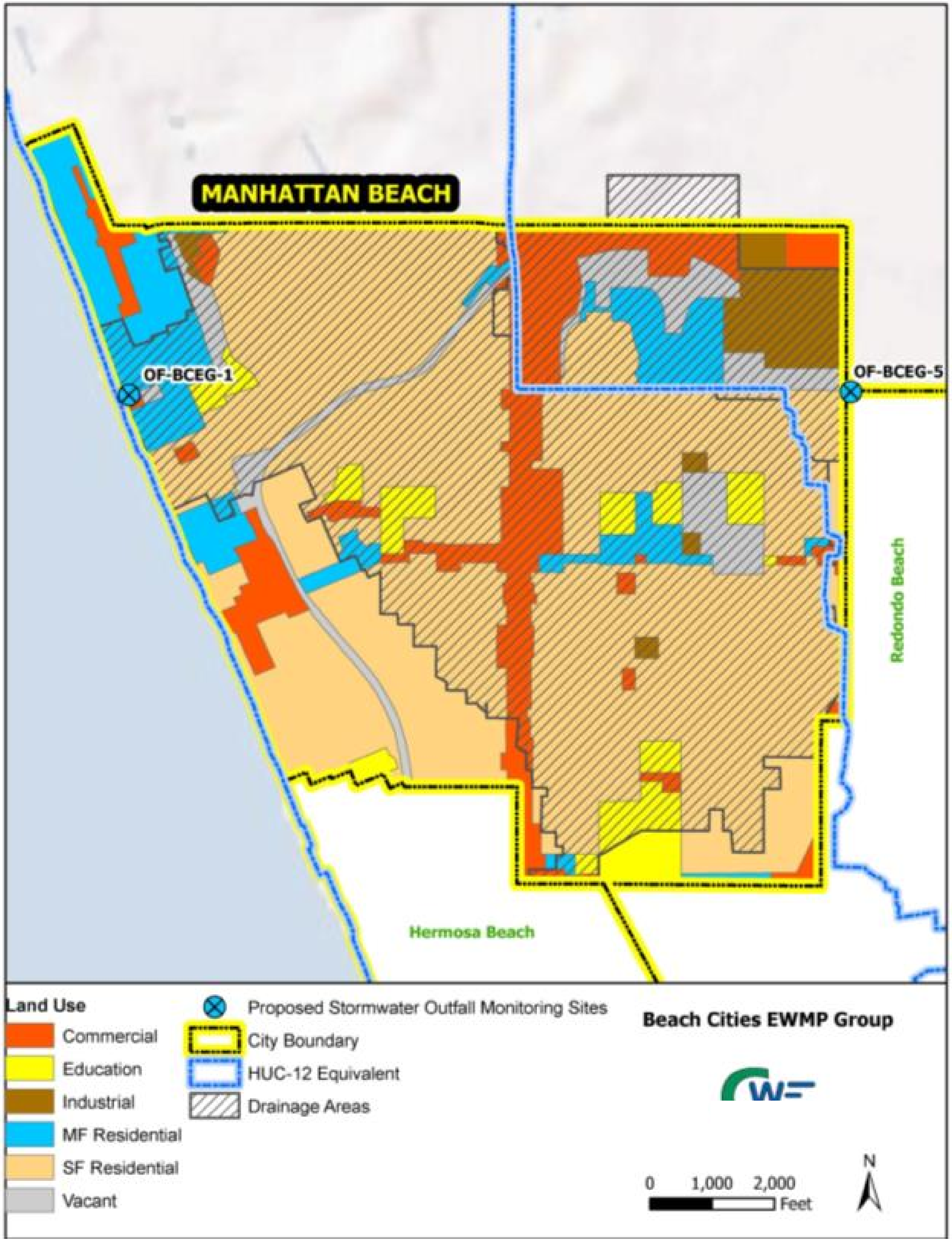

Figure 9 Stormwater Outfall Monitoring Site OF-BCEG-1 Drainage Area

4.2.2 OF-BCEG-2

Stormwater outfall-based monitoring site OF-BCEG-2 receives discharges from the Hermosa Beach Pier storm drain within the Manhattan Beach Frontal Santa Monica Bay HUC-12 area. Drainage is entirely from within the City of Hermosa Beach and represents 5.7% of City area and about 0.64% of the total Beach Cities WMG area within that HUC-12. **Table 11** compares the land use composition within the OF-BCEG-2 catchment area with that of the City of Hermosa Beach and the Beach Cities WMG within the Manhattan Beach Frontal Santa Monica Bay HUC-12 area. The catchment has a greater proportion of commercial and multi-family residential, and a lower proportion of single family residential land use areas as compared to either the City or the total Beach Cities WMG portion within the Santa Monica Bay watershed. As depicted in **Figure 10**, discharge from the OF-BCEG-2 catchment area is more representative of discharge within the City of Hermosa Beach than the Beach Cities WMG group as whole, but may best assess the impact of commercial land use areas in the WMG area on Santa Monica Bay water quality.

Table 11 Stormwater Outfall Monitoring Site OF-BCEG-2 (City of Hermosa Beach)

	OF-BCEG-2 Catchment		**Hermosa Beach Portion of SMB MB HUC-12 area**		**Beach Cities WMG Portion of SMB MB HUC-12 area**	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agricultural	0	0%	0	0%	53.44	0.70%
Commercial	20.8	42.7%	129.92	15.31%	791.58	10.36%
Education	0	0%	16.27	1.92%	403.11	5.28%
Industrial	0	0%	13.3	1.57%	150.34	1.97%
Multi-Family Residential	23.24	47.7%	254.05	29.95%	1408.86	18.44%
Open Space	0.25	0.51%	51.39	6.06%	375.10	4.91%
Single Family Residential	4.43	9.09%	383.44	45.20%	4456.40	58.34%
Total	48.72	100%	848.37	100%	7638.83	100%
Municipal Jurisdiction						
Hermosa Beach	48.72	100%	848.37	100%	848.37	11.11%
Manhattan Beach	0	0%	0	0%	2079.79	27.23%
Redondo Beach	0	0%	0	0%	2599.58	34.03%
Torrance	0	0%	0	0%	2111.09	27.64%
Total	48.72	100%	848.37	100%	7638.83	100%

Figure 10 Stormwater Outfall Monitoring Site OF-BCEG-2 Drainage Area

4.2.3 OF-BCEG-4a

Stormwater outfall monitoring site OF-BCEG-4a is located near the downstream end of the Herondo Drain, approximately 1,800 feet from the storm drain outfall in Santa Monica Bay. The monitoring location is within the Manhattan Beach Frontal Santa Monica Bay HUC-12 area of the Beach Cities WMG. The catchment area is primarily within the cities of Redondo Beach and Torrance (36.0% Redondo Beach, 53.7% Torrance), though some area from both Hermosa Beach (8.5%) and Manhattan Beach (1.8%) also drains to this location. In total, the monitoring location accounts for approximately 38% of the Beach Cities WMG area within the SMB HUC-12 area. The drainage area for OF-BCEG-4a is shown in **Figure 11** and the land use categories are listed in **Table 12**. The tributary area is relatively representative of the cities of Redondo Beach and Torrance, as single family residential and multi-family residential land uses account for approximately 70-75% of the land use in both the watershed and cities within the SMB HUC-12.

Table 12 Stormwater Outfall Monitoring Site OF-BCEG-4a (Redondo Beach and Torrance)

	OF-BCEG-4a Catchment		Redondo/Torrance Portion of SMB MB HUC-12 area		Beach Cities WMG Portion of SMB MB HUC-12 area	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agriculture	50.92	1.7%	53.44	1.1%	53.44	0.70%
Commercial	359.35	12.3%	454.03	9.6%	791.58	10.36%
Education	138.91	4.8%	266.31	5.7%	403.11	5.28%
Industrial	132.57	4.5%	124.27	2.6%	150.34	1.97%
Multi-Family Residential	574.96	19.7%	946.62	20.1%	1408.86	18.44%
Open Space	185.10	6.4%	215.99	4.6%	375.10	4.91%
Single Family Residential	1,472.13	50.5%	2650	56.3%	4456.40	58.34%
Total	2,913.94	100%	4710.7	100.00%	7638.83	100%
Municipal Jurisdiction						
Hermosa Beach	246.80	8.5%	0	0%	848.37	11.11%
Manhattan Beach	52.91	1.8%	0	0%	2079.79	27.23%
Redondo Beach	1,049.74	36.0%	2599.6	55.2%	2599.58	34.03%
Torrance	1,564.50	53.7%	2111.1	44.8%	2111.09	27.64%
Total	2,913.94	100%	4710.7	100%	7638.83	100%

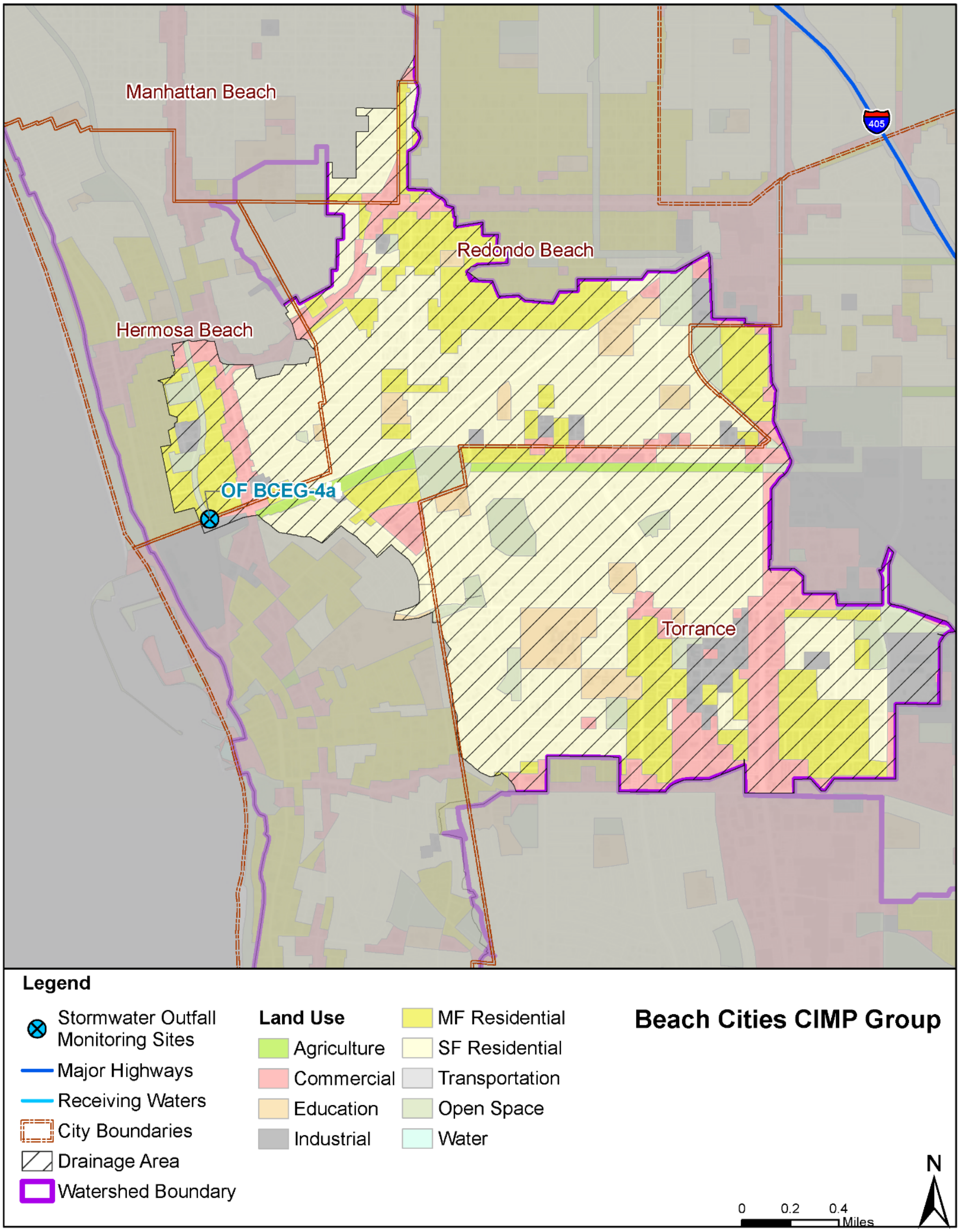

Figure 11 Stormwater Outfall Monitoring Site OF-BCEG-4a Drainage Area

4.2.5 OF-BCEG-5

Stormwater outfall monitoring site OF-BCEG-5 drains primarily from the City of Manhattan Beach through the Marine Avenue storm drain within the Lower Dominguez Channel HUC-12 area. The OF-BCEG-5 catchment area encompasses nearly 99% of the City of Manhattan Beach and 4.9% of the Beach Cities WMG area within the Lower Dominguez Channel HUC-12. The OF-BCEG-5 drainage area is depicted in **Figure 12**, while **Table 13** summarizes the land use composition within the catchment above the location. This location is representative of the City of Manhattan Beach discharges to the Dominguez Channel.

Table 13 Stormwater Outfall Monitoring Site OF-BCEG-5 (City of Manhattan Beach)

	OF-BCEG-5 Catchment		**Manhattan Beach Portion of Lower DC HUC-12 area**		**Beach Cities WMG Portion of Lower DC HUC-12 area**	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agricultural	0	0%	0	0%	106.13	1.42%
Commercial	121.9	33.40%	111.43	30.16%	1252.65	16.73%
Education	0	0%	0	0%	259.25	3.46%
Industrial	72.31	19.81%	77.45	20.96%	2012.17	26.88%
Multi-Family Residential	51.25	14.04%	51.25	13.87%	905.69	12.10%
Open Space	59.58	16.33%	56.89	15.40%	439.53	5.87%
Single Family Residential	59.91	16.42%	72.45	19.61%	2392.15	31.95%
Transportation	0	0%	0	0%	118.77	1.59%
Total	364.95	100%	369.47	100%	7486.34	100%
Municipal Jurisdiction						
Hermosa Beach	0	0%	0	0%	0	0%
Manhattan Beach	325.2	89.11%	369.47	100%	362.95	4.89%
Redondo Beach	1.24	0.34%	0	0%	1251.83	16.85%
Torrance	0	0%	0	0%	5812.65	78.26%
El Segundo[1]	38.51	10.55%	0	0%	0	0%
Total	364.95	100%	369.47	100%	7427.43	100%

[1] El Segundo not part of Beach Cities WMG

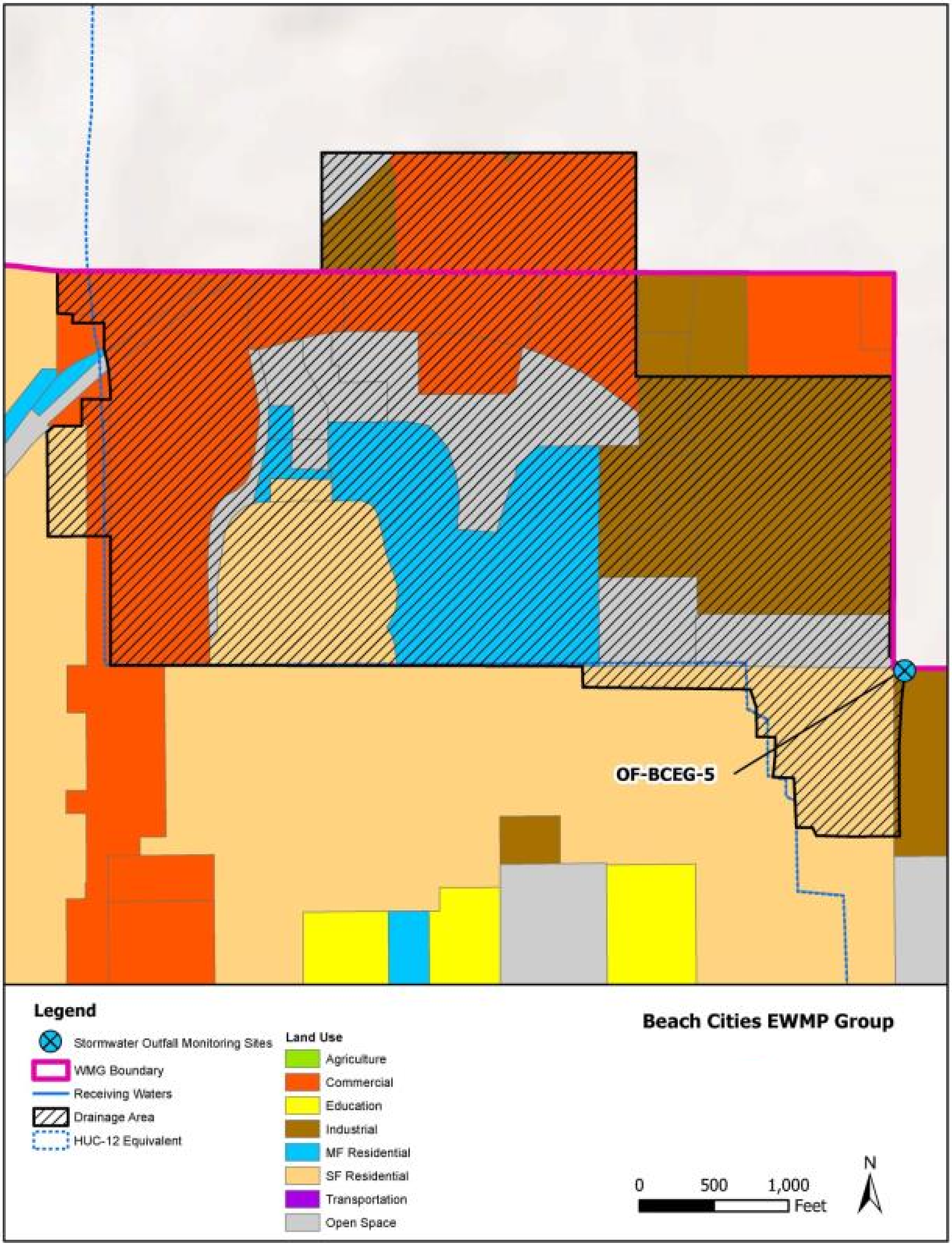

Figure 12 Stormwater Outfall Monitoring Site OF-BCEG-5 Drainage Area

4.2.6 OF-BCEG-6

Stormwater outfall monitoring site OF-BCEG-6 primarily drains from the City of Redondo Beach through the BI 569 storm drain to the Lower Dominguez Channel HUC-12 area. The OF-BCEG-6 catchment area comprises 61% of the City of Redondo Beach and 10.5% of the total Beach Cities WMG area within the HUC-12. The drainage area for OF-BCEG-6 is depicted in **Figure 13**, while **Table 14** identifies land uses within the OF-BCEG-6 catchment area as compared to the Beach Cities WMG portion of Lower Dominguez Channel HUC-12 area. As compared to the Dominguez Channel watershed portion of the City of Redondo Beach, the area of single and multi-family residential is higher, with lower percentages of industrial and commercial land use categories. Single family land use in the catchment is comparable to that of the greater Beach Cities WMG portion of the Lower Dominguez Channel watershed, while multifamily residential areas replace commercial and industrial land uses found in adjacent portions of the City of Torrance. Due to the industrial characteristics of northeast Redondo Beach, no outfalls are particularly representative of the land use distribution or of the EWMP Group within the Lower Dominguez Channel HUC-12 area. This site was chosen as most representative among the available options and includes the largest possible tributary drainage area.

Table 14 Stormwater Outfall Monitoring Site OF-BCEG-6 (City of Redondo Beach)

	OF-BCEG-6 Catchment		Redondo Beach Portion of Lower DC HUC-12 area		Beach Cities WMG Portion of Lower DC HUC-12 area	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agricultural	6.03	0.77%	11.34	0.90%	106.13	1.42%
Commercial	51.08	6.55%	226	17.96%	1252.65	16.73%
Education	15.65	2.01%	15.69	1.25%	259.25	3.46%
Industrial	0.65	0.08%	199.46	15.85%	2012.17	26.88%
Multi-Family Residential	419.9	53.87%	463.49	36.83%	905.69	12.10%
Open Space	39.61	5.08%	59.63	4.74%	439.53	5.87%
Single Family Residential	246.58	31.63%	260.76	20.72%	2392.15	31.95%
Transportation	0	0%	22.21	1.76%	118.77	1.59%
Total	779.5	100%	1258.6	100%	7486.34	100%
Municipal Jurisdiction						
Hermosa Beach	0	0%	0	0%	0	0%
Manhattan Beach	7.59	0.97%	0	0%	362.95	4.89%
Redondo Beach	771.91	99.03%	1258.6	100%	1251.83	16.85%
Torrance	0	0%	0	0%	5812.65	78.26%
Total	779.5	100%	1258.6	100%	7427.43	100%

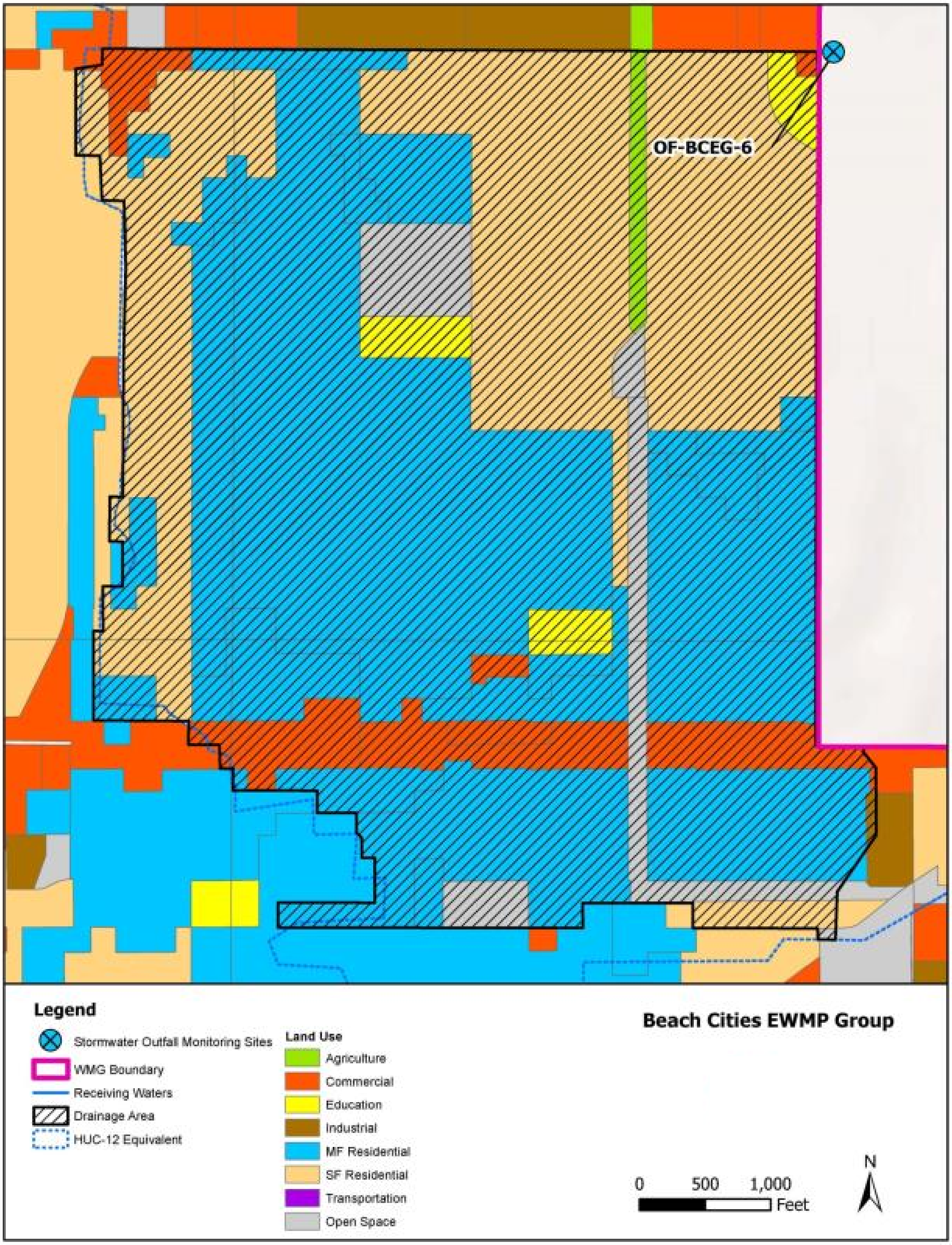

Figure 13 Stormwater Outfall Monitoring Site OF-BCEG-6 Drainage Area

4.2.7 OF-BCEG-7

Stormwater outfall monitoring site OF-BCEG-7 is located near the Torrance Carson Lateral headwaters and receives runoff exclusively from the City of Torrance. The catchment comprises the entirety of the area of the City of Torrance tributary to the Torrance lateral and represents 57% of the City of Torrance and 44.64% of the Beach Cities WMG contributory area to the Lower Dominguez Channel HUC-12. **Figure 14** depicts the drainage area for OF-BCEG-7, while **Table 15** demonstrates that the catchment is relatively concentrated in industrial land use. Most of the residential land use tributary to this location is associated with two smaller drains from the more central portion of the City of Torrance. Land use characteristics to the combined outfall area near Western Avenue are relatively similar to, and consistent with, land use within the City of Torrance to the Lower Dominquez Channel watershed, including areas above the County Mass Emission station S28-Artesia Boulevard and the Dominguez Channel. As a result, the monitoring location has been placed near the boundary of the City of Torrance.

Table 15 Stormwater Outfall Monitoring Site OF-BCEG-7 (City of Torrance)

	OF-BCEG-7 Catchment		**Torrance Portion of Lower DC HUC-12 area**		**Beach Cities WMG Portion of Lower DC HUC-12 area**	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agricultural	20.22	0.61%	94.79	1.63%	106.13	1.42%
Commercial	514.41	15.52%	885.65	15.22%	1252.65	16.73%
Education	109.69	3.31%	243.56	4.19%	259.25	3.46%
Industrial	1576.1	47.56%	1729.2	29.71%	2012.17	26.88%
Multi-Family Residential	114.37	3.45%	391.35	6.72%	905.69	12.10%
Open Space	252.55	7.62%	320.16	5.50%	439.53	5.87%
Single Family Residential	710.21	21.43%	2058.5	35.37%	2392.15	31.95%
Transportation	16.51	0.50%	96.56	1.66%	118.77	1.59%
Total	3314.1	100%	5819.8	100%	7486.34	100%
Municipal Jurisdiction						
Hermosa Beach	0	0%	0	0%	0	0%
Manhattan Beach	0	0%	0	0%	362.95	4.89%
Redondo Beach	0	0%	0	0%	1251.83	16.85%
Torrance	3314.1	100%	5819.8	100%	5812.65	78.26%
Total	3314.1	100%	5819.8	100%	7427.43	100%

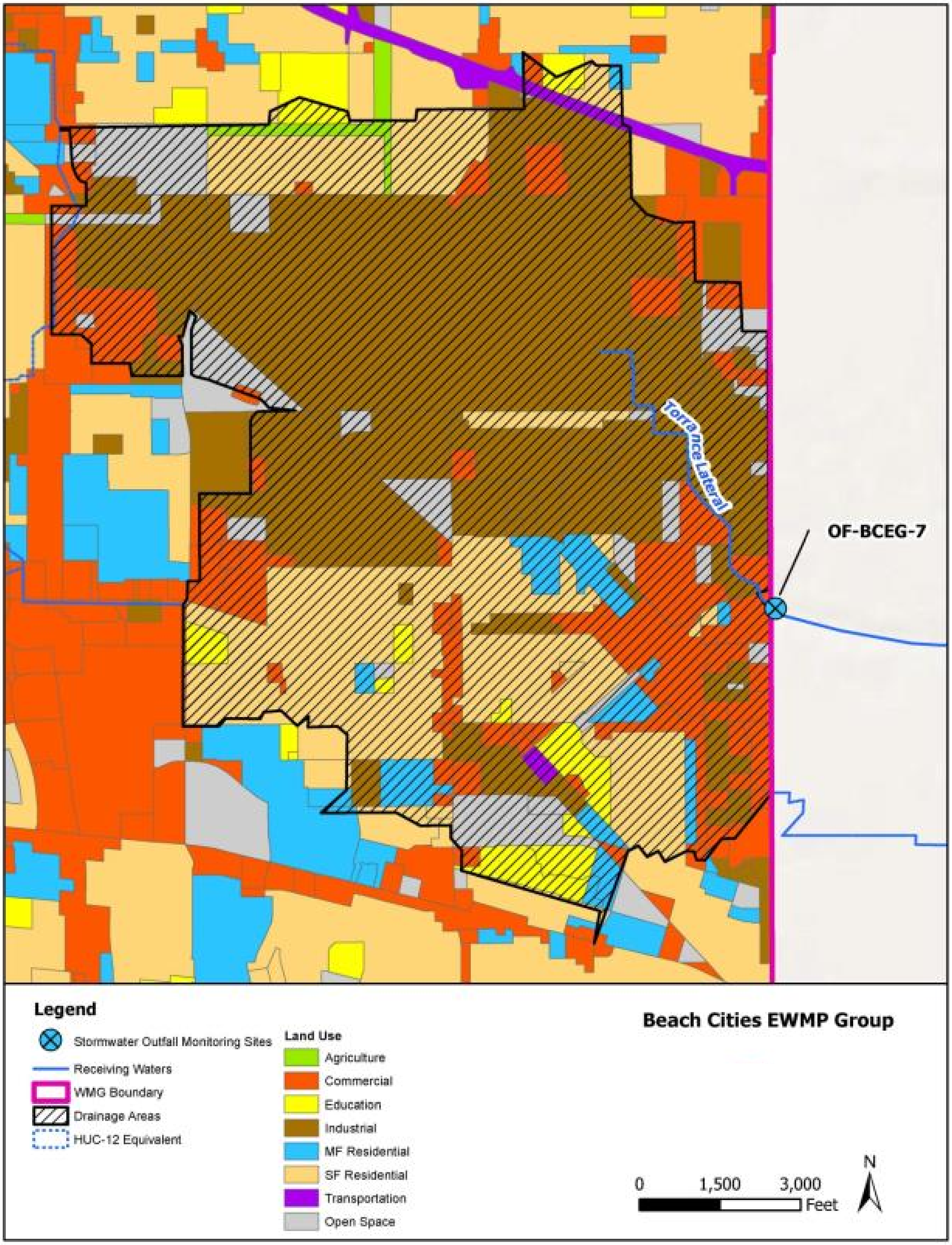

Figure 14 Stormwater Outfall Monitoring Site OF-BCEG-7 Drainage Area

4.2.8 Existing WMG Machado Lake and Harbor Monitoring

Appendix B of this CIMP includes the Board-approved Machado Lake Monitoring and Reporting Plan, which addresses monitoring within the Long Beach Harbor HUC-12 area.

4.3 Monitoring Frequency, Parameters, and Duration

Stormwater outfall water quality samples would initially be manually composited as aliquots taken at 20-minute increments over a three hour period. Upon Permittee determination of cost effectiveness and improved safety, an automatic sampler, using a flow-weighted routine, may replace manual collection. For composite samples, analytes with short holding times, such as bacteria, cyanide, oxygen demand, or oil and grease, along with field parameters, would always be collected as grab samples, typically late in the storm event, although not necessarily as the last sample collected.

Stormwater outfall monitoring sites will be monitored for three storm events per year, prior to receiving water monitoring, for all required constituents except aquatic toxicity. Aquatic toxicity will be monitored when triggered by recent receiving water toxicity monitoring, where a toxicity identification evaluation (TIE) on the observed receiving water toxicity test was inconclusive. Aquatic toxicity monitoring requirements are summarized in correspondence from the Regional Board to all Permittees which has been provided as Section D.5 of **Appendix D**. The requirements for monitored constituents at each outfall are outlined in the MRP Section VIII.B.1.c and presented in **Table 16**. Monitoring conducted in the Machado Lake watershed is described in the approved Machado Lake Watershed Monitoring Plan, included as Appendix B. Parameters in Table E-2 of the MRP, will not be identified as exceeding applicable water quality objectives until after the first year of receiving water monitoring. Monitoring for the selected sites would occur for at least the duration of the Permit term, unless an alternative site is warranted, per the adaptive management process, as presented in **Section 10**. Additional analytical and monitoring procedures are discussed in the Analytical and Monitoring Procedures per **Appendix D.**

Table 16 List of Constituents for Stormwater Outfall Monitoring

Constituent	Water Body		
	Santa Monica Bay	**Dominguez Channel**	**Torrance Carson Lateral**
Flow, temperature, pH, hardness, total suspended solids, dissolved oxygen, and specific conductivity	X	X	X
Table E-2 pollutants detected above relevant objectives	X	X	X
Aquatic Toxicity and Toxicity Identification Evaluation (TIE)[(1)]			
Total Coliform	X		
Fecal Coliform	X		
Enterococcus	X		
Arsenic	X		
Mercury	X		
Total Copper		X	X
Total Lead		X	X
Total Zinc		X	X
Diazinon		X	
E. coli (Indicator Bacteria)		X	X
Cyanide		X	X
pH		X	X
Selenium		X	X
Mercury		X	X
Cadmium		X	X
DDT and PCB	X		

[1] Toxicity is only monitored from outfalls when triggered by recent receiving water toxicity monitoring where a TIE on the observed receiving water toxicity test was inconclusive. If toxicity is observed at the outfall a TIE must be conducted.

5.0 Non-Stormwater Outfall Screening and Monitoring Program

The Non-Stormwater Outfall Screening and Monitoring Program (Non-Stormwater Program) is focused on dry-weather discharges to receiving waters from major outfalls. The program fills two roles: (1) to provide assessment of whether the non-stormwater discharges are potentially impacting the receiving water, and (2) to determine whether significant non-stormwater discharges are allowable.

The Beach Cities WMG has been addressing non-stormwater flow to Santa Monica Bay with the installation of LFDs. The Beach Cities WMG has installed seven LFDs, throughout the Santa Monica Bay portion of the WMGs area. These LFDs are operational year-round and divert non-stormwater flows from storm drains to the sanitary sewer or subsurface infiltration systems, preventing the flows from directly discharging into Santa Monica Bay. These systems will periodically be inspected to verify that they are working as designed and preventing any flow from discharging to SMB. Outfalls containing LFDs will only be included in the outfall screening process if their LFDs have been shown to not be functioning adequately.

The Non-Stormwater Program is complimentary to the IC/ID MCM. Non-stormwater outfall monitoring sites will be determined after outfall screening, determination of discharge significance, and source identification. The outfall screening and monitoring process is intended to prioritize outfalls for assessment and, where appropriate, support scheduling of BMPs to address non-stormwater flows.

5.1 Program Objectives

The objectives of the Non-Stormwater Program include the following (Part II.E.3 of the MRP):

a. Determine whether a Permittee’s discharge is in compliance with applicable non-stormwater WQBELs derived from TMDL WLAs;
b. Determine whether a Permittee’s discharge exceeds non-stormwater action levels, as described in Attachment G of the MS4 Permit;
c. Determine whether a Permittee’s discharge causes or contributes to an exceedance of receiving water limitations; and
d. Assist Permittees in identifying illicit discharges as described in Part VI.D.10 of the MS4 Permit.

Additionally, the outfall screening and monitoring process is intended to meet the following objectives (Part IX.A of the MRP):

1. Develop criteria or other means to ensure that all outfalls with significant non-stormwater discharges are identified and assessed during the term of this MS4 Permit.
2. For outfalls determined to have significant non-stormwater flow, determine whether flows are the result of illicit connections or illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources.
3. Refer information related to identified IC/IDs to the IC/ID Elimination Program (Part VI.D.10 of the MS4 Permit) for appropriate action.

4. Based on existing screening or monitoring data or other institutional knowledge, assess the impact of non-stormwater discharges (other than identified IC/IDs) on the receiving water.
5. Prioritize monitoring of outfalls considering the potential threat to the receiving water and applicable TMDL compliance schedules.
6. Conduct monitoring or other investigations to identify the source of pollutants in non-stormwater discharges.
7. Use results of the screening process to evaluate the conditionally exempt non-stormwater discharges identified in Parts III.A.2 and III.A.3 of the MS4 Permit and take appropriate actions pursuant to Part III.A.4.d of the MS4 Permit for those discharges that have been found to be a source of pollutants. Any future reclassification shall occur per the conditions in Parts III.A.2 or III.A.6 of the MS4 Permit.
8. Conduct monitoring or assess existing monitoring data to determine the impact of non-stormwater discharges on the receiving water.
9. Maximize the use of Permittee resources by integrating the screening and monitoring process into existing or planned Integrated Monitoring Program (IMP) and/or CIMP efforts.

The outfall screening and source identification investigations must be completed prior to initiating monitoring at an individual outfall. A flowchart of the Non-Stormwater Program is presented as **Figure 15**. Detailed discussion of the major program elements is provided in the following subsections.

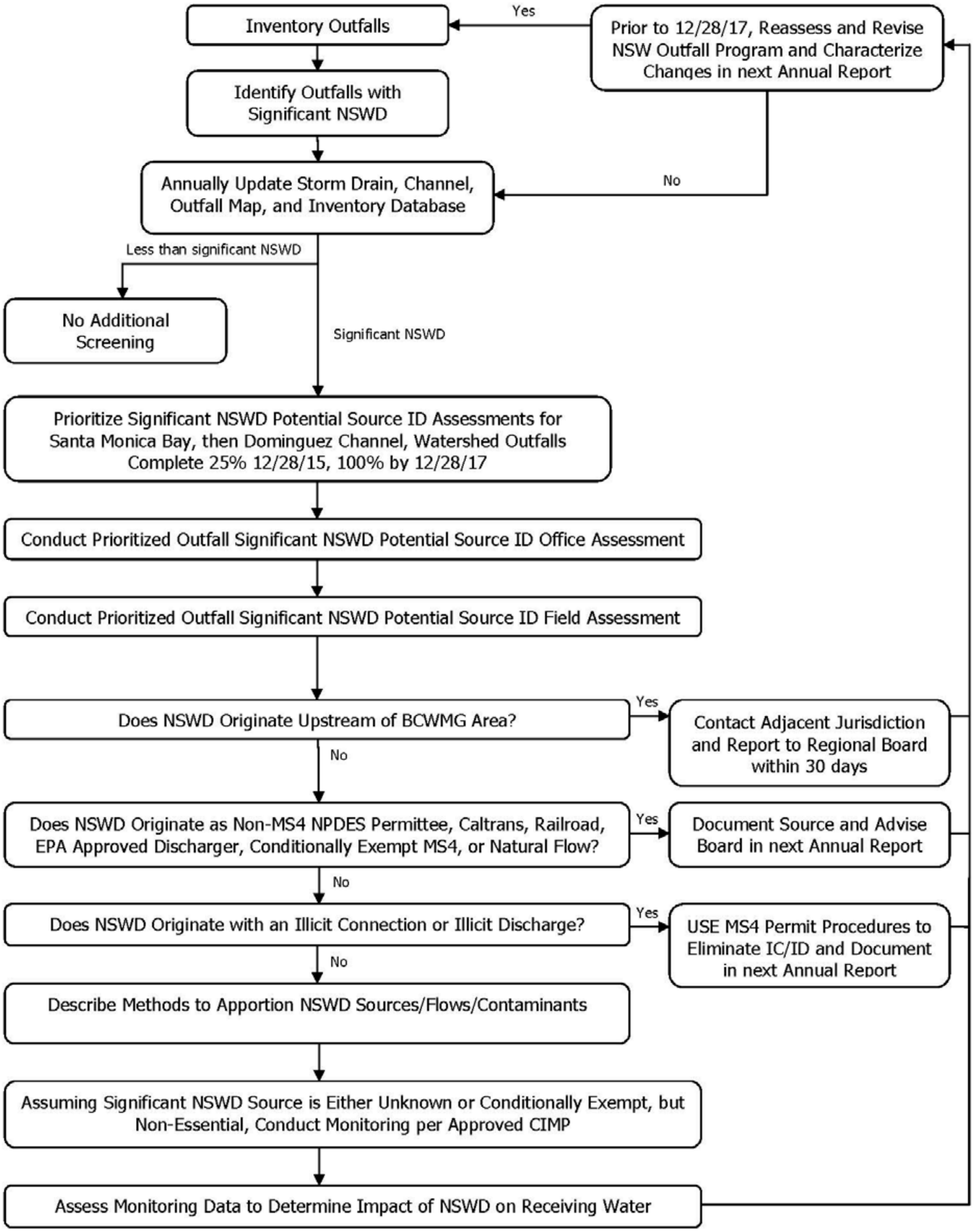

Figure 15 Non-Stormwater Outfall Monitoring Program Flow Chart

5.2 Outfall Screening and Identification of Outfalls with Significant Non-Stormwater Discharge

Based on a review of the available information, identification of significant non-stormwater discharges is not possible at this time. Under this task, each Beach Cities WMG member will undertake three outfall screenings to evaluate all major outfalls within their jurisdiction area[1]. The major outfalls for the Beach Cities WMG are defined as follows:

- 36-inch or larger pipes, or non-circular drains with a drainage area of more than 50 acres, and
- 12-inch or larger pipes, or non-circular drains from industrial zoned areas with a drainage area of 2 acres or more.

In order to collect data to determine significant non-stormwater outfalls, the Beach Cities will perform three outfall screenings during the first year after CIMP approval. The outfall screening is necessary to collect the information to identify outfalls exhibiting significant non-stormwater discharges and to develop the information needed for the inventory of outfalls with significant non-stormwater discharges. Each member agency within the Beach Cities WMG has agreed to use the same screening criteria for the non-stormwater outfall screening process; however significance criteria for non-stormwater discharges will differ between the two watersheds, Santa Monica Bay and Dominguez Channel. Significance for the two watersheds will be deemed as follows:

a. For **Santa Monica Bay watershed**, significant non-stormwater flows will be designated if non-stormwater flow was observed reaching the wave wash from the particular outfall during two of the three outfall screenings. Flow of any amount that reaches the wave wash will be considered significant for Santa Monica Bay outfalls due to the high recreational use of the beaches, and will require source identification of the discharge.
b. For **Dominguez Channel watershed**, significant non-stormwater flow will be designated if persistent flows, exceeding 10 gallons per minute (gpm) (approximately the flow of a garden hose), are observed during two of the three screening events. Outfalls within the Dominguez Channel watershed will be screened during working hours and three days or longer after a rain event. The first screening event will note flow observation, whether flow was observed or not observed. During the second and third screening event, flow rate will be estimated and measured using a container and stop watch. If flow of 10 gpm was observed for a particular outfall at two of the three screening events, the outfall will then be designated as having significant non-stormwater discharge and will require source identification of the discharge.

The initial first screening serves the dual purpose of data collection for completing the MS4 infrastructure database, addressed in **Section 3**, and the initial evaluation of outfalls for

[1] The previously approved Monitoring and Reporting Plan for Machado Lake (Appendix B) includes both dry weather sampling and continuous flow measurement of all outfalls from the Machado Lake watershed in Torrance. Therefore, additional non-stormwater outfall screening described in this Section need not be performed in that watershed.

significant non-stormwater discharge. Each outfall in the Beach Cities WMG area will be visited during the first screening. A standard field data collection form will be used, consisting of the following:

- Date, time, weather;
- Photos of outfall and receiving water;
- Descriptions of site condition and accessibility;
- Discharge characteristics, such as odor and color;
- Field probe measurements of conventional parameters such as pH, temperature, etc.; and
- Receiving water characteristics.

Additionally, outstanding information for the MS4 inventory database will be collected as discussed in **Section 3**. Outfalls with significant non-stormwater discharges will be determined after the three outfall screening events conducted by each member agency within their own jurisdictional area.

5.3 MS4 Outfall Inventory

An inventory of MS4 Outfalls will be developed and maintained by each Beach Cities WMG member after the outfall screening. The Beach Cities WMG inventory database will include available existing data from past outfall screening efforts, monitoring, and other data collection efforts. The data within the database will include the physical attributes of MS4 outfalls determined to have significant non-stormwater discharges as well as a list of those outfalls requiring no further assessment. If the MS4 outfall requires no further assessment, the inventory will include the rationale for the determination of no further action required based on the following:

- The outfall does not have flow;
- The outfall does not have a known significant non-stormwater discharge; or
- Discharges observed were determined to be exempt during the source identification (**Section 5.5**).

The inventory will be recorded in the database as required in Part VII.A of the MRP. Each year, the inventory will be updated to incorporate the most recent characterization data for outfalls with significant non-stormwater discharges. The following physical attributes of outfalls with significant non-stormwater discharges will be included in the inventory and should be collected as part of the screening process:

- Date and time of last visual observation or inspection;
- Outfall alpha-numeric identifier;
- Description of outfall structure including size (e.g., diameter and shape);
- Description of receiving water at the point of discharge (e.g., concrete channel);
- Latitude/longitude coordinates;
- Nearest street address;
- Parking, access, and safety considerations;
- Photographs of outfall condition;
- Photographs of significant non-stormwater discharge (or indicators of discharge) unless safety considerations preclude obtaining photographs;

- Estimation of discharge rate;
- All diversions either upstream or downstream of the outfall;
- Observations regarding discharge characteristics such as turbidity, odor, color, presence of debris, floatables, or monitoring characteristics that could aid in pollutant source identification; and
- Monitoring data.

5.4 Prioritized Source Identification

Once the significant non-stormwater outfalls have been identified through the screening process and incorporated into the inventory, Part IX.E of the MRP requires Permittees to prioritize outfalls for further source investigations. The MRP identifies the following prioritization criteria for outfalls with significant non-stormwater discharges:

- Outfalls discharging directly to receiving waters with WQBELs or receiving water limitations in the TMDL provisions for which final compliance deadlines have passed.
- All major outfalls and other outfalls that discharge to a receiving water subject to a TMDL shall be prioritized according to TMDL compliance schedules.
- Outfalls for which monitoring data exist and indicate recurring exceedances of one or more of the Action Levels identified in Attachment G of the Permit.
- All other major outfalls identified to have significant non-stormwater discharges.

In addition to the Permit requirements, the following criteria may be considered when developing the prioritization schedule:

- Rate of discharge based on visual flow observations
- Drainage area to outfall and/or size of outfall
- Odor, color and clarity of discharge
- Results of the field measurements of pH, temperature, DO, and EC
- Presence of flow in the receiving water

Once the prioritization is complete, a source identification schedule will be developed. The scheduling will focus on the outfalls with the highest priorities first. Unless the results of the field screening justify a modification to the schedule in the MRP, the schedule will ensure that source investigations are completed on no less than 25% of the outfalls with significant non-stormwater discharges by December 28, 2015 and 100% by December 28, 2017.

5.4.1 SMB-O-7

As shown in Appendix G, Observational Monitoring Site SMB-O-7 is a major outfall at the Redondo Beach Pier that was observed to have non-stormwater discharge reach the surf on 8 of 74 (11 percent) observed dry weather days between July 2012 and May 2015. Per conversations with the Regional Board on September 11 and September 17, 2015, the Beach Cities Group has agreed to classify this outfall as a priority outfall and will seek to initiate a source investigation by December 28, 2015. The source investigation will take place in accordance with Section 5.5 below. If outfall monitoring is required based on results of the source identification, it will be initiated within 90 days of the completion of the source identification and will be conducted in accordance with Section 5.6.

If the source identification and monitoring at SMB-O-7 demonstrate that non-stormwater flows are causing or contributing to exceedances of the bacteria objectives in Santa Monica Bay, the responsible agency/agencies will seek to eliminate all dry weather flows at this location with the installation of a dry weather diversion or equivalent BMP (e.g., diversion and infiltration). If determined not to be required, the Beach Cities Group will coordinate with the Regional Board on a plan for future monitoring or observations at this location.

5.5 Source Identification of Significant Non-Stormwater Discharge

After the prioritization and schedule have been determined, source identification of the major outfalls with significant non-stormwater discharge will be conducted to identify the source(s) or potential source(s) of non-stormwater discharge.

Part IX.A.2 of the MRP requires Permittees to classify the source identification results into the following types which are summarized in **Table 17**:

A. IC/IDs: If the source is determined to be an illicit discharge, the Permittee must implement procedures to eliminate the discharge consistent with IC/ID requirements (Permit Part VI.D.10) and document actions.
A. Authorized or conditionally exempt non-stormwater discharges: If the source is determined to be an NPDES permitted discharge, a discharge subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or a conditionally exempt essential discharge, the group member must document the source. For non-essential conditionally exempt discharges, the group member must conduct monitoring consistent with Part IX.G of the MRP to determine whether the discharge should remain conditionally exempt or be prohibited.
B. Natural flows: If the source is determined to be a natural flow (e.g. groundwater), the Permittee must document the source.
C. Unknown sources: If the source is unknown, the Permittee must conduct monitoring consistent with Part IX.G of the MRP.

Table 17 Summary of Source Identification Types

Type	Follow-up	Action Required by Permit
A. Illicit Discharge or Connection	Refer to IC/ID program	Implement control measures and report in annual report. Monitor if cannot be eliminated.
B. Authorized or Conditionally Exempt Discharges[1]	Document and identify if essential or non-essential	Monitor non-essential discharges
C. Natural Flows	End investigation	Document and report in annual report
D. Unknown	Refer to IC/ID program	Monitor
E. Upstream of WMG	End investigation	Inform upstream WMG and the Regional Board in writing within 30 days of identifying discharge.

[1] Discharges authorized by a separate NPDES permit, subject to a Record of Decision approved by USEPA pursuant to section 121 of CERCLA, or conditionally exempt and addressed by other requirements. Conditionally exempt non-stormwater discharges addressed by other requirements are described in detail in Part III.A. Prohibitions – Non-Storm Water Discharges of the Permit.

Source identification will be conducted using site-specific procedures based on the characteristics of the non-stormwater discharge. Investigations could include:

- Performing field measurements to characterize the discharge;
- Following dry-weather flows from the location where they are first observed in an upstream direction along the conveyance system; and
- Compiling and reviewing available resources, including past monitoring and investigation data, land use/MS4 maps, aerial photography, and property ownership information.

Based on the results of the source assessment, outfalls may be reclassified as requiring no further assessment, and the inventory will be updated to reflect the information and justification for the reclassification.

Where investigations determine the non-stormwater source to be authorized, natural, or essential conditionally exempt flows, the Beach Cities WMG will conclude the investigation, categorize the outfall as requiring no further assessment in the inventory, and move to the next highest priority outfall for investigation. Where investigations determine that the source of the discharge is non-essential conditionally exempt, an illicit discharge, or is unknown – further investigation may be conducted to eliminate the discharge or demonstrate that it is not causing or contributing to receiving water problems.

In some cases, source investigations may ultimately lead to prioritized programmatic or structural BMPs. Where the Beach Cities WMG has determined that they will address the non-stormwater discharge through modifications to programs or by structural BMP implementation, the Beach Cities WMG will incorporate the approach into the implementation schedule developed in the EWMP, and the outfall can be eliminated from the monitoring list.

5.6 Monitoring of Non-Stormwater Outfalls Exceeding Criteria

As outlined in the MRP (Part II.E.3), outfalls with significant non-stormwater discharges that remain unaddressed after the source investigation shall be monitored to meet the following objectives:

a. Determine whether a Permittee's discharge is in compliance with applicable dry-weather WQBELs derived from TMDL WLAs;
b. Determine whether the quality of a Permittee's discharge exceeds non-stormwater action levels, as described in Attachment G of the Permit; and
c. Determine whether a Permittee's discharge causes or contributes to an exceedance of receiving water limitations.

Thus, outfalls must be monitored if they have been determined to convey significant non-stormwater discharges where the source identification concluded that the source is attributable to an ongoing ID (Type A from **Table 17**), is non-essential conditionally exempt (Type B from **Table 17**), or is unknown (Type D from **Table 17**). Monitoring will seek to begin within 90 days of completing the source identification, but may begin at a later time in order to be coordinated with dry weather receiving water monitoring.

5.6.1 Non-Stormwater Outfall Monitoring Sites

The information to determine the number and location of outfalls requiring monitoring is not available at this time. After the outfall inventory, identification of outfalls with significant non-stormwater discharge, outfall prioritization, and source identification process, outfalls identified as requiring monitoring will be monitored per the Permit requirements.

5.6.2 Monitored Parameters and Frequency

After the outfall screening and determination of which outfalls have significant non-stormwater flows, non-stormwater monitoring sites will be grab sample monitored for two events per year to coordinate with receiving water dry-weather monitoring. Non-stormwater outfall monitoring will occur at least three days following precipitation events and on days having <0.1 inch of precipitation (wet-weather is defined as >=0.1 inch of precipitation). Grab sample water collection during this phase is appropriate, as the focus remains on source controls and eliminating the flow, which during dry-weather tends to be less variable and more integrating of flow characteristics and pollutants, as noted in Permit Attachment E, Part III.F2. Coordination with receiving water monitoring will allow for an evaluation of whether the non-stormwater discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water. Significant non-stormwater outfalls will be monitored for all required constituents, per receiving water bodies, as outlined in Part IX.G.1.a-e of the MRP, except toxicity. Toxicity monitoring is only required when triggered by recent receiving water toxicity monitoring where a TIE on the observed receiving water toxicity test was inconclusive. An overview of the constituents to be monitored and the corresponding frequency is listed in **Table 18**.

Table 18 List of Constituents for Non-Stormwater Outfall Monitoring

Constituent	Water Body		
	Santa Monica Bay	Dominguez Channel	Torrance Carson Lateral
Flow, hardness, pH, dissolved oxygen, temperature, specific conductivity, and total suspended solids	X	X	X
Table E-2 pollutants detected above relevant objectives	X	X	X
Aquatic Toxicity and Toxicity Identification Evaluation (TIE)[1]			
Total Coliform	X		
Fecal Coliform	X		
Enterococcus	X		
Mercury	X		
Arsenic	X		
Total Copper		X	X
Total Lead		X	X
Total Zinc		X	X
Diazinon		X	
E. coli (Indicator Bacteria)		X	X
Cyanide		X	X
pH		X	X
Selenium		X	X
Mercury		X	X
Cadmium		X	X

1. Toxicity is only monitored from outfalls when triggered by recent receiving water toxicity monitoring where a TIE on the observed receiving water toxicity test was inconclusive. If toxicity is observed at the outfall a TIE must be conducted.

Outfalls on the monitoring list will be monitored for at least the duration of the Permit term, or until the non-stormwater discharge is eliminated. Additional analytical and monitoring procedures are discussed in the Analytical and Monitoring Procedures per **Appendix D**.

6.0 New Development/Re-Development Effectiveness

New Development/Re-Development Effectiveness Tracking is used for tracking data on new development and re-development activities. The procedures for reviewing projects, tracking data, and reporting are different for each jurisdiction and may even be different across departments within the same jurisdiction. Due to the complexity of land development processes across jurisdictions, data management and tracking procedures will vary by jurisdiction. The WMG will develop a complete tracking system that works for their individual needs and internal processes. The database will track the following information:

1. Name of the Project and Developer,
2. Mapped project location (preferably linked to the Geographic Information System (GIS) storm drain map),
3. Issuance date of the project Certificate of Occupancy,
4. 85th percentile 24-hour storm event for project design (inches),
5. 95th percentile 24-hour storm event for projects draining to natural water bodies (inches),
6. Other design criteria required to meet hydromodification requirements for drainages to natural water bodies,
7. Project design storm (inches per 24 hours),
8. Project design storm volume (gallons or MGD),
9. Percent of design storm volume to be retained onsite,
10. Design volume for water quality mitigation treatment BMPs (if any),
11. If flow-through BMPs are approved, provide the one-year, one-hour storm intensity as depicted on the most recently issued isohyetal map published by the Los Angeles County Hydrologist,
12. Percent of design storm volume to be infiltrated at an off-site mitigation or groundwater replenishment project site,
13. Percent of design storm volume to be retained or treated with biofiltration at an off-site retrofit project,
14. Location and maps (preferably linked to the GIS storm drain map) of off-site mitigation, groundwater replenishment, or retrofit sites, and
15. Documentation of issuance of requirements to the developer.

Until the EWMP is approved by the Regional Board or the Executive Officer, the Beach Cities WMG is only required to implement and track MCM information in its existing stormwater management program per Part V.C.4.d.i. In addition to the requirements in Part X.A of the MRP, Part VI.D.7.d.iv of the Permit requires that the Beach Cities WMG implement a tracking system for new development/re-development projects that have planned post-construction BMPs. The following information is to be tracked using GIS or another electronic system:

1. Municipal Project ID
2. State Waste Discharge Identification (WDID) Number
3. Project Acreage
4. BMP Type and Description
5. BMP Location (coordinates)
6. Date of Acceptance
7. Date of Maintenance Agreement

8. Maintenance Records
9. Inspection Date and Summary
10. Corrective Action
11. Date Certificate of Occupancy Issued
12. Replacement or Repair Date

Participating agencies have developed mechanisms for tracking new development/re-development projects that have been conditioned for post-construction BMPs pursuant to MS4 Permit Part VI.D.7 Agencies also have developed mechanisms for tracking the effectiveness of these BMPs pursuant to MS4 Permit Attachment E.X.

7.0 Regional Studies

The MRP identifies one regional study: the SMC Regional Watershed Monitoring Program. The SMC Program is a collaborative effort between SCCWRP, the State Water Board's Surface Water Ambient Monitoring Program (SWAMP), three Southern California Regional Water Quality Control Boards, and several county stormwater agencies. SCCWRP acts as a facilitator to organize the monitoring program, conducts the data analysis, and prepares monitoring results reports. The goal of the SMC Program is to develop a monitoring program on a regional level for Southern California's coastal streams and rivers.

7.1 Regional Study Participation

The MRP states that each Permittee shall be responsible for supporting the monitoring described at the sites within the watershed management area(s) that overlap with the Permittee's jurisdictional area. One program initiated under the SMC is the Regionally Consistent and Integrated Freshwater Stream Bioassessment Monitoring Program (Bioassessment Program), which included six monitoring sites that were monitored annually within the WMP Group area. The SMC initiated the Bioassessment Program, which is structured to occur in cycles of five years, in 2009. Sampling under the 2009 cycle concluded in 2013. The next five-year cycle is scheduled to begin in 2015, with additional special study monitoring scheduled to occur in 2014.

The Beach Cities WMG will continue to participate in the Biosassessment Program being managed by the SMC, through the LACFCD. The LACFCD will continue to participate in the Regional Watershed Monitoring Program (Bioassessment Program) being managed by the Southern California Stormwater Monitoring Coalition (SMC). The LACFCD will contribute resources to SMC's bioassessment monitoring program during the current permit cycle. Initiated in 2008, the SMC's Regional Bioassessment Program is designed to run over a five-year cycle. Monitoring under the first cycle concluded in 2013, with reporting of findings and additional special studies planned to occur in 2014. SMC, including LACFCD, is currently working on designing the bioassessment monitoring program for the next five-year cycle, which is scheduled to run from 2015 to 2019.

8.0 Special Studies

The Beach Cities WMG is responsible for conducting special studies that are required in an effective TMDL or an approved TMDL Monitoring Plan applicable to a watershed that is within the Beach Cities WMG's jurisdictional boundary. At this time there are no special studies required by any of the TMDLs within the Beach Cities WMG; therefore, the Beach Cities WMG will not participate in any special studies. At a future date, if implementation of a special study is desirable, then a separate work plan coordinated with the CIMP will be developed.

9.0 Non-Direct Measurements

Existing monitoring programs that collect water quality data in the WMG area, as summarized in **Appendix A**, will be incorporated into the CIMP database to the extent practicable. Gathering and compiling information from outside the CIMP programs will be dictated by cost. Water quality data reported by these monitoring programs will be evaluated for suitability for inclusion in the CIMP database.

10.0 Adaptive Management

An adaptive management approach provides a structured process that allows for taking action under uncertain conditions based on the best available science, closely monitoring and evaluating outcomes, and re-evaluating and adjusting decisions as more information is collected.

The CIMP, as with the EWMP, is to be implemented as an adaptive process. As new program elements are implemented and data are gathered over time, the EWMP and CIMP will undergo revision to reflect the most current understanding of the watershed and present a sound approach to addressing changing conditions. As such, the EWMP and CIMP will employ an adaptive management process utilizing BMPs that meet the maximum extent practicable (MEP) standard and will allow the programs to evolve.

10.1 Annual Assessment and Reporting

Part XVIII.A of the MRP details the annual assessment and reporting that is required as part of the annual report. The annual assessment and reporting is composed of seven parts:

1. Stormwater Control Measures
2. Effectiveness Assessment of Stormwater Control Measures
3. Non-stormwater Control Measures
4. Effectiveness Assessment of Non-stormwater Control Measures
5. Integrated Monitoring Compliance Report
6. Adaptive Management Strategies
7. Supporting Data and Information

Based on the findings of the annual assessment, revisions to the CIMP will be included as part of the Adaptive Management Strategies.

10.2 CIMP Revision Process

Implementation of the CIMP is used to gather data on receiving water conditions and stormwater/non-stormwater quality to assess the effectiveness of the EWMP. As part of the adaptive management process, re-evaluation of the CIMP will need to be conducted to better inform the Beach Cities WMG of ever-changing conditions of the watershed. Each program of the CIMP will be re-evaluated every two years, in line with the EWMP's Adaptive Management Strategies, for the following:

- **Monitored site locations:** As water quality priorities change and certain WBPCs are being addressed or identified, monitoring site locations may need to be added or changed.
- **Monitoring constituents**: Eliminate or reduce monitoring of certain constituents. If constituents were initially detected during initiation of the CIMP and are not being addressed by a watershed control measure.
- **Monitoring frequency**: Increased or decreased based on the evaluation of RWL, WQBELs, or non-stormwater action levels.

Based on the re-evaluation, CIMP revisions will be made and submitted to the Regional Board for approval.

11.0 Reporting

Analysis and reporting of data is an integral part of communicating to the Regional Board whether the CIMP is meeting MRP objectives. The MRP establishes NPDES permit monitoring, reporting, and recordkeeping requirements, including those for large MS4s, based on federal Clean Water Act (CWA) section 308(a) and Code of Federal Regulations (40 CFR) sections 122.26(d)(2)(i)(F), (iii)(D), 122.41(h)-(l), 122.42(c), and 122.48. In addition, California Water Code (CWC) section 13383 authorizes the Regional Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. The sections below will outline the CIMP reporting process for the Beach Cities WMG.

11.1 Documents and Records

Consistent with the Part XIV.A of the MRP requirements, the Beach Cities WMG will retain records of all monitoring information, including: all calibration, major maintenance records, all original lab and field data sheets, all original strip chart recordings for continuous monitoring instrumentations, copies of all reports required by the Permit, and records of data used to complete the application for the Permit for a period of at least 3 years from the date of the sample, measurement, report, or application.

Records of monitoring will include:

1. The date, time of sampling or measurements, exact place, weather conditions, and rain fall amount;
2. The individual(s) who performed the sampling or measurements;
3. The date(s) analyses were performed;
4. The individual(s) who performed the analyses;
5. The analytical techniques or methods used;
6. The results of such analyses; and
7. The data sheets showing toxicity test results.

11.1.1 Semi-Annual Analytical Data Submittal

Monitoring data will be submitted semi-annually (by June 15 and December 15 of each year), as stated in Part XIV.L of the MRP. The transmitted data will be in the most recent update of the Southern California Municipal Storm Water Monitoring Coalition's (SMC) Standardized Data Transfer Formats (SDTFs) and sent electronically to the Regional Board at losangeles@waterboards.ca.gov with the subject line "LA County MS4 Permit – Beach Cities WMG Monitoring Data". The SMC SDTFs can be found at the Southern California Coastal Water Research Project (SCCWRP) web page. The monitoring data should highlight the following:

1. Exceedances of applicable WQBELs,
2. Receiving water limitations,
3. Action levels,
4. Municipal action levels (MALs), and/or

5. Aquatic toxicity thresholds for all test results, with corresponding sampling dates per receiving water monitoring station.

11.2 Monitoring Reports

Part XVIII.A.5, of the MRP presents the requirements of the Integrated Monitoring Compliance Report (IMCR) that will be included and submitted on an annual basis as part of the Annual Report. As discussed in **Section 10**, the IMCR is one of seven parts of the Annual Assessment and Reporting.

The IMCR will include the following information as required by the MRP:

- Summary of exceedances against all applicable MALs, RWLs, WQBELs, non-stormwater action levels, and aquatic toxicity thresholds for:
    1. Receiving water monitoring – wet- and dry-weather;
    2. Stormwater outfall monitoring; and
    3. Non-stormwater outfall monitoring.
- Summary of actions taken:
    1. To address exceedances for WQBELs, non-stormwater action levels, or aquatic toxicity for stormwater and non-stormwater outfall monitoring.
    2. To determine whether MS4 discharges contributed to RWL exceedances and efforts taken to control the discharge causing the exceedances to the receiving water.
- If aquatic toxicity was confirmed and a TIE was conducted, identify the toxic chemicals determined by the TIE, and include all relevant data to allow the Regional Board to review the adequacy and findings of the TIE.

The IMCR may serve as MAL assessment reports provided that the IMCRs include an assessment of the stormwater outfall data as compared to the MALs (as noted above). Additionally, the IMCRs in conjunction with the EWMP may meet the requirement for a MAL Action Plan if the EWMP addresses the waterbody-pollutant combination(s) for which the MAL(s) was exceeded, or where the Group requests modifications to its EWMP to address the MAL exceedances. The IMCR will be submitted as part of the Annual Assessment Report to the Regional Board by December 15th of each year, for at least the duration of the Permit term. As indicated above, event summary reports will be attached to the IMCR.

11.3 Signatory and Certification Requirements

Part V.B of Attachment D of the Permit presents the Signatory and Certification Requirements and states:

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below [40 CFR section 122.41(k)(1)].
2. All applications submitted to the Regional Water Board shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer includes: (i) the chief executive officer of the agency (e.g.,

Mayor), or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., City Manager, Director of Public Works, City Engineer, etc.).[40 CFR section 122.22(a)(3)].

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:
    a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above [40 CFR section 122.22(b)(1)];
    b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) [40 CFR section 122.22(b)(2)]; and
    c. The written authorization is submitted to the Regional Water Board [40 CFR section 122.22(b)(3)].
4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the Regional Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative [40 CFR section 122.22(c)].
5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following certification: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." [40 CFR section 122.22(d)].

All required signatures and statements will be included as an attachment to the Annual Report, which will be submitted to the Regional Board by December 15th of each year, for the duration of the Permit term.

12.0 Schedule for CIMP Implementation

As stated in Part IV.C.6 of the MRP, the Beach Cities WMG's CIMP will commence within 90 days after approval by the Executive Officer of the Regional Board. Existing monitoring will continue to be conducted and beginning summer of 2014, the dry weather screening of major outfalls will commence.

Implementation of new monitoring programs and modifications to existing monitoring programs will be implemented beginning 90 days after the approval of the CIMP.

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Beach Cities CIMP Appendix A
Total Maximum Daily Load Requirements and Existing Monitoring Programs

July 2015

A.1 Total Maximum Daily Load Monitoring Requirements

Attachment K to the 2012 MS4 Permit identifies Total Maximum Daily Loads (TMDLs) applicable to each Permittee and the Beach Cities Watershed Management Group (Beach Cities WMG) Permittees are included on Tables K-2 for the Santa Monica Bay (SMB) and K-4 for the Dominguez Channel (DC) Watersheds. The Beach Cities Permittees directly discharge to Santa Monica Bay and those TMDLs are of highest priority and most immediate concern. Since flows from the Beach Cities WMG only indirectly flow to Machado Lake, which is actively managed by the City of Los Angeles, the Watershed Management Area (WMA) will coordinate with the City to share monitoring data for those lake TMDLs. Similar coordination is anticipated with respect to the DC and Greater Harbor Toxic Pollutants TMDL, which has a significant legacy component and large stakeholder group.[1] Water samples at the outlet of the storm drains discharging to the Dominguez Channel will be monitored at OF-BVEG-5 and OF-BCEG-6 (see CIMP Figure 8). Receiving water at Torrance Lateral will be monitored at OF-BCEG-7. Monitoring data will be shared by the City of Los Angeles, as part of other WMG CIMPs, for the Dominguez Channel, Dominguez Channel Estuary, Torrance Lateral, and Machado Lake, and will be incorporated into the Beach Cities WMG annual report by reference. The TMDLs of greatest concern to the Beach Cities WMG are further characterized in the following subsections and include the following:

- Los Angeles Regional Water Quality Control Board (LARWQCB) Santa Monica Bay Beaches Bacteria TMDLs, effective July 15, 2003 (SMBBB TMDL);
- United States Environmental Protection Agency (USEPA) Santa Monica Bay TMDL for Dichlorodiphenyltrichloroethane (DDTs) and Polychlorinated biphenyls (PCBs), March 26, 2012 (SMB DDT and PCB TMDL);
- LARWQCB Santa Monica Bay Nearshore and Offshore Debris TMDL, effective March 20, 2012 (SMB Debris TMDL);
- LARWQCB Trash TMDL for Machado Lake in the Dominguez Channel Watershed, effective March 6, 2008 (Machado Lake Trash TMDL);
- LARWQCB Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) TMDL, effective March 11, 2009 (Machado Lake Nutrient TMDL);
- LARWQCB Machado Lake Pesticides and PCBs TMDL, effective March 20, 2012 (Machado Lake Toxics TMDL); and
- LARWQCB Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL, effective March 23, 2012 (Harbors Toxics TMDL).

Appendix D details the Monitoring and Reporting Plan and the Quality Assurance Project Plan with includes QA/QC elements.

A.1.1 Santa Monica Bay Beaches Bacteria TMDL

The July 2, 2014 adopted revision of the SMB Beaches Bacteria TMDL establishes multi-part numeric targets for total coliform, fecal coliform and enterococcus densities, reported as bacteria counts (Most Probable Number/MPN or Colony Forming Units/CFU) per 100 milliliters of sample. The TMDL Waste Load Allocation (WLA), expressed as Water Quality-Based Effluent Limitations (WQBELs) for outfall discharges, are based on the Los Angeles Basin Plan objectives for body-contact recreation (REC-1) and summarized in **Table A-1.** Dry-weather WQBELs compliance was required as of December 28, 2012, the effective date of the MS4 Permit, while wet-weather compliance is required by July 15, 2021. The Daily Maximum WQBEL applies to single samples, while the Geometric mean is calculated using all applicable samples collected during the prior 30 days.

[1] The Beach Cities WMG will coordinate with the DC EWMP group to share DC Estuary data for the Harbor Toxics TMDL.

Table A-1 SMB Beaches Bacteria TMDL Water Quality-Based Effluent Limitations

Constituent	Daily Maximum (MPN or CFU)	Geometric Mean (MPN or CFU)
Total Coliform[1]	10,000/100 mL	1,000/100 mL
Fecal Coliform	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL

[1] Total Coliform density shall not exceed a daily maximum of 1,000/100 mL, if the ratio of fecal to total coliform exceeds 0.1.

Recognizing that storms and other natural events may cause a RWLs exceedance, the TMDL allows a limited number of annual exceedance days. These occur when the average of samples taken within the preceding 30 days exceeds the geometric mean limit or when any single sample exceeds the WQBEL/RWL. The interim single sample bacteria RWL schedule for wet-weather is presented in **Table A-2**.

Table A-2 Interim Single Sample Receiving Water Limitations Schedule

Deadline	Cumulative percentage reduction from the total exceedance day reductions required for each jurisdictional group as identified in Table M-1
July 15, 2013	25%
July 15, 2018	50%

Table A-4 presents the interim single sample bacteria RWLs for the Beach Cities WMG per Table M-1 of the MS4 Permit. Permittees in each jurisdictional group must comply with the interim for all shoreline monitoring stations within their jurisdictional area during wet-weather.

Table A-3 Maximum Allowable Exceedance Days during Wet-Weather[1]

JG	Primary Jurisdiction	Additional Responsible Jurisdiction and Agencies	Monitoring Sites	10% Reduction Milestone	25% Reduction Milestone	50% Reduction Milestone
5	Manhattan Beach	El Segundo Hermosa Beach Redondo Beach County of Los Angeles	SMB-5-1# SMB-5-2 SMB-5-3# SMB-5-4# SMB-5-5#	63	52	35
6	Redondo Beach	Hermosa Beach Manhattan Beach Torrance County of Los Angeles	SMB-6-1 SMB-6-2# SMB-6-3 SMB-6-4 SMB-6-5# SMB-6-6#	62	51	34

[1] Interim Single Sample Bacteria Receiving Water Limitations.
[#] Monitoring locations subject to the antidegradation implementation provision in the TMDL.

The grouped final single sample bacteria RWLs for all monitoring stations along SMB, except for those monitoring stations subject to the antidegradation implementation provisions, is summarized in **Table A-5**.

Table A-4 Annual Allowable Exceedance Days of the Single Sample Objective (days)[1]

Time Period	Daily Sampling	Weekly Sampling
Summer Dry-Weather (April 1 to October 31)	0	0
Winter Dry-Weather (November 1 to March 31)	3(9)	1(2)
Wet-Weather[2] (Year-round)	17	3

[1] The final RWLs are group-based and shared among all MS4 Permittees located within the sub-drainage area to each beach monitoring location. Values in parentheses apply upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL (July 2, 2014).
[2] Wet-weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.

In accordance with the 2004 approved Coordinated Shoreline Monitoring Plan (CSMP), the SMB Beaches Bacteria TMDL shoreline monitoring program was implemented in November 2004. Point zero (ankle depth) and open beach water samples are collected along the shoreline throughout SMB. Within Beach Cities WMG, there are 11 monitoring stations. The grouped final single sample bacteria receiving water limitations monitoring site with anti-degradation implementation provisions is summarized in **Table A-6.** Monitoring stations SMB 5-2, 6-1, 6-3, and 6-4 are not listed as part of the grouped final single sample bacteria receiving water limitations.

Table A-5 Annual Allowable Exceedance Day of the Single Sample Objective for Antidegradation Sites (days)[1]

Monitoring Sites	Beach Monitoring Locations	Summer Dry-Weather (April 1 - October 31)		Winter Dry-Weather (November 1 - March 31)		Wet-Weather (Year-round)	
		Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling
SMB 5-1	Manhattan Beach at 40th Street	0	0	1	1	4	1
SMB 5-3	Manhattan Beach Pier, southern drain	0	0	1(3)	1	5(6)	1
SMB 5-4	Hermosa City Beach at 26th St.	0	0	3	1	12	2
SMB 5-5	Hermosa Beach Pier	0	0	2	1	8	2
SMB 6-2	Redondo Municipal Pier – 100 yards south	0	0	3	1	14	2
SMB 6-5	Avenue I storm drain at Redondo Beach	0	0	3(4)	1	6(11)	1(2)
SMB 6-6	Malaga Cove, Palos Verdes Estates	0	0	1	1	3	1

[1] The final RWLs are group-based and shared among all MS4 Permittees located within the sub-drainage area to each beach monitoring location. Values in parentheses apply upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL (July 2, 2014).

A.1.2 Santa Monica Bay TMDLs for DDTs and PCBs

The SMB TMDL for DDTs and PCBs includes the area from Point Dume to Point Vicente, while the Palos Verdes shelf includes the area from Point Vicente to Point Fermin. As a USEPA originated TMDL, implementation may occur through a State approved implementation plan, National Pollutant Discharge Elimination System (NPDES) permit, or other regulatory mechanism, such as Waste Discharge Requirements (WDRs), conditional waivers of WDRs, or enforcement actions. The LARWQCB has chosen to implement the TMDL through the MS4 Permit, using WLA targets, expressed as an annual loading of pollutants to SMB, as indicated in **Table A-7**.

Table A-6 Santa Monica Bay DDTs and PCBs TMDL Waste Load Allocations Targets

Constituent	Annual Mass-Based WLA (g/yr)[1]
DDT	27.08
PCBs	140.25

[1] Compliance shall be determined based on a three-year averaging period.

The Beach Cities WMG propose to follow the Permit Minimum Stormwater Outfall Based Monitoring Program of three events per year, with no dry-weather monitoring. Dry-weather flows are diverted or rare and therefore have a de minimus contribution to the annual load.

A.1.3 Santa Monica Bay Debris TMDL

Compliance with the SMB Debris TMDL is based on the final Numeric Target and Waste Load and Load Allocations (WLA and LA), which are defined as zero trash in and on the shorelines of SMB, and no plastic pellets discharged from plastic manufacturers and facilities. Compliance is to be achieved no later than March 20, 2020, and every year thereafter. If a Permittee adopts local ordinances to ban plastic bags, smoking in public places and single use expanded polystyrene food packaging by November 4, 2013, then the final compliance date will be extended until March 20, 2023. SMB Debris TMDL compliance is assessed in accordance with the Permittees' implementation of programs for point and non-point source trash and plastic pellet abatement, and attainment of the progressive trash reductions in accordance with the TMDL compliance schedule as shown in **Table A-8**. Compliance strategy with the SMB Debris TMDL is based on installation of structural Best Management Practices (BMPs), such as full capture or partial capture systems, institutional controls, or any BMPs, to attain a progressive reduction in the amount of trash in SMB.

Table A-7 SMB Debris TMDL Compliance Schedule

Permittees	Baseline[1]	Annual Trash Discharge (gals/yr)				
		March 20, 2016	March 20, 2017	March 20, 2018	March 20, 2019	March 20, 2020[2]
Hermosa Beach	1,117	894	670	447	223	0
Manhattan Beach	2,501	2,001	1,501	1,001	500	0
Redondo Beach	3,197	2,558	1,918	1,279	639	0
Torrance	2,484	1,987	1,490	993	497	0

[1] If a Permittee elects not to use the default baseline, then the Permittee shall include a plan to establish a site specific trash baseline in their TMRP.
[2] Permittees shall achieve their final effluent limitation of zero trash discharge for the 2019-2020 storm year and every year thereafter.

The SMB Debris TMDL Staff Report requires the development of a Trash Monitoring and Reporting Plan (TMRP) and Plastic Pellets Monitoring and Reporting Plan (PMRP) to be approved by the Regional Board EO. The City of Hermosa Beach provided an undated TMRP, with cover letter dated September 20, 2012, asserting that the three ordinances would be adopted and no debris monitoring was warranted, so long as a full capture BMP implementation compliance schedule was followed. A similar TMRP was prepared by the City of Manhattan Beach. The City of Redondo Beach TMRP, made no assertion regarding the source control ordinances, but planned for a baseline assessment study and annual monitoring effort. However, the TMRP indicated that a full capture BMP installation effort would be tracking the schedule in **Table A-8**. No TMRP was provided by the City of Torrance.

The Cities of Hermosa Beach and Manhattan Beach provided letters, directed to the LARWQB EO and dated September 20 and 26, 2013, respectively, demonstrating that the PMRP were not required within their jurisdictions. It is unclear if similar letters were sent by the Cities of Redondo Beach and Torrance.

Assuming the TMRP and PMRP letters are ultimately approved, responsible WMG members will conduct annual reporting that consist of numeric progress assessments regarding the installation of full capture certified connector pipe (CPS) screens and similar devices. Since the Cities of Redondo Beach and Torrance have not adopted trash source control ordinances, they will follow the **Table A-8** schedule. Hermosa Beach has adopted two trash source control ordinances, a polystyrene ban, and a smoking ban; however, they have not adopted a plastic bag ordinance and therefore will adhere to the schedule shown in Table A-8. Manhattan Beach will have a final compliance date that is extended three years.

A.1.4 Machado Lake Trash TMDL

The existing Machado Lake beneficial uses, impaired by trash accumulations that include suspended and settled debris, are Water Contact Recreation (REC-1), Non-contact Water Recreation (REC-2), Warm Freshwater Habitat (WARM), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), and Wetland Habitat (WET). Items reported to be commonly observed by Regional Board staff include styrofoam cups and food containers, glass and plastic bottles, paper cartons, packaging materials, plastic bags, and cans, although heavier debris is transported during storms. The Machado Lake Trash TMDL requires responsible Permittees to implement a Minimum Frequency of Assessment and Collection (MFAC) program, BMPs that comply with the progressive trash reduction schedule, or LARWQCB-approved trash full capture devices. Compliance with the TMDL is numeric and progressive with the WLAs and LAs defined as zero trash discharges in and on the shoreline of Machado Lake.

The interim trash reduction compliance schedule as shown in **Table A-9** for the responsible Beach Cities WMG Permittees will be assessed based on the approved implementation plan and attainment of progressive trash reductions or full capture BMP installations. Final compliance is to be achieved by March 6, 2016, and every year thereafter; however, with annual WLA WQBEL compliance determinations, final compliance effectively begins on March 7, 2015.

Table A-8 Machado Lake Trash Water Quality-Based Effluent Limitations

Permittees	Baseline[1]	Annual Trash Discharge (uncompressed gals/yr)				
		March 6, 2012	March 6, 2013	March 6, 2014	March 6, 2015	March 6, 2016[2]
Redondo Beach	18	15	11	7	4	0
Torrance	34,809	27,847	20,885	13,924	6,962	0

1 The Regional Water Board calculated the baseline water quality-based effluent limitations for the Permittees based on the estimated trash generation rate of 5,334 gallons of uncompressed trash per square mile per year.

2 Permittees shall achieve their final effluent limitation of zero trash discharge for the 2015-2016 storm year and every year thereafter.

A.1.5 Machado Lake Nutrient TMDL

The Machado Lake Nutrient TMDL was adopted by the Regional Board on May 1, 2008, and approved by the State Water Resources Control Board (State Board) on December 2, 2008. Upon approval by the USEPA, the TMDL became effective on March 11, 2009. The Nutrient TMDL was developed to address beneficial use impairments due to eutrophication, algae, ammonia, and odor in Machado Lake which arise due to the enrichment of the lake with nitrogen and phosphorus. The degraded warm water ecosystem is impaired for LARWQCB Basin Plan WARM, REC 1 and REC 2 beneficial uses. The Machado Lake Nutrient TMDL set concentration-based WLAs for in-lake or end-of-pipe compliance options while allowing for a mass-based compliance option, on the condition that parties choosing this option develop the equivalent mass-based WLA, and method of compliance with the WLA, through a Special Study. The WQBEL and RWL WLAs for nutrients in Machado Lake were developed based on the nutrient loading capacity. **Table A-10** and **Table A-11** present the interim and final annual WQBEL and RWL, respectively. The interim allocations are intended to allow dischargers to implement the measures necessary to achieve the final allocations. The interim WQBEL and RWL are based on current in-lake concentrations and require a reduction in concentration over time.

Table A-9 Machado Lake Nutrient Interim and Final Water Quality-Based Effluent Limitations

Deadline	Monthly Average Total Phosphorus (mg/L)	Monthly Average Total Nitrogen (TKN + NO_3-N + NO_2-N) (mg/L)
At Effective Date	1.25	3.50
March 11, 2014	1.25	2.45
September 11, 2018	0.10	1.00

Table A-10 Machado Lake Nutrient Interim and Final Receiving Water Limitations

Deadline	Monthly Average Total Phosphorus (mg/L)	Monthly Average Total Nitrogen (TKN + NO_3-N + NO_2-N) (mg/L)
At Effective Date	1.25	3.50
March 11, 2014	1.25	2.45
September 11, 2018	0.10	1.00

The City of Torrance submitted a special work plan, which was approved by the Regional Board EO, and established the annual mass-based water quality-based effluent limitations shown in **Table A-12**. The special work plan can be reviewed in **Appendix B**.

Table A-11 Machado Lake Nutrient Interim and Final WQBELs for City of Torrance

Deadline	Annual Load Total Phosphorus (kg)	Annual Load Total Nitrogen (TKN + NO_3-N + NO_2-N) (kg)
March 11, 2014	3,760	7,370
September 11, 2018	301	3,008

A.1.6 Machado Lake Toxics TMDL

The Machado Lake Toxics TMDL was adopted by the LARWQCB on September 2, 2010, approved by the State Board on December 6, 2011, and became effective on March 20, 2012, upon approval by the USEPA. The Toxics TMDL addresses impairments due to organochlorine pesticides (chlordane, dieldrin, and DDT) and PCBs in fish tissue. Organochlorine (OC) Pesticides are often referred to as legacy pesticides, since they have been banned from use for decades, but continue to persist in the environment and cause water quality impairments. PCBs are similar chlorinated hydrocarbons consisting of a mixture of up to 209 different congeners, generally appearing as oily liquids or waxy solids. They were produced in the United States from 1929 until being banned in 1979. The chemical properties of these toxic compounds result in strong binding to particulates, such as fine-grained sediments and organic matter. OC Pesticides and PCBs bioaccumulate and the environment risk rarely occur as the result of a single discharge event. The Regional Board created the WQBEL with a 3-year averaging period. The impacts of OC Pesticides and PCBs are manifested over long time periods.

As presented in **Table A-13**, the Regional Board assigned pesticides and PCBs WQBELs, as concentration-based WLAs equal to the sediment numeric targets, for suspended sediment-associated contaminants, which must be met by September 30, 2019. This was to ensure that targets in the lake will not be exceeded. The 3-year averaging period protects the beneficial uses of the lake over long time periods.

Table A-12 WQBELs for Pesticides and PCBs

Pollutant	Effluent Limitations for Suspended Sediment- Associated Contaminants (µg/kg dry weight)
Total PCBs	59.8
DDT (all congeners)	4.16
DDE (all congeners)	3.16
DDD (all congeners)	4.88
Total DDT	5.28
Chlordane	3.24
Dieldrin	1.9

A.1.7 Dominguez Channel and Harbors Toxics TMDL

The Dominguez Channel and Harbors Toxics TMDL identify water quality standards for the Dominguez Channel, Torrance Lateral and Greater Los Angeles and Long Beach Harbors (Greater Harbor Waters), including wet-weather freshwater objectives for the Dominguez Channel and Torrance Lateral. The TMDLs identify impaired sediment chemistry, sediment quality conditions (benthic communities) and bioaccumulation (elevated fish tissue levels) objectives that apply year-round in Dominguez Channel Estuary and Greater Harbor water bodies. The interim TMDL are presented in **Table A-14** and for freshwaters in Dominguez Channel and Torrance Lateral and **Table A-16** present the TMDL for impaired sediment chemistry for Dominguez Channel Estuary and Greater Harbor Waters. The interim Water Quality Objectives (WQOs) are to be met upon the effective date of the TMDL to ensure that no additional decreases in water quality occur.

Final TMDL WQBELs for Dominguez Channel freshwater is presented in **Table A-14** and Torrance Lateral for freshwater and sediment chemistry in **Table A-18**, and Dominguez Channel Estuary and Greater Los Angeles and Long Beach Harbor Waters for sediment deposited in **Table A-19** and sediment discharge in **Table A-20**. These WQBELs are to be met no later than March 23, 2032, and every year thereafter.

Table A-13 Wet-Weather Interim Toxicity WQBEL

Water Bodies	Interim	Final
Dominguez Channel (Freshwater)	2 TUc	1 TUc

Table A-14 Wet-Weather Interim WQBELs, Dominguez Channel Freshwater and Torrance Lateral

Metals	Interim Effluent Limitation Daily Maximum (µg/L)
Total Copper	207.51
Total Lead	122.88
Total Zinc	898.87

[1] Effluent limitations are based on a hardness of 50mg/L, and 90th percentile of annual flow rates (62.7 cfs) in Dominguez Channel. Effluent limitations using ambient hardness at the time of sampling are consistent with the assumptions and requirements of the TMDL. In addition to the effluent limitations above, samples collected during flow conditions less than the 90th percentile of annual flow rates must demonstrate that the acute and chronic hardness dependent water quality criteria provided in the California Toxics Rule (CTR) are achieved.

Table A-15 Interim WQBELs, Dominguez Channel Estuary

Water Body	Interim Effluent Limitations Daily Maximums (mg/kg sediments)					
	Copper	Lead	Zinc	DDT	PAHs	PCBs
Dominguez Channel Estuary	220.0	510.0	789.0	1.727	31.60	1.490

Table A-16 Final Wet-Weather Freshwater WQBELs, Dominguez Channel

Metals	Water Column Mass-Based Final Effluent Limitation Daily Maximum[1] (g/day)
Total Copper	1,300.3
Total Lead	5,733.7
Total Zinc	9,355.5

[1] Effluent limitations are based on a hardness of 50mg/L, and 90th percentile of annual flow rates (62.7 cfs) in Dominguez Channel. Recalcuated mass-based effluent limitations using ambient hardness and flow rate at the time of sampling are consistent with the assumptions and requirements of the TMDL. In addition to the effluent limitations above, samples collected during flow conditions less than the 90th percentile of annual flow rates must demonstrate that the acute and chronic hardness dependent water quality criteria provided in the California Toxics Rule (CTR) are achieved.

Table A-17 Final Wet-Weather WQBELs for Torrance Lateral

Metals	Water	Sediment
	Water Column Effluent Limitation Daily Maximum[1] (unfiltered, µg/L)	Concentration-Based Effluent Limitation Daily Maximum (mg/kg dry)
Total Copper	9.7	31.6
Total Lead	42.7	35.8
Total Zinc	69.7	121

[1] Effluent limitations are based on a hardness of 50 mg/L. Recalculated concentrations-based effluent limitations using ambient hardness at the time of sampling are consistent with the assumptions and requirements of the TMDL. In addition to the effluent limitations above, samples collected during flow concentrations less than the 90th percentile of annual flow rates must demonstrate that the acute and chronic hardness dependent water quality criteria provided in the CTR area achieved.

Table A-18 Final WQBELs Sediment Deposited to Dominguez Channel Estuary

Water Body	Final Effluent Limitations					
	Annual (kg/yr)				Annual (g/yr)	
	Total Cu	Total Pb	Total Zn	Total PAHs	Total DDTs	Total PCBs
Dominguez Channel Estuary	22.4	54.2	271.8	0.134	0.250	0.207

Table A-19 Final WQBELs Sediment Discharge to Dominguez Channel Estuary

Water Bodies	Effluent Limitations Daily Maximum (mg/kg dry sediment)		
	Cadmium	Chromium	Mercury
Dominguez Channel Estuary	1.2	--	--

A.2 Existing Watershed Monitoring Programs

Existing watershed monitoring programs provide historical data and identification of constituents for monitoring. The following subsections briefly describe significant existing and historical monitoring programs relevant to the Beach Cities WMG. All existing monitoring locations are presented in **Figure A-1**.

A.2.1 Los Angeles County Mass Emission and Tributary Monitoring

In anticipation of, and compliance with, prior MS4 Permits, the County of Los Angeles initiated in 1994 a multi-watershed monitoring program with annual reporting. Much like the Receiving Water monitoring program in the current permit, a minimum of three wet-weather events, including the first storm event of the year, and two dry-weather events were sampled at each mass emission station. Both grab and composite samples were collected and variously analyzed for:

- Conventional pollutants (oil and grease, total phenols, cyanide, pH and dissolved oxygen)
- Total Suspended Solids
- General minerals
- Indicator Bacteria
- Metals
- Semi-Volatile Organic Compounds
- Chlorinated Pesticides and Polychlorinated biphenyls
- Organophosphate Pesticides
- Herbicides

For the Beach Cities WMG area, the most relevant mass emission site is S28, located in Dominguez Channer near the intersection of the Dominguez Channel and Artesia Boulevard, in the City of Torrance, and presented in **Figure A-1**. This location was previously chosen to encompass a tributary area of 33 square miles, including portions of the Cities of Hermosa Beach, Manhattan Beach, and Torrance.

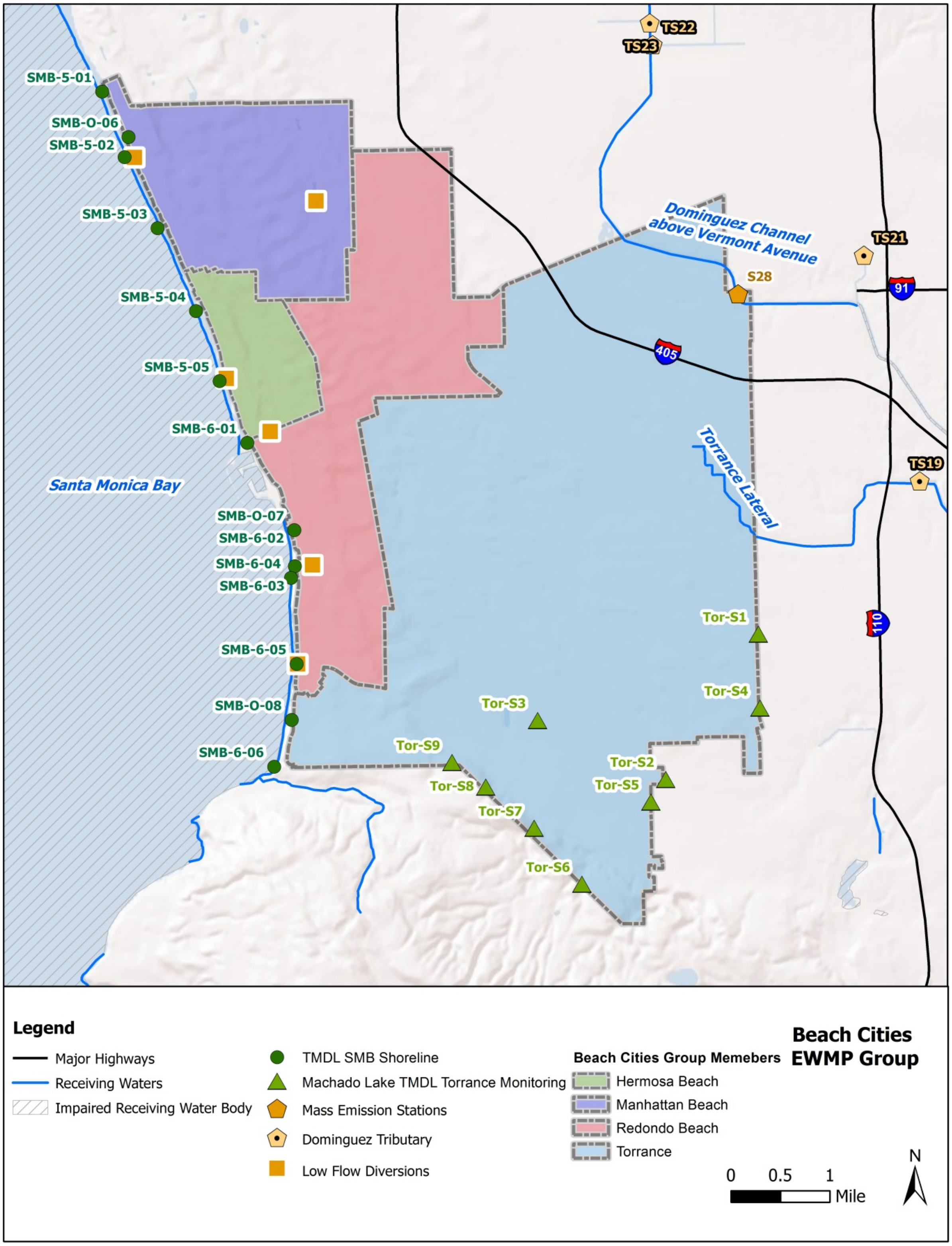

Figure A-1 Beach Cities WMG Reported Monitoring Stations

A.2.2 Santa Monica Bay Beaches Bacteria TMDL Shoreline Monitoring

The Los Angeles County Department of Health Services (LACDHS) and Los Angeles County Sanitation Districts (LACSD) historically monitored shoreline water quality at 55 sites along the Santa Monica Bay and Palos Verdes Peninsula (Attachment A to Resolution No. 2002-022). In 1998, the Santa Monica Bay Beaches were listed as impaired in the 1998 Clean Water Act 303(d) list of impaired waters due to excessive coliform bacteria. In 2003, following USEPA approval, the Santa Monica Bay Beaches Bacteria TMDL for dry- and wet-weather conditions became effective. To comply with the requirements of the TMDL, the associated Jurisdictional Groups developed and implemented the Coordinated Shoreline Monitoring Plan (CSMP). Currently the LACDHS and a Private Laboratory monitor water quality at eleven Jurisdictional Group 5 and 6 sites within the Beach Cities WMG area. A description of these monitoring sites is presented in **Table A-21** and shown in **Figure A-1**.

Table A-20 Santa Monica Bay Beaches Bacteria TMDL Monitoring Sites

Station Name	JG	Type	LFD	Sampling Agency	Location Description	Sample Schedule
SMB 5-1#	5	Open Beach	No	Private Lab	40th Street, Manhattan Beach	Weekly
SMB 5-2	5	Point Zero	Yes(2)	LACDHS	27/28th Street extended, Manhattan Beach	Daily
SMB 5-3#	5	Point Zero	Yes	Private Lab	50 yards south of Manhattan Beach Pier	Weekly
SMB 5-4#	5	Open Beach	No	LACDHS	26th Street extended, Hermosa Beach	Weekly
SMB 5-5#	5	Open Beach	Yes	Private Lab	50 yards south of Hermosa Beach Pier	Weekly
SMB 6-1	6	Point Zero	Yes	LACDHS	Herondo Street extended (at Herondo drain)	Daily
SMB 6-2#	6	Open Beach	No	Private Lab	50 yards south of Redondo Beach Pier	Weekly
SMB 6-3	6	Point Zero	Yes	Private Lab	Project of Sapphire Street drain	Weekly
SMB 6-4	6	Open Beach	No	LACDHS	Topaz Street extended (north of groin/jetty)	Weekly
SMB 6-5#	6	Point Zero	Yes	Private Lab	Avenue I, Redondo Beach	Weekly
SMB 6-6#	6	Open Beach	No	Private Lab	Malaga Cove	Weekly

Monitoring locations subject to anti-degradation implementation provision in the TMDL.

A.2.3 Machado Lake Nutrients and Toxics TMDL Monitoring

The Machado Lake Nutrients and Toxics TMDLs named the Cities of Redondo Beach and Torrance, and LACFCD, within Beach Cities WMG, as responsible parties. These three agencies conducted the Machado Lake Nutrient TMDL Special Study and developed a combined monitoring and reporting plan for the two TMDLs. Nine water quality sampling stations (Tor-S1 through Tor-S9), shown in **Figure A-1**, are sampled for nutrient and toxic analytes monthly and during qualifying wet-weather events. During these visits flow sensor data at each site is downloaded and the sensors serviced. **Appendix B** contains the monitoring plan and special study that have been submitted to the Regional Board for approval.

A.2.5 Bight Regional Monitoring

Regional monitoring, of the California Bight occurred in 1994, 1998, 2003, 2008, and 2013, with the objectives of the 2013 Bight Program (SCCWRP, 2013) being to answer the following questions:

1. What is the extent and magnitude of direct impact from sediment contaminants?
2. What is the trend in extent and magnitude of direct impacts from sediment contaminants?
3. What is the indirect risk of sediment contaminants to seabirds?

Sampling occurred at the sites shown in **Figure A-2** and included analyses for metals, PCBs, PAHs, polybrominated diphenyl ethers (PBDEs), chlorinated hydrocarbons, total organic carbon (TOC), nitrogen, phosphorus, and sediment grain size.

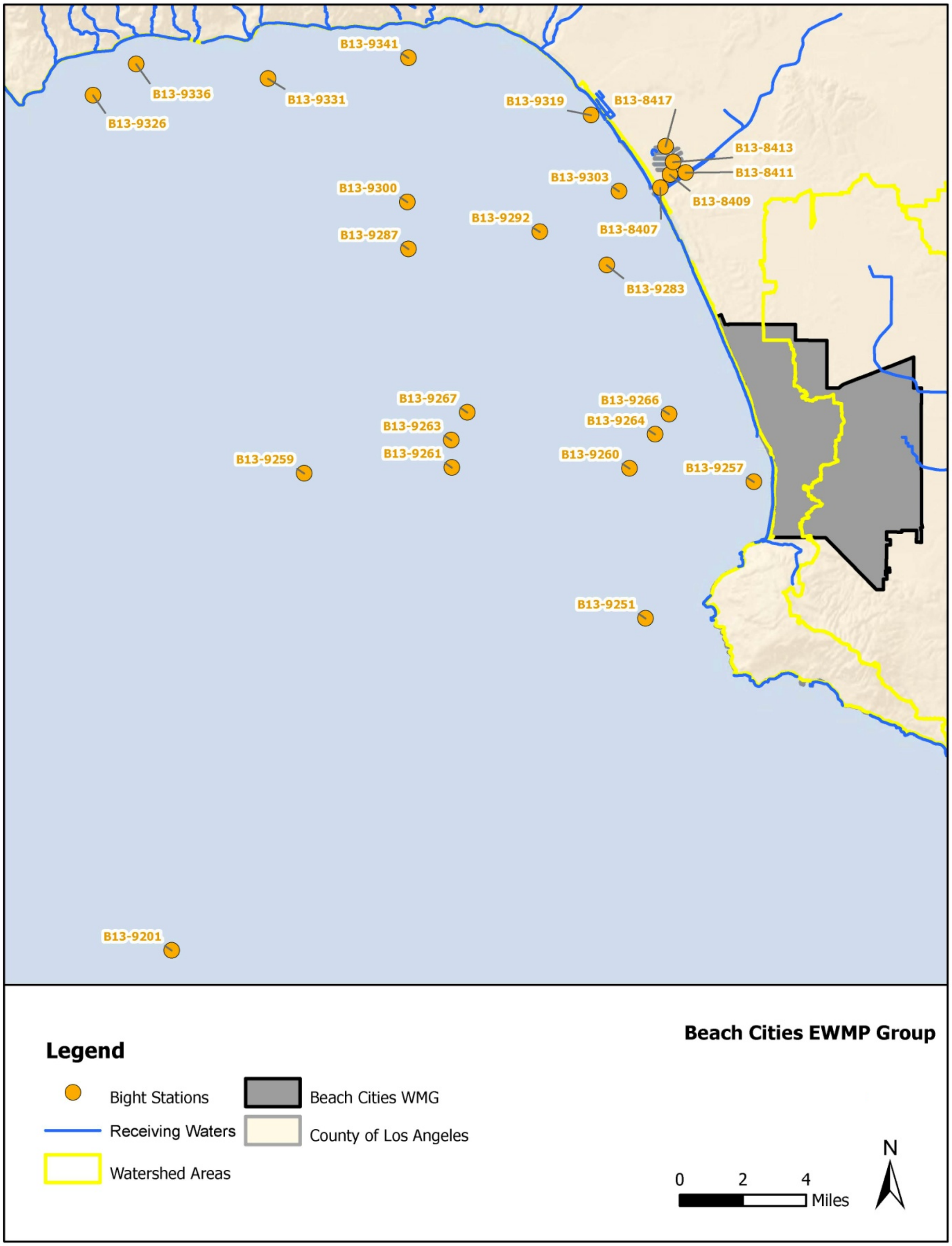

Figure A-2 2013 Bight Regional Monitoring Sites in the Santa Monica Bay

Beach Cities CIMP Appendix B

Monitoring and Reporting Plan, Machado Lake Nutrients and Toxics TMDL / Special Study Work Plan, Machado Lake Nutrient TMDL

July 2015

northgate
environmental management, inc.

December 9, 2013 2040.01

Mr. John Dettle
City of Torrance
3031 Torrance Boulevard
Torrance, California 90503

RE: Final Monitoring and Reporting Plan
Machado Lake Nutrient and Toxics Total Maximum Daily Load (TMDL)

Dear Mr. Dettle:

Enclosed is a compact disk (CD) containing the finalized version of the Monitoring and Reporting Plan for Nutrients and Toxics TMDL monitoring. The document was updated to include stormwater sampling activities as described in the Machado Lake Nutrient Total Maximum Daily Load Special Study Workplan (Nutrient-SSWP), the Machado Lake Pesticides and polychlorinated bi-phenyls (PCBs) Total Daily Load Special Study Work Plan (Toxics-SSWP), and changes requested by the Los Angeles Regional Water Quality Control Board in a letter dated August 2, 2013. Also included is a separate Quality Assurance Project Plan (QAPP) which is consistent with the State's Surface Water Ambient Monitoring Program (SWAMP) QAPP.

If you have any questions regarding these plans, please call me at (949) 230-0643, or Derrick Willis at (949) 375-7004.

Respectfully yours,
Northgate Environmental Management, Inc.

Dana R Brown
Senior Geologist

cc: Derrick Willis, Northgate

MONITORING AND REPORTING PLAN

Machado Lake Nutrient and Toxics
Total Maximum Daily Load (TMDL)
Torrance, California

Prepared For:

City of Torrance
3031 Torrance Boulevard
Torrance, CA 90503

Prepared By:

Northgate Environmental Management, Inc.
24411 Ridge Route Drive, Suite 130
Laguna Hills, California 92653

December 9, 2013

Project No. 2040.01

MONITORING AND REPORTING PLAN

Machado Lake Nutrient and Toxics
Total Maximum Daily Load (TMDL)
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City of Torrance
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REGISTERED GEOLOGIST
DANA R. BROWN
No. 7188
Expires: 12-31-2013
STATE OF CALIFORNIA

Derrick S. Willis
Principal

Dana R. Brown, P.G.
Project Manager

2040.01

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9 Water Quality Monitoring Sites: Tor-S8

10 Water Quality Monitoring Sites: Tor-S9

APPENDICES

A Site-Specific Health and Safety Plan

B Field Forms

C Quality Assurance Project Plan

ABBREVIATIONS AND ACRONYMS

BMP	Best Management Practices
CLP	Contract Laboratory Program
COC	Chain-of-Custody
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
EB	Equipment Blank
FD	Field Duplicate Sample
H_2SO_4	Sulfuric Acid
HASP	Health and Safety Plan
kg	Kilogram
LACDPW	Los Angeles County Department of Public Works
LCS	Laboratory Control Sample
MDL	Method Detection Limit
µmhos/cm	Micro ohms per Centimeter
mg/l	Milligram per Liter
ml	Milliliter
MRP	Monitoring and Reporting Plan
MS4	Municipal Separate Stormwater Systems
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NH_3+	Ammonia-Ammonium
NO_2	Nitrite
NO_3	Nitrate
Northgate	Northgate Environmental Management, Inc.
Nutrient TMDL	Machado Lake Nutrient Total Maximum Daily Load
NTU	Nephelometric Turbidity Unit
OCP	Organochlorine Pesticide
PCB	Polychlorinated Biphenyl
PO_4	Phosphate
QAPP	Quality Assurance Project Plan
QA	Quality Assurance
QC	Quality Control
RL	Laboratory Reporting Limit
RWQCB	Los Angeles Regional Water Quality Control Board
SSWP	Special Study Work Plan

SWAMP	Surface Water Ambient Monitoring Program
TB	Temperature Blank
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TOC	Total Organic Carbon
Toxics TMDL	Machado Lake Pesticides and PCBs Total Maximum Daily Load
TP	Total Phosphorus
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
VOA	Volatile Organic Analysis
WLA	Waste Load Allocation

1.0 INTRODUCTION

Northgate Environmental Management, Inc. (Northgate) has prepared this Monitoring and Reporting Program (MRP) for the City of Torrance (the City) to comply with provisions of both the Machado Lake Nutrient Total Maximum Daily Load (Nutrient TMDL), and the Machado Lake Pesticides and polychlorinated biphenyls (PCBs) Total Maximum Daily Load (Toxics TMDL).

The mass-based waste load allocation (WLA) compliance alternative for the Nutrient TMDL is currently addressed in the ongoing work performed as part of the Special Study Work Plan (SSWP) for the Pre-Best Management Practices Implementation Study Period (Carollo, 2011a). The Toxics TMDL will be addressed in work performed under this MRP.

The MRP outlines the specific activities to be performed and the procedures to be used for performing the Nutrient and Toxics TMDL sampling. The MRP documents sample collection methods, analytical procedures, data analysis, and data reporting. Appendix A of the MRP contains a site-specific Health and Safety Plan (HASP) that includes confined space entry procedures and protocols for working inside the below ground portions of manholes.

1.1 Background

Machado Lake is located in the City of Los Angeles' Ken Malloy Harbor Regional Park. It is approximately 40 acres in size, and averages approximately 3 feet in depth. Machado Lake is listed on the 1998, 2002, and 2006 Clean Water Act Section 303(d) lists of impaired water bodies due to eutrophic conditions, algae and odors (Nutrients): and chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, Chem A, and PCBs in tissue; and impaired sediment due to chlordane, DDT, and PCBs (Toxics). The listed impairments are caused by the overloading of nutrients, such as nitrogen and phosphorus, resulting in excessive algal growth which leads to increased turbidity, decreased levels of oxygen, and odor problems.

The City is situated in the western portion of the Machado Lake subwatershed, which is bounded to the north by the City, to the east by the City of Los Angeles, and to the south and west, by the Pacific Ocean. The City is located about 15 miles south of Downtown Los Angeles, in southern Los Angeles County, just north of the Palos Verdes Hills. The City was incorporated on May 12, 1921, and is just over 20.5 square miles in area. The City is bounded by Redondo Beach on the west and north, Lawndale and Gardena on the north, Los Angeles on the east, Lomita to the southeast, and Rolling Hills Estates and Palos Verdes Estates on the south. The City is also bounded by approximately 4,000 feet of Santa Monica Bay coastline.

The City's stormwater conveyance systems are interconnected with neighboring city systems. Neighboring cities located at generally higher elevation such as Rolling Hills Estates and Palos Verde Estates discharge stormwater into stormwater conveyance systems located within the City's boundaries. Figure 1 shows a regional site location map of the City.

The Regional Water Quality Control Board – Los Angeles Region (RWQCB) established TMDLs for Machado Lake for algae, ammonia and odors (Nutrients) on May 1, 2008 (RWQCB, 2008), and for Pesticides and PCBs (Toxics) on September 2, 2010 (RWQCB, 2010).

1.1.1 Nutrient TMDL

The City has elected to establish annual mass-based WLAs for Nutrients equivalent to monthly average concentrations of 0.1 milligrams per liter (mg/l) total phosphorus (TP) and 1.0 mg/l total nitrogen (TN) based on approved flow conditions. When the concentration-based WLAs are met under the approved flow condition of 8.45 cubic hectometers per year, the annual mass of the TP discharged to Machado Lake will be 845 kilograms (kg) and the annual mass of TN discharged to the lake will be 8,450 kg. The City mass-based WLAs will be proportional to the City owned area in the sub-watershed. The City area accounts for 35.6 percent of the Machado Lake Watershed. Table 1 lists the interim and final WLAs based on this area.

Table 1: Nutrient TMDL Mass-Based Waste Load Allocations

Responsible Party	Years after TMDL Effective Date	Total Phosphorus (kg)	Total Nitrogen (kg)
City of Torrance	5	3,760	7,370
	9.5 (final WLAs)	301	3,008

Notes:
mg/l = milligrams per liter

1.1.2 Toxics TMDL

The Toxics TMDL assigned WLAs for municipal separate storm sewer systems (MS4) permitees as concentration-based allocations (equal to the sediment numeric targets) for suspended sediment-associated contaminants as shown in Table 2.

Table 2: Toxics TMDL Concentration Based Waste Load Allocations		
Responsible Party	**Pollutant**	**WLA for Suspended Sediment Associated Contaminants (*ug*/kg dry weight)**
City of Torrance	Total PCBs	59.8
	DDT (all congeners)	4.16
	DDE (all congeners)	3.16
	DDD (all congeners)	4.88
	Total DDT	5.28
	Chlordane	3.24
	Dieldrin	1.9

Notes:
*u*g/kg = micrograms per kilogram
DDT = dichlorodiphenyltrichloroethane
DDE = Dichlorodiphenyldichloroethylene
DDD = Dichlorodiphenyldichloroethane

1.2 Summary of Proposed Activities

Ongoing Nutrient TMDL monitoring will be combined with Toxics TMDL monitoring after approval of the workplan by the RWQCB in the fall of 2012. The following sections describe in detail the proposed activities to accomplish TMDL monitoring.

1.2.1 Nutrient TMDL Monitoring Summary

Northgate will perform monthly visits to nine (9) monitoring sites during dry weather conditions and three (3) additional monitoring visits during wet weather conditions to collect water samples, download flow sensor data, and service the sensors. Northgate will also perform up to seven (7) additional visits to station Tor-S3 when Los Angeles County pumps stormwater from the Walteria Lake into the 54-inch storm drain and collect a water sample (maximum of 10 storm event/pumping event visits per year).Based on the requirements of the Special Study Workplan (Carollo, 2011a), routine dry weather sampling will be conducted at all nine stations until a full year of data is obtained after the February, 2013 dry weather sampling event. At the end of this period the City will review the monitoring results to determine if the sampling frequency and locations should be modified. For the remainder of the Special Study period, flow measurements and water samples (when available) will continue to be collected at all nine monitoring stations.

Details of the monitoring locations, frequency of sampling, and sampling parameters are included in Sections 3.0 to 5.0 of the MRP.

1.2.2 Toxics TMDL Monitoring Summary

The Toxics TMDL monitoring will consist of two phases of wet weather sampling designed to collect suspended solids for the analysis of pollutants in bulk sediments. Phase I monitoring will be conducted for a two (2) year period, and Phase II monitoring will commence once Phase I monitoring has been completed. In Phase I monitoring, samples will be collected during three (3) qualifying wet weather events at all stations for the first year, including the first significant storm event of the season. In the second year of Phase I activity samples will still be collected at stations representing discharge from the City during three qualifying wet weather events (Tor-S1, Tor-S2, Tor-S4, and Tor-S5), but the remaining stations will only be sampled during one qualifying wet weather event. During Phase II monitoring the number of sampling events will be decreased to one per year, and the frequency decreased to every other year, and all nine sampling stations will be visited.

At the end of the fourth year of wet weather monitoring, the City will assess the data to determine if the monitoring schedule should be altered. Details of the monitoring locations, frequency of sampling, and sampling parameters are included in Sections 3.0 to 5.0 of the MRP.

1.3 Work Plan Organization

Section 2.0 presents the MRP objectives. Section 3.0 summarizes the field methods and materials to be used in performing the scope of work. Section 4.0 summarizes the sampling locations, and Section 5.0 presents the sampling schedule and frequency. Section 6.0 presents the quality assurance/quality control (QA/QC) procedures to be used in the performance of this work.

2.0 PROJECT OBJECTIVES

The objective of this project is to ensure that the City is in compliance with the requirements of the Machado Lake Nutrient and Toxics TMDLs. The specific objectives of the work to be performed under this MRP are:

- Monitor attainment of WLAs as required by the TMDLs;
- Guide the design of future implementation actions;
- Monitor the effectiveness of implementation actions in improving water quality; and
- Guide pollutant source investigations.

Knowledge gained through the Special Studies (Carollo, 2011a and 2011b) will be used to modify the monitoring approach, number and location of monitoring sites, and sample collection techniques to adequately characterize and document the City's pollutant loads, progress toward pollutant load reductions, and improvement in water and sediment quality.

3.0 SAMPLING PROCEDURES

This section documents the procedural and analytical requirements for sampling events performed to collect water quality data as part of the MRP. All work conducted as part of the project is to be in accordance with provisions of the HASP, attached as Appendix A.

3.1 Sampling Methodology

Sampling will be conducted by a team of at least two workers using a combination of non-dedicated and dedicated sampling equipment. All sampling will be conducted in a manner that minimizes the possibility of sample contamination. Sampling equipment will be decontaminated prior to use. Grab samples will be collected in laboratory-supplied pre-preserved containers. Other types of discrete samples will also be collected and described separately.

After collection, the sample containers will be labeled, sealed in plastic bags, and placed in a cooler with ice for transportation under proper chain-of-custody (COC) protocol to the analytical laboratory. QA/QC samples will be collected and analyzed for each sampling event. Field personnel shall adhere to established sample collection protocols to ensure the collection of representative and uncontaminated samples for laboratory analysis. Deviations from the standard protocol must be recorded on the *Water Sample Data Sheet* at the time of sampling. The following sections describe the specific protocols for stormwater sample collection and handling.

3.1.1 Nutrient TMDL Dry Weather Sampling

3.1.1.1 Sampling Equipment

Sampling equipment shall typically consist of reusable polyethylene dippers or polyethylene buckets suspended on a disposable rope. Non-dedicated sampling equipment shall be decontaminated prior to each use according to the methods listed in *Section 3.3 Decontamination Procedures*. Non-dedicated sampling equipment will be stored and transported in resealable plastic bags to prevent contamination.

3.1.1.2 Sampling Procedures

A checklist is to be used by the field team at each monitoring site to ensure that the team members comply with all appropriate health and safety protocols during the sampling task. A *Water Sample Data Sheet* will also be used to document the sample collection, flow measurement, and water conditions. The checklist for site visits and *Water Sample Data Sheets* are attached in Appendix B.

Upon arrival at a monitoring site, the sampling team will inspect the location for general safety and deploy traffic cones to delineate the working zone around the vehicle, and alert drivers of the potential hazard. Prior to water sample collection, specific observations concerning the weather, water conditions, and flow conditions will be recorded on the *Water Sample Data Sheet*. Care must be taken to avoid disturbing the channel sediment or debris on the walls of the manhole access port prior to sample collection.

Grab samples will be collected from approximately mid-channel and at a depth where the flow is greatest (typically 60% of total depth). If the monitoring site lacks sufficient flow no sample will be collected and observations of the flow width and velocity (if measurable) will be recorded on the Water Sample Data Sheet. Pools of water with no visible flow should not be sampled as data collected at those locations may not represent surface flows. Care should be exercised to not capture algae, sediment, or other particulates from the bottom or sides of the channel to avoid bias in the collected sample.

A grab sample of the water will be collected by dipping the sampler into the water and emptying it three times to acclimate, then dipping a sample and pouring directly into the sample container containing preservative acid. The sampler will be held facing upstream during sample collection, and retrieved quickly to avoid mixing of the water. Care must be taken not to touch the sampler, or allow the sampler to touch vegetation, the rim or sides of the manhole, or other objects that would contaminate it as the sample is retrieved.

After filling and capping the sample bottles, the bottles will be labeled and placed in resealable plastic bags. The bags will be placed upright in a cooler and the samples surrounded with bagged ice so that the ice is around, beside, and above the samples. The samples will then be entered on the COC record and the sample cooler secured from unauthorized access.

Following sample collection, flow measurements stored in the dedicated flow sensors will be downloaded and the sensor data reset. At some locations, direct flow measurements will be performed with field-portable equipment and the results compared to the flow sensor data. Section 3.2 describes methods and procedures for performing flow measurements in subsurface storm drains and open channels.

3.1.2 Nutrient TMDL Wet Weather Sampling

Nutrient TMDL wet weather sampling is very similar to dry weather sampling, using the same equipment and sampling handling protocols. The only significant difference between wet and dry weather Nutrient TMDL sampling is the qualification procedure for validating a wet weather event that must be used prior to performing wet weather sampling (see Section 5.1.2 for a description of the procedure used to qualify a wet weather sampling event).

3.1.3 Toxics TMDL Wet Weather Sampling

Toxics TMDL sampling involves both water sample and suspended sediment sample collection during qualifying wet weather events. An attempt will be made to collect flow-weighted composite samples during each storm event, but due to the uncertainty associated with storm event durations that may not always be possible. When that is not possible the sampling period will be concluded when enough sample has been collected to supply water and sediment for the required analyses. In some cases where the storm event and resulting discharge ceases rapidly, the falling limb of the storm hydrograph may not be sampled in its entirety.

Water samples will be collected as grab samples, using the procedures described above for wet and dry weather Nutrient TMDL sampling. Samples will be retrieved as grab samples using a polyethylene dipper, bucket, or disposable Teflon bailer; and then transferred to the sample containers. Sufficient volumes of water will be collected to allow for separation of the suspended solids and analysis of toxics in the bulk sediment. The volume of sample to be retrieved in order to obtain at least 10 grams of sediment may require the use of larger capacity sampling equipment to recover sufficient volumes of sample. General water chemistry parameters including temperature, dissolved oxygen, pH, and electrical conductivity will be determined in the field at the time of water sample collection.

A minimum of six unfiltered water samples in 1-liter amber bottles will be collected during the rising and falling limbs of a storm event, then combined in 6:1 ratio to form a composite sample for subsequent analysis. Suspended solids will be extracted from the composite sample for analysis. Because of the highly variable amount of total suspended solids (TSS) present in natural waters, efforts will be made in the field to qualify the sample as containing enough suspended solids to provide the necessary sediment for analysis. A total of 10 grams of sediment is required when all grab samples are combined, so each sample bottle must be screened for the presence of sediment, and evaluated to determine the amount of unfiltered water sample that will be collected to produce a total of 10 grams of sediment.

Following collection, each unfiltered sample will be allowed to settle in the cooler for a period of at least fifteen minutes. After that time the amount of sediment collected on the bottom of the container will be evaluated, and additional samples collected (if required) to capture enough suspended solids for analysis.

An attempt will be made to collect grab samples at all locations within the first 1 to 2 hours of stormwater discharge (first flush) wherever practical. As the storm event continues, the sampling team will return to all the sampling stations in rotation, and continue collection of grab samples. When the storm event declines or precipitation ceases, an attempt will be made to collect additional grab samples at all stations representing the falling limb of the hydrograph, but this may not be possible in all cases.

Grab samples will be transported under COC protocol to the analytical laboratory where they will be combined into one aliquot and filtered prior to analysis. Analytical methods and target reporting limits (RLs) are discussed in Section 3.8.

3.2 Flow Measurement

Continuous flow data will be recorded at all nine stations using dedicated flow sensors. Instantaneous flow measurements using an alternate measurement technique will also be obtained wherever possible during wet weather events, and when practical during dry weather events.

Instantaneous flow measurements will consist of a minimum of three velocity measurements will made immediately following sample collection. The flow measurements will be made using a digital water velocity meter (Global Water FP111 or equivalent), or area-velocity meter calibrated for the particular conveyance structure to be monitored (Global Water FC220 or equivalent), or both. The flow (Q) will be calculated using the average velocity (V) multiplied by the cross-sectional area (A) using the formula A x V = Q.

The cross-sectional area of each structure will be obtained from construction drawings, and verified by measurements collected within the conveyance during the site visit.

3.2.1 Flow Measurement Methods

Flow measurements will be collected at a fixed location in culverts or pipes. The measurement stations and channel profiles will be established during the initial site visit, when detailed measurements of the conveyance geometry will be collected. All subsequent measurements will be performed at the same locations to ensure uniformity and repeatability within the collected data.

3.2.1.1 Flow Measurement in Subsurface Storm Drains

For conduits or pipes, the flow velocity probe will be moved smoothly and uniformly throughout the flow profile. When a steady average reading is obtained, the average velocity for the flow stream and depth of water will be recorded on the Water Sample Data Sheet (see Appendix B). Three readings will be collected at each station, and the results of the readings averaged to obtain the calculated flow for the station.

3.2.1.2 Flow Measurement in Open Channels

To determine flow velocity in a stream, the flow velocity probe will be held at fixed measurement stations along a traverse of the channel and the velocity will be measured at 2/3 channel depth. Flow velocity and water depth will be recorded for each station along the traverse on the Discharge Measurement Note (see Appendix B), and the flow value for each segment of the profile will be measured to determine total flow through the channel profile. The value of flow within the channel will be obtained by calculating the average velocity for each subsection of the channel, then combining the results to obtain the total flow within the channel.

3.2.1.3 Flow Measurement – Sheet Flow Conditions

If the depth of flow does not allow measurement with the flow velocity probe (<0.1 foot), a "float" will be used to measure the velocity of flowing water. The width, depth, velocity, cross section and flow rate will be estimated based on the channel geometry, water depth, and amount of time it took a float to travel a marked distance three times. The estimated flow rate (Q) can then be calculated as follows:

$$Q = f \text{ x (cross section) x (average surface velocity)}$$

Where:

Q = the flow rate in feet per second

f = dimensionless number

Cross section is the measured value in feet, and average velocity is the measured value in feet per second.

The coefficient f is used to account for friction effects on the channel bottom. The float travels on the water surface, but the average velocity (not the surface velocity) determines the flow rate so f converts the surface velocity to the average velocity. Typical f values range from 0.60 to 0.90 based on the roughness of the surface, in this project a value of 0.75 will be used.

3.3 Decontamination Procedures

Non-dedicated sampling equipment will be decontaminated immediately prior to and after each use. Decontamination will be performed using a three-stage process with phosphate-free detergent wash, tap water rinse, and final deionized/distilled water rinse.

Decontamination will be performed in a designated area, using a plastic sheet as a liner to protect the ground against spilled solutions. The decontamination procedure is as follows:

1) Wash with non-phosphate detergent (e.g. Alconox ®) using bristles brush if necessary;
2) Rinse with tap water; and
3) Rinse with de-ionized/distilled water.

Following decontamination, if the item is not to used immediately; it will be wrapped in plastic or stored on plastic sheeting to prevent contamination. Used decontamination solutions will be containerized for appropriate disposal off-site in a municipal sanitary sewer.

3.4 Sample Containers and Preservation

The following sections detail sample containers and preservation methods for water and sediment samples collected as part of Nutrient and Toxics TMDL monitoring.

3.4.1 Nutrient TMDL Sample Containers and Preservation

The analytical laboratory will provide sample containers for all water samples collected by the field team. Samples collected for nitrate-nitrite will use one 500 milliliter (ml) polyethylene bottle. Samples collected for TPand total Kjeldahl nitrogen (TKN) will each use one 500 ml polyethylene bottle, containing a small amount of concentrated H_2SO_4 (Sulfuric Acid), used as a sample preservative. Table 3 provides a summary of the sample container and preservative use used for each analytical method.

The sample containers must be stored properly to prevent accidental release of the acid during transport and handling. The field team will keep the sample bottles stored inside plastic bags that are kept within a bulk bottle cooler to ensure they are clean and do not become contaminated during transport. Sample bottles will only be handled by gloved hands, and the lids will be secured at all times except when filling the bottle.

At each sampling location the field team will place the required number of sample containers into a resealable plastic bag prior to collection of a water sample, then close and seal the bulk bottle container. Sample containers shall be filled but not overflow. If a container is overflowed during filling, the container will be sealed, marked, and placed aside as an unused sample. In that case an additional container will be filled and used as the primary sample.

It should be noted that unused samples contain preservative acids and must be disposed of properly. Unused samples will be transported to the analytical laboratory for proper disposal and will not be listed on the COC.

Table 3: Analytical Methods, Bottle Types, Preservatives and Holding Times

Analyte	Method	Bottle/Volume	Preservative	Holding Time
Total Phosphorous	EPA 365.3	500 ml Polyethylene	<4^{O}C, H_2SO_4	28 days
TKN	EPA 351.2	500 ml Polyethylene	<4^{O}C, H_2SO_4	28 days
Nitrate/Nitrite	EPA 300.0	500 ml Polyethylene	<4^{O}C	48 hours
Total Organic Carbon (TOC)	EPA 415.3	40 ml VOA	<4^{O}C	28 days
Total Suspended Solids	EPA 160.2	500 ml Polyethylene	<4^{O}C	7 days
Organochlorine Pesticides[1]	EPA 8081A	1 liter amber	<4^{O}C	7 days
Total PCBs[2]	EPA 8082	1 liter amber	<4^{O}C	7 days

Notes:

1. Organochlorine Pesticides (OCPs) to be analyzed include chlordane-alpha, chlordane gamma, 2,4'-DDD, 2,4'-DDE, 2.4'-DDT, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin.
2. PCBs in water and sediment are measured as sum of seven Aroclors identified in the CTR (1016, 1221, 1232, 1242, 1248, 1254, and 1260). Congeners will also be analyzed to provide a better estimate of PCB concentrations and loads for PCBs.

VOA – volatile organic analysis

3.4.2 Toxics TMDL Sample Containers and Preservation

The analytical laboratory will provide sample containers for all water and sediment samples collected by the field team. Water samples collected for TOC will use three 40 ml VOA vials.

Water samples for TSS analysis will use one 500 ml polyethylene bottle. Water samples collected for sediment analysis of OCPs and PCBs will be collected in 1-liter glass amber bottles. Table 3 provides a summary of the sample container and preservative use used for each analytical method.

3.5 Sample Handling, Packaging, and Shipping

The handling and transportation of samples must be accomplished in a manner that protects the integrity of the samples and complies with the provisions of the MRP. As few people as possible will handle the samples. The field team will have custody of the samples during the monitoring event, and COC forms will accompany all samples during shipment or delivery to the analytical laboratory.

The field team shall package samples carefully to avoid breakage or contamination, maintain samples at the proper temperature (4^{o}C), and ship samples daily to the analytical laboratory under COC protocol. The following sample packaging requirements shall be followed:

1) Sample bottle lids must not be mixed, all sample lids must stay with the original containers;
2) Sample bottles will be placed in a resealable plastic bag to minimize leakage in case a bottle breaks during shipment;
3) The samples will be cooled by placing ice in sealed plastic bags and placing the sealed ice-filled bags around, between, and above the sample containers;
4) Any remaining space in the sample shipping container shall be filled with clean, inert packing material such as bubble-wrap;
5) The COC document must be sealed in a resealable plastic bag and placed in the shipping container. The resealable plastic bag will be taped to the inside lid of the sample cooler, and sealed with shipping tape;
6) Clear strapping tape will be wrapped around the cooler in at least two locations, sealing the container to prevent the contents from spilling; and
7) Custody seals will be affixed over the shipping tape in at least two locations (normally the front and right side of the cooler); in a manner that access to the container can only be gained by breaking a seal. A layer of clear strapping tape will be placed over the seals to ensure that they are not broken accidentally during shipping. Custody seals shall be constructed with security slots designed to break if the seals are disturbed.

3.6 Sample Naming Convention

Each sample will be labeled with a unique name that contains the sample station, the date of collection, and a suffix indicating the order of sample collection. Each sample will have the name of the monitoring site written first, followed by the date in mmddyyyy format, and a number denoting the sample order (X). For example, the first sample collected at station Tor-S2 on November 24, 2012 would be labeled **Tor-S2-11242012-1**. Table 4 lists the sample naming protocol for each sampling station.

Table 4: Sample Naming Convention

Sampling Station	Station Location	Sample Name
Tor-S1	40' north and 80' east of intersection of Plaza Del Amo and Western Ave.	Tor-S1-mmddyyyy-X
Tor-S2	50' west of intersection of 246th Place and Pennsylvania Ave.	Tor-S2-mmddyyyy-X
Tor-S3	Effluent of Walteria Lake, approx. 100' east of intersection of Madison St. and Skypark Drive.	Tor-S3-mmddyyyy-X
Tor-S4	210' north and 85' east of intersection of 236th St. and Western Ave.	Tor-S4-mmddyyyy-X
Tor-S5	25' west of intersection of Bani Avenue and 250th Street.	Tor-S5-mmddyyyy-X
Tor-S6	600' east of intersection of Estates Lane and Crenshaw Boulevard.	Tor-S6-mmddyyyy-X
Tor-S7	160' south and 280' east of intersection of Rolling Hills Road and Hawthorne Boulevard.	Tor-S7-mmddyyyy-X
Tor-S8	500' northwest of intersection Paseo de las Tortugas and Mesa Street.	Tor-S8-mmddyyyy-X
Tor-S9	830' east and 120' south of intersection of Paseo de las Tortugas and Vista Montana.	Tor-S9-mmddyyyy-X

3.7 Chain-of-Custody Procedures

The field team shall follow proper COC protocol with collected samples at all times. Samples will be considered to be in custody if they are (1) in the custodian's possession or view, (2) retained in a secure place (under lock) with restricted access, or (3) placed in a container and secured with an official seal such that the sample could not be reached without breaking the seal.

The field team shall complete COC records for all collected samples on triplicate forms supplied by the analytical laboratory. The COC will be utilized by the field team for all samples throughout the collection, transport, and analytical process to ensure compliance with the SSWP. Each field team member handling the samples will sign the COC.

3.8 Analytical Methods and Limits

Stormwater samples will be collected and analyzed for multiple constituents to support development of methods for reducing contaminant loading in City stormwater and to evaluate the effectiveness of Best Management Practices (BMPs) as they are implemented. The following sections describe the constituents for which samples will be analyzed, the analytical methods, method detection limits (MDLs) and RLs for each constituent.

3.8.1 Nutrient TMDL Monitoring

Nutrient TMDL samples will be analyzed for ammonia-ammonium, nitrate-nitrite, TKN, TP, phosphate, and TSS. Table 5 specifies the analytical methods, reporting units, target RLs, and MDLs for use in Nutrient TMDL monitoring.

Table 5: Nutrient TMDL Monitoring Analytical Methods and Limits

Parameter	Method Number	Reporting Units	Target Reporting Limits	Method Detection Limits
Ammonia-Ammonium (NH_3^+)	SM 4500D	mg/l	0.6	0.12
Nitrate (NO_3)	EPA 300.0	mg/l	0.1	0.03
Nitrite (NO_2)	EPA 300.0	mg/l	0.1	0.03
Total Kjeldahl Nitrogen (TKN)	EPA 351.2	mg/l	0.1	0.07
Total Phosphorus (TP)	EPA 6010B	mg/l	0.05	0.01
Phosphate (PO_4)	EPA 365.3	mg/l	0.1	0.05
Total Suspended Solids (TSS)	EPA 160.2	mg/l	1.0	0.5

Notes:
mg/l = milligrams per liter

3.8.2 Toxics TMDL Monitoring

Toxics TMDL samples will be analyzed for TSS, OCPs, PCBs, and TOC. Table 6 specifies the analytical methods, reporting units, target RLs, and MDLs for use in Toxics TMDL monitoring. If the constituents of concern have numeric targets that are lower than the readily available detection limits, the cities shall incorporate new MDLs in the MRP and QAPP when analytical methods and detection limits continue to improve (i.e., development of lower detection limits) and become more environmentally relevant.

Table 6: Toxics TMDL Monitoring Analytical Methods and Limits

Sample Medium	Parameter	Method Number	Method Detection Limit	Target Reporting Limit
Water	TSS	EPA 160.2	0.5 mg/L	1.0 mg/L
Sediment	TOC	EPA 415.1	0.05% dry weight	0.05%-66% dry weight
	OCPs[1]	EPA 8081	0.1-1 ng/dry g	0.5-5 ng/dry g
	Total PCBs[2]	EPA 8082	10 ng/dry g	20 ng/dry g

Notes:
Mg/l = milligrams per liter
ng/dry g = nano grams dry weight per gram
1.OCPs to be analyzed include chlordane-alpha, chlordane gamma, 2,4'-DDD, 2,4'-DDE, 2.4'-DDT, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin.
2. PCBs in water and sediment are measured as sum of seven Aroclors identified in the CTR (1016, 1221, 1232, 1242, 1248, 1254, and 1260). Congeners will also be analyzed to provide a better estimate of PCB concentrations and loads for PCBs. Method Detection Limit/Reporting Limit for individual congeners are 1 ng/dry g and 5 ng/dry g.

3.8.3 Field Measurements

Sample collection for Toxics TMDL monitoring will also be analyzed for the following field parameters: temperature, dissolved oxygen, turbidity, and conductivity. Table 7 specifies the field methods, range of expected values, reporting units, and target RLs for use in conducting field measurements.

Table 7: Field Measurements

Parameter	Range	Project RL
Velocity/Flow[1]	-0.5 to +20 ft^3/s	
pH	0 – 14 pH units	NA
Temperature	-5 – 50 ^{O}C	NA
Dissolved oxygen	0 – 50 mg/L	0.5 mg/L

Table 7: Field Measurements		
Parameter	**Range**	**Project RL**
Turbidity	0 – 3000 NTU	0.2 NTU
Conductivity	0 – 10000 µmhos/cm	2.5 µmhos/cm

Notes:
RL - Reporting Limit
Ft^3/s = cubic feet per second
NA- Not applicable
^{O}C = degrees Celsius
NTU = nephelometric turbidity units
µmhos/cm = micro ohms per centimeter
1. For velocity/flow, range refers to velocities measured by a handheld flow meter. The lower limit for measuring flow is dependent upon the size of the specific pipe or channel.

3.9 No Sample Taken Procedures

If a sample is not able to be collected due to lack of flow or site accessibility issues, the field team shall fill out a *Water Sample Data Sheet* to explain why no sample was taken. Sampling will not be attempted in low-flow conditions to avoid sample bias or contamination. If a sample is not able to be collected, this information shall be reported immediately to the Project Manager who will direct the sampling team to the appropriate course of action as specified in the SSWP.

4.0 MONITORING SITES

Nine (9) water quality sampling stations (Tor-S1 through Tor-S9) will be visited by the monitoring crew on a monthly basis and during qualifying wet weather events (see Figure 1). One sampling station (Tor-S3) will also be visited by the crew when Los Angeles County pumps stormwater out of Walteria Lake into the 54-inch storm drain. Six (6) of the monitoring sites are owned by the County of Los Angeles (Tor-S1 through Tor-S6), stations Tor-S7, Tor-S8, and Tor-S9 are owned by the City of Torrance. Table 8 provides a summary of the monitoring sites, and Figures 2 through 10 are detailed maps of the monitoring site locations.

Table 8: Monitoring Site Summary

Site Name	Site Ownership	Drainage System	System Description	Site Location	GPS Coordinates
Tor-S1	LA Co FCD	RDD 339	36" RCP	40' north and 80' east of intersection of Plaza Del Amo and Western Ave.	33° 49.3572' N, 118° 18.5208' W
Tor-S2	LA Co FCD	Project 2	33" RCP	50' west of intersection of 246th Place and Pennsylvania Ave.	33° 48.093' N, 118° 19.5252' W
Tor-S3	LA Co FCD	Project 245	54"	Effluent of Walteria Lake, approx. 100' east of intersection of Madison St. and Skypark Drive.	33° 48.6312' N, 118° 20.8674' W
Tor-S4	LA Co FCD	Project 8101	9'-2"W x 11' H RCB	210' north and 85' east of intersection of 236th St. and Western Ave.	33° 48.7056' N, 118° 18.5196' W
Tor-S5	LA Co FCD	Project 540	54”	39' east of intersection of Pennsylvania Avenue and 250th Street.	33° 47.8956' N, 118° 19.6872' W
Tor-S6	LA Co FCD	PD 1032	36" RCP	600' east of intersection of Estates Lane and Crenshaw Boulevard.	33° 47.1822' N, 118° 20.43' W
Tor-S7	City of Torrance	N/A	10' x 10' RCB	160' south and 280' east of intersection of Rolling Hills Road and Hawthorne Boulevard.	33° 47.6826' N, 118° 20.9232' W
Tor-S8	City of Torrance	N/A	24" RCP	500' northwest of intersection Paseo de las Tortugas and Mesa Street.	33° 48.0522' N, 118° 21.4254' W
Tor-S9	City of Torrance	N/A	42" RCP	830' east and 120' south of intersection of Paseo de las Tortugas and Vista Montana.	33° 48.2742' N, 118° 21.7776' W

The following sections provide a detailed description of each monitoring station.

4.1 Station Tor-S1 (RDD 339)

Sampling location Tor-S1 is within LACoFC Storm Drain RDD 399. The storm sewer conveying stormwater to this site is a 36-inch reinforced concrete pipe. It is accessed through a manhole located 40 feet north and 80 feet east of the intersection of Plaza Del Amo and Western Avenue (Thomas Guide page 763, grid J7). The total upstream drainage area served by the conveyance is approximately 63 acres. The drainage area is mainly residential and commercial land use that represents 36 percent and 33 percent, respectively, of the drainage area. This site is one of the four sites that will provide information on the amount of pollutants leaving the City limits.

The site is easily accessible and safe for conducting sampling during both dry and wet weather conditions provided traffic control procedures are followed as described in the Work Area Traffic Control Handbook (BNI Publications, Inc., 2010) or "WATCH Manual". An Encroachment Permit from the City of Los Angeles is required to block part of the street to conduct sampling.

Figure 1 Sampling Station Tor-S1

4.2 Station Tor-S2 (Project 2)

Tor-S2 is within LACoFC Storm Drain Project 2. Stormwater is conveyed to this site through an 8' x 7' reinforced concrete box (RCB). It is accessed through a manhole located approximately 50 feet west of the intersection of 246th Place and Pennsylvania Avenue (page 793-grid G3). The total upstream drainage area is about 2,605 acres. The drainage area is a mixed land use, about 32 percent residential, 10 percent commercial and 11 percent industrial. The Torrance

Airport accounts for 12 percent of the drainage area. This site is one of the four sites that will provide information to quantify the amount of pollutants leaving the City limits. Tor-S2 is easily accessible and safe for conducting sampling during both dry and wet weather conditions provided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Lomita is required to block part of the street to conduct sampling.

Figure 2 Sampling Station Tor-S2

4.3 Station Tor-S3 (Project 245)

Sampling station Tor-S3 is within LACoFC Storm Drain Project 245. It is accessed through a manhole located in a parking lot approximately 150 feet east of the intersection of Madison Street and Skypark Drive (page 793, grid D2). The station is located upstream of station Tor-S2, and will assist the City in characterizing discharges from Walteria Lake. The total upstream drainage area is approximately 2,285 acres. Land use is mixed with 37 percent residential, 10 percent commercial and 9 percent industrial. A 54-inch pipe conveys stormwater to this site. The site is easily accessible and safe for all weather sampling provided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Torrance is required to block part of the parking lot during sampling.

Figure 3. Sampling Station Tor-S3

4.4 Station Tor-S4 (Project 8101)

Sampling station Tor-S4 is within LACoFC Storm Drain Project 8101). It is accessed through a manhole located approximately 210 feet north and 85 feet east of the intersection of 236th Street and Western Avenue (page 793, grid J2). The total drainage area upstream of this sampling location is approximately 1,014 acres. Residential land use represents nearly 60 percent of the drainage area. Commercial and industrial land uses represent only 9 percent of the drainage area. The storm drain serving this site is a 9’-2” x 11’ RCB. The site is safe for all weather sampling and it is easily accessible provided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Los Angeles is required to block part of the street to conduct sampling.

Figure 4. Sampling Station Tor-S4

4.5 Station Tor-S5 (Project 540)

Sampling station Tor-S5 is within LACoFC Storm Drain Project 540. It is accessed through a manhole located about 39 feet east of the intersection of Pennsylvania Avenue and 250th Street (page 793, grid G4). The site is downstream of two conveyance pipes that intersect from the south and west. This sampling site serves an upstream drainage area of approximately 661 acres. This site is mainly residential and airport land use, which represent 43 and 24 percent of the drainage area, respectively. The storm drain discharging stormwater to this site is a 54” conduit. This site is easily accessible and safe for sampling activities provided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Lomita is required to block part of the street during sampling.

Figure 5. Sampling Station Tor-S5

4.6 Station Tor-S6 (PD 1032)

Sampling Station Tor-S6 is within LACoFC Storm Drain PD 1032. It is accessed through a manhole located approximately 600 feet east of the intersection of Estates Lane and Crenshaw Boulevard (page 793, grid E5). This site will monitor flow entering the City's storm drain from Rolling Hills Estate. The sampling site is safe and easily accessible provided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Torrance is required to block part of the street during sampling.

Figure 6. Sampling Station Tor-S6

4.7 Station Tor-S7

Sampling station Tor-S7 is accessed through a manhole located about 160 feet south and 280 feet east of the intersection of Rolling Hills Road and Hawthorne Blvd (page 793, grid D4). It will monitor dry weather flow originating from Rolling Hills Estates. The site is easily accessible and safe for sampling at all weather conditions provided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Torrance is required to block part of the street during sampling.

Figure 7. Sampling Station Tor-S7

4.8 Station Tor-S8

Sampling station Tor-S8 is accessed through a manhole located about 500 feet northwest of the intersection of Paseo De Las Tortugas and Mesa Street (page 793, grid C4). It will monitor dry weather flow originating from Rolling Hills Estates. The site is easily accessible and safe for sampling at all weather conditions provided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Torrance is required to block part of the street during sampling.

Figure 8. Sampling Station Tor-S8

4.9 Station Tor-S9

Sampling station Tor-S9 is accessed through a manhole located about 830 feet east and 120 feet south of the intersection of Paseo de Las Tortugas and Vista Montana (page 793, grid B3). This site will monitor dry weather flow originating from Palos Verdes Estates. The site is accessible and safe for sampling activities provided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Torrance is required to block part of the street during sampling.

Figure 9. Sampling Station Tor-S9

5.0 MONITORING SCHEDULE AND FREQUENCY

The City has completed seven months of Nutrient monitoring under the Machado Lake Nutrient TMDL Special Study Workplan (Carollo, 2011a). Monitoring under that program will continue until March, 2013 when the study will be completed. At that time the monitoring program will be re-evaluated to assess compliance with the WLA criteria in the Nutrient TMDL shown in Table 1 and adjust the sampling methodology as appropriate. .

A summary of the schedule for Nutrient TMDL monitoring for the remaining Special Study period is included in Table 9. The table also shows the proposed schedule for monitoring following completion of the Special Study, but after each year the City will review the monitoring results to assess potential changes to the monitoring program.

Table 9: Monitoring Schedule and Frequency

Sampling Station	Constituents	Phase I				Phase II					
		Year 1		Year 2		Year 3		Year 4		Year 5(1)	
		Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry
Tor-S1	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	3	--	1	--	--	--	1	--
Tor-S2	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	3	--	1	--	--	--	1	--
Tor-S3	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	1	--	1	--	--	--	1	--
Tor-S4	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	3	--	1	--	--	--	1	--
Tor-S5	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	3	--	1	--	--	--	1	--
Tor-S6	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	1	--	1	--	--	--	1	--

Table 9: Monitoring Schedule and Frequency											
Sampling Station	**Constituents**	**Phase I**				**Phase II**					
		Year 1		**Year 2**		**Year 3**		**Year 4**		**Year 5(1)**	
		Wet	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**
Tor-S7	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	1	--	1	--	--	--	1	--
Tor-S8	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	1	--	1	--	--	--	1	--
Tor-S9	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	1	--	1	--	--	--	1	--

Notes:

(1) At the end of year 5 the City will review the monitoring results to determine whether additional monitoring is required in subsequent years.

-- No monitoring required

Toxics TMDL monitoring will be implemented in the fall of 2012 following approval by the RWQCB of the MRP. Toxics monitoring will be performed in two phases. Phase 1 monitoring will be conducted for a two-year period and phase 2 monitoring that commences once Phase I monitoring has been completed.

Phase I Toxics TMDL sampling will be conducted during three wet weather events, including the first significant storm of the season, for two years (see Table 9). Phase I sampling will begin within 60 days of approval of the MRP and QAPP by the RWQCB. Phase 2 toxics TMDL samples will be collected during one wet weather event every other year as shown in Table 9

The following sections summarize the schedule for Nutrient and Toxics TMDL monitoring.

5.1 Nutrient TMDL Monitoring

Nutrient TMDL monitoring consists of three major elements:

- Monthly sampling during dry weather conditions at all nine sampling locations;
- Wet weather sampling at station Tor-S3 during four discrete storm events; and

- Up to six pumping event samples from station Tor-S3 when the Los Angeles County Department of Public Works (LACDPW) discharges water from Walteria Lake.

The following sections describe the schedule for Nutrient TMDL monitoring for each type of sampling event.

5.1.1 Dry Weather Sampling

Dry weather sampling will be conducted monthly at the nine (9) primary monitoring stations. The sampling will occur on a Thursday during the first full week of the month to facilitate traffic control at station Tor-S2 (parking at the station Tor-S2 is restricted on Thursday mornings). Dry weather conditions must be preceded by at least 24 hours of no greater than trace precipitation, or have an intensity of less than 0.1 inches of rain in a 24-hour period.

5.1.2 Wet Weather Sampling

Three wet weather sampling events are scheduled for the fall and winter of 2012 to complete the Special Study #3. Following acceptance by the RWQCB of the City's BMP Evaluation and Selection Study Report, the MRP will be modified to accomplish sampling specific to the needs for assessment of future compliance with the Nutrient TMDL. At that time the wet weather sampling schedule and locations will be revised, and the number of samples collected and events scheduled is predicted to increase (see Table 8).

For the 2012 fall and winter season, only station Tor-S3 will be sampled during qualifying wet weather events. Qualifying events occur during a storm with at least 0.1 inch of precipitation (defined as a "measurable" event). Wet weather sampling will not occur at a frequency greater than once every 72 hours, and sampling will not occur unless there has been at least 72 hours of continuous dry weather immediately preceding the "measurable" event. Weather forecasts for the 90503 zip code will be evaluated before deciding whether or not to sample a particular storm event.

5.1.3 Pumping Event Sampling

Whenever LACDPW pumps stormwater from Walteria Lake into the 54-inch storm drain, the City will conduct sampling at station Tor-S3. The pumping schedule will be obtained from LACDPW, and a decision regarding which events to sample will be made by the City. A maximum of seven (7) pumping events will be sampled yearly.

5.2 Toxics TMDL Monitoring

The frequency for Toxics TMDL sampling will follow the requirements of the Machado Lake Pesticides and PCBs Total Maximum Daily Load Special Study Workplan (Carollo, 2011b), and requirements set forth in the R10-008 (RWQCB, 2010). Phase I sampling will begin within 60 days of approval of the MRP and QAPP by the RWQCB. Phase I Toxics TMDL sampling will be conducted during three wet weather events, including the first significant storm of the season, for two years (see Table 8). Phase 2 toxics TMDL samples will be collected during one wet weather event every other year as shown in Table 8.

6.0 QA/QC

This section describes the QA/QC measures that will be implemented for field and laboratory activities outlined in this plan.

6.1 Field Sampling QA/QC Procedures

QA/QC samples will be collected to ensure that the project QA objectives outlined in the Special Studies Workplan are met. QA/QC samples will include field duplicates (FD), matrix spike/matrix spike duplicates (MS/MSD), equipment blanks (EB), and temperature blanks (TB). Table 10 lists the QA/QC sample types, initial frequency of collection, and ongoing frequency of collection.

Table 10: QA/QC Sampling Summary

QA/QC Sample Type	Initial Sampling Frequency	Ongoing Sampling Frequency	Naming Convention
FD	1 per event, rotating location	1 per event, rotating location	Tor-S30-mmddyyy-A
MS/MSD	1 every other sampling event, rotating location	1 every other sampling event, rotating location	Primary sample ID plus suffix -MS or -MSD
EB	1 per decontamination method per event	1 per decontamination method per every 20 samples or at field staff change, decontamination method change, or sampling device change whichever is more frequent	Tor-S31-mmddyyy-A
TB	1 per cooler	1 per cooler	Temperature Blank

The following sections describe the purpose, collection method, sample naming conventions, and frequency of collection for QA/QC samples.

6.1.1 Field Duplicates

Collection of FD samples will be at the same time and place, and in sequential order from the primary sample. It shall be collected as soon as possible after the primary sample, and will be subjected to identical handling and analysis. The FD is a blind duplicate, and shall be identified with a fictitious sample ID (i.e. "Tor-S30-mmddyyy-A"), and assigned a time one hour prior to the first sample collection event of the day. A minimum of one (1) FD shall be collected each sampling day, and the location of the FD shall be rotated among the monitoring sites from one event to the next.

6.1.2 Matrix Spike/Matrix Spike Duplicates

Collection of MS/MSD samples is performed to allow the analytical laboratory to perform duplicate and spike analysis on the primary samples to evaluate accuracy, precision, and potential matrix interferences. MS/MSD samples consist of triple volume (3X) samples collected at the same time and place, and in sequential order from the primary sample. The MS/MSD shall be collected as soon as possible after the primary sample, and will be subjected to identical handling and analysis.

One set of sample bottles will be labeled with the standard primary sample ID. A second set of sample bottles will be labeled with the primary sample ID, followed by the suffix -MS. The third set of sample bottles will be labeled with the primary sample ID, followed by the suffix -MSD. All three sets of samples will be listed on the COC document. The CMP does not specify a frequency for MS/MSD sample collection, but one (1) every other sampling event is proposed for the frequency of collection.

6.1.3 Equipment Blanks

Non-dedicated sampling equipment will be tested with equipment blanks (EBs) to evaluate the potential for cross-contamination associated with decontamination procedures. Prior to collecting an EB, decontaminate the sampling equipment using the procedure in *Section 4.5 Decontamination Procedures*. The EB will be collected by pouring laboratory grade reagent water into the sampling device, and then transferring it to the sample bottles. The EB is a blind sample, and shall be identified with a fictitious sample ID (i.e. "Tor-S31-mmddyyy-A). The EB shall be collected at the frequency of one (1) per sampling event for the first two (2) events; at a reduced frequency of one (1) per fifty (50) samples (2 percent) thereafter or one (1) per every change in field personnel, decontamination methodology, or change in sampling device - whichever is more frequent.

6.1.4 Temperature Blanks

Sample bottles containing tap water for use as temperature blanks (TBs) shall be provided by the analytical laboratory with each batch of sample bottles. The TBs are used to check for proper temperature of sample preservation by the receiving laboratory. The sampling team will include one TB per sample cooler, and label the bottle "Temperature Blank". The TB will not be listed on the COC.

6.2 Laboratory QA/QC Procedures

Samples will be submitted under COC protocol to the analytical laboratory. The analytical laboratory will have its own internal QC program, and will follow the QC requirements for each analytical method. The laboratory shall maintain logs sufficient to track each sample submitted, and will analyze or preserve each sample within the specified holding times.

All analytical data generated by the laboratory will undergo a QC review prior to release of the reported data. Each step of this review process involves evaluation of data quality based on both the results of the QC data and the professional judgment of those performing the review. This application of technical knowledge and experience to the data evaluation is essential so that data of high quality are generated consistently.

6.2.1 Method Blank

A method blank will be analyzed with every batch of 20 or fewer samples to measure laboratory contamination. The method blank will consist of analyte-free (laboratory reagent-grade) water and will be carried through the entire preparation and analysis procedure. Acceptance criteria for method blanks must conform to reference method requirements when specified. Generally, corrective action, including data flagging, is required when method blank concentrations are greater than the reporting detection limit, and the samples must be reprocessed if sample target compound/analyte concentrations are not greater than 10 times the method blank concentrations.

6.2.2 Spikes

A laboratory control sample (LCS) will be analyzed with every batch containing 20 samples or less to measure accuracy. The LCS will consist of a method blank spiked with a known amount of analyte, and it will be carried through the entire preparation and analysis procedure. The standards source will be separate from that used to prepare calibration standards. All analytes will be used for spiking the LCS. The recoveries will be plotted on control charts, and control limits will be calculated based upon historical data. If control limits are exceeded, the analysis will be stopped and the problem corrected. Samples associated with the out-of-control LCS will be reanalyzed in another batch.

One MS will be analyzed for one out of every 20 samples to measure matrix effects on accuracy. MS samples will consist of additional alilquots of sample spiked with a known amount of analyte. All analytes will be spiked. If a valid spike recovery is outside acceptable limits, but the LCS in control, matrix interference may be indicated.

One MSD will be analyzed for one out of every 20 samples to measure precision. For any batch of samples that does not contain a FD or MSD, two LCS samples (LCS and LCS duplicate) will be separately prepared and analyzed. If the relative percent difference does not meet the required acceptance limits, the problem will be investigated and corrected. Any affected samples will be reanalyzed in a separate batch.

6.2.3 Laboratory Sample Custody

The analytical laboratory will maintain custody procedures that conform to those required by the Contract Laboratory Program (CLP), as outlined in the CLP User's Guide (USEPA, 1991 and USEPA, 2002). The procedures include designation of a sample custodian who will accept the samples and document sample condition; complete the COC, any required sample tags, and the laboratory request sheets. The custodian will follow laboratory sample tracking and documentation procedures, and ensure secure sample storage in the appropriate environment to maintain preservation.

The laboratory will maintain records documenting all phases of sample handling, from receipt to final report of analysis. Accountable documents include sample receipt forms, laboratory operation logbooks, COC records, bench work sheets, and other documents related to sample preparation and analysis. The laboratory shall utilize a document numbering and identification system for all documents/logs.

7.0 REFERENCES

BNI Publications, Inc., 2010. *Work Area Traffic Control Handbook "WATCH Manual"*.

The State of California, California Regional Water Quality Control Board, Los Angeles Region (RWQCB), 2008. *Resolution No. R08-006, Amendment to the Water Quality Control Plan for the Los Angeles Region to Incorporate a Total Daily Maximum Load for Eutrophic, Algae, Ammonia, and Odors (Nutrients) for Machado Lake:* Dated May 1, 2008.

RWQCB, 2010. *Resolution No. R10-008, Amendment to the Water Quality Control Plan for the Los Angeles Region to Incorporate a Total Daily Maximum Load for Pesticides and PCBs for Machado Lake:* Dated September 2, 2010.

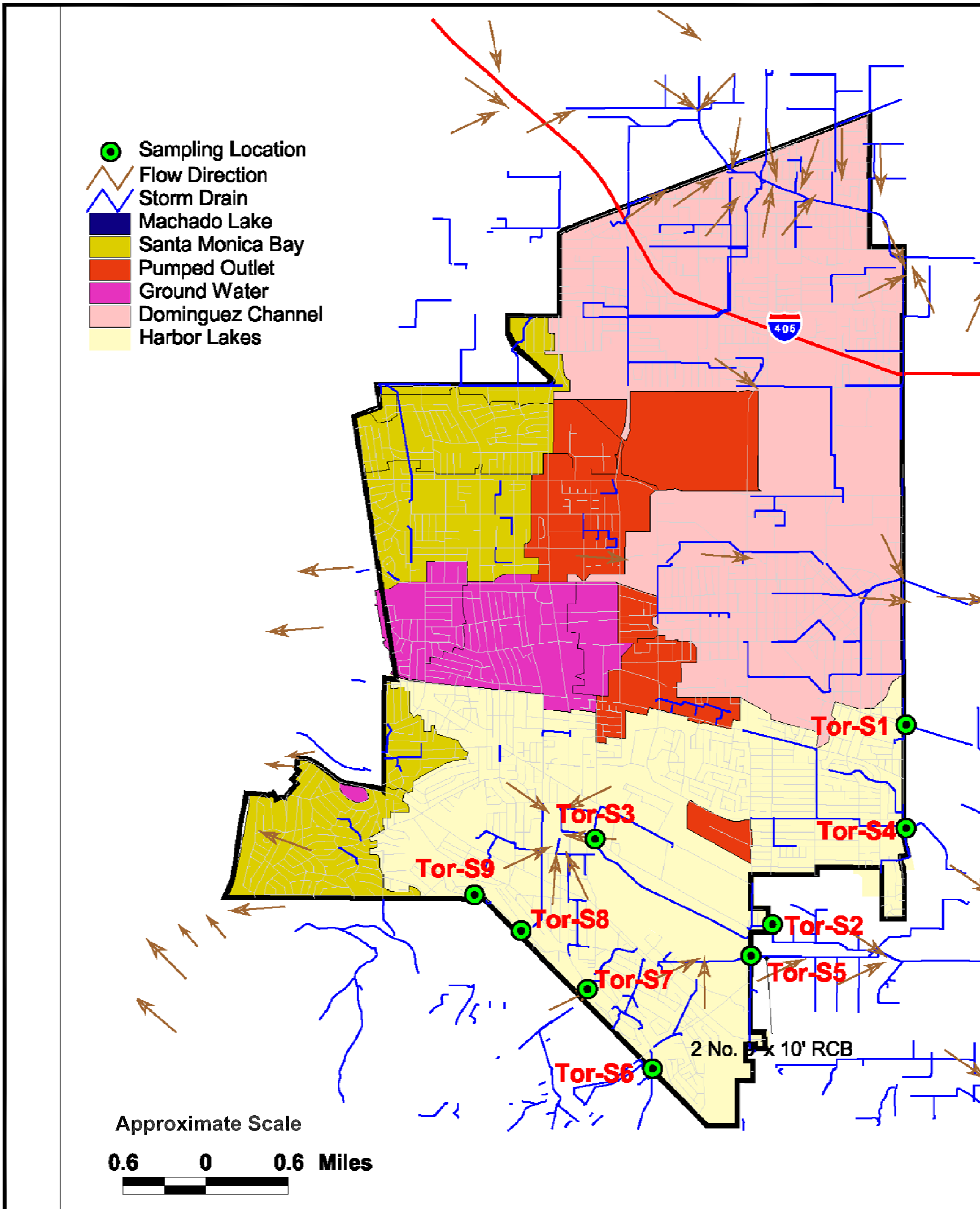
Carollo Engineers, 2011a. *Machado Lake Nutrient Total Maximum Daily Load Special Study Workplan:* Dated May 18, 2011.

Carollo Engineers, 2011b. *Machado Lake Pesticides and PCBs Total Maximum Daily Load Special Study Workplan:* Dated August 31, 2011.

U.S. Environmental Protection Agency (USEPA), 1991. *User's Guide to the Contract Laboratory Program. Office of Emergency and Remedial Response. EPA/540/P-921/002. January, 1991.*

U.S. Environmental Protection Agency (USEPA), 2002. *USEPA Contract Laboratory Program National Functional Guidelines for Data Review-Inorganics. EPA-540-R-01-008. July, 2002.*

FIGURES



After Carollo Engineers, Inc., 2010.

FIGURE 1
Site Location Map

Stormwater Sampling Stations
Special Studies Work Plan
Torrance, California

northgate
environmental management, inc.

Project No. 2040.01

LEGEND

● Sampling Station Tor-S1

Los Angeles County Flood Control Storm Drain RDD 339

Located 40 ft north and 80 ft east of Plaza Del Amo and Western Ave.

N

SCALE

0 33 66 99 Feet

FIGURE 2
Tor-S1, RDD 339

Stormwater Sampling Stations
Special Studies Work Plan
Torrance, California

northgate
environmental management, inc.

Project No. 2040.01

LEGEND

● Sampling Station Tor-S2

Los Angeles County Flood Control Storm Drain Project 2

Located 50 ft south of 246th Place on Pennsylvania Avenue

SCALE

0 33 66 99 Feet

N

FIGURE 3
Tor-S2, Project 2

Stormwater Sampling Stations
Special Studies Work Plan
Torrance, California

northgate
environmental management, inc.

Project No. 2040.01

LEGEND

● Sampling Station Tor-S3

Los Angeles County Flood Control Storm Drain Project 245

Located 100 ft east of Madison Street and Skypark Drive

N

SCALE

0 33 66 99 Feet

FIGURE 4
Tor-S3, Project 245

Stormwater Sampling Stations
Special Studies Work Plan
Torrance, California

northgate environmental management, inc.

Project No. 2040.01

LEGEND

● Sampling Station Tor-S4

Los Angeles County Flood Control Storm Drain Project 8101

Located 210 feet north & 85 feet east of 236th Street and Western Ave.

N

SCALE

0 33 66 99 Feet

FIGURE 5

Tor-S4, Project 8101

Stormwater Sampling Stations
Special Studies Work Plan
Torrance, California

northgate environmental management, inc.

Project No. 2040.01

LEGEND

● Sampling Station Tor-S5

Los Angeles County Flood Control Storm Drain Project 540

Located 25 feet west of Bani Avenue and 250th Street

N

SCALE

0 33 66 99 Feet

FIGURE 6
Tor-S5, Project 540

Stormwater Sampling Stations
Special Studies Work Plan
Torrance, California

northgate
environmental management, inc.

Project No. 2040.01

LEGEND

● Sampling Station Tor-S6

Los Angeles County Flood Control Storm Drain PD 1032

Located 600 feet east of Estates Lane and Crenshaw Blvd.

SCALE

0 33 66 99 Feet

N

FIGURE 7
Tor-S6, PD 1032

Stormwater Sampling Stations
Special Studies Work Plan
Torrance, California

northgate environmental management, inc.

Project No. 2040.01

LEGEND

● Sampling Station Tor-S7

Located 160 ft east ofHawthorne Blvd. on Rolling Hills Road

SCALE

0 33 66 99 Feet

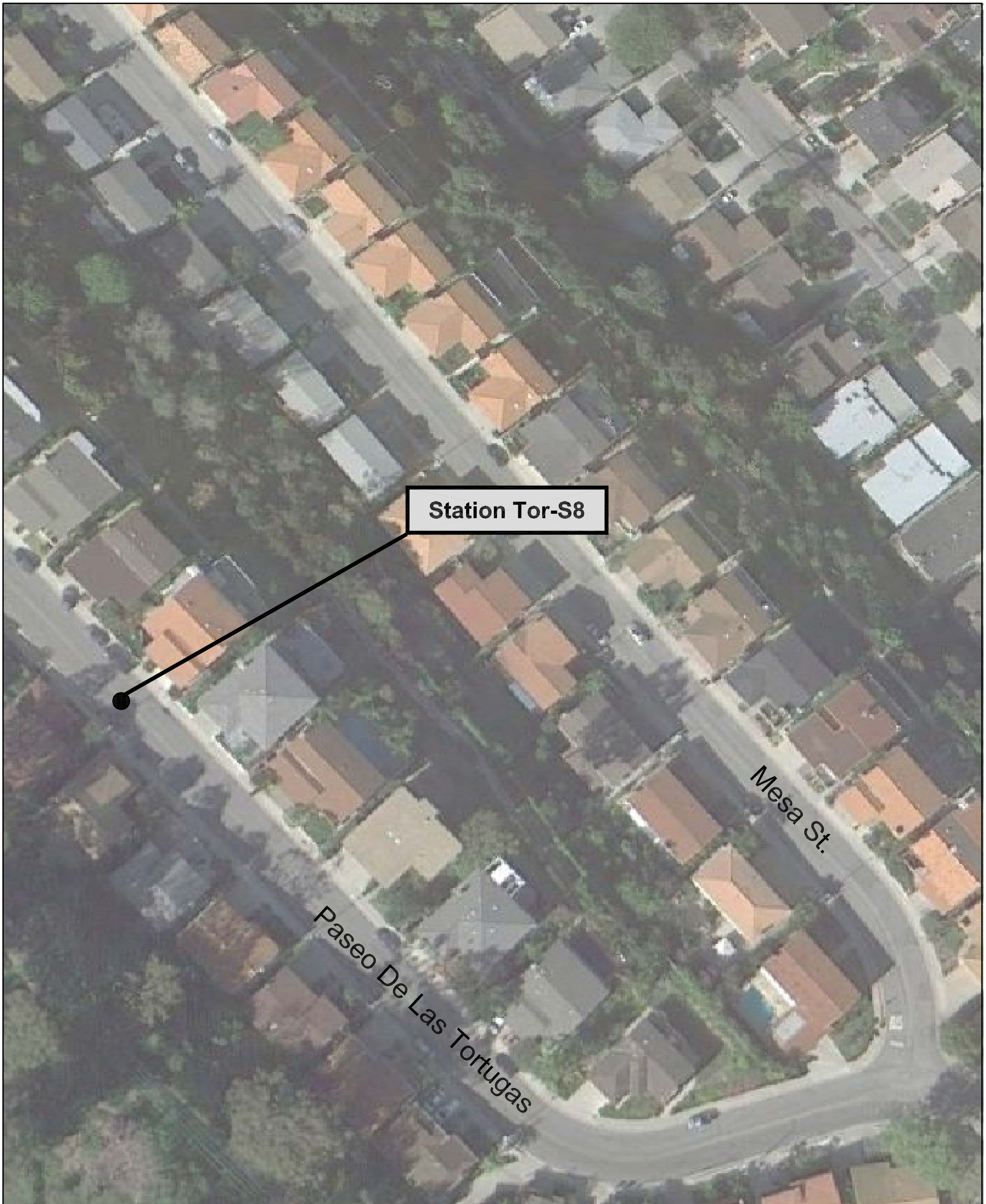
N

FIGURE 8
Tor-S7

Stormwater Sampling Stations
Special Studies Work Plan
Torrance, California

northgate
environmental management, inc.

Project No. 2040.01



LEGEND

● Sampling Station Tor-S8

Located 500 ft northwest of Paseo De Las Tortugas & Mesa St.

N

SCALE

0 33 66 99 Feet

FIGURE 9
Tor-S8

Stormwater Sampling Stations
Special Studies Work Plan
Torrance, California

northgate
environmental management, inc.

Project No. 2040.01

LEGEND

- Sampling Station Tor-S9

Approx 830 ft east & 120 ft south of Paseo De Las Tortugas & Vista Montana

N

SCALE

0 35 70 105 Feet

FIGURE 10
Tor-S9

Stormwater Sampling Stations
Special Studies Work Plan
Torrance, California

northgate
environmental management, inc.

Project No. 2040.01

APPENDIX A

Site-Specific Health and Safety Plan

Health and Safety Plan
For Stormwater Sampling Activities
City of Torrance
Torrance, California

February 29, 2012

Prepared For:

City of Torrance
3031 Torrance Boulevard
Torrance, California 90503

Prepared By:

Northgate Environmental Management, Inc.
24411 Ridge Route Drive, Suite 130
Laguna Hills, California 92653

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Air Monitoring Form
Incident Report Form
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1.0 GENERAL

Northgate Environmental Management (Northgate) has prepared this Health and Safety Plan (HASP) for use during water sampling activities conducted at monitoring stations in the City of Torrance (the Site) as part of the Special Studies Workplan. Activities conducted under Northgate's direction at the Site will be in compliance with applicable Occupational Safety and Health Administration (OSHA) regulations, particularly those in Title 8 California Code of Regulations (CCR) 5192, and other applicable federal, state, and local laws, regulations, and statutes. A copy of this HASP will be kept on Site during scheduled field activities.

This HASP addresses the potential hazards associated with planned field activities at the Site. It presents the minimum health and safety requirements for establishing and maintaining a safe working environment during the course of work. In the event of conflicting requirements, the procedures or practices that provide the highest degree of personnel protection will be implemented. If work plan specifications change or if site conditions encountered during the course of the work are found to differ substantially from those anticipated, the Director of Health and Safety must be informed immediately upon discovery, and appropriate changes will be made to this HASP.

It is the Project Manager's responsibility to ensure that health and safety procedures are enforced at the Site. Project personnel, including subcontractors, shall receive a copy of this HASP and sign the form to indicate acceptance before on-site project activities begin.

Northgate's health and safety programs and procedures, including medical monitoring, respiratory protection, injury and illness prevention, hazard communication, and personal protective equipment (PPE), are documented in the Northgate Corporate Health and Safety Manual. These health and safety procedures are incorporated herein by reference, and Northgate employees will adhere to the procedures specified in the manual.

When specified in contract documents, this HASP may cover the activities of Northgate subcontractors. However, this HASP may not address hazards associated with tasks and equipment that are specialties of the subcontractor (e.g., operation of a drill rig). Subcontractors are responsible for developing, maintaining, and implementing their own health and safety programs, policies, and procedures.

Northgate is responsible for the safety of its employees and subcontractors under its control, but assumes no responsibility for the activities of other contractors or their subcontractors who may be working concurrently at the general project location. Northgate will use a reasonable degree of care when marking potentially hazardous areas within its project work site and restricting access as appropriate. Northgate will not be responsible for others outside its control that disregard such marked hazards or restricted access. This HASP has been prepared specifically for this project and is intended to address health and safety issues solely with respect to Northgate's work. All references, therefore, to the site, the work, activities, site personnel, workers, persons, or subcontractors in this HASP are with respect to Northgate work only.

2.0 SITE DESCRIPTION AND BACKGROUND

There are nine locations (9) where monthly stormwater sampling will be performed on behalf of the City of Torrance. The stormwater will also be sampled during qualifying wet weather events and during pumping events where Walteria Lake is lowered. In the City of Torrance, stormwater flows generally toward the east, contributing flow to drainage systems entering Machado Lake. Stormwater from the City of Torrance accounts for approximately 35.6% of the Machado Lake watershed (Carollo Engineers, 2011).

Machado Lake is located in the City of Los Angeles at the Ken Malloy Harbor Regional Park. It is approximately 40 acres in size, and averages approximately 3 feet in depth. Machado Lake is listed on the 1998, 2002, and 2006 Clean Water Act Section 303(d) lists of impaired water bodies due to eutrophic conditions, algae and odors. The listed impairments are caused by the overloading of nutrients, such as nitrogen and phosphorus, resulting in excessive algal growth which leads to increased turbidity, decreased levels of oxygen, and odor problems. The Los Angeles Regional Water Quality Control Board established total maximum daily loads (TMDLs) for Machado Lake for algae, ammonia and odors (nutrient) on May 1, 2008.

3.0 PLANNED SITE ACTIVITIES

Project work will consist of the following activities:

- Placement of dedicated flow sensors;
- Stormwater sample collection; and
- Water flow measurement.

Stormwater sampling and flow measurements are expected to be taken from subsurface storm drains and conveyances in dry weather on a monthly basis, in wet weather during qualifying storm events, and during up to 10 yearly pumping events where water is transferred from Walteria Lake into the storm drain system. Access to the conveyances is via manholes located within the public right-of-way. Work within the manholes or an underground conveyance is subject to confined space entry protocols and safe work practices.

4.0 KEY PROJECT PERSONNEL AND RESPONSIBILITIES

Project Manager	Dana Brown
Site Safety Officer (SSO)	Nicky Galloway

The responsibilities of key project personnel are outlined below.

4.1 Project Manager

The Project Manager has the ultimate responsibility for the health and safety of Northgate personnel at the Site. The Project Manager is responsible for:

- Ensuring that project personnel review and understand the requirements of this HASP;
- Keeping the Director of Health and Safety informed of project developments;
- Keeping on-site personnel, including subcontractors, informed of the expected hazards and appropriate protective measures at the Site; and
- Providing resources necessary for maintaining a safe and healthy work environment for Northgate personnel.

4.2 Site Safety Officer

The SSO is responsible for enforcing the requirements of this HASP once Site work begins. The SSO has the authority to immediately correct situations where noncompliance with this HASP is noted and to immediately stop work in cases where an immediate danger to Site workers or the environment is perceived. Responsibilities of the SSO also include:

- Obtaining and distributing PPE and air monitoring equipment necessary for this project;
- Limiting access at the Site to authorized personnel;
- Communicating unusual or unforeseen conditions at the Site to the Project Manager;
- Supervising and monitoring the safety performance of site personnel to evaluate the effectiveness of health and safety procedures and correct deficiencies;
- Conducting daily tailgate safety meetings before each day’s activities begin; and
- Conducting a Site safety inspection prior to the commencement of each day’s field activities.

4.3 Subcontractor Personnel

Subcontractor personnel are expected to comply with the minimum requirements specified in this HASP. Failure to do so may result in the removal of the subcontractor or any of the subcontractor's workers from the job site. Subcontractors may employ health and safety procedures that afford them a greater measure of personal protection than those specified in this plan so long as they do not pose additional hazards to themselves, the environment, or others working in the area.

5.0 HAZARDS OF KNOWN OR EXPECTED SUBSTANCES OF CONCERN

Anticipated Compounds	Source (soil/water/drum, etc.)	Known Concentration Range (ppm, mg/kg, mg/l)	
		Lowest	Highest
Nitrate-Nitrite	Stormwater	unknown	unknown
Total Kjeldahl Nitrogen (TKN)	Stormwater	unknown	unknown
Total Phosphorus	Stormwater	unknown	unknown

Compounds to be tested in stormwater include those in the table above. Exposure pathways of concern for these compounds are direct skin contact with contaminated materials and incidental ingestion of affected media. Wearing protective equipment and following decontamination procedures listed in Section 9.0 can minimize dermal contact and incidental ingestion. Descriptions of the compounds of concern are located in Appendix A.

In addition, there is a potential for exposure to bacteria in stormwater. Wearing of protective equipment and proper decontamination procedures will also minimize exposure to bacteria.

6.0 PHYSICAL HAZARDS

The following potential physical hazards may be encountered during scheduled activities at the Site:

- Rapidly flowing water;
- Open manholes;
- Slips, trips, and falls;
- Heat stress;
- Cold stress;
- Inclement weather;
- Materials and equipment handling;
- Lightning/electrical storms; and
- Traffic.

6.1 General Safe Work Practices

- Workers will thoroughly clean their hands, faces, and other potentially contaminated areas before smoking, eating, or leaving the Site;
- Accidents and/or injuries associated with work at the Site will be immediately reported to the SSO. If necessary, an incident report will be initiated by the SSO;
- Periodic safety briefings will be held to discuss current Site conditions, field tasks being performed, planned modifications, and work concerns;
- Site conditions may include uneven, unstable, or slippery work surfaces. Substantial care and personal observation is required on the part of each employee to prevent injuries from slips, trips, and falls;
- Workers will maintain good housekeeping practices during field activities to maintain a safe working environment. The work site will be kept free of debris, waste, and trash;
- The "buddy system" will be used whenever appropriate;
- To prevent head injury, ANSI-approved hard hats will be worn at all times while the worker is in an area where overhead obstructions or falling objects may be encountered; and
- To prevent eye injuries, workers must wear ANSI-approved safety glasses during field activities.

6.2 Rapidly Flowing Water

In accordance with CFR 1926.106, employees working over or near water, where the danger of drowning exists, shall be provided with U.S. Coast Guard-approved life jackets or buoyant work vests. Prior to and after each use, the buoyant work vests or life preservers shall be inspected for defects that would alter their strength or buoyancy. Defective units shall not be used.

Workers will not enter water deeper than the knee under any circumstance. Workers will not enter flowing water when the product of depth (in feet) and velocity (in feet per second) equals 12 or greater. When water conditions preclude safe water entry, water depths and current velocity will be measured from a traverse located atop the culvert or drain inlet structure and reported as an approximate value.

6.3 Open Manholes

Manholes will be opened by a team of two workers using hooks or a lid lifting tool. When preparing to remove a manhole cover make sure it is not locked with a bolt, setscrew, or other locking device. When handling a cover, keep feet solidly placed and clear of the cover should it drop. Take a working position with knees slightly bent and unseat the cover by both workers pulling at the same time. Re-position the feet and continue to make additional pulls until the cover is clean from the frame and will not interfere with the work being done. Workers will deploy a safety fence around the manhole opening to create an exclusion zone and limit access to authorized personnel. Replacing the cover can be done in a similar manner by moving it until the cover seats itself in the frame.

When the manhole is located in a public right of way, traffic control measures will be placed according to requirements published in the Work Area Traffic Control Handbook (WATCH Manual) (BNI, 2010). Traffic control measures will be placed according to Northgate standard Safe Work Practices and all applicable permit conditions.

6.4 Heat Stress

Adverse climate conditions, primarily heat, are important considerations in planning and conducting Site operations. Heat-related illnesses range from heat fatigue to heat stroke, with heat stroke being the most serious condition. The effects of ambient temperature can cause physical discomfort, loss of efficiency, and personal injury, and can increase the probability of accidents. In particular, protective clothing that decreases the body's ventilation can be an important factor leading to heat-related illnesses.

To reduce the possibility of heat-related illness, workers should drink plenty of fluids and establish a work schedule that will provide sufficient rest periods for cooling down. Personnel shall maintain an adequate supply of non-caffeinated drinking fluids on Site for personal hydration. Workers should be aware of signs and symptoms of heat-related illnesses, as well as first aid for these conditions. These are summarized in the table below.

Condition	Signs	Symptoms	Response
Heat Rash or Prickly Heat	Red rash on skin.	Intense itching and inflammation.	Increase fluid intake and observe affected worker.
Heat Cramps	Heavy sweating, lack of muscle coordination.	Muscle spasms, and pain in hands, feet, or abdomen.	Increase fluid uptake and rest periods. Closely observe affected worker for more serious symptoms.
Heat Exhaustion	Heavy sweating; pale, cool, moist skin; lack of coordination; fainting.	Weakness, headache, dizziness, nausea.	Remove worker to a cool, shady area. Administer fluids and allow worker to rest until fully recovered. Increase rest periods and closely observe worker for additional signs of heat exhaustion. If symptoms of heat exhaustion recur, treat as above and release worker from the day's activities after he/she has fully recovered.
Heat Stroke	Red, hot, dry skin; disorientation; unconsciousness	Lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse.	Immediately contact emergency medical services by dialing 911. Remove the victim to a cool, shady location and observe for signs of shock. Attempt to comfort and cool the victim by administering small amounts of cool water (if conscious), loosening clothing, and placing cool compresses at locations where major arteries occur close to the body's surface (neck, underarms, and groin areas). Carefully follow instructions given by emergency medical services until help arrives.

6.5 Cold Stress

Workers performing activities during winter and spring months may encounter extremely cold temperatures, as well as conditions of snow and ice, making activities in the field difficult. Adequate cold weather gear, especially head and foot wear, is required under these conditions.

Workers should be aware of signs and symptoms of hypothermia and frostbite, as well as first aid for these conditions. These are summarized in the table below.

Condition	Signs	Symptoms	Response
Hypothermia	Confusion, slurred speech, slow movement.	Sleepiness, confusion, warm feeling.	Remove subject to warm area, such as truck cab; give warm fluids; warm body core as rapidly as possible; remove outer clothing and wrap torso in blankets with hot water bottle or other heat source. Get medical attention immediately.
Frostbite	Reddish area on skin, frozen skin.	Numbness or lack of feeling on exposed skin.	Place affected extremity in warm, not hot, water, or wrap in warm towels. Get medical attention.

6.6 Inclement Weather

Rain and wet conditions increase slipping and tripping hazards, braking distances of vehicles, and the potential for slippage or handling difficulties of field equipment. Winter storms will bring in colder than normal temperatures to the area. Sampling teams should be prepared to work long hours in wet and cold conditions and should wear extra layers of clothing under rain gear since there may be a variety of temperature changes. Traffic control equipment should be placed with the consideration that vehicles will take longer to stop on wetted roadways, and the work area should be protected from traffic by positioning a truck between the work area and direction of traffic flow as a buffer.

6.7 Materials and Equipment Handling Procedures

The movement and handling of heavy equipment and materials on the Site pose a risk to workers in the form of muscle strains and minor injuries. These injuries can be avoided by using safe handling practices, proper lifting techniques, and proper personal safety equipment such as steel-toed boots and sturdy work gloves. Where practical, mechanical devices such as hand carts, manhole hooks, pry bars, and lid lifting tools will be utilized to assist in the movement of heavy equipment or materials. Workers will not attempt to move heavy objects by themselves without using appropriate mechanical aids.

6.8 Lightning/Electrical Storms

Lightning can be unpredictable and may strike many miles in front of, or behind, a thunderstorm. Workers will therefore cease field operations at the first sign of lightning and suspend activities until at least 30 minutes after the last observed occurrence of lightning or thunder. For purposes of this HASP, signs of a thunderstorm will include any visible lightning or audible thunder.

In the event of a thunderstorm, workers will take the following actions:

- Get inside a permanent building structure (not a shed or canopy) or fully enclosed metal vehicle (not a convertible or camper shell) with the windows fully up.
- Stay away from tall isolated objects, such as trees, telephone poles, or flag poles.
- Avoid touching pry bars, metal lifting hooks, or metal manhole covers and store them on the ground away from the vehicle.
- Avoid large open areas, such as fields or parking lots, where a person is the relatively highest object.
- Stay away from lakes, ponds, railroad tracks, fences, culverts and storm drains that contain water, and other objects that could transmit current from a distant lightning strike.

6.9 Traffic

Vehicular traffic at sample stations located in right-of-ways presents opportunities for serious injury to persons or property. Traffic may consist of automobiles and trucks, and workers are clearly at risk during periods of heavy traffic and/or inclement weather. Risk from motor vehicle operations may be minimized by good operating practices, alertness, and care on the part of workers and pedestrians.

Site personnel will wear high-visibility safety vests whenever activities are conducted in areas with vehicular traffic. Work vehicles and traffic control devices will be placed according to the standards published in the WATCH manual (BNI, 2009) as appropriate for each sampling location. The equipment will be in conformance with the Manual on Uniform Traffic Control Devices for Streets and Highways (United States Department of Transportation, 2009), and the California Manual on Uniform Traffic Control Devices for Streets and Highways (California Department of Transportation, 2012). The equipment shall be arranged to serve as a barrier between Site workers and vehicular traffic. If required by local ordinances or Site location, a traffic control plan will be developed and implemented.

7.0 PERSONAL PROTECTIVE EQUIPMENT

The purpose of PPE is to protect employees from hazards and potential hazards they are likely to encounter during Site work. The amount and type of PPE used will be based on the nature of the anticipated or encountered hazards, but at a minimum, dermal protection and eye protection will be worn whenever contact with stormwater is anticipated.

Northgate personnel will be provided with appropriate personal safety equipment and protective clothing. The SSO is to inform each worker about necessary protection and must provide proper training in the use of the safety equipment. The required PPE to be worn for Site work is described below.

7.1 Level D Protection

It is anticipated that collection of stormwater samples will normally require Level D PPE. Dermal protection is required whenever contact with stormwater is anticipated. Higher levels of PPE are not expected to be required unless confined space entry is performed. The following equipment is specified as the minimum PPE required to conduct work at the Site:

- Work shirt and long pants;
- Waterproof gloves;
- ANSI-approved steel-toed boots or safety shoes;
- ANSI approved hard hat;
- Reflective traffic safety vest; and
- ANSI-approved safety glasses.

Other personal protection readily available for use, if necessary, includes the following:

- Waders, when direct contact with stormwater is anticipated
- U.S. Coast Guard-approved life jacket or buoyant work vest; and
- Chemical splash goggles.

7.2 Confined Space Entry

Work inside a manhole or underground stormwater conveyance requires the implementation of confined space entry protocols and manhole safe work practices. The confined space entry protocol contains a summary of tasks that are required to be performed prior to entering the confined space (see Appendix B). In the event of an emergency involving the worker within the confined space, a Confined Space Entry Emergency Action Plan will be followed by the attendant (see Appendix C). Appendix D contains the Manhole Safe Work Practices protocol, and a summary of confined space entry and manhole safety is contained in the following paragraphs.

During confined space entry, atmospheric monitoring is required to determine if a hazardous condition exists. If a hazardous condition is present, in order to continue working within the confined space Level B protection is required. Level B PPE consists of the standard Level D PPE plus a supplied air respirator (SAR). The following are conditions that require the use of SARs:

- Oxygen-deficient atmosphere (less than 19.5% oxygen);
- Carbon Monoxide level above 25 parts per million (ppm);
- Hydrogen Sulfide level above 10 ppm;
- Entry into confined or unventilated areas which may contain airborne contaminants that have not been characterized;
- Presence of unidentified contaminants; or
- Identified substances which have inadequate warning properties.

The SSO shall ensure that employees using SARs be supplied with breathing gases of high purity. Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7. 1-1989. Breathing air couplings shall be incompatible with outlets for nonrespirable worksite air or other gas systems.

7.3 Manhole Safety

The use of appropriate PPE is required for all work in and around a manhole, and selection of the PPE shall be based on the expected hazard(s). At a minimum Level D PPE shall be worn and an approved rescue system (harness-safety line-tripod) shall be utilized whenever a worker enters a manhole.

A fresh air blower ventilation system shall be set up and in operation before and during all confined space entry procedures. The blower shall provide a continuous source of fresh air to the breathing zone of a worker within the confined space. Operation of the blower shall be monitored by a worker outside the confined space to ensure it remains operational during the entire time a worker is within the confined space.

After the ventilation system has been in operation for at least 15 minutes, and the confined space has been tested and determined to be safe for entry; workers entering the confined space shall be equipped at a minimum with the following:

- Rescue equipment including harness, lifeline, and safety retrieval system;
- An approved, properly calibrated gas detector;
- Hard hat;
- Coveralls;
- Steel-toed safety shoes;
- Dust mask;
- Safety Glasses with side shields or goggles; and
- Gloves.

8.0 SAFETY PROCEDURES AND SITE REQUIREMENTS

A daily morning briefing to cover safety procedures and contingency plans in the event of an emergency is to be included with a discussion of the day's activities. These daily meetings will be recorded on Northgate Daily Tailgate Safety Meeting Forms. A debriefing to cover the activities is to be held upon completion of the work. A copy of the Daily Tailgate Safety Meeting Form is included in Appendix E.

The SSO will conduct a safety inspection of the work site before each day's activities begin to verify compliance with the requirements of the HASP. Results of the first day's inspection will be documented on a Northgate Site Safety Checklist. A copy of the checklist is included in Appendix E.

Minimum emergency equipment maintained on Site will include a fully charged 20-pound ABC dry chemical fire extinguisher, an adequately stocked first aid kit, and an emergency eyewash station (when corrosive chemicals are present).

8.1 Training Requirements

Site personnel, including subcontractors and visitors conducting work in controlled areas of the Site, must have completed the appropriate training as required by 8 CCR 5192. Further Site-specific training will be conducted by the SSO prior to the initiation of project activities. This training will include, but will not necessarily be limited to, emergency procedures, Site control, personnel responsibilities, and the provisions of this HASP.

General Site workers (such as equipment operators, general laborers, and supervisory personnel) engaged in hazardous substance removal or other activities that could expose them to hazardous substances must have successfully completed an initial 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training course. In addition, each employee must have attended an eight-hour annual HAZWOPER refresher training course within the past 12 months if their initial 40-hour HAZWOPER training course was completed more than 12 months prior.

8.2 Medical Surveillance Requirements

Site personnel, including subcontractors and Site visitors, who will or may work in an area designated as an exclusion zone must have fulfilled the appropriate medical monitoring requirements in accordance with 8 CCR 5192(f). Each individual entering an exclusion zone must have completed an annual surveillance examination and/or an initial baseline examination within the last 12 months.

9.0 SITE CONTROL MEASURES

Procedures must be followed to maintain Site control so that persons who may be unaware of Site conditions and oncoming traffic are not exposed to hazards. The vehicle parking area will be marked with cones to warn oncoming traffic. The work area will be barricaded by tape, warning signs, or other appropriate means. Pertinent equipment will be secured and stored safely.

Access inside the specified work area will be limited to authorized personnel. Only Northgate employees and designated Northgate subcontracted personnel, as well as designated employees of the client, will be admitted to the work Site. Personnel entering the work area are required to sign the signature page of this HASP, indicating they have read and accepted the health and safety practices outlined in this plan.

9.1 Establishing Work Zones

In some instances it may be necessary to define established work zones: an Exclusion Zone, a Contamination Reduction Zone, and a Support Zone. Work zones may be established based on the extent of anticipated contamination, projected work activities, and the presence or absence of non-project personnel. The physical dimensions and applicability of work zones will be determined for each area based on the nature of job activity and hazards present. Within these zones, prescribed operations will occur using appropriate PPE. Movement between zones will be controlled at checkpoints.

Considerable judgment is needed to maintain a safe working area for each zone, balanced against practical work considerations. Physical and topographical barriers may constrain ideal locations. Field measurements combined with climatic conditions may, in part, determine the control zone distances. Even when work is performed in an area that does not require the use of chemical-resistant clothing, work zone procedures may still be necessary to limit the movement of personnel and retain adequate Site control.

Personnel entering the designated Exclusion Zone should exit at the same location. There must be an alternate exit established for emergency situations. In all instances, worker safety will take precedence over decontamination procedures. If decontamination of personnel is necessary, exiting the Site will include the decontamination procedures described below.

9.2 Decontamination Procedures

Despite protective procedures, personnel may come in contact with potentially hazardous compounds while performing work tasks. If so, decontamination needs to take place using an Alconox or Liquinox wash, followed by a rinse with clean water. Standard decontamination procedures for Level D are as follows:

- Equipment drop;
- Boot cover and outer glove wash and rinse;
- Boot cover and outer glove removal;
- Suit wash and rinse;
- Suit removal;
- Safety boot wash and rinse;
- Inner glove wash and rinse;
- Inner glove removal; and
- Field wash of hands and face.

Workers should employ only applicable steps in accordance with level of PPE worn and extent of contamination present. The SSO shall maintain adequate quantities of clean water to be used for personal decontamination (i.e., field wash of hands and face) whenever a suitable washing facility is not located in the immediate vicinity of the work area. Disposable items will be disposed of in an appropriate container. Wash and rinse water generated from decontamination activities will be handled and disposed of properly. Non-disposable items may need to be sanitized before reuse. Each Site worker is responsible for the maintenance, decontamination, and sanitizing of his/her own PPE.

Used equipment may be decontaminated as follows:

- An Alconox or Liquinox and water solution will be used to wash the equipment; and
- The equipment will then be rinsed with clean water.

Each person must follow these procedures to reduce the potential for transferring chemically affected materials off Site.

10.0 CONTINGENCY PROCEDURES

In the event of an emergency, Site personnel will signal distress with three blasts of a horn (a vehicle horn will be sufficient), or other predetermined signal. Communication signals, such as hand signals, must be established where communication equipment is not feasible or in areas of loud noise.

It is the SSO's duty to evaluate the seriousness of the situation and to notify appropriate authorities. Section 11 of this plan contains emergency telephone numbers as well as directions to the hospital. Nearby telephone access must be identified and available to communicate with local authorities. If a nearby telephone is not available, a cellular telephone will be maintained on Site during work activities.

Personnel should contact local emergency services in the event of an emergency (see Section 11). After emergency services are notified, the Project Manager and Director of Health and Safety will be notified of the situation as soon as possible. If personal injury, property damage, or equipment damage occurs, the Project Manager and Northgate Corporate Administration will be contacted as soon as practicable. An Incident Report form will be completed within 24 hours by the SSO or another designated person. A copy of the Northgate Incident Report form is included in Appendix E.

10.1 Injury/Illness

If an exposure or injury occurs, work will be temporarily halted until an assessment can be made of whether it is safe to continue work. The SSO, in consultation with the Director of Health and Safety, will make the decision regarding the safety of continuing work. The SSO will conduct an investigation to determine the cause of the incident and steps to be taken to prevent recurrence.

In the event of an injury, the extent and nature of the victim's injuries will be assessed and first aid will be rendered as appropriate. If necessary, the individual may be transported to the nearby medical center. The mode of transportation and the eventual destination will be based on the nature and extent of the injury. A hospital route map for each sample station is included in Appendix F.

In the event of a life-threatening emergency, the injured person will be given immediate first aid and emergency medical services will be contacted by dialing the number listed in Section 11. The individual rendering first aid will follow directions given by emergency medical personnel via telephone. When working in areas where medical services are not readily available, a person trained in first aid/CPR techniques will be present during field activities.

10.2 Fire

In the event of fire, personnel should contact the local fire department immediately by dialing 911. When representatives of the fire department arrive, the SSO, or designated representative, will advise the commanding officer of the location, nature, and identification of hazardous materials on Site. Only trained, experienced fire fighters should attempt to extinguish substantial fires at the Site. Site personnel should not attempt to fight fires, unless properly trained and equipped to do so.

Smoking is not permitted in controlled areas (i.e., exclusion or contamination reduction zones), near flammable or combustible materials, or in areas designated by the facility as non-smoking areas.

10.3 Underground Utilities

In the event that an underground conduit or manhole cover is damaged during sampling activities, mechanized equipment will immediately be shut off and the lead agency will be notified of the damage. Sampling will be discontinued, and the team will remain onsite until a representative of the lead agency has arrived to inspect the damage and take a report of the incident.

10.4 Evacuation

The SSO will designate evacuation routes and refuge areas to be used in the event of an emergency. Site personnel will stay upwind from vapors or smoke and upgradient from spills. If workers are in an Exclusion or Contamination Reduction Zone at the start of an emergency, they should exit through the established decontamination areas whenever possible. If evacuation cannot be done through an established decontamination area, Site personnel will go to the nearest safe location and remove contaminated clothing there or, if possible, leave it near the Exclusion Zone. Personnel will assemble at the predetermined refuge following evacuation and decontamination. The SSO, or designated representative, will count and identify Site personnel to verify that all have been evacuated safely.

10.5 Hazardous Material Spill

If a hazardous material spill occurs, Site personnel should locate the source of the spill and determine the hazard to the health and safety of Site workers and the public. Attempt to stop or reduce the flow if it can be done without risk to personnel. Isolate the spill area and do not allow entry by unauthorized personnel. De-energize sources of ignition within 100 feet of the spill, including vehicle engines. Should a spill be of the nature or extent that it cannot be safely contained, or poses an imminent threat to human health or the environment, an emergency cleanup contractor will be called out as soon as possible. Spill containment measures listed below are examples of responses to spills.

- Right or rotate containers to stop the flow of liquids. This step may be accomplished as soon as the spill or leak occurs, providing it is safe to do so;
- Sorbent pads, booms, or adjacent soil may be used to dike or berm materials, subject to flow, and to solidify liquids;
- Sorbent pads, soil, or booms, if used, shall be placed in appropriate containers after use, pending disposal; and
- Contaminated tools and equipment shall be collected for subsequent cleaning or disposal.

11.0 EMERGENCY CONTACTS

Emergency Services (Police/Fire Department/Ambulance):	911
National Response Center:	(800) 424-8802
Poison Control Center:	(800) 876-4766 or (800) 222-1222
CHEMTREC:	(800) 424-9300
Northgate Project Manager: (Dana Brown) Cell Phone:	(949) 716-0050 ext. 107 (949) 230-0643
Northgate Oakland office:	(510) 839-0688

Nearby Hospital:

Torrance Memorial Medical Center
3330 Lomita Boulevard
Torrance, CA 90505
(310) 517-4750

Emergency entrance is on east side of Hospital

Directions to the Hospital from sampling stations:

Hospital route maps are included in Appendix F.

Tor-S1: Head south on Western Avenue to Sepulveda Blvd. Turn right (west) on Sepulveda and proceed to Crenshaw Blvd. Turn left (south) onto Crenshaw and proceed to Lomita Boulevard. Turn left (west) onto Lomita Boulevard; hospital will be on the left (south) side. Emergency entrance is on the East side of the hospital. Total drive time approximately 6 minutes, 3.7 miles.

Tor-S2: Head south on Pennsylvania Avenue to 227th Street. Turn right (west) onto 227th Street and proceed to Crenshaw Blvd. Turn left (south) onto Crenshaw and proceed to Lomita Boulevard. Turn left (west) onto Lomita Boulevard; hospital will be on the left (south) side. Emergency entrance is on the East side of the hospital. Total drive time approximately 4 minutes, 2.2 miles.

Tor-S3: Head north on Madison Street to Lomita Boulevard. Turn right (east) on Lomita Boulevard; hospital will be on the right (south) side. Emergency entrance is on the East side of the hospital. Total drive time approximately 2 minutes, 0.4 miles.

Tor-S4: Head south on Western Avenue to Lomita Boulevard. Turn right (west) onto Lomita Boulevard and proceed 2.4 miles. Hospital will be on the left (south) side. Emergency entrance is on the East side of the hospital. Total drive time approximately 6 minutes, 3.3 miles.

Tor-S5: Turn right(east) on 250th Street and proceed 0.1 miles to Pennsylvania Avenue. Turn left (north) on Pennsylvania Avenue and proceed 0.4 miles to Lomita Boulevard. Turn left (west) on Lomita Boulevard and proceed 1.2 miles. Hospital will be on the left (south) side. Emergency entrance is on the East side of the hospital. Total drive time approximately 4 minutes, 1.8 miles.

Tor-S6: Head north on Rolling Hills Road toward Crenshaw Boulevard. Turn right (north) on Crenshaw Boulevard and proceed 1.6 miles to Lomita Boulevard. Turn left (west) onto Lomita Boulevard and proceed 1.1 miles, the Hospital will be on the left (south) side. Emergency entrance is on the East side of the hospital. Total drive time approximately 4 minutes, 2.8 miles.

Tor-S7: Head west on Rolling Hills Road toward Hawthorne Boulevard. Turn right on Hawthorne Boulevard and proceed 1.5 miles north on Hawthorn Boulevard to Lomita Boulevard. Turn right (east) onto Lomita Boulevard and proceed 0.4 miles, the Hospital will be on the right (south) side. Emergency entrance is on the East side of the hospital. Total drive time approximately 4 minutes, 2.0 miles.

Tor-S8: Head southeast on Paseo de las Tortugas toward Mesa Street. Turn left (east) onto Via Valmonte. Proceed to Hawthorne Boulevard and turn left (north). Proceed 1.2 miles north on Hawthorn Boulevard to Lomita Boulevard. Turn right (east) onto Lomita Boulevard and proceed 0.4 miles, the Hospital will be on the right (south) side. Emergency entrance is on the East side of the hospital. Total drive time approximately 4 minutes, 2.0 miles.

Tor-S9: Head northwest on Paseo de las Tortugas toward Vista Montana. Take the 1st right onto Vista Montana. Proceed 0,6 miles to Pacific Coast Highway. Turn right (southeast) on Pacific Coast Highway and proceed 0.4 miles to Hawthorne Boulevard. Turn left (north) on Hawthorne Boulevard and proceed 0.8 miles to Lomita Boulevard. Turn right (east) onto Lomita Boulevard and proceed 0.4 miles, the Hospital will be on the right (south) side. Emergency entrance is on the East side of the hospital. Total drive time approximately 5 minutes, 2.4 miles.

12.0 NORTHGATE APPROVALS

This HASP has been prepared for the following project:

Water Quality Monitoring Services – TMDL Compliance
The City of Torrance, California

Northgate Project Number: 2040.01.01S

This HASP has been reviewed and approved by the following Northgate personnel:

February 29, 2012

Dana R. Brown, P.G. Date
Project Manager

February 29, 2012

Derrick Willis Date
Principal in Charge

13.0 SIGNATURE PAGE

The following signatures indicate that this Health and Safety Plan has been read and accepted by Northgate personnel as well as subcontractors and their personnel.

NAME	COMPANY	SIGNATURE	DATE

Important notice to subcontractor(s):

This Health and Safety Plan has been prepared solely for the use of Northgate personnel. It is supplied to you for informational purposes only and may not be relied upon for protection of your employees. The Subcontractor is responsible for providing, at its cost, all personal protective clothing and equipment required for its employees to perform their work in a safe manner and in compliance with all applicable state and federal OSHA regulations. Subcontractor is responsible for ensuring that such equipment is in good condition and is properly inspected and maintained. Subcontractor must, at a minimum, use the equipment and follow the procedures described in this HASP. Failure to do so may result in immediate termination of Subcontractor's services. This does not relieve Subcontractor of the responsibility to provide equipment and institute procedures affording a greater degree of protection than those specified in this HASP should Subcontractor determine such measures are necessary to protect the health and welfare of its employees, second-tier subcontractors, or others under its control or direction.

APPENDIX A

Compound Descriptions

COMPOUND DESCRIPTIONS

The following descriptions are presented for compounds that will be analyzed in stormwater from the Site.

NITRATE-NITRITE

Nitrate and nitrite are nitrogen-oxygen chemical units which combine with various organic and inorganic compounds. Once taken into the body, nitrates are converted into nitrites. The greatest use of nitrates is as a fertilizer.

The EPA Maximum Contaminant Level (MCL) for nitrate (as N) is 10 mg/l.

The California MCL for nitrate (as NO_3) is 45mg/l.

The EPA and California MCL for nitrite is 1 ppm.

TOTAL KJELDAHL NITROGEN AND PHOSPHORUS

TKN is the total of nitrogen, ammonia, and ammonium.

Excess nitrogen and phosphorus in water lead to harmful algal blooms, hypoxia, and declines in wildlife and wildlife habitat.

There are no MCLs for total kjeldahl nitrogen and phosphorus.

APPENDIX B

Confined Space Entry Procedure

CONFINED SPACE ENTRY PROCEDURE

Manholes are a confined space and special protocols must be followed to ensure worker safety when performing tasks within a confined space. Although most manholes are relatively safe to enter, some might contain an unsafe atmosphere or other hazards. Before entering a manhole workers must have confined space entry training, and must follow Northgate standard operating protocols and safe work procedures for entry into a confined space.

At a minimum, the following procedures will be followed before entering any manhole or stormwater conveyance:

1) Set up the manhole guard/barrier and any other required worker area protection.
2) Before removing the manhole cover, test the atmosphere inside the manhole with an air monitoring device attached to a wand or tubing inserted through the small hole in the cover. Do not remove the cover until you are sure there is no flammable gas collected inside it.
3) If there is no indication of a flammable gas in the manhole, then remove the cover and test the space from top to bottom with the air monitoring device. To avoid back injury, use the manhole cover lifting tool and wear leather gloves.
4) If the only potential hazard is the atmosphere and it has been tested and is safe to enter, then the space may be designated a non-permit confined space.
5) Purge and ventilate the manhole with fresh air from a portable blower.
6) When possible, pump out any water that has collected in the manhole and dispose of it as required by local laws.
7) Set up a rescue winch, cable, and tripod over the manhole.
8) Don the required PPE including rescue harness and chemical splash goggles.
9) Review Entrant and Observer communication protocols, the *Confined Space Entry Emergency Action Plan*, and then begin observation of the entrant.
10) You may now enter the manhole and begin work.

During work within the manhole, periodically or continuously monitor the atmosphere in the manhole to ensure that it remains safe. Take the air monitoring device into the manhole to monitor, or have the attendant monitor from outside the manhole.

In the event of an emergency-e.g., a worker is in a manhole and is unresponsive-DO NOT ENTER THE MANHOLE because it may contain a hazardous environment. Follow the *Confined Space Entry Emergency Action Plan* and immediately implement emergency procedures including call 9-1-1 and notify the Site Safety Officer or Project Manager. While waiting for the rescue team, DO NOT ENTER THE MANHOLE, continuously pump fresh air into the manhole and keep unnecessary workers and bystanders away from the manhole.

APPENDIX C

Confined Space Emergency Action Plan

1.0 CONFINED SPACE EMERGENCY ACTION PLAN

The precautions and procedures outlined in our written Confined Space Safety Program are designed to ensure that our employees are safe while working in permit spaces. Under no circumstances do we expect our employees to enter a permit space where hazards have not been eliminated or effectively controlled.

Additionally, we recognize that unexpected situations might arise that prevent entrants from self-rescue. In response, the following rescue and emergency action plan has been developed and will be strictly enforced.

This plan must be filled out prior to entering any confined space.

CONFINED SPACE SITE INFORMATION
Site Address:
Date:
Confined Space Description:
Purpose of Entry:

We have decided to use:

- ☐ On-site rescue services which include:
  - ☐ Non-entry rescue procedures
  - ☐ Entry rescue procedures
- ☐ Off-site entry rescue services.

Emergency Preparation Checklist:

1) ____________________ will ensure that each member of the firm's rescue service is appropriately trained;
2) ____________________ will ensure that each member of the rescue service will receive basic first aid and cardiopulmonary resuscitation (CPR). At least one of these members must hold current certification in first aid and CPR;
3) ____________________ will ensure that rescue team members will practice rescue techniques at least annually from the actual or similarly configured spaces(s);
4) ____________________ has made arrangements with _______________________ for off-site rescue and emergency services and they have consented to provide this service;

5) ______________________ has informed ________________________ of the hazards they may encounter if they are summoned; and

6) ____________________ has also provided access to the rescue service so they can evaluate the permit spaces to develop appropriate rescue plans and practice rescue operations.

2.0 CONFINED SPACE EMERGENCY PROCEDURES

If rescue and emergency services are needed, the following procedures will go into effect:

- Whenever possible, **Entrant** should first attempt self-rescue;
- If self-rescue is not possible or has failed, the **Attendant** must not enter the permit space until additional personnel have arrived, and afterwards only if the **Attendant** has received emergency response training;
- If available, non-entry rescue measures should be implemented if self-rescue has failed;
    - **Attendant** should consider any possible injuries that the **Entrant** may have sustained before attempting any non-entry rescue measures.
- If the above recovery actions cannot be implemented or have failed, the **Attendant** should immediately contact the rescue service specified below;
- In cases of serious injury, the emergency medical service should also be contacted;
- **Attendant** should continue to monitor and maintain existing hazard controls while waiting for additional personnel; and
- Once additional personnel or off-site rescue service personnel have arrived, trained emergency rescuers should analyze the situation and perform appropriate response actions.

To summon rescue and emergency services for our specific work site:

(The site address is located on the first page of this document).

RESCUE SERVICE: ________________________________ Location:______________________

Telephone: ____ ______________________

Approximate response time:_____________________________ ______________________

MEDICAL SERVICE:________________________________ Location:______________________

Telephone:____ ______________________

Approximate response time:_____________________________ ______________________

APPENDIX D

Manhole Safe Work Practices

1.0 CONFINED SPACE ENTRY AND MANHOLE SAFETY

This document provides an overview of safe work practices and procedures for complying with OSHA requirements (29 CFR 1910.146) when entering into the confined space inside a manhole, or working around an open manhole. Entry into a manhole, work around an open manhole, and opening/closing manholes require personnel to work in coordinated teams, use specialized safety equipment, and follow confined space entry procedures.

1.1 Introduction

A manhole structure is a confined space that presents possible fall hazards, the potential for toxic gases or oxygen deficient atmosphere to be present, and other general safety hazards. Entry into the confined space of a manhole requires a two man team where one worker is the Entrant, the other an Attendant. At a minimum the following safety equipment must be present and in use whenever a confined space is entered:

- Approved gas detector (properly calibrated);
- Fresh air blower;
- Safety harness, tripod, and wire line safety system; and
- Level D PPE including coveralls, gloves, hard hat and eye protection.

1.2 Confined Space Entry Procedure

No employee may enter a confined space until several requirements are met. These requirements include:

- Conducting pre-entry atmospheric testing;
- Ventilating and cleaning the confined space as necessary;
- Use of appropriate PPE;
- Having an Attendant in place;
- Having rescue equipment in place; and
- Having an approved *Emergency Action Plan*.

A description of each requirement of the Confined Space Entry Procedure is contained in the following sections.

1.2.1 *Atmospheric Testing*

Atmospheric testing is required prior to entering the confined space, and air monitoring within the confined space is required to be performed during the entire time the employee is working inside the confined space. Combustible gases (CG) and oxygen (O2) will be measured continuously in the worker breathing space using a combination CG/O2 sensor (QRAE-II or equivalent). Before allowing any personnel inside the confined space, ambient air within the space is tested for a minimum of four atmospheric conditions:

- Oxygen content;
- Flammable or explosive gases;
- Carbon monoxide; and
- Hydrogen sulfide.

The following sections describe the testing methods and limits for atmospheric conditions and hazardous vapors:

- **Oxygen Content.** The oxygen content must be at least 19.5% in the confined space, measured at all levels (bottom, middle, and top). The safe oxygen level is between 19.5% and 21%. **Do not enter the confined space if the oxygen level is below 19.5% or above 21%.** Due to the extreme danger of suffocation in confined spaces, constant and continuous oxygen monitoring is required throughout each work period. Oxygen content above 23% can cause explosions and vigorous burning of flammable materials, including hair or clothing;

- **Flammable or Explosive Gases.** The flammable nature of the confined space must be measured at all levels within the confined space (bottom, middle, and top). Flammability is measured in terms of the *Lower Flammable Limit* (LFL) or the *Lower Explosive Limit* (LEL). This is the smallest concentration of a combustible gas in air that will explode when it contacts a spark or open flame. Prior to entry into a confined space, the level of flammable gases measured at all levels (bottom, middle, and top), must be below 10% of LEL. The safe flammable gas level is below 10% of the LEL; **Do not enter the confined space if the LEL is above 10%;**

- **Carbon Monoxide.** There is a potential for toxic concentrations of Carbon Monoxide (CO) to be present in the confined space. CO is an odorless, invisible gas that can be extremely toxic to humans. Because it cannot be detected without instruments, it is possible for workers to advance far enough into a space containing CO that they can no longer self-rescue when the symptoms manifest. For that reason the concentration of CO must be measured and compared to the Threshold Limit Values (TLVs) for CO of 25 ppm by the field team prior to entering a confined space, and continuously when working inside a confined space; and

- **Hydrogen Sulfide.** There is a potential for toxic concentrations of Hydrogen Sulfide (H_2S) vapors to be present in the confined space. H_2S is a flammable, toxic, and acid gas which irritates the eyes and mucus membranes at concentrations between 20 to 150 ppm. Slightly higher concentrations cause irritation to the upper respiratory tract. Concentrations above 600 ppm can be fatal within 30 minutes due to respiratory paralysis. Smell alone cannot be relied upon to detect the presence of H_2S due to the paralyzing effect it has on the olfactory nerves. H_2S must be measured and compared to the TLV of 10 ppm by the field team prior to entering a confined space and continuously when working inside a confined space.

1.2.2 *Ventilation*

A fresh air blower ventilation system shall be set up and in operation **before and during** all confined space entry procedures. The blower shall provide a continuous source of fresh air to the breathing zone of a worker within the confined space. Operation of the blower shall be monitored by a worker outside the confined space to ensure it remains operational during the entire time a worker is within the confined space.

1.2.3 *Personal Protective Equipment*

The use of appropriate PPE is required for all work in and around the manhole, and selection of the PPE shall be based on the expected hazard(s). At a minimum Level D PPE shall be worn and an approved rescue system (harness-safety line-tripod) shall be utilized.

After the ventilation system has been in operation for at least 15 minutes, and the confined space has been tested and determined to be safe for entry; workers entering the confined space shall be equipped at a minimum with the following:

- Rescue equipment including harness, lifeline, and safety retrieval system;
- An approved, properly calibrated gas detector;
- Hard hat;
- Coveralls;
- Steel-toed safety shoes;
- Dust mask;

- Safety Glasses with side shields or goggles; and
- Gloves.

1.2.4 *Rescue Equipment*

No person shall enter a confined space without the use of specialized rescue equipment designed to aid the removal of the worker from the confined space if they become incapacitated. The specialized equipment shall consist of a safety harness, lifeline, and tripod safety system with attached winch.

The harness shall consist of an OSHA and ASNI compliant full body harness with back D ring. The harness must be fitted to the individual worker, and shall contain stress-indicating safety tabs to indicate when the harness has been involved in a fall and should be removed from service. The harness shall have a minimum breaking strength of 5,000 pounds, and feature mating buckles to prevent improper connection.

The lifeline will consist of a galvanized steel cable at least 3/16” in thickness with a breaking strength in excess of 5,000 pounds. The cable shall be secured to a fully enclosed spool with anti-backlash system and brake. The spool will be contained in a winch offering at least 5:1 gear ratio and ratchet crank handle.

The Tripod safety system is an anchor point for the winch and pulley, providing at least 5,000 pound loading strength. It is used to anchor the ratcheting winch, and must be capable of operation by a single worker. The tripod and pulley system provides a mechanical advantage during the retrieval of a worker from the confined space, and allows personnel at the surface to provide assistance without entering the confined space.

1.2.5 *Duties of the Entrant and Attendant*

A confined space team consists of a minimum of two members: Entrant and Attendant. The Entrant does the work, and the Attendant remains outside while the work is being performed. The Entrant and Attendant have specific responsibilities that include use of appropriate PPE, pre-entry atmospheric testing, use of safety equipment, area and personnel monitoring, and performance of the assigned task within the confined space. Specific responsibilities for each position are detailed in the following sections.

Entrant

The Entrant does the assigned task within the confined space. He is required to wear the appropriate safety equipment and be trained to use the equipment in an emergency. The Entrant is responsible for performance of continuous air monitoring when inside the confined space, and for monitoring their own physical reactions that could signal an unsafe condition. The Entrant shall maintain contact with the Attendant, and respond to evacuation orders if given. If the Entrant senses any reaction to the environment, he or she should signal the attendant for help, if necessary, and leave the confined space immediately.

Attendant

The Attendant shall be stationed immediately outside the confined space and remain there for the duration of activity within the confined space. The Attendant shall be physically capable of assisting any employee inside the confined space in the event of an emergency. This individual will be responsible for alerting others that a rescue is in progress and for taking appropriate measures to ensure the safety of all co-workers in the area. **No employee is to enter a confined space if another employee goes down!** In the event of emergency the Attendant shall activate the Emergency Action Plan and always seek assistance.

The Attendant shall:

- Not enter the confined space;
- Remain at the entry point unless relieved by another trained attendant;
- Be trained in rescue protocols;
- Keep track of who is in the confined space at all times;
- Keep unauthorized people out of the area;
- Make sure the ventilation equipment is working;
- Attend to the lifeline worn by the Entrant;
- Maintain continuous communication, visual or voice, with the Entrant during entry;
- Remain alert for early symptoms of danger within the confined space;
- Watch for hazards outside and inside the confined space;
- Notify the Entrant and order evacuation if conditions warrant;
- Have means to summon assistance; and
- Have safety and rescue equipment on hand.

1.2.6 *Emergency Action Plan*

No person shall enter a confined space to retrieve someone who is unconscious without having **additional trained** personnel above ground to assist. Employees shall follow the *Emergency Action Plan* in the event of a jobsite emergency. The plan provides procedures to be used in case of jobsite emergency, and directs the Attendant to summon the authorities before commencing any rescue activity on a worker who is within the confined space area. The person entering the confined space for rescue purposes must be equipped with the required rescue equipment and follow the specific rescue procedure. A qualified person shall inspect all safety devices and instruct all involved employees on proper confined space safety procedures. All defective safety devices shall be reported to the foreman immediately.

APPENDIX E

Forms

DAILY TAILGATE SAFETY MEETING FORM

Date _________ *Time* _____________ *Northgate Project No.* ______________________________

Project Name ______________________________ *Specific Location* ______________________

Type of Work ____

Chemicals Present ____

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment ____

____

Hazards of Chemicals Present ____

____

Physical Hazards ____

____

Special Hazards ____

____

Other Topics ____

____

ATTENDEES

Name (please print)	***Signature***

SITE SAFETY CHECKLIST

Project Name ______________________ *Northgate Project No.* ______________________

Project Activities ____

	YES	NO	N/A
Written Health and Safety Plan (HASP) is on Site	☐	☐	☐
Addenda to the HASP are documented on Site	☐	☐	☐
Information in the HASP matches conditions and activities at the Site	☐	☐	☐
HASP has been read and signed by all Site personnel, including visitors	☐	☐	☐
Daily tailgate safety meetings have been held and documented	☐	☐	☐
Site personnel have appropriate training and medical clearance	☐	☐	☐
Air monitoring is performed and documented as described in the HASP	☐	☐	☐
Air monitoring equipment has been calibrated daily	☐	☐	☐
Site zones are set up and observed where appropriate	☐	☐	☐
Access to the work area limited to authorized personnel	☐	☐	☐
Decontamination procedures are followed and match the requirements of the HASP	☐	☐	☐
Decontamination stations (including hand/face wash) are set up and used	☐	☐	☐
Personal protective equipment used matches HASP requirements	☐	☐	☐
Hearing protection used where appropriate	☐	☐	☐
Respirators are properly cleaned and stored	☐	☐	☐
Utility locator has cleared subject locations	☐	☐	☐
Overhead utilities do not present a hazard to field equipment/personnel	☐	☐	☐
Traffic control measures have been implemented	☐	☐	☐
Trenches and excavations are in compliance with federal, state, and local safety requirements before worker entry	☐	☐	☐
Spoils are placed no closer than 2 feet from the edge of an excavation	☐	☐	☐
Emergency and first aid equipment is on Site as described in the HASP	☐	☐	☐
Drinking water is readily available	☐	☐	☐
Accessible phone is readily available for emergency use	☐	☐	☐
Proper drum and material handling techniques are used	☐	☐	☐
Drums and waste containers are labeled appropriately	☐	☐	☐
Extension cords are grounded and protected from water and vehicle traffic	☐	☐	☐
Tools and equipment are in good working order	☐	☐	☐

Notes (All "no" answers must be addressed and corrected immediately. Note additional health and safety observations here): ____

____

____

Conducted By: ______________ *Signature:* ______________ *Date:* ______________

AIR MONITORING FORM

Date ____________________ *Northgate Project No.* ____________________

Project Name ____________________ *Type of Activities* ____________________

Type of PID/FID ____________________ *Serial No.* ____________________

Initial Calibration Reading ____________________ *End-of-Use Calibration Check* ____________________

Calibration Standard/Concentration ____________________

Mini-RAM Serial No. ____________________ *Zeroed in Z-Bag?* ☐ Yes ☐ No

Time	Activity/Location	PID/FID (ppm)	Mini-RAM (mg/m^3)

Name (print) ____________________ *Signature* ____________________

INCIDENT REPORT Form

INSTRUCTIONS: Complete, obtain Ops. Mgr.'s signature and route original to your Administrative Manager within 3 days of the Incident.

Office:	Department:	Supervisor:
Name:	Occupation:	
Exact Location Incident Occurred: (Street Address, City, State)	Project No.:	Project Name:
Date and Time of Occurrence:	Time Began Work on Day Injury Occurred:	
Date and to Whom Initially Reported:		
Nature of Incident: (e.g. strain, contusion, laceration, abrasion)		
Parts of Body Affected:		
Type of Activity Engaged in and Equipment Being Used When Incident Occurred: (e.g. water/soil/air sampling, Site assessment, hand augering)		
Person with Most Control of Object/Equipment/Substance:		
Witness:		

Describe clearly how the incident occurred: ____________________

____

Were Safety Equipment/Safeguards Required for this Particular Job/Activity? ☐ Yes ☐ No If yes, were they used?

Indicate by an "x" if in your opinion the incident was caused by:

Physical Causes

- ☐ Defective Equipment
- ☐ Hazardous Equipment
- ☐ Improper Dress
- ☐ Improper Guarding
- ☐ Improper Ventilation
- ☐ Other ____________________

Unsafe Acts

- ☐ Operating Without Authority
- ☐ Failure to Wear Protective Equipment
- ☐ Horseplay
- ☐ Failure to Secure or Warn
- ☐ Took Unsafe Position
- ☐ Used Unsafe Equipment or Hands Instead of Equipment
- ☐ Worked on Moving/Energized Equipment
- ☐ Unsafe Equipment
- ☐ Unsafe Loading

Do you require medical attention at this time? ☐ No ☐ Yes Treated in an emergency room? ☐ No ☐ Yes

Hospital Name & Address: ____________________

Physician Name & Address: ____________________

What actions will be taken to prevent reoccurrence? ____________________

Employee Signature:	Group Manager Signature:
Date:	Print Name:
Phone No.:	Date:

APPENDIX F

Hospital Route Maps

Trip to:
3330 Lomita Blvd
Torrance, CA 90505-5002
3.76 miles
7 minutes

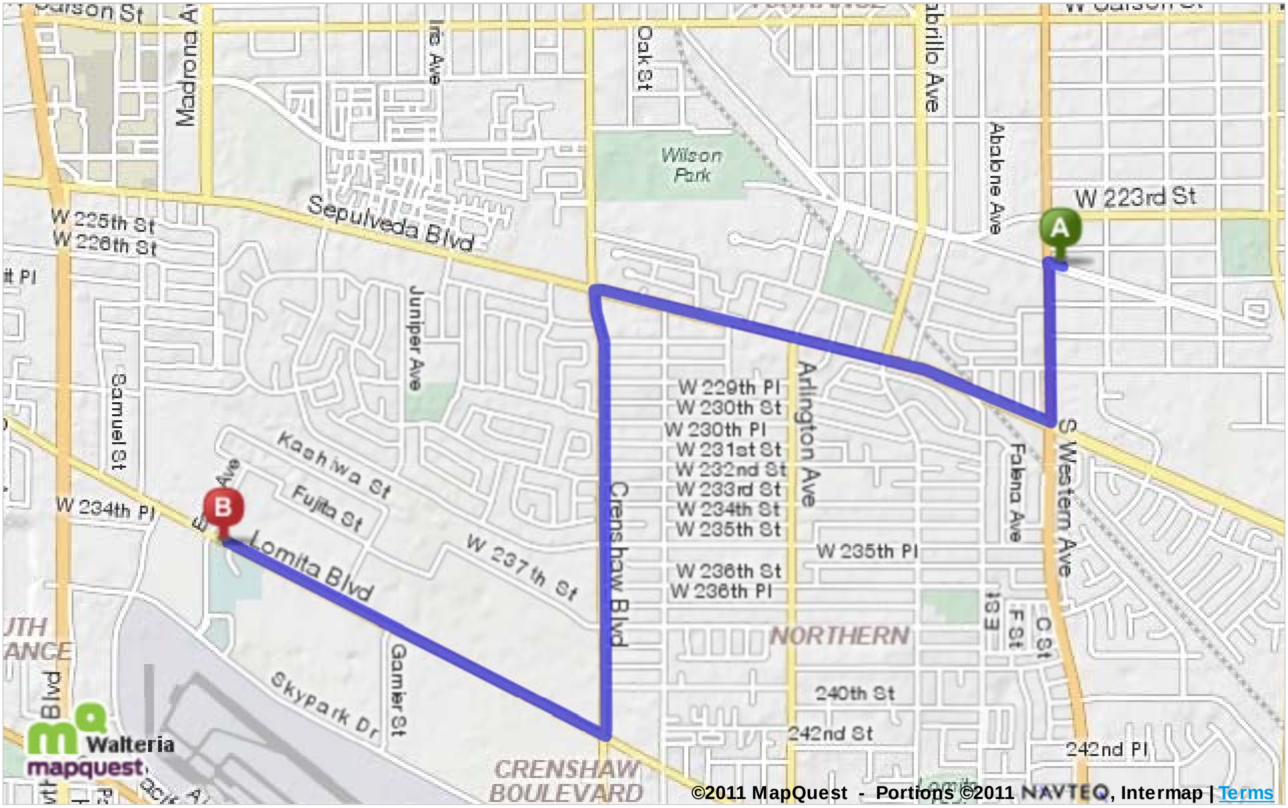
Notes

Station Tor-S1

Torrance Memorial Medical Center
3330 Lomita Boulevard
Torrance, CA 90505
(310) 517-4750
Emergency entrance is on east side of bldg.

			Miles Per Section	Miles Driven
A		**1677 Plaza Del Amo** Torrance, CA 90501 33.822731644427165, -118.30835250241213 (Address is approximate)	**Miles Per Section**	**Miles Driven**
		1. Start out going **west** on **Plaza del Amo** toward **S Western Ave / CA-213**.	**Go 0.03 Mi**	0.03 mi
	213	2. Turn **left** onto **S Western Ave / CA-213**.	**Go 0.4 Mi**	0.4 mi
		3. Turn **right** onto **Sepulveda Blvd**. *Sepulveda Blvd is 0.1 miles past W 228th St* *Conroy's Flowers is on the corner* *If you reach W 234th St you've gone about 0.2 miles too far*	**Go 1.2 Mi**	1.6 mi
		4. Turn **left** onto **Crenshaw Blvd**. *Crenshaw Blvd is 0.1 miles past Plum Ave* *If you reach Eriel Ave you've gone about 0.1 miles too far*	**Go 1.1 Mi**	2.7 mi
		5. Turn **right** onto **Lomita Blvd**. *Lomita Blvd is 0.1 miles past W 239th St* *Bamboo Song is on the corner* *If you reach Torrance Crossroads you've gone about 0.1 miles too far*	**Go 1.1 Mi**	3.8 mi
		6. **3330 LOMITA BLVD** is on the **left**. *Your destination is 0.3 miles past Telo Ave* *If you reach Medical Center Dr you've gone a little too far*		3.8 mi
B		**3330 Lomita Blvd** Torrance, CA 90505-5002	**3.8 mi**	**3.8 mi**

Total Travel Estimate: **3.76 miles - about 7 minutes**



Trip to:
3330 Lomita Blvd
Torrance, CA 90505-5002
1.38 miles
2 minutes

Notes

Station Tor-S2

Torrance Memorial Medical Center
3330 Lomita Boulevard
Torrance, CA 90505
(310) 517-4750
Emergency entrance is on east side of bldg.

		Miles Per Section	Miles Driven
A	**2392 246th St** Lomita, CA 90717 33.80255440064128, -118.32525041920529 (Address is approximate)		
	1. Start out going **west** on **246th St** toward **Pennsylvania Ave**.	**Go 0.01 Mi**	0.01 mi
	2. Turn **right** onto **Pennsylvania Ave**.	**Go 0.1 Mi**	0.2 mi
	3. Take the 1st **left** onto **Lomita Blvd**. *Lomita Blvd is 0.1 miles past Austinbrook Ct* *Cafe La Vida is on the corner* *If you reach 241st St you've gone about 0.1 miles too far*	**Go 1.2 Mi**	1.4 mi
	4. **3330 LOMITA BLVD** is on the **left**. *Your destination is 0.3 miles past Telo Ave* *If you reach Medical Center Dr you've gone a little too far*		1.4 mi
B	**3330 Lomita Blvd** Torrance, CA 90505-5002	**1.4 mi**	**1.4 mi**

Total Travel Estimate: **1.38 miles - about 2 minutes**

Trip to:
3330 Lomita Blvd
Torrance, CA 90505-5002
0.58 miles
1 minute

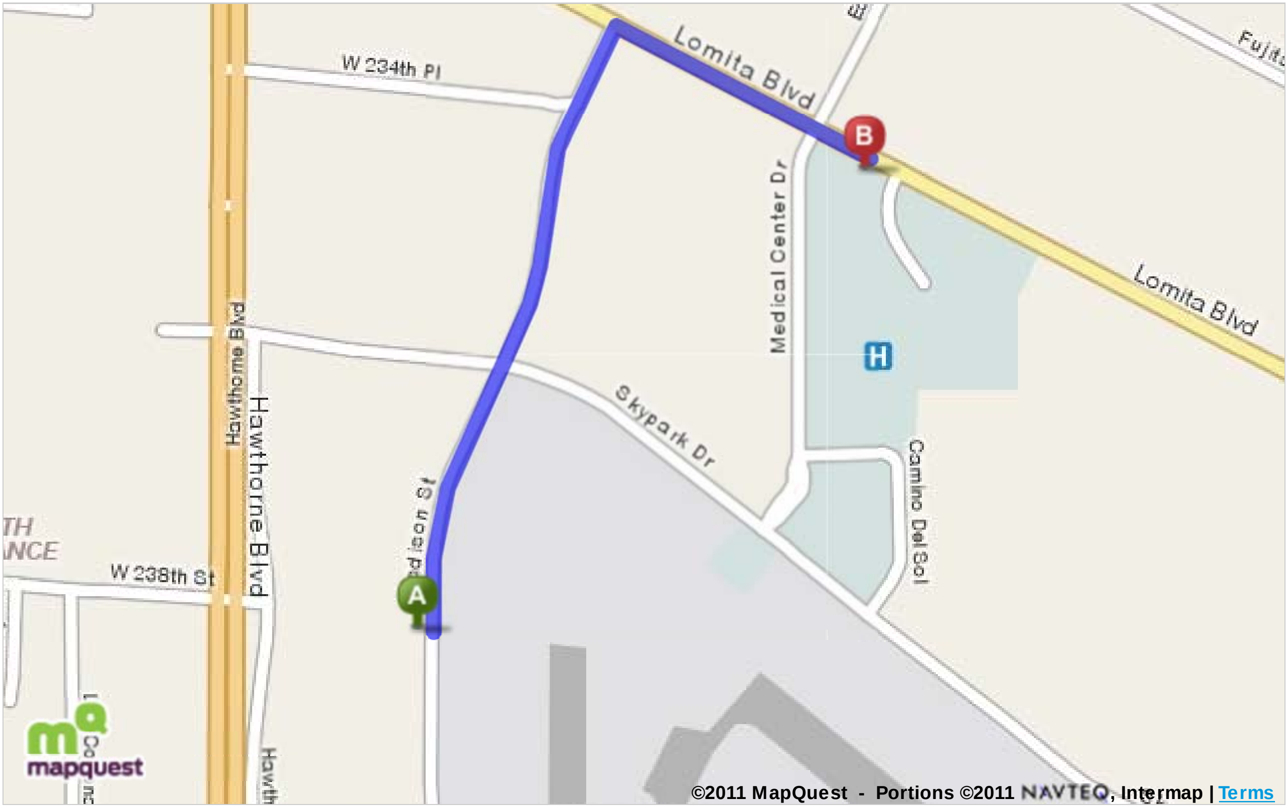
Notes

Station Tor-S3

Torrance Memorial Medical Center
3330 Lomita Boulevard
Torrance, CA 90505
(310) 517-4750
Emergency entrance is on east side of bldg.

		Miles Per Section	Miles Driven
A	**23823 Madison St** Torrance, CA 90505 33.8086120850382, -118.34899333340414 (Address is approximate)		
	1. Start out going **north** on **Madison St** toward **Skypark Dr**.	**Go 0.4 Mi**	0.4 mi
	2. Turn **right** onto **Lomita Blvd**. *Hope Chapel Torrance is on the corner*	**Go 0.2 Mi**	0.6 mi
	3. **3330 LOMITA BLVD** is on the **right**. *Your destination is just past Medical Center Dr* *If you reach Telo Ave you've gone about 0.3 miles too far*		0.6 mi
B	**3330 Lomita Blvd** Torrance, CA 90505-5002	**0.6 mi**	**0.6 mi**

Total Travel Estimate: **0.58 miles - about 1 minute**



Trip to:
3330 Lomita Blvd
Torrance, CA 90505-5002
3.32 miles
6 minutes

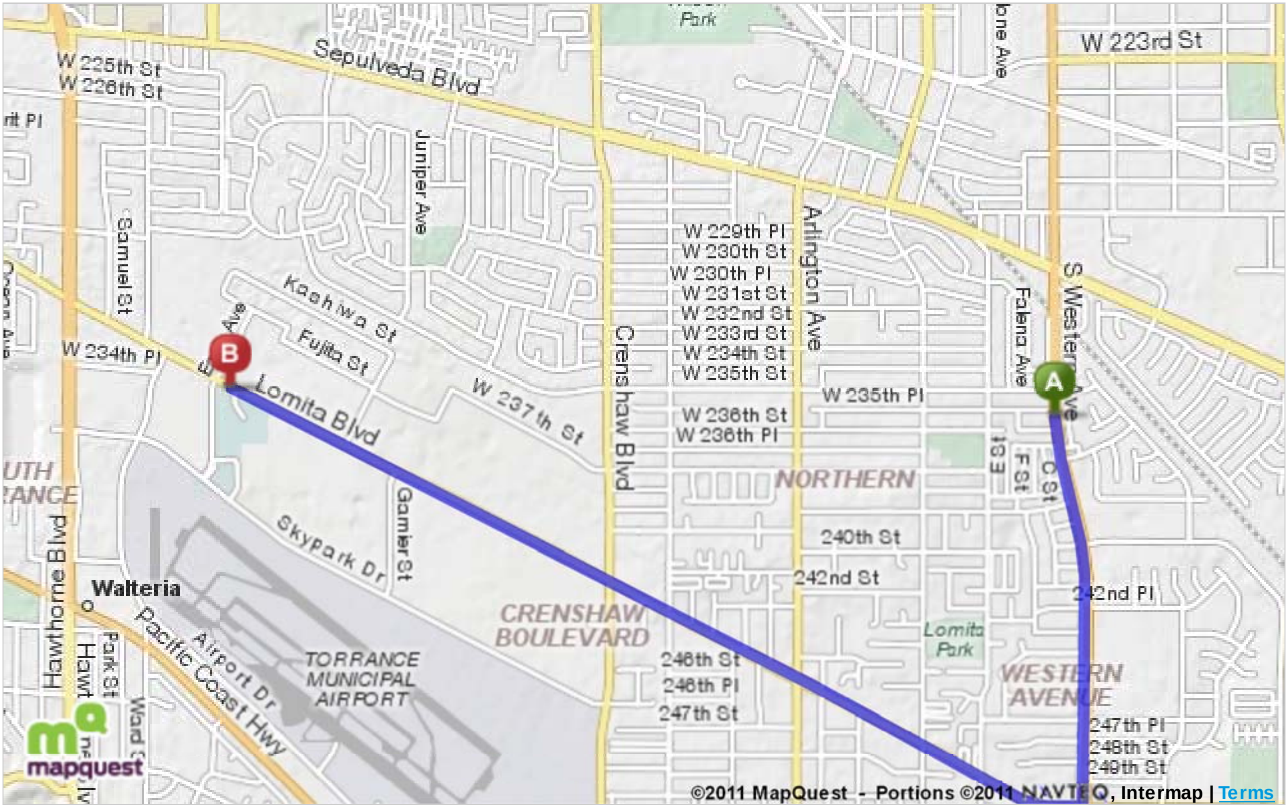
Notes

Station Tor-S4

Torrance Memorial Medical Center
3330 Lomita Boulevard
Torrance, CA 90505
(310) 517-4750
Emergency entrance is on east side of bldg.

		Miles Per Section	Miles Driven
A	**23535 S Western Ave** Torrance, CA 90501 33.81169648066995, -118.3088460288708 (Address is approximate)		
	1. Start out going **south** on **S Western Ave / CA-213 S** toward **W 236th St**.	**Go 1.0 Mi**	1.0 mi
	2. Turn **right** onto **Lomita Blvd**. *Lomita Blvd is just past 249th St* *Duke Service Center is on the corner* *If you reach 251st St you've gone a little too far*	**Go 2.4 Mi**	3.3 mi
	3. **3330 LOMITA BLVD** is on the **left**. *Your destination is 0.3 miles past Telo Ave* *If you reach Medical Center Dr you've gone a little too far*		3.3 mi
B	**3330 Lomita Blvd** Torrance, CA 90505-5002	**3.3 mi**	**3.3 mi**

Total Travel Estimate: **3.32 miles - about 6 minutes**



mapquest

Trip to:
3330 Lomita Blvd
Torrance, CA 90505-5002
1.82 miles
4 minutes

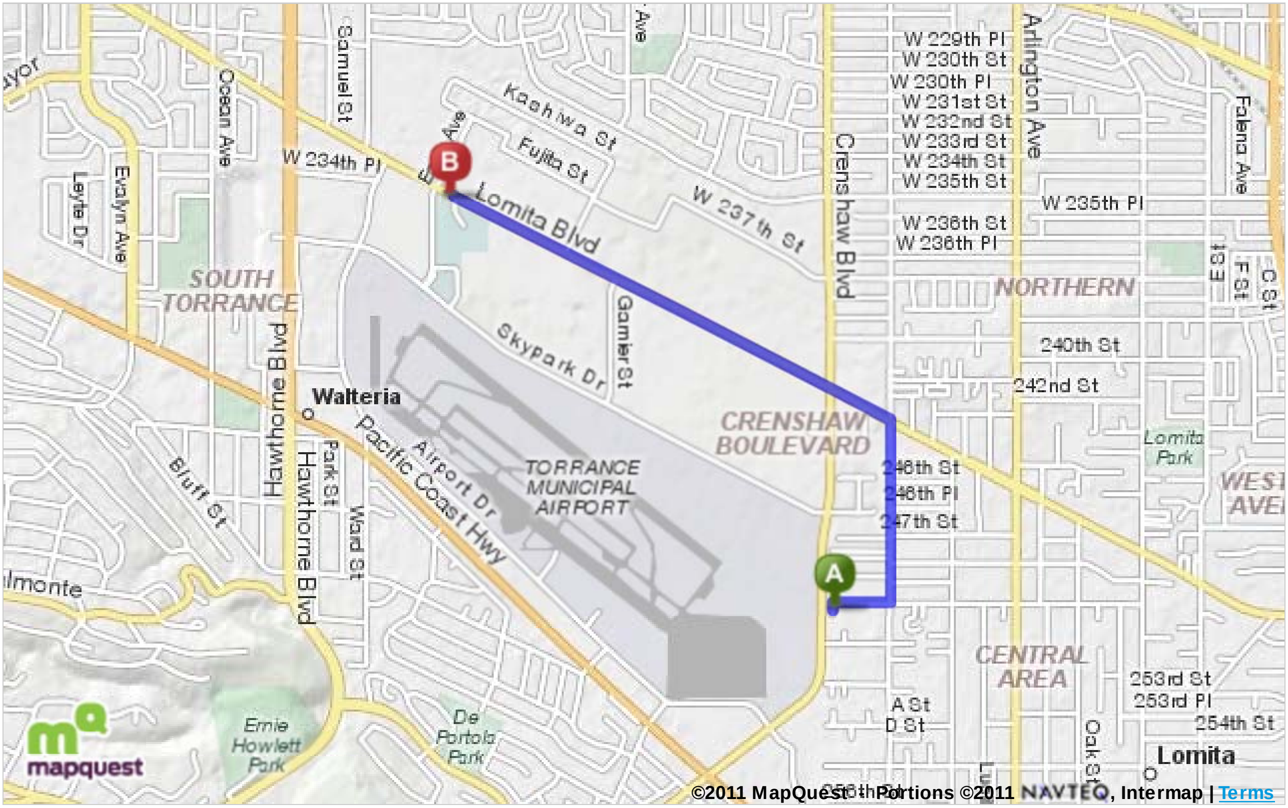
Notes

Station Tor-S5

Torrance Memorial Medical Center
3330 Lomita Boulevard
Torrance, CA 90505
(310) 517-4750
Emergency entrance is on east side of bldg.

		Miles Per Section	Miles Driven
A	**25062 Bani Ave** Lomita, CA 90717 33.79801197039075, -118.3278146110234 (Address is approximate)		
	1. Start out going **north** on **Bani Ave** toward **250th St**.	**Go 0.02 Mi**	0.02 mi
	2. Turn **right** onto **250th St**.	**Go 0.1 Mi**	0.2 mi
	3. Take the 1st **left** onto **Pennsylvania Ave**. *If you reach Cypress St you've gone about 0.1 miles too far*	**Go 0.4 Mi**	0.6 mi
	4. Turn **left** onto **Lomita Blvd**. *Lomita Blvd is 0.1 miles past Austinbrook Ct* *Cafe La Vida is on the corner* *If you reach 241st St you've gone about 0.1 miles too far*	**Go 1.2 Mi**	1.8 mi
	5. **3330 LOMITA BLVD** is on the **left**. *Your destination is 0.3 miles past Telo Ave* *If you reach Medical Center Dr you've gone a little too far*		1.8 mi
B	**3330 Lomita Blvd** Torrance, CA 90505-5002	**1.8 mi**	**1.8 mi**

Total Travel Estimate: **1.82 miles - about 4 minutes**



Trip to:
3330 Lomita Blvd
Torrance, CA 90505-5002
2.88 miles
4 minutes

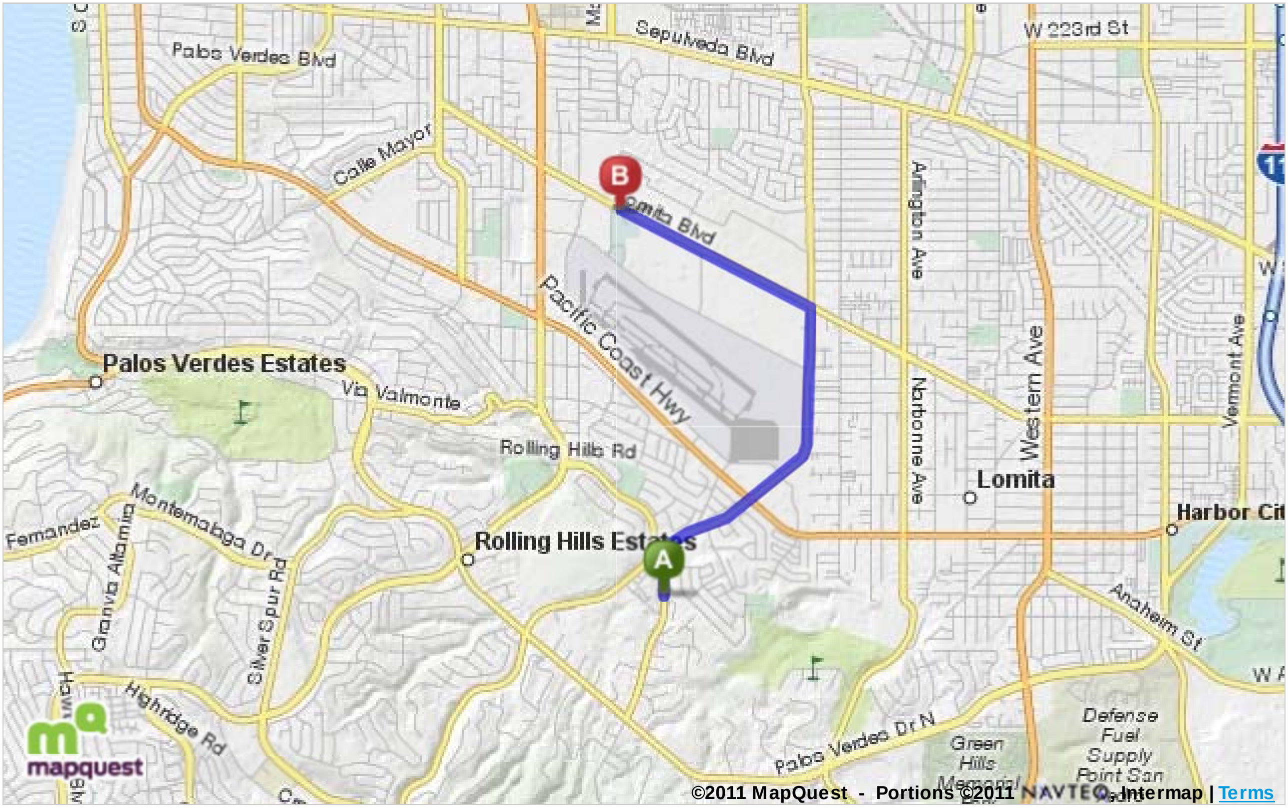
Notes

Station Tor-S6

Torrance Memorial Medical Center
3330 Lomita Boulevard
Torrance, CA 90505
(310) 517-4750
Emergency entrance is on the east side of bldg.

		Miles Per Section	Miles Driven
A	**25974 Rolling Hills Rd** Torrance, CA 90505 33.785125524948995, -118.34039127508564 (Address is approximate)		
	1. Start out going **north** on **Rolling Hills Rd** toward **Crenshaw Blvd**.	**Go 0.2 Mi**	0.2 mi
	2. Take the 1st **right** onto **Crenshaw Blvd**. *Ralphs is on the corner* *If you reach Fallenleaf Dr you've gone about 0.1 miles too far*	**Go 1.6 Mi**	1.8 mi
	3. Turn **left** onto **Lomita Blvd**. *Lomita Blvd is 0.1 miles past Torrance Crossroads* *Bamboo Song is on the right* *If you reach W 239th St you've gone about 0.1 miles too far*	**Go 1.1 Mi**	2.9 mi
	4. **3330 LOMITA BLVD** is on the **left**. *Your destination is 0.3 miles past Telo Ave* *If you reach Medical Center Dr you've gone a little too far*		2.9 mi
B	**3330 Lomita Blvd** Torrance, CA 90505-5002	**2.9 mi**	**2.9 mi**

Total Travel Estimate: **2.88 miles - about 4 minutes**



Trip to:
3330 Lomita Blvd
Torrance, CA 90505-5002
2.00 miles
3 minutes

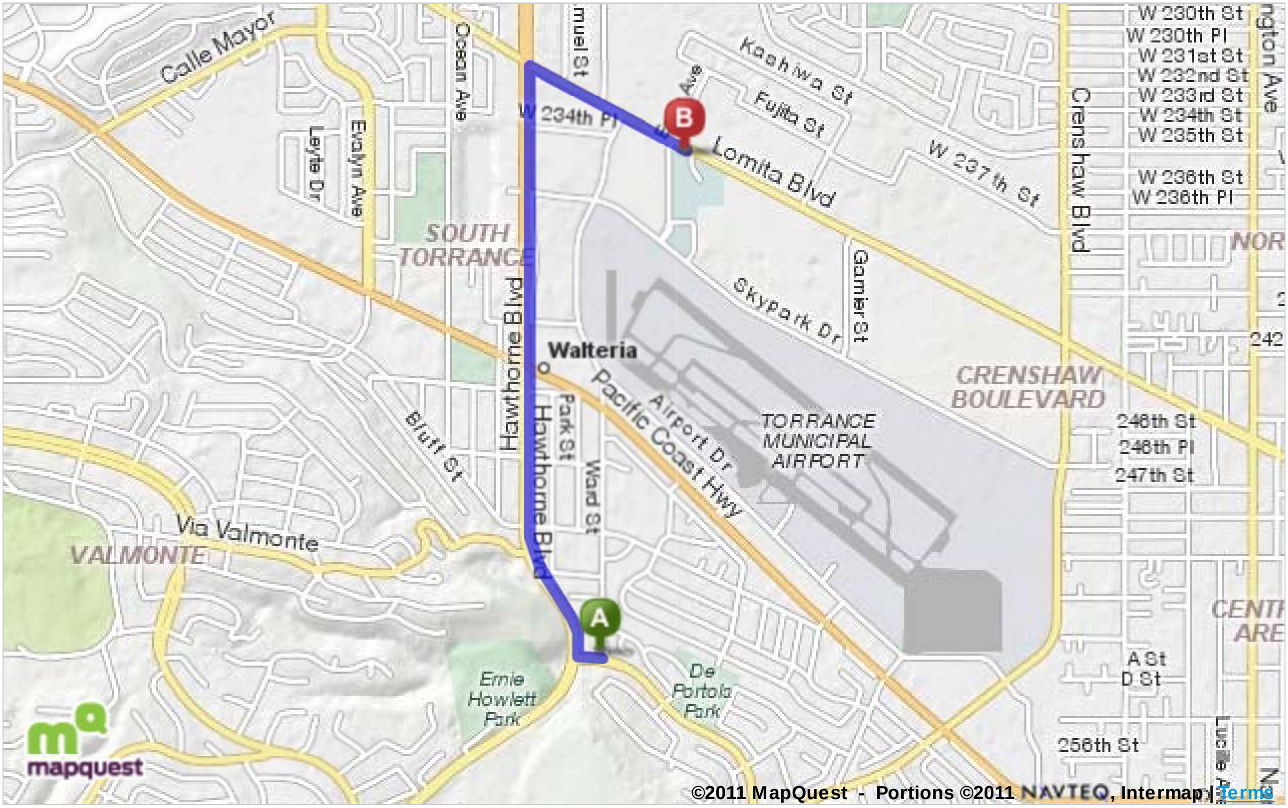
Notes

Station Tor-S7

Torrance Memorial Medical Center
3330 Lomita Boulevard
Torrance, CA 90505
(310) 517-4750
Emergency entrance is on east side of bldg.

	Miles Per Section	Miles Driven
3319 Rolling Hills Rd Torrance, CA 90505 33.79477550893578, -118.34794190747031 (Address is approximate)		
1. Start out going **west** on **Rolling Hills Rd** toward **Hawthorne Blvd**.	**Go 0.06 Mi**	0.06 mi
2. Take the 1st **right** onto **Hawthorne Blvd**. *If you are on Hawthorne Blvd and reach Ernie Howlett Park Rd you've gone about 0.3 miles too far*	**Go 1.0 Mi**	1.1 mi
NORTH 107 3. Stay **straight** to go onto **Hawthorne Blvd / CA-107 N**.	**Go 0.5 Mi**	1.6 mi
4. Turn **right** onto **Lomita Blvd**. *Lomita Blvd is 0.1 miles past W 234th Pl* *Yoshinoya Beef Bowl Restaurant is on the corner* *If you reach W 230th St you've gone about 0.1 miles too far*	**Go 0.4 Mi**	2.0 mi
5. **3330 LOMITA BLVD** is on the **right**. *Your destination is just past Medical Center Dr* *If you reach Telo Ave you've gone about 0.3 miles too far*		2.0 mi
3330 Lomita Blvd Torrance, CA 90505-5002	**2.0 mi**	**2.0 mi**

Total Travel Estimate: **2.00 miles - about 3 minutes**



Trip to:
3330 Lomita Blvd
Torrance, CA 90505-5002
2.07 miles
4 minutes

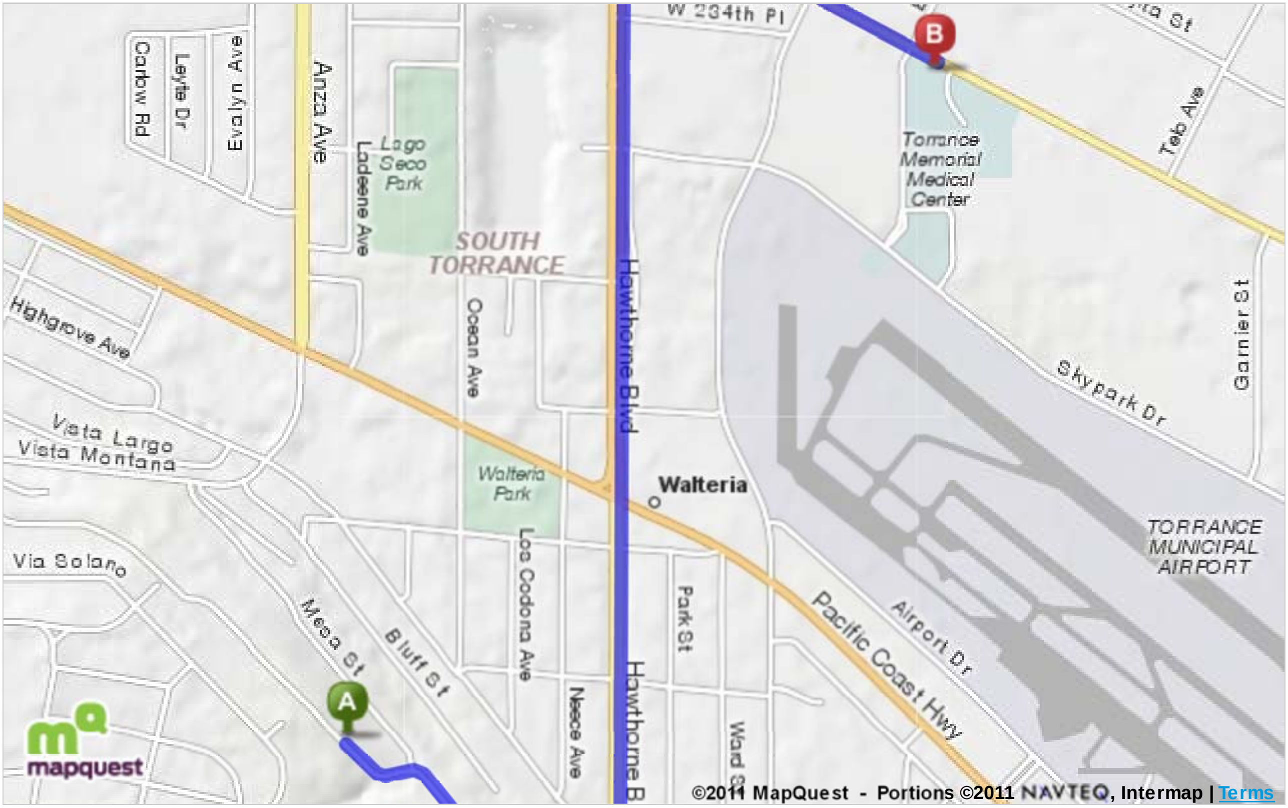
Notes

Station Tor-S8

Torrance Memorial Medical Center
3330 Lomita Boulevard
Torrance, CA 90505
(310) 517-4750
Emergency entrance is on east side of bldg.

			Miles Per Section	Miles Driven
A		**4013 Paseo De Las Tortugas** Torrance, CA 90505 33.800668808715066, -118.35695412976 (Address is approximate)		
		1. Start out going **southeast** on **Paseo de las Tortugas** toward **Mesa St**.	**Go 0.2 Mi**	0.2 mi
		2. Turn **left** onto **Via Valmonte**.	**Go 0.2 Mi**	0.4 mi
		3. Turn **left** onto **Hawthorne Blvd**. *Il Toscano Restaurant in Hillside Village Shops is on the corner*	**Go 0.7 Mi**	1.1 mi
	NORTH 107	4. Stay **straight** to go onto **Hawthorne Blvd / CA-107 N**.	**Go 0.5 Mi**	1.6 mi
		5. Turn **right** onto **Lomita Blvd**. *Lomita Blvd is 0.1 miles past W 234th Pl* *Yoshinoya Beef Bowl Restaurant is on the corner* *If you reach W 230th St you've gone about 0.1 miles too far*	**Go 0.4 Mi**	2.1 mi
		6. **3330 LOMITA BLVD** is on the **right**. *Your destination is just past Medical Center Dr* *If you reach Telo Ave you've gone about 0.3 miles too far*		2.1 mi
B		**3330 Lomita Blvd** Torrance, CA 90505-5002	**2.1 mi**	**2.1 mi**

Total Travel Estimate: **2.07 miles - about 4 minutes**



Trip to:
3330 Lomita Blvd
Torrance, CA 90505-5002
2.39 miles
5 minutes

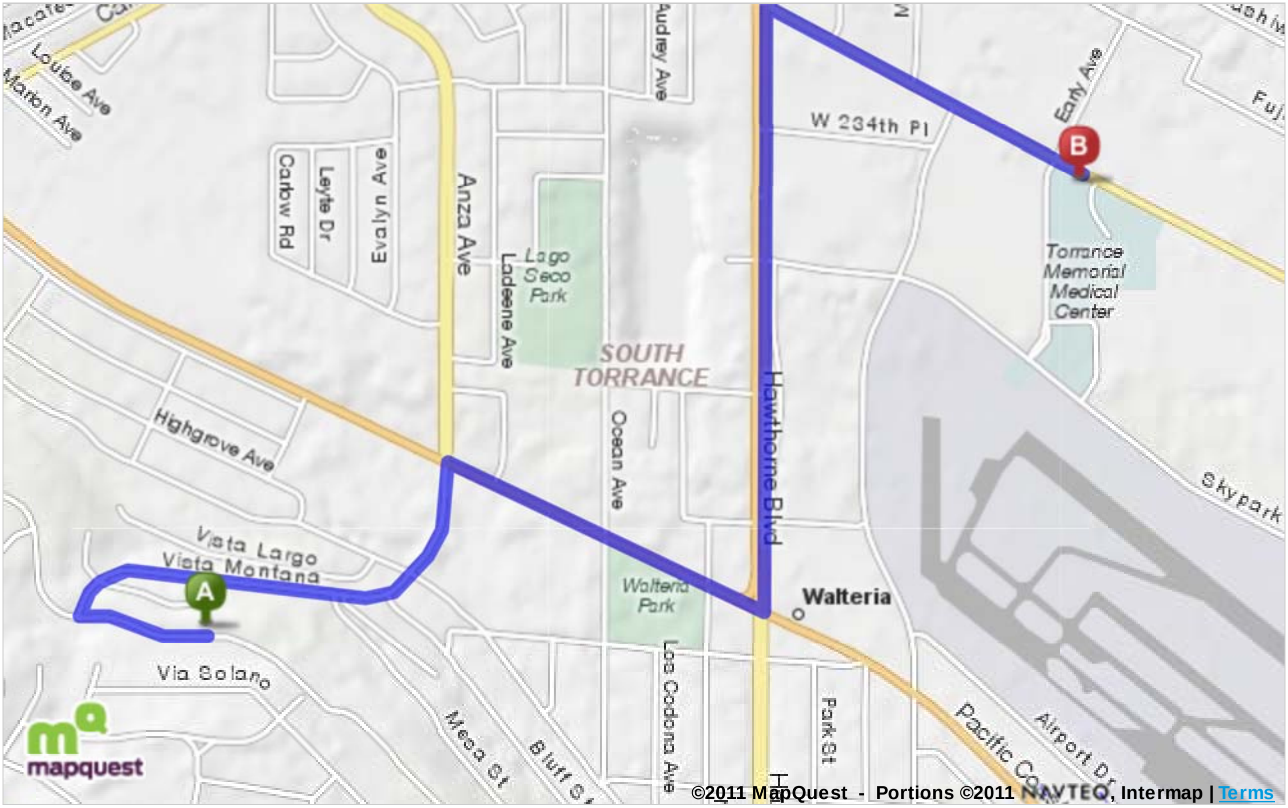
Notes

Station Tor-S9

Torrance Memorial Medical Center
3330 Lomita Boulevard
Torrance, CA 90505
(310) 517-4750
Emergency entrance is on east side of bldg.

	Directions	Miles Per Section	Miles Driven
A	**4519 Paseo De Las Tortugas** Torrance, CA 90505 33.80461825150893, -118.36304810864156 (Address is approximate)		
	1. Start out going **northwest** on **Paseo de las Tortugas** toward **Vista Montana**.	**Go 0.2 Mi**	0.2 mi
	2. Take the 1st **right** onto **Vista Montana**. *If you reach Calle de Arboles you've gone about 0.1 miles too far*	**Go 0.6 Mi**	0.8 mi
1	3. Turn **right** onto **Pacific Coast Hwy / CA-1**. *Pacific Coast Hwy is 0.1 miles past Newton St* *Shandiz Kebob in Village Ctr is on the right* *If you are on Anza Ave and reach W 239th St you've gone a little too far*	**Go 0.4 Mi**	1.2 mi
NORTH 107	4. Turn **left** onto **Hawthorne Blvd / CA-107 N**. *Starbucks Coffee is on the corner* *If you reach Ward St you've gone about 0.1 miles too far*	**Go 0.8 Mi**	1.9 mi
	5. Turn **right** onto **Lomita Blvd**. *Lomita Blvd is 0.1 miles past W 234th Pl* *Yoshinoya Beef Bowl Restaurant is on the corner* *If you reach W 230th St you've gone about 0.1 miles too far*	**Go 0.4 Mi**	2.4 mi
	6. **3330 LOMITA BLVD** is on the **right**. *Your destination is just past Medical Center Dr* *If you reach Telo Ave you've gone about 0.3 miles too far*		2.4 mi
B	**3330 Lomita Blvd** Torrance, CA 90505-5002	**2.4 mi**	**2.4 mi**

Total Travel Estimate: **2.39 miles - about 5 minutes**



APPENDIX B

Field Forms

Field Activity Report

northgate environmental management, inc.
24411 Ridge Route Drive, Suite 130, Laguna Hills, CA 92653
main (949) 716-0050; fax (949) 716-0055

Date: ____________________
Recorded By: ____________________

Project Name: Stormwater Monitoring **Project No.:** 2040.01
Client Name: the City of Torrance
Weather: ____________________ **Temperature:** ____________________
Site Conditions: ____________________

NORTHGATE PERSONNEL ON-SITE

VISITORS

Name	Company/Agency	Time Arrived	Time Left

CONTRACTORS
Contractor Name: ____________________ **Phone No.:** ____________________
Supervisor: ____________________ **Task:** ____________________

Company	No. of Supervisors	No. of Workers	Remarks

EQUIPMENT

Field Activity Report

northgate
environmental management, inc.

24411 Ridge Route Drive, Suite 130, Laguna Hills, CA 92653
main (949) 716-0050; fax (949) 716-0055

Date: ____________________

Recorded By: ____________________

Project Name: Stormwater Monitoring **Project No.:** 2040.01

Client Name: The City of Torrance

ACTIVITIES

Time:	Activities (include event, time, observations, observers, etc.)

Print Name: ____________________ **Signature:** ____________________

DISCHARGE MEASUREMENT NOTE

northgate environmental management, inc.
24411 Ridge Route Drive, Suite 130, Laguna Hills, CA 92653
main (949) 716-0050; fax (949) 716-0055

Date: ______
Arrival Time: ______
Leaving Time: ______

Project Name: Stormwater Monitoring
Client Name: the City of Torrance
Project No.: 2040.01
Recorded By: ______

Station Name:
Section #:
Method:
Meter Type:
Observations:

DISTANCE FROM INITIAL POINT	WIDTH (FT)	DEPTH (FT)	OBSER DEPTH	REVS	TIME (SEC)	VELOCITY (F/S)		AREA (FT)	DISCHARGE (CFS)
						AT POINT	MEAN IN VERTICAL		
	LEW or REW (circle one) at time =								
	LEW or REW (circle one) at time =								

24411 Ridge Route Drive, Suite 130, Laguna Hills, CA 92653
main (949) 716-0050; fax (949) 716-0055

DAILY SITE SAFETY MEETING RECORD

Recorded By:

Date & Time:

Project No.: 2040.01

Project Name: Stormwater Monitoring

Project Location: Torrance, CA

Field Activities: Stormwater sampling & stream flow measurement in underground storm drains.
and subsurface storm drains.

Chemicals Present: Nitrate-nitrate, Total Kjeldahl Nitrogen, Total Phosphorus.

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: Level D: Steel-toed safety shoes, coveralls, gloves, safety glasses, hardhat, reflective traffic vest.

Hazards of Chemicals Present: No hazardous levels of site specific chemicals have been determined yet. Bacterial hazards from the stormwater may be present and exposure should be prevented.

Physical Hazards: Truck and vehicle traffic; heavy lifting; slips-trips-falls; pinch points;

Special Hazards: Spiders or insects inside manholes; reptiles or rodents in landscape surrounding manholes;

Other Topics of Concern: Use proper lifting procedures (bend at knees, do not use back to lift) when moving manhole covers. Avoid pinch points by keeping feet away from the cover as lid is moved. Wear leather gloves when using manhole hooks.

SITE SAFETY CHECKLIST	YES	NO
Attached Signature Page - No, see below		X
Written Health and Safety Plan (HASP) is on-site	X	
Information in the HASP matches conditions and activities at the site	X	
Site personnel have appropriate training and certification and medical clearance	X	
Air monitoring equipment has been calibrated daily	X	
Site zones are set up and observed where appropriate	X	
Access to Work Areas is limited to authorized personnel	X	
Decontamination stations (including hand/face wash) are set up and used	X	
Personal protective equipment used matches HASP requirements	X	
Emergency and First Aid equipment is on-site as described in the HASP	X	
Drinking water is readily available	X	

Note: All "NO" answers must be addressed & corrected immediately. Note additionally health and safety observations here.

Conducted By

Signature: **Date:**

Water Sample Data Sheet

24411 Ridge Route Drive, Suite 130, Laguna Hills, CA 92653
main (949) 716-0050; fax (949) 716-0055

Date: ______________________
Arrival Time: ______________________
Leaving Time: ______________________
Project Name: Stormwater Monitoring
Project No.: 2040.01
Client Name: the City of Torrance
Recorded By: ______________________

Water Sample Data

Site Name: ______________________
Sample ID: ______________________
Time of Sample Collection: ______________________
Date: ______________________
Number of Containers: ______________________

Flow Measurements

Depth of Water: ______________ in, ft
Width of Flow: ______________ in, ft
Flow Rate: ______________ gal/min
Time: ______________ 24-hour format

Depth of Water: ______________ in, ft
Width of Flow: ______________ in, ft
Flow Rate: ______________ gal/min
Time: ______________ 24-hour format

Depth of Water: ______________ in, ft
Width of Flow: ______________ in, ft
Flow Rate: ______________ gal/min
Time: ______________ 24-hour format

Water Conditions

Circle the Appropriate Identifier

Odor: None, Musty, Sewage, Rotten Egg, Sour milk, Fishy, Other:
Color: None, Yellow, Brown, Grey, Green, Red, Other:
Clarity: Clear, Cloudy, Opaque, Suspended solids, Other:
Floatables: None, Oil sheen, Foam, Animal waste, Green waste, Food, Paper, Plastic, Grease, Hydrophytes, Trash, Other:
Settleables: None, Salt, Clay, Oil, Rust, Microbes, Other:
Weeds: None, Normal, Excessive, Note:
Biology: None, Algae bloom, Larvae, Crawfish, Frog, Fish, Waterfowl, Hydrophytes, Blue-green algae
Other:
Sky: Stormy, Overcast, Partial clouds, Haze, Fog, Clear
Wind: Calm,Light breeze, Strong breeze, Windy, Gusty
Flow Characterization: Storm/Flood, Rapid, Tranquil, Laminar, Standing, Dry

Low Flow/No Flow Conditions

Was there flow?: Yes, No

If there was flow, but no sample was taken, explain why.

____

APPENDIX C

Quality Assurance Project Plan

Quality Assurance Project Plan
Monitoring and Reporting Plan

Machado Lake Nutrient and Toxics
Total Maximum Daily Load (TMDL)
Torrance, California

December 9, 2013

Prepared For:

City of Torrance
3031 Torrance Boulevard
Torrance, California 90503

Prepared By:

Northgate Environmental Management, Inc.
24411 Ridge Route Drive, Suite 130
Laguna Hills, California 92653

REGISTERED GEOLOGIST
DANA R. BROWN
No. 7188
Expires: 12-31-2013
STATE OF CALIFORNIA

Derrick S. Willis Principal	Dana R. Brown, P.G. Project Manager

2040.01

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ABBREVIATIONS AND ACRONYMS

BMP	Best Management Practices
COC	Chain-of-Custody
DDD	Dichloro-diphenyl-dichloroethane
DDE	Dichloro-diphenyl-dichloroethylene
DDT	Dichloro-diphenyl-trichloroethane
DO	Dissolved Oxygen
DQO	Data Quality Objective
DPM	Diesel Particulate Matter
EB	Equipment Blank
EDD	Electronic Data Deliverable
FD	Field Duplicate Sample
HASP	Health and Safety Plan
kg	Kilogram
MDL	Method Detection Limit
µmhos/cm	Microohms per Centimeter
mg/l	Milligram per Liter
MRP	Monitoring and Reporting Plan
MS4	Municipal Separate Stormwater Systems
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NH_3+	Ammonia-Ammonium
NO_2	Nitrite
NO_3	Nitrate
NTU	Nephelometric Turbidity Unit
PCB	Polychlorinated Biphenyl
PO_4	Phosphate
QAPP	Quality Assurance Project Plan
QAPrP	Quality Assurance Program Plan
QA	Quality Assurance
QC	Quality Control
RL	Laboratory Reporting Limit
RPD	Relative Percent Difference
RWQCB	Los Angeles Regional Water Quality Control Board
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
TB	Trip Blank
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load

TN	Total Nitrogen
TOC	Total Organic Carbon
TP	Total Phosphorus
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
WLA	Waste Load Allocation

1.0 INTRODUCTION AND PROJECT MANGEMENT

1.1 Introduction

This Quality Assurance Project Plan (QAPP) presents the organization, objectives, planned activities, and specific quality assurance and quality control (QA/QC) procedures associated with the Monitoring and Reporting Plan (MRP) for the Machado Lake Nutrient Total Maximum Daily Load (Nutrient TMDL), and the Machado Lake Pesticides polychlorinated biphenyls *(*PCBs) Total Maximum Daily Load (Toxics TMDL). Northgate Environmental Management, Inc. (Northgate) prepared the MRP and this QAPP on behalf of the City of Torrance (the City).

This QAPP addresses QA/QC policies and procedures associated with the collection of stormwater quality data according to the MRP, of which this QAPP is an appendix. This QAPP generally follows the State of California's Surface Water Ambient Monitoring Program Quality Assurance Program Plan (SWAMP QAPrP; State Water Resources Control Board, 2008) which closely follows the United States Environmental Protection Agency (USEPA) guidance for preparing such documents (USEPA; 2001, 2002a). Nutrient and Toxics TMDL sampling will be performed in accordance with the activities outlined in the MRP. The sampling activities will be conducted under the oversight of the management positions described in Section 1.3.

1.2 Distribution List

Most of the data-intensive tasks will be accomplished by Northgate, with oversight and review by the Los Angeles Regional Water Quality Control Board (RWQCB). Table 1.1 presents a general distribution list for documents prepared for work performed under the MRP.

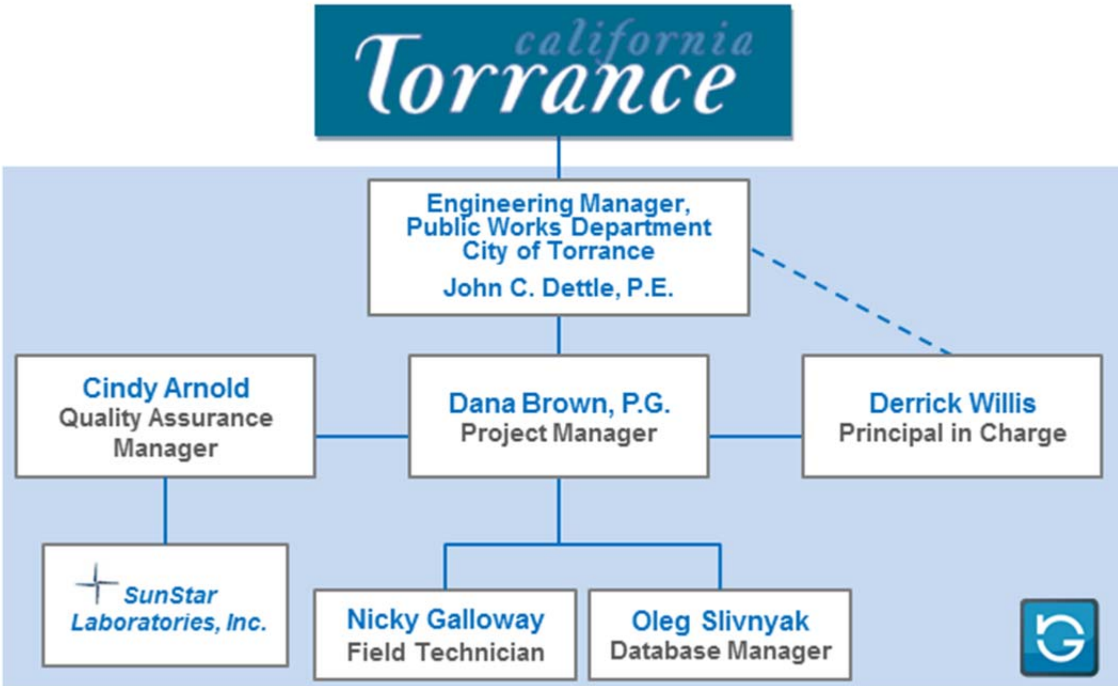
Table 1.1: Distribution List

Name		Email	Organization	Distribution	
Last	First			Hard Copy	e-Copy
Newman	Jenny	jnewman@waterboards.ca.gov	RWQCB		X
Dettle	John	jdettle@torranceca.gov	City of Torrance		X
Willis	Derrick	derrick.willis@ngem.com	Northgate		X
Brown	Dana	dana.brown@ngem.com	Northgate		X

1.3 Project Organization

An organization chart for implementation of the MRP is provided below. The organization chart defines the lines of communication and identifies key personnel assigned to various activities. The individuals participating in the work performed under the MRP and their specific roles and responsibilities are discussed below.

Figure 1 – Program Organization Chart



1.3.1 Management Responsibilities

City Engineering Manager – The City's Engineering Manager (John Dettle) is responsible for overall program coordination, correspondence with the RWQCB, compliance with the Nutrient and Toxics TMDLs, assessing the data to determine if the monitoring schedule should be altered, and budget approval.

Principal – The Northgate Principal (Derrick Willis) is primarily responsible for MRP direction and decisions concerning management issues and strategies, budget, and schedule.

Project Manager – The Northgate Project Manager's (Dana Brown) duties will include, as necessary:

- Subcontractor selection and coordination;
- Assignment of duties to staff and orientation of the staff to the specific needs and requirements of the MRP;
- Ensuring that data collection and evaluation activities are conducted in accordance with the QAPP and standard professional practices;
- Resolving any logistical problems that could potentially hinder field activities, such as equipment malfunctions or availability, personnel conflicts, or weather-dependent working conditions;

- Serving as the focus for coordination, communication, and reporting with the City and regulators; and
- Maintenance of the project files.

Database Manager – The Northgate Database Manager (Oleg Slivnyak) has overall responsibility for database development and management. Database Manager's duties will include:

- Receiving analytical data from the laboratory;
- Following completion of QA/QC procedures by the QA Manager (below), processing monitoring and analytical data for loading into a project database;
- Notifying the Project Manager of problems associated with the raw data; and
- Preparation of data reports as requested by the Project Manager.

1.3.2 Quality Assurance Responsibilities

QA Manager – The Northgate QA Manager (Cindy Arnold) has overall responsibility for quality assurance oversight. The QA Manager communicates directly to the Project Manager. Specific responsibilities include:

- Reviewing and approving QA procedures, including any modifications to existing approved procedures;
- Providing QA technical assistance to staff;
- Ensuring that data validation/data assessment is conducted in accordance with the QAPP; and
- Reporting on the adequacy, status, and effectiveness of the QA program to the Project Manager.

1.3.3 Field Responsibilities

Field Technician – The Northgate Field Technician (Nicky Galloway) has responsibility for completion of all field activities in accordance with the MRP and QAPP and communicates directly with the Project Manager. Specific responsibilities of the Field Technician include:

- Collecting samples, conducting field measurements, and decontaminating equipment according to documented procedures stated in the MRP and QAPP;
- Implementing field QC, including issuance and tracking of measurement and test equipment, the proper labeling, handling, storage, shipping, and chain-of-custody (COC) procedures used at the time of sampling, and control and collection of all field documentation;
- Ensuring that field instruments are properly operated, calibrated, and maintained, and that adequate documentation is kept for all instruments;

- Collecting the required QC samples and thoroughly documenting QC sample collection;
- Ensuring that field documentation and data are complete and accurate; and
- Communicating any non-conformance or potential data quality issues to the Project Manager at the earliest opportunity.

1.3.4 Laboratory Responsibilities

Laboratory Manager – SunStar Laboratories, Inc. (SunStar), which undergoes routine audits of analytical procedures by the USEPA, will perform chemical analyses of samples collected. The SunStar Laboratory Manager is ultimately responsible for the data produced by the laboratory. Specific responsibilities of the Laboratory Manager and his/her staff include:

- Implementing and adhering to the laboratory QA manual and all corporate policies and procedures within the laboratory;
- Approving the standard operating procedures (SOPs);
- Reviewing data packages for completeness and compliance to client needs;
- Performing QA assessments; and
- Reviewing and approving corrective action plans for non-conformances, tracking trends of non-conformances to detect systematic problems, and implementing additional corrective actions as needed.

1.3.5 Regulatory Agency

The RWQCB will oversee the monitoring activities performed according to the MRP.

RWQCB Representative – RWQCB staff or designee will review reports and may independently perform oversight of the sampling program.

1.4 Problem Definition/Background

1.4.1 Background

Machado Lake is located in the City of Los Angeles' Ken Malloy Harbor Regional Park. It is approximately 40 acres in size, and averages approximately 3 feet in depth. Machado Lake is listed on the 1998, 2002, and 2006 Clean Water Act Section 303(d) lists of impaired water bodies due to eutrophic conditions, algae and odors (Nutrients): and chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, Chem A, and PCBs in tissue; and impaired sediment due to chlordane, DDT, and PCBs (Toxics). The RWQCB established TMDLs for Machado Lake for algae, ammonia and odors (Nutrients) on May 1, 2008 (RWQCB, 2008), and for Pesticides and PCBs (Toxics) on September 2, 2010 (RWQCB, 2010).

1.4.2 Nutrient TMDL

The City has elected to establish annual mass-based waste load allocations (WLAs) for Nutrients equivalent to monthly average concentrations of 0.1 milligrams per liter (mg/l) total phosphorus and 1.0 mg/l total nitrogen based on approved flow conditions. When the concentration-based WLAs are met under the approved flow condition of 8.45 cubic hectometers per year, the annual mass of the total phosphorus discharged to Machado Lake will be 845 kilograms (kg) and the annual mass of total nitrogen discharged to the lake will be 8,450 kg. The City mass-based WLAs will be proportional to the City owned area in the sub-watershed. The City area accounts for 35.6 percent of the Machado Lake Watershed. Table 1 lists the interim and final WLAs based on this area.

Table 1.2: Nutrient TMDL Mass-Based Waste Load Allocations

Responsible Party	Years after TMDL Effective Date	Total Phosphorus (kg)	Total Nitrogen (kg)
City of Torrance	5	3,760	7,370
	9.5 (final WLAs)	301	3,008

Notes:
mg/l = milligrams per liter

1.4.3 Toxics TMDL

The Toxics TMDL assigned WLAs for municipal separate storm sewer systems (MS4) permitees as concentration-based allocations (equal to the sediment numeric targets) for suspended sediment-associated contaminants as shown in Table 2.

Table 1.3: Toxics TMDL Concentration Based Waste Load Allocations

Responsible Party	Pollutant	WLA for Suspended Sediment Associated Contaminants (*ug*/kg dry weight)
City of Torrance	Total PCBs	59.8
	DDT (all congeners)	4.16
	DDE (all congeners)	3.16
	DDD (all congeners)	4.88
	Total DDT	5.28
	Chlordane	3.24
	Dieldrin	1.9

Notes:
*u*g/kg = micrograms per kilogram
DDT = dichlorodiphenyltrichloroethane
DDE = Dichlorodiphenyldichloroethylene
DDD = Dichlorodiphenyldichloroethane

1.5 Project/Task Description

Ongoing Nutrient TMDL monitoring will be combined with Toxics TMDL monitoring according to the MRP. The following sections describe in detail the proposed activities to accomplish TMDL monitoring.

1.5.1 Nutrient TMDL Monitoring Summary

Northgate will perform monthly visits to nine (9) monitoring sites during dry weather conditions and three (3) additional monitoring visits during wet weather conditions to collect water samples, download flow sensor data, and service the sensors. Northgate will also perform up to seven (7) additional visits to station Tor-S3 when Los Angeles County pumps stormwater from the Walteria Lake into the 54-inch storm drain and collect a water sample (maximum of 10 storm event/pumping event visits per year).

Based on the requirements of the Special Study Workplan (Carollo, 2011a), routine dry weather sampling will be conducted at all nine stations until a full year of data is obtained after the February, 2013 dry weather sampling event. At the end of this period the City will review the monitoring results to determine if the sampling frequency and locations should be modified. For the remainder of the Special Study period, flow measurements and water samples (when available) will continue to be collected at all nine monitoring stations. Details of the monitoring locations, frequency of sampling, and sampling parameters are included in Sections 3.0 to 5.0 of the MRP.

1.5.2 Toxics TMDL Monitoring Summary

The Toxics TMDL monitoring will consist of two phases of wet weather sampling designed to collect suspended solids for the analysis of pollutants in bulk sediments. Phase I monitoring will be conducted for a two (2) year period, and Phase II monitoring will commence once Phase I monitoring has been completed. In Phase I monitoring, samples will be collected during three (3) qualifying wet weather events at all stations for the first year, including the first significant storm event of the season. In the second year of Phase I activity samples will still be collected at stations representing discharge from the City during three qualifying wet weather events (Tor-S1, Tor-S2, Tor-S4, and Tor-S5), but the remaining stations will only be sampled during one qualifying wet weather event. During Phase II monitoring the number of sampling events will be decreased to one per year, and the frequency decreased to every other year, and all nine sampling stations will be visited.

At the end of the fourth year of wet weather monitoring, the City will assess the data to determine if the monitoring schedule should be altered. Details of the monitoring locations, frequency of sampling, and sampling parameters are included in Sections 3.0 to 5.0 of the MRP.

1.6 Quality Objectives and Criteria for Measurement Data

1.6.1 Data Quality Objectives

The Data Quality Objectives (DQOs) were developed in general accordance with the USEPA Guidance (USEPA, 2006). The objective of the MRP is to gather sufficient monitoring data to ensure that the City is in compliance with the requirements of the Machado Lake Nutrient and Toxics TMDLs. Specific project objectives are presented in Section 2.0 of the MRP and the DQOs of the MRP are based on:

- Sample collection protocols designed to obtain sufficient data to meet the objectives of tracking and characterization;
- The use of sample collection and handling procedures that will ensure the representativeness and integrity of the samples; and
- An analytical program designed to generate definitive data of sufficient quality and sensitivity to meet the MRP objectives.

Data deliverables will provide sufficient information to allow validation of the data.

1.6.2 Data Quality Indicators for Measurement Data

Precision – Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates. Field duplicates will be collected once per sampling event at a rotating location. Precision will be measured through the calculation of relative percent difference (RPD). The objectives for field precision RPDs are $\leq$50% RPD for the stormwater samples.

Precision in the laboratory is assessed through the calculation of RPD for a matrix spike/matrix spike duplicate (MS/MSD) pair. A MS/MSD sample will be collected once every other sampling event at a rotating location. Precision control limits for laboratory analyses will be consistent with the current statistical limits used by the laboratory at the time of analyses.

Accuracy – Accuracy is the degree of agreement between the observed value and an accepted reference or true value. Accuracy in the field is assessed through the adherence to all sample handling, preservation, and holding time requirements. Equipment blanks will be used for non-dedicated sampling equipment to evaluate the potential for cross-contamination and effectiveness of decontamination procedures and will be collected approximately once per decontamination method per sampling event. Equipment blank samples will be collected using laboratory-grade reagent water. Temperature blank samples will be incorporated at a rate of one per cooler to check for proper temperature. Temperature blanks will be supplied by the laboratory or made up by the field team.

Laboratory accuracy is assessed through the analysis of laboratory blanks, matrix spike recovery, and calibration checks. Accuracy control limits for laboratory analyses will be consistent with the current statistical limits used by the laboratory at the time of analyses.

Representativeness – Representativeness is *"a qualitative term that expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition"* (USEPA, 2002a). The QA/QC process will include a qualitative assessment of whether it appears that measurements are made and samples collected in such a manner that the resulting data appropriately reflect the conditions of the Machado Lake subwatershed.

Comparability – Comparability is a qualitative term that expresses the measure of confidence that one data set can be compared to another and can be combined for the purposes of decision-making. A determination of comparability may include comparison of sample collection and handling methods, sample preparation and analytical procedures, holding times, stability issues, and QA protocols. Comparability of data collected during work performed under the MRP will be evaluated in annual progress reports.

Completeness – Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under normal conditions. "Normal conditions" are defined as the conditions expected if the MRP was implemented as planned.

Field completeness is a measure of the amount of valid samples obtained during all sampling for the MRP. The field completeness goal is 90 percent.

Laboratory completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project. The laboratory completeness goal is 95 percent.

Sensitivity – Sensitivity of analytical data is demonstrated by laboratory method detection limits (MDLs) and by laboratory reporting limits (RLs). Target MDLs and RLs are specified in Section 2.4 of this QAPP.

1.7 Special Training/Certifications and Permits

1.7.1 Training

Monitoring personnel will meet the educational, work experience, responsibility, and training requirements for their respective positions. Personnel will have familiarity with the quality documents described in the SWAMP QAPrP and make use of SWAMP training tools as necessary. Prior to performing measurement and sampling activities, personnel will be given instructions by the Project Manager specific to the MRP, covering the following areas:

- Organization and lines of communication and authority;
- Overview of the MRP and QAPP;
- QA/QC requirements;
- Documentation requirements; and
- Health and safety requirements.

1.7.2 Certifications

No special certifications are anticipated or required for stormwater sampling personnel.

1.7.3 Permits

Prior to commencing field work, access agreements and required permits will be obtained from agencies responsible for stormwater conveyances and public right-of-ways at the sampling locations. Access agreements and permits may include the following: Flood Control District Permit from the County of Los Angeles Department of Public Works; Construction/Excavation Permit from the City of Torrance; Encroachment permit from the City of Lomita; Building Materials Permits from the City of Los Angeles; and Road Permit Applications from the County of Los Angeles.

1.8 Documentation and Records

1.8.1 Project Files

The MRP files will be kept in a central repository on a secure network drive backed up regularly and maintained by Northgate. These files will include all documents relevant to sampling and analysis activities described in this QAPP. The files for this investigation, including all relevant records, final reports, logs, field notebooks, pictures, subcontractor reports, and data validation reviews, will be maintained in a secure, limited access area and under custody of the Project Manager. The files for the MRP will be maintained by Northgate at the Laguna Hills office for a period of five years after the final project report is issued.

1.8.2 Field Records

Field data sheets provide the means of recording the sample and field data collecting activities performed during the investigations.

The title page of each data sheet should contain the following:

- Person who is recording the data;
- Project name and number;
- Project start date; and
- End date.

Entries on the field forms will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of field team members present, and the signature of the person making the entry will be entered. The names of visitors observing field activities and the purpose of their visit will also be recorded.

Standardized field measurement and sample data forms will be utilized. All measurements made and samples collected will be recorded. All entries will be made in permanent ink, signed, and dated, and no erasures or obliterations will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark, which is to be signed and dated by the sampler. Whenever a sample is collected, or a measurement is made, the sampling location will be recorded. All equipment used to make measurements will be identified, along with the date of calibration. Sample field forms for use in this project are provided in Appendix B of the MRP.

1.8.3 Laboratory Records

Laboratory data reduction procedures should be performed according to the following protocol. All information related to analysis will be documented in controlled laboratory logbooks, instrument printouts, or other approved forms. All entries that are not generated by an automated data system will be made neatly and legibly in permanent, waterproof ink. Information will not be erased or obliterated. Corrections will be made by drawing a single line through the error and entering the correct information adjacent to the strike-out. All changes will be initialed, dated, and if appropriate, accompanied by a brief explanation. Unused pages or portions of pages will be crossed out to prevent future data entry. Analytical laboratory records will be reviewed by the supervisory personnel on a regular basis, and by the Laboratory Manager or his/her designee periodically, to verify adherence to documentation requirements.

Analytical data deliverables will be provided within a one-week turnaround time from date of sample receipt at the laboratory. The laboratory will provide one copy of an electronic data deliverable (EDD) for each set of samples submitted. The laboratory will also provide a laboratory analytical report at least annually, which will include laboratory certification that the results have been reviewed and validated and will include the QA and laboratory replicate results.

If new or different laboratories are used during the course of the work performed under the MRP, their qualifications and QA/QC procedures will be reviewed and approved by the Project Manager and the RWQCB, as appropriate, prior to engagement.

1.8.4 Reporting

Annual progress reports will be prepared by Northgate and submitted to the RWQCB to present results of the Nutrient and Toxics TMDL monitoring. The reports will include monthly and year-to date totals for total nitrogen (TN), total phosphorous (TP), and toxics (total PCBs, DDT, DDE, DDD, total DDT, chlordane, and dieldrin) in stormwater, project progress for the calendar year, and summarize the collected analytical data, flow data, and QA/QC data.

2.0 DATA GENERATION AND ACQUISITION

2.1 Sampling Process Design

A detailed discussion of the sampling design rationale and methods is provided in the MRP (of which this QAPP is an Appendix). The objective of this project is to ensure that the City is in compliance with the requirements of the Machado Lake Nutrient and Toxics TMDLs. The specific objectives of the work to be performed under the MRP are:

- Monitor attainment of WLAs as required by the TMDLs;
- Guide the design of future implementation actions;
- Monitor the effectiveness of implementation actions in improving water quality; and
- Guide pollutant source investigations.

2.2 Sampling Methods

The detailed sampling methodology is provided in the MRP (Section 3.2) including specific equipment and procedures for nutrient TMDL dry weather sampling, nutrient TMDL wet weather sampling, toxics TMDL wet weather sampling, and flow measurement. Section 3.3 of the MRP presents decontamination procedures and Section 3.4 describes sample containers and preservation. The monitoring schedule and frequency is described in detail in Section 5.0 of the MRP.

Sampling will be conducted by a team of at least two workers using a combination of non-dedicated and dedicated sampling equipment. All sampling will be conducted in a manner that minimizes the possibility of sample contamination. Sampling equipment will be decontaminated prior to use. Grab samples will be collected in laboratory-supplied pre-preserved containers. Other types of discrete samples will also be collected and described separately.

After collection, the sample containers will be labeled, sealed in plastic bags, and placed in a cooler with ice for transportation under proper chain-of-custody protocol to the analytical laboratory. QA/QC samples will be collected and analyzed for each sampling event. Field personnel shall adhere to established sample collection protocols to ensure the collection of representative and uncontaminated samples for laboratory analysis. Deviations from the standard protocol must be recorded on the *Water Sample Data Sheet* at the time of sampling.

2.3 Sample Handling and Custody

The purpose of this element of the QAPP is to ensure that samples maintain their original physical form and chemical composition throughout the process of sample collection, transport, and analysis.

2.3.1 Sample Labeling and Identification

Each sample will be labeled with a unique name that contains the sample station, the date of collection, and a suffix indicating the order of sample collection. Each sample will have the name of the monitoring site written first, followed by the date in mmddyyyy format, and a number denoting the sample order (X). For example, the first sample collected at station Tor-S2 on November 24, 2012 would be labeled **Tor-S2-11242012-1**. Table 4 lists the sample naming protocol for each sampling station.

2.3.2 Chain-of-Custody Procedures

The field team shall follow proper chain-of-custody protocol with collected samples at all times. Samples will be considered to be in custody if they are (1) in the custodian's possession or view, (2) retained in a secure place (under lock) with restricted access, or (3) placed in a container and secured with an official seal such that the sample could not be reached without breaking the seal.

The field team shall complete chain-of-custody records for all collected samples on triplicate forms supplied by the analytical laboratory. The chain-of-custody will be utilized by the field team for all samples throughout the collection, transport, and analytical process to ensure compliance with the SSWP. Each field team member handling the samples will sign the chain-of-custody.

2.3.3 Sample Handling, Packaging, and Shipping

The handling and transportation of samples must be accomplished in a manner that protects the integrity of the samples and complies with the provisions of the MRP. As few of people as possible will handle the samples. The field team will have custody of the samples during the monitoring event, and chain-of-custody (COC) forms will accompany all samples during shipment or delivery to the analytical laboratory.

The field team shall package samples carefully to avoid breakage or contamination, maintain samples at the proper temperature (4^{o}C), and ship samples daily to the analytical laboratory under chain-of-custody protocol. The following sample packaging requirements shall be followed:

1) Sample bottle lids must not be mixed, all sample lids must stay with the original containers;
2) Sample bottles will be placed in a resealable plastic bag to minimize leakage in case a bottle breaks during shipment;
3) The samples will be cooled by placing ice in sealed plastic bags and placing the sealed ice-filled bags around, between, and above the sample containers;

4) Any remaining space in the sample shipping container shall be filled with clean, inert packing material such as bubble-wrap;

5) The chain-of-custody document must be sealed in a resealable plastic bag and placed in the shipping container. The resealable plastic bag will be taped to the inside lid of the sample cooler, and sealed with shipping tape;

6) Clear strapping tape will be wrapped around the cooler in at least two locations, sealing the container to prevent the contents from spilling; and

7) Custody seals will be affixed over the shipping tape in at least two locations (normally the front and right side of the cooler); in a manner that access to the container can only be gained by breaking a seal. A layer of clear strapping tape will be placed over the seals to ensure that they are not broken accidentally during shipping. Custody seals shall be constructed with security slots designed to break if the seals are disturbed.

2.4 Analytical Methods

Stormwater samples will be collected and analyzed for multiple constituents to support development of methods for reducing contaminant loading in City stormwater and to evaluate the effectiveness of BMPs as they are implemented. The following sections describe the constituents for which samples will be analyzed, the analytical methods, method detection limits and reporting limits for each constituent.

2.4.1 Laboratory Analytical Methods and Reporting Limits

Samples collected under the MRP will be sent to SunStar for analysis according to the analytical methods described below. The contact information for SunStar is the following:

SunStar Laboratories, Inc.
25712 Commercentre Drive
Lake Forest CA, 92630
(949) 297-5020

2.4.1.1 Nutrient TMDL Monitoring

Nutrient TMDL samples will be analyzed for ammonia-ammonium, nitrate-nitrite, total Kjeldahl nitrogen (TKN), total phosphorus, phosphate, and total suspended solids. Table 5 specifies the analytical methods, reporting units, target reporting limits, and method detection limits for use in Nutrient TMDL monitoring.

Table 2.1: Nutrient TMDL Monitoring Analytical Methods and Limits				
Parameter	**Method Number**	**Reporting Units**	**Target Reporting Limits**	**Method Detection Limits**
Ammonia-Ammonium (NH_3^+)	SM 4500D	mg/l	0.6	0.12
Nitrate (NO_3)	EPA 300.0	mg/l	0.1	0.03
Nitrite (NO_2)	EPA 300.0	mg/l	0.1	0.03
Total Kjeldahl Nitrogen (TKN)	EPA 351.2	mg/l	0.1	0.07
Total Phosphorus (TP)	EPA 365.3	mg/l	0.05	0.01
Phosphate(PO_4)	EPA 365.3	mg/l	0.13	0.16
Total Suspended Solids (TSS)	EPA 160.2	mg/l	1.0	0.5

Notes:
mg/l = milligrams per liter

2.4.1.2 Toxics TMDL Monitoring

Toxics TMDL samples will be analyzed for TSS, organochlorine Pesticides, PCBs, and total organic carbon (TOC). Table 6 specifies the analytical methods, reporting units, target reporting limits, and method detection limits for use in Toxics TMDL monitoring.

Table 2.2: Toxics TMDL Monitoring Analytical Methods and Limits				
Sample Medium	**Parameter**	**Method Number**	**Method Detection Limit**	**Target Reporting Limit**
Water	Total Suspended Solids	EPA 160.2	0.5 mg/L	1.0 mg/L
Sediment	Total Organic Carbon (TOC)	EPA 415.1	0.05% dry weight	0.05%-66% dry weight
	Organochlorine Pesticides[1]	EPA 8081	0.1-1 ng/dry g	0.5-5 ng/dry g
	Total PCBs[2]	EPA 8082	10 ng/dry g	20 ng/dry g

Notes:
Mg/l = milligrams per liter
ng/dry g = nano grams dry weight per gram
1. Organochlorine Pesticides to be analyzed include chlordane-alpha, chlordane gamma, 2,4'-DDD, 2,4'-DDE, 2.4'-DDT, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin.
2. PCBs in water and sediment are measured as sum of seven Aroclors identified in the CTR (1016, 1221, 1232, 1242, 1248, 1254, and 1260). Congeners will also be analyzed to provide a better estimate of PCB concentrations and loads for PCBs. Method Detection Limit/Reporting Limit for individual congeners are 1 ng/dry g and 5 ng/dry g.

2.4.2 Field Measurements

Sample collection for Toxics TMDL monitoring will also be analyzed for the following field parameters: temperature, dissolved oxygen, turbidity, and conductivity. Table 7 specifies the field methods, range of expected values, reporting units, and target reporting limits for use in conducting field measurements.

Table 2.3: Field Measurements

Parameter	Range	Project RL
Velocity/Flow[1]	-0.5 to +20 ft^3/s	NA
pH	0 – 14 pH units	NA
Temperature	-5 – 50 ^{O}C	NA
Dissolved oxygen	0 – 50 mg/L	0.5 mg/L
Turbidity	0 – 3000 NTU	0.2 NTU
Conductivity	0 – 10000 µmhos/cm	2.5 µmhos/cm

Notes:
RL - Reporting Limit
Ft^3/s = cubic feet per second
NA- Not applicable
^{O}C = degrees Celsius
NTU = nephelometric turbidity units
µmhos/cm = micro ohms per centimeter

1. For velocity/flow, range refers to velocities measured by a handheld flow meter. The lower limit for measuring flow is dependent upon the size of the specific pipe or channel.

2.5 Quality Control

2.5.1 Laboratory QA/QC Procedures

Samples will be submitted under chain-of-custody (COC) protocol to the analytical laboratory. The analytical laboratory will have its own internal QC program, and will follow the QC requirements for each analytical method. The laboratory shall maintain logs sufficient to track each sample submitted, and will analyze or preserve each sample within the specified holding times.

All analytical data generated by the laboratory will undergo a QC review prior to release of the reported data. Each step of this review process involves evaluation of data quality based on both the results of the QC data and the professional judgment of those performing the review. This application of technical knowledge and experience to the data evaluation is essential so that data of high quality are generated consistently.

2.5.1.1 Method Blank

A method blank will be analyzed with every batch of 20 or fewer samples to measure laboratory contamination. The method blank will consist of analyte-free (laboratory reagent-grade) water and will be carried through the entire preparation and analysis procedure. Acceptance criteria for method blanks must conform to reference method requirements when specified. Generally, corrective action, including data flagging, is required when method blank concentrations are greater than the reporting detection limit, and the samples must be reprocessed if sample target compound/analyte concentrations are not greater than 10 times the method blank concentrations.

2.5.1.2 Spikes

A laboratory control sample (LCS) will be analyzed with every batch containing 20 samples or less to measure accuracy. The LCS will consist of a method blank spiked with a known amount of analyte, and it will be carried through the entire preparation and analysis procedure. The standards source will be separate from that used to prepare calibration standards. All analytes will be used for spiking the LCS. The recoveries will be plotted on control charts, and control limits will be calculated based upon historical data. If control limits are exceeded, the analysis will be stopped and the problem corrected. Samples associated with the out-of-control LCS will be reanalyzed in another batch.

One MS will be analyzed for one out of every 20 samples to measure matrix effects on accuracy. MS samples will consist of additional alilquots of sample spiked with a known amount of analyte. All analytes will be spiked. If a valid spike recovery is outside acceptable limits, but the LCS in control, matrix interference may be indicated.

One MSD will be analyzed for one out of every 20 samples to measure precision. For any batch of samples that does not contain a FD or MSD, two LCS samples (LCS and LCS duplicate) will be separately prepared and analyzed. If the relative percent difference does not meet the required acceptance limits, the problem will be investigated and corrected. Any affected samples will be reanalyzed in a separate batch.

2.5.1.3 Laboratory Sample Custody

The analytical laboratory will maintain custody procedures that conform to those required by the Contract Laboratory Program (CLP), as outlined in the CLP User's Guide (USEPA, 1991 and USEPA, 2002c). The procedures include designation of a sample custodian who will accept the samples and document sample condition; complete the chain-of-custody, any required sample tags, and the laboratory request sheets. The custodian will follow laboratory sample tracking and documentation procedures, and ensure secure sample storage in the appropriate environment to maintain preservation.

The laboratory will maintain records documenting all phases of sample handling, from receipt to final report of analysis. Accountable documents include sample receipt forms, laboratory operation logbooks, chain-of-custody records, bench work sheets, and other documents related to sample preparation and analysis. The laboratory shall utilize a document numbering and identification system for all documents/logs.

2.5.2 Laboratory Corrective Action

Corrective action in the laboratory may occur prior to, during, and after initial analyses. Corrective action may be necessary if internal laboratory QC checks exceed control limits. Following consultation with laboratory analysts and supervisory personnel, it may be necessary for the Laboratory Manager to approve the implementation of corrective action. If the non-conformance causes project objectives to not be achieved, the Project Manager and QA Manager will be notified.

Corrective actions, if necessary, are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files and in the narrative data report sent from the laboratory to the Project Manager. If the corrective action does not rectify the situation, the laboratory will contact the Project Manager, who will determine the action to be taken and inform the appropriate personnel.

2.5.3 Field Sampling QA/QC Procedures

QA/QC samples will be collected to ensure that the project QA objectives outlined in the Special Studies Workplan (Carollo, 2011b) are met. QA/QC samples will include field duplicates (FD), matrix spike/matrix spike duplicates (MS/MSD), equipment blanks (EB), and temperature blanks (TB). Table 10 lists the QA/QC sample types, initial frequency of collection, and ongoing frequency of collection.

Table 2.4: QA/QC Sampling Summary

QA/QC Sample Type	Initial Sampling Frequency	Ongoing Sampling Frequency	Naming Convention
FD	1 per event, rotating location	1 per event, rotating location	Tor-S30-mmddyyy-A
MS/MSD	1 every other sampling event, rotating location	1 every other sampling event, rotating location	Primary sample ID plus suffix -MS or -MSD

Table 2.4: QA/QC Sampling Summary			
QA/QC Sample Type	**Initial Sampling Frequency**	**Ongoing Sampling Frequency**	**Naming Convention**
EB	1 per decontamination method per event	1 per decontamination method per every 20 samples or at field staff change, decontamination method change, or sampling device change whichever is more frequent	Tor-S31-mmddyyy-A
TB	1 per cooler	1 per cooler	Temperature Blank

The following sections describe the purpose, collection method, sample naming conventions, and frequency of collection for QA/QC samples.

2.5.3.1 Field Duplicates

Collection of FD samples will be at the same time and place, and in sequential order from the primary sample. It shall be collected as soon as possible after the primary sample, and will be subjected to identical handling and analysis. The FD is a blind duplicate, and shall be identified with a fictitious sample ID (i.e. "Tor-S30-mmddyyy-A"), and assigned a time one hour prior to the first sample collection event of the day. A minimum of one (1) FD shall be collected each sampling day, and the location of the FD shall be rotated among the monitoring sites from one event to the next.

2.5.3.2 Matrix Spike/Matrix Spike Duplicates

Collection of MS/MSD samples is performed to allow the analytical laboratory to perform duplicate and spike analysis on the primary samples to evaluate accuracy, precision, and potential matrix interferences. MS/MSD samples consist of triple volume (3X) samples collected at the same time and place, and in sequential order from the primary sample. The MS/MSD shall be collected as soon as possible after the primary sample, and will be subjected to identical handling and analysis.

One set of sample bottles will be labeled with the standard primary sample ID. A second set of sample bottles will be labeled with the primary sample ID, followed by the suffix -MS. The third set of sample bottles will be labeled with the primary sample ID, followed by the suffix -MSD. All three sets of samples will be listed on the chain-of-custody document. The MRP does not specify a frequency for MS/MSD sample collection, but one (1) every other sampling event is proposed for the frequency of collection.

2.5.3.3 Equipment Blanks

Non-dedicated sampling equipment will be tested with equipment blanks (EBs) to evaluate the potential for cross-contamination associated with decontamination procedures. Prior to collecting an EB, decontaminate the sampling equipment using the procedure in *Section 4.5 Decontamination Procedures*. The EB will be collected by pouring laboratory grade reagent water into the sampling device, and then transferring it to the sample bottles. The EB is a blind sample, and shall be identified with a fictitious sample ID (i.e. "Tor-S31-mmddyyy-A). The EB shall be collected at the frequency of one (1) per sampling event for the first two (2) events; at a reduced frequency of one (1) per twenty (20) samples (5 percent) thereafter or one (1) per every change in field personnel, decontamination methodology, or change in sampling device - whichever is more frequent.

2.5.3.4 Temperature Blanks

Sample bottles containing tap water for use as temperature blanks (TBs) shall be provided by the analytical laboratory with each batch of sample bottles. The TBs are used to check for proper temperature of sample preservation by the receiving laboratory. The sampling team will include one TB per sample cooler, and label the bottle "Temperature Blank". The TB will not be listed on the chain-of-custody.

2.5.4 Field Corrective Action

Corrective action in the field may be needed when the sample network is changed (e.g., greater or fewer samples, sampling locations other than those specified in the MRP, etc.) or when sampling procedures and/or field analytical procedures require modification due to unexpected conditions. The field team, Field Technician, Project Manager, or QA Manager may identify the need for corrective action. The Project Manager in consultation with the QA Manager will approve the corrective measure. The Field Technician will ensure that the corrective measure is implemented in the field.

Corrective action resulting from internal field audits will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods. The QA Manager will identify deficiencies and recommend corrective action to the Project Manager. Implementation of corrective actions will be performed by the Field Technician. Corrective actions will be documented in the daily field logs or field logbook. Documentation will include:

- A description of the circumstances that initiated the corrective action;
- The action taken in response;
- The final resolution; and
- Any necessary approvals.

2.6 Instrument Testing, Inspection, and Maintenance

Samples collected for Toxics TMDL monitoring will be analyzed for field parameters as described in Section 2.4.2 of the QAPP. Instrumentation used for monitoring will be subject to routine testing, inspection, and maintenance in accordance with standard operating procedures and manufacturer protocols.

2.7 Instrument Calibration and Frequency

Calibration of field monitoring instrumentation will be performed in the field prior to collection of field measurements on at least a monthly basis. Routine manufacturer calibration of the instrumentation will also be performed as necessary.

2.8 Non-Direct Measurements

Non-direct data, including those produced by a calculation involving multiple direct measurements, historical reports, maps, literature searches, and previously collected analytical data, will be reviewed prior to use to determine its acceptability based on the end use of the data. In particular, procedures will be implemented to verify that calculations performed using direct measurements are consistent and that results are transcribed correctly. These procedures will include the use of repeatable processes to perform calculations and verification of those processes and calculations by the Project Manager.

2.9 Data Management

Data management operations include data recording, validation, transformation, transmittal, reduction, analysis, tracking, storage, and retrieval. Monitoring activities will be documented in plans and reports, which in turn will be supported by field documents (e.g., daily field logs, field logbooks, standardized forms, etc.), laboratory analytical reports, and other related documents.

Laboratory documentation requirements are delineated in the laboratory contracts and include specifications for data report composition, report format, turn-around time, and records retention. Laboratory data are recorded in a format that includes sample identification, analysis date, parameter values, detection limits, and uncertainties.

As analytical data are received, a variety of QC checks are performed to ensure data integrity. These checks include:

- Audits to ensure that laboratories have reported all requested analyses;
- Checks that all analytes are consistently and correctly identified;
- Reviews to ensure that units of measurement are provided and are consistent; and

- Reports to review sample information (dates, locations);

A separate database will be maintained by the Database Manager on a secure network drive that is backed up regularly. Verification and validation of analytical results will be performed in accordance with the procedures described in Section 4.1.

3.0 ASSESSMENT AND OVERSIGHT

Prior to beginning of field work, all members of the team will review the QAPP, the MRP, the Health and Safety Plan (HASP), and any other governing documents. The Project Manager will promptly distribute any updates or addenda to the entire project team. The Field Technician will assemble necessary field supplies including field logs, field forms, copies of the MRP and HASP, field instruments and calibration equipment, COC forms and seals, sample coolers, and any other equipment or materials needed for field work. The Field Technician will contact the analytical laboratory in advance to schedule analyses and arrange for shipping and delivery of samples to and from the laboratory.

3.1 Assessments and Response Actions

3.1.1 Data Assessments

Assessments include technical audits of field and laboratory activities, data packages, and data validation procedures conducted to ensure that the QAPP is being implemented as approved. Assessments are to be conducted throughout the extent of work performed under the MRP to identify potential problems early and provide timely corrective action.

Field Activity Review – The Project Manager will oversee work performed under the MRP to ensure that field work is performed in accordance with the approved QAPP and the MRP, including sampling activities, documentation of accuracy, completeness and consistency, packaging and shipping of samples to the laboratory, and field instrument monitoring and calibration. The Project Manager will communicate as necessary with the QA Manager regarding field activities and any changes or correction that will be implemented. During and following any field work, the Project Manager will review field documents and field measurements for accuracy and completeness and will periodically provide the information to the QA Manager for additional review.

The QA Manager may periodically audit field activities to evaluate adherence to specified methods for sample collection, documentation, packaging, and other field activities. If conducted, the QA Manager will prepare an audit report for the Project Manager that summarizes the audit findings, identifies deficiencies, and recommends corrective action. The Project Manager is responsible for ensuring that corrective measures are implemented and documented, as necessary.

Laboratory Audit – The purpose of the laboratory audit is to evaluate the laboratory's ability to perform the required analyses. No laboratory audit specific to this QAPP is proposed, however, laboratory audits may be conducted at the discretion of the Program Manager. The laboratory audit typically includes a review of the following areas:

- QA organization and procedures;
- Personnel training and qualifications;
- Sample log-in procedures;
- Samples storage facilities;
- Analyst technique;
- Adherence to the laboratory SOP and project QAPP;
- Compliance with QA/QC objectives;
- Instrument calibration and maintenance;
- Data recording, reduction, review, and reporting; and
- Cleanliness and housekeeping.

If conducted, preliminary results of the laboratory audit will be discussed with the Laboratory Manager. A written report that summarizes audit findings and recommends corrective actions will be prepared and submitted to the Laboratory Manager for response. The final report, including the laboratory's response, will be distributed to the Project Manager and the City Engineering Manager.

Data Package Audits – Audits of analytical data packages will be conducted for 100 percent of the packages received as part of the data validation process (Section 4.1). The review will include an evaluation of the package to ensure that all required deliverables are provided and the package contains the information necessary to reproduce the reported results. Any deficiencies will be communicated to the laboratory and documented in the data validation reports.

Data Validation Audits – Each analytical data package will be validated as described in Section 4.1.3. As part of the validation process, a review of each completed validation package will be conducted by a validator other than the one performing the validation. The review will verify that the analytical deliverable package was complete and that any missing information requested from the laboratory was supplied, that validation worksheets were filled out accurately and completely, that validation actions were consistent with the validation guidelines established for this program and/or best professional judgment, and that the validation reports and data qualifiers accurately reflect the validation actions as documented on the worksheets.

3.1.2 Response Actions

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out-of-control QC performance that can affect data quality. Corrective actions can be related to field activities, laboratory analyses, data validation, and data assessment. Field and laboratory correction actions are described in

Section 2.5 of this QAPP. The need for corrective action may also be identified during data verification or assessment. Potential types of corrective action may include higher level data validation, reanalysis of samples by the laboratory, or re-sampling by the field team. These actions are dependent upon the ability to mobilize the field team and whether or not the data to be collected are necessary to meet the required QA objectives.

3.2 Reports to Management

QA reports will be submitted to the Project Manager to ensure that any problems identified during the measurement, sampling and analysis programs are investigated and the proper corrective measures taken in response. The QA reports will include:

- All results of field and laboratory audits;
- Problems noted during data validation and assessment; and
- Significant QA/QC problems, recommended corrective actions, and the outcome of corrective actions.

QA reports will be prepared by the QA Manager and submitted on an as-needed basis.

4.0 DATA VERIFICATION, VALIDATION, AND USABILITY

The scope and content of verification and validation tasks that will be conducted on laboratory analytical data are described below and at a minimum include the USEPA's recommended Stage 2A verification and validation checks (USEPA; 2002b, 2009).

4.1 Data Review, Verification, and Validation

4.1.1 Field Data

Field records will be reviewed by the Field Technician or Project Manager to ensure that the records are complete, accurate, and legible, and to verify that the measurement and sample collection procedures are in accordance with the protocols specified in the MRP and this QAPP. This includes ensuring that:

- Daily field logs and field logbooks and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed;
- Records are in accordance with good recordkeeping practices (e.g., entries are signed and dated, data are not obliterated, changes are initialed, dated, and explained, etc.); and
- Sample collection, handling, and storage procedures were conducted in accordance with the protocols described in the MRP and QAPP, and that any deviations were documented and approved by the appropriate personnel.

4.1.2 Internal Laboratory Review

Prior to the release of any data from the laboratory as final, laboratory data will proceed through a tiered review process. The first two levels of review will be performed by laboratory personnel. Initially review will be performed by the laboratory analyst performing the work to verify that work was done correctly. Following the completion of the initial verification by the analyst, a systematic check of the data will be performed by an experienced peer or supervisor. This check will be performed to ensure that initial review has been completed correctly and thoroughly, and typically includes a review to ensure accuracy of calculations, acceptability of QC data, and correct interpretation of any chromatograms, mass spectra, etc., as applicable. Unresolved problems should be discussed with the QA Manager and described in the report narrative.

A third-level review will be performed before results are published. This review serves to verify the completeness of the data report and to ensure that the DQOs are met for the analyses performed.

4.1.3 Data Verification and Validation

Verification and validation of the laboratory deliverables will be performed by the QA Manager or another qualified party independent of the laboratory. Verification and validation will be performed on 100 percent of the data. Data verification is the process of evaluating the correctness, conformance, compliance, and completeness of a specific data set against method, procedural, or contractual requirements. Data validation is an analyte- and sample-specific process that evaluates the information after the verification process to determine analytical quality and any limitations.

4.2 Verification and Validation Methods

4.2.1 Verification

Data verification will be performed by the QA Manager or designated representative. Verification will include field data and laboratory verification. Field data verification is discussed in Section 4.1.1 of this QAPP. Laboratory data verification includes review of Microsoft Excel files submitted by the laboratory and review of hardcopy data packages. Data verification will include, but is not limited to, reviewing the following:

- Completeness of the deliverable, including the case narrative, COC documentation, and sample condition upon receipt;
- Sample documentation, including dates and times;
- Analytical methods, dates, and units;
- Sample preservation, if applicable; and
- Laboratory qualifiers.

4.2.2 Validation

Data validation will be performed by the QA Manager or designated representative. Data validation includes further review and checks for compliance of:

- Laboratory method and equipment blank contamination;
- Holding times;
- Matrix spike/matrix spike duplicates (MS/MSDs);
- Reporting limits;
- Method blanks;
- QC sample frequencies as stipulated in this QAPP; and
- Initial and continuing calibrations.

4.3 Reconciliation with User Requirements

4.3.1 Comparison to Measurement Objectives

The field and laboratory data collected during this project will be used to achieve the objectives identified in Section 1.6.1 of this QAPP. The QC results associated with each analytical parameter for each matrix will be compared to the measurement objectives as defined in Section 1.6.2. Only data generated in association with QC results meeting the stated acceptance criteria will be considered usable for decision-making purposes. The primary goal is to ensure that the data reported will be representative of the measured conditions at a particular point in time and can be compared to the Nutrient and Toxics TMDLs.

4.3.1.1 Precision Assessment

The RPD between the primary sample and field duplicate, and the laboratory MS/MSD pair, is calculated to compare to the precision objective. The RPD will be calculated according to the following formula:

$$RPD = \frac{(Amount\ in\ Sample\ 1 - Amount\ in\ Sample\ 2)}{0.5\,(Amount\ in\ Sample\ 1 + Amount\ in\ Sample\ 2)}\,x\,100$$

Failure to achieve precision objectives may result in the qualification of the associated data and limitations placed upon their use. The objectives for field precision is ≤50% RPD the ambient air samples. The precision control objectives for laboratory analyses of replicates will be specified by the laboratory at the time of analyses.

4.3.1.2 Accuracy Assessment

One measure of accuracy will be the percent recovery (%R) for a MS sample according to the following equation:

$$\%R = \frac{MeasuredValueOfSpikedSample - MeasureValueOfSample}{Known\ Amount\ Added}\,x\,100$$

The percent recovery objective for laboratory analyses of a MS sample will be specified by the laboratory at the time of analyses. Blank samples are also used to assess accuracy. The blanks associated with sampling events include laboratory method blanks and equipment blanks. The results of the laboratory and equipment blanks will be compared to an accuracy objective. Failure to meet the objectives may indicate a systematic laboratory or field problem that should be investigated and resolved immediately. Associated data may be qualified and limitations placed on their use, depending on the magnitude of the problem.

4.3.1.3 Completeness Assessment

Completeness is the ratio of the number of valid sample results to the total number of samples analyzed with a specific matrix and/or analysis. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$Completeness = \frac{(number\ of\ valid\ measurements)}{(number\ of\ measurements\ planned)} x100$$

Failure to meet the completeness objective will require an assessment to determine if the missing or invalid data are critical to achieving the project objectives and/or if corrective actions are warranted. The completeness objective for valid samples is 90%.

4.3.2 Comparison to Project Objectives

The data obtained will be both qualitatively and quantitatively assessed. Factors to be considered in this assessment of field, monitoring, and laboratory data include but are not necessarily limited to the following:

- Conformance to the field methodologies and procedures proposed in the QAPP;
- Conformance to the analytical methodologies provided in the QAPP;
- Adherence to proposed sampling strategy;
- Presence of elevated detection limits due to matrix interferences or contaminants present at high concentrations;
- Effect of qualifiers applied as a result of data verification or validation on the ability to implement the project decision rules; and
- Status of all issues requiring corrective action.

The effect of non-conformance (procedures or requirements) or non-compliant data will be evaluated. Minor deviations from approved field and laboratory procedures and sampling approach will likely not affect the adequacy of the data as a whole in meeting the DQOs. Any instances of extreme bias will be evaluated on a case-by-case basis to determine the limitations, if any, of the data usability. Missing or rejected data will be reviewed to determine if the data are critical to attaining the objectives.

4.3.3 Data Qualifier Flags

The data qualification scheme is the basis for determining if sample results should be qualified, but the reviewer's judgment is also critical in determining if data quality and usability have been systematically influenced and if data points require qualification. The staff performing the assessment must understand the analytical procedures being reviewed, understand how the data will be used, and be an experienced chemist. If QC results are unacceptable, the data will be qualified using the analysis flags identified by the laboratory.

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City of Torrance, California

MACHADO LAKE NUTRIENT TOTAL MAXIMUM DAILY LOAD

SPECIAL STUDY WORK PLAN

May 18, 2011

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City of Torrance, California

MACHADO LAKE
NUTRIENT TOTAL MAXIMUM DAILY LOAD

SPECIAL STUDY WORK PLAN

May 18, 2011

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SPECIAL STUDY WORK PLAN

1.0 INTRODUCTION

This Field Sampling Plan (FSP) presents the approach and procedures to implement stormwater sampling activities in 2011 for a Special Study of the City of Torrance (City) storm drains discharging stormwater into Machado Lake. The field study sampling procedures, methods, and analyses for stormwater are described in this document.

1.1 Background

The City is subject to the requirements of the Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) Total Maximum Daily Load (TMDL) per the Los Angeles Regional Quality Control Board's (Regional Board's) Resolution R08-006. Under the Regional Board's resolution, the City shall submit to the Regional Board's Executive Officer a Monitoring and Reporting Plan (MRP) within 1 year of the effective date of the resolution or propose a Special Study Work Plan following the requirements of one of three optional studies. This Special Study Work Plan details the approach proposed by the City to perform Optional Study No. 3, to assess compliance with the Waste Load Allocations (WLA) on a mass basis for total nitrogen and total phosphorus originating from the City's watersheds. The Special Study Work Plan proposes a pre-Best Management Practices (BMP) Implementation Study including field sampling and data collection to be followed by submittals to the Regional Board including a BMP Evaluation and Selection Report, a MRP, and a BMP Implementation Report to be provided at a later date.

Machado Lake is identified on the 1998 and 2002 Clean Water Act 300(d) list of impaired water bodies as impaired due to eutrophic conditions, algae, ammonia, and odors. Resource agencies, local governments, project implementers, the scientific community, environmental groups, decision-makers at the city, county, state, and federal levels, and many others have continued to take meaningful steps towards the restoration of Machado Lake and its basin. Among these efforts, restoration activities are expanding through continued implementation of erosion control, stormwater management, and riparian restoration projects, development of the Machado Lake Nutrient TMDL that is providing a quantitative, science-based approach for pollutant reduction, and a strong research/monitoring effort to evaluate key ecological processes and response to water quality improvement projects.

The Machado Lake Nutrient TMDL allows for the establishment of annual mass-based WLAs for total phosphorus (TP) and total nitrogen (TN) equivalent to monthly average concentrations of 0.1 mg/L TP and 1.0 mg/L TN, based on approved flow conditions. When the concentration based WLAs are met under the approved flow condition of 8.45 hm3, the annual mass of the TP discharged to the lake will be 845 kg and the annual mass of TN discharged to the lake will be 8,450 kg. The City of Torrance mass-based WLA will be proportional to the City owned area in the sub-watershed. The City of Torrance area accounts for 35.6% of the Machado Lake Watershed. Table 1 lists the interim and final WLAs based on this area.

Table 1 Waste Load Allocations

Responsible Party	Years after TMDL Effective Date	TP (kg)	TN (kg)
City of Torrance	5	3,760	7,370
	9.5 (final WLAs)	301	3,008

1.2 Site Conditions and Characteristics

1.2.1 Study Site Location

The City is located about 15 miles south of Downtown Los Angeles (LA), in southern LA County, just north of the Palos Verdes Hills. The City was incorporated on May 12, 1921, and is just over 20.5 square miles in area. The City is bounded by Redondo Beach on the west and north, Lawndale and Gardena on the north, LA on the east, Lomita to the southeast, and Rolling Hills Estates and Palos Verdes Estates on the south. The City is also bounded by approximately 4,000 feet of Santa Monica Bay coastline. The City's storm conveyance systems are interconnected with neighboring city systems. Neighboring cities located at generally higher elevation such as Rolling Hills Estate and Palos Verde Estate discharge stormwater into the City's and/or LA County's storm conveyance systems located within the City's boundaries. Figure 1 shows a regional location map of the City.

1.2.2 Hydrology and Hydraulics

The Machado Lake subwatershed is located in the southwestern area of the Dominguez Watershed and includes portions of the Cities of Los Angeles, Torrance, Lomita, Rolling Hills, Rolling Hills Estates, Carson, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, and the communities of unincorporated Los Angeles County, including Wilmington and Harbor City. However, much of the Machado Lake watershed consists of the hilly regions of Rolling Hills Estates and Rolling Hills. This portion of the watershed is unique, as it consists of relatively steep hills with drainage into the canyons. The Machado Lake Watershed covers an area of approximately 20 square miles and is itself divided into six primary subdrainage areas. These subdrainages are the Walteria Lake, Project 77/510, Wilmington Drain, Project 643 (72-inch Storm Drain), Project 643 (Figueroa Drain), and Private Drain 553.

Machado Lake, about 40 acres in area and the Machado Lake Wetlands (64 acres) are located within the Ken Malloy Harbor Regional Park in the southeastern corner of the Machado Lake Watershed. Both Machado Lake and the Machado Lake wetlands serve as flood retention basins for the Machado Lake Watershed.

1.2.2.1 Storm Drain

As the area is highly urbanized, drainage is primarily conducted through an extensive network of underground storm drain facilities. The Los Angeles County Department of Public Works maintains the system of storm drains in the City of Rolling Hills Estates. The primary use of the Dominguez Channel and all other open channels in the Dominguez Watershed (including Wilmington Drain, Machado Lake, and Madrona Marsh) is flood protection.

Machado Lake receives urban and storm water runoff from a complex network of storm drain systems. The first of three primary storm drain channels that flow into Machado Lake is the Wilmington Drain. Approximately 65 percent of the runoff from the Machado Lake Watershed flows through the Wilmington Drain into Machado Lake. The other two primary storm drain channels are the Project No. 77 Drain and the Harbor City Relief Drain. Several smaller storm drains also discharges into Machado Lake, including Project No. 643’s Figueroa Street Outlet and a 72-inch storm drain outlet. Machado Lake discharges at the southern end by overflowing a concrete dam into the Machado Lake wetland. Water discharges from the wetland through the Harbor Outflow structure and into the West Basin of the Los Angeles Harbor.

The Walteria Lake, located within the City’s boundaries, is owned and operated by LA County. It is approximately 1,005 acre-feet in capacity and receives raw stormwater mainly from Rolling Hills Estates and Palos Verdes Estates. Effluent from the lake is pumped at a maximum rate of 57 cubic feet per second (cfs) through a force main system into a 54-inch drain line that lies under Skypark Drive. The discharge eventually leaves the City near the intersection of Crenshaw Boulevard and Amsler Street.

Figure 2 shows the drainage basins and stormwater conveyance infrastructure in the City. The figure also shows nearby communities discharging stormwater into the City’s drainage system.

1.2.3 Land Use

The City of Torrance is predominantly residential land use, with concentrations of industrial and commercial uses. This reflects the City’s history as a “company town,” where homes were built to house the local work force of industries. Residential development covered almost half of the City’s land area. Industrial uses occupied the second largest land area, at 22 percent. Commercial and Public/Quasi-Public/Open Space uses represent the third largest land uses in the City, about 12 percent each. Torrance also had a limited supply of vacant land mostly within commercial and industrial areas. Given the built-out character of the community, only minor land use changes from baseline year 2010 conditions will occur over the long term.

Residential uses are located throughout Torrance at varying development densities. The highest residential densities occur along major streets and near major transportation corridors, in older neighborhoods, and in apartment or condominium developments and Planned Development communities around Sepulveda Boulevard and Plaza Del Amo between Hawthorne and Crenshaw Boulevards. The lowest residential densities are largely located in the western and southern portions of the City. Figure 3 identifies the land uses in Torrance.

1.2.4 Water Quality Issues

Machado Lake, located in the Dominguez Channel watershed in southern LA County, is identified on the 1998 and 2002 Clean Water Act 303(d) list of impaired water bodies as impaired due to eutrophic conditions, algae, ammonia, and odors. The Machado Lake eutrophic, algae, and odor impairments are caused by excessive loading of nutrients, including nitrogen and phosphorus, to Machado Lake (Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) TMDL, Revised Draft – April 2008). Ammonia is found to be at levels below the toxicity standards, but nevertheless, these concentrations contribute to the total nitrogen loading in the Lake. Table 2 provides a summary of the quantifiable loads entering Machado Lake on an annual basis (Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) TMDL, Revised Draft – April 2008). Nutrient flux from the sediments and atmospheric nitrogen deposition are the two directly quantifiable non-point sources included as part of the total nutrient load. The total annual nitrogen and phosphorus loads are estimated to be 24,327 kg and 10,421 kg, respectively.

Machado Lake is located in the Ken Malloy Harbor Regional Park (KMHRP), which is a 231 acres LA City Park serving the Wilmington and Harbor City areas. As shown on Figure 4, the park is located west of the Harbor freeway (110) and east of Vermont Avenue between the Tosco Refinery on the south and the Pacific Coast Highway on the North. Machado Lake is one of the last lake and wetland systems in LA; the area is approximately 103.5 acres in total size. The upper portion, which includes the open water area, is approximately 40 acres and the lower wetland portion is about 63.5 acres. Machado Lake is a shallow polymictic lake; the depth is generally 0.5 to 1.5 meters; the *average* depth is approximately 1.0 meter. The lake was originally developed as part of Harbor Regional Park in 1971 and intended for boating and fishing. Over the years water quality generally declined; boating was stopped and signs were posted warning of the risk of eating fish from the lake.

Table 2 Total Annual Nutrient Load Entering Machado Lake[1]

Source	Total N (kg)	Total P (kg)	Ortho-P (kg)	Inorg-N (kg)
External Load	7,587	3,260	737	3,736
Sediment Flux	16,520	7,161	4,963	16,520
Atmospheric Deposition	220			
Total Annual Load	**24,327**	**10,421**	**5,700**	**20,256**

Notes:
1. Source: Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) TMDL, Revised Draft - April 2008.

The dominant land use in the Machado Lake Watershed is high-density single-family residential, accounting for approximately 45 percent of the land use. Industrial, vacant, retail/commercial, multi-family residential, transportation, and educational institutions each account for 5 to 7 percent of the land use, while "all other" accounts for the remaining 23 percent. Machado Lake is a receiving body of urban and stormwater runoff from a network of storm drains throughout the watershed. As indicated on Figure 4, there are three discharge points into Machado Lake from the following storm drain channels:

- Wilmington Drain.
- Project No. 77.
- Harbor City Relief Drain.

Approximately 88 percent of the Machado Lake Watershed drainage area flows through the Wilmington Drain into Machado Lake.

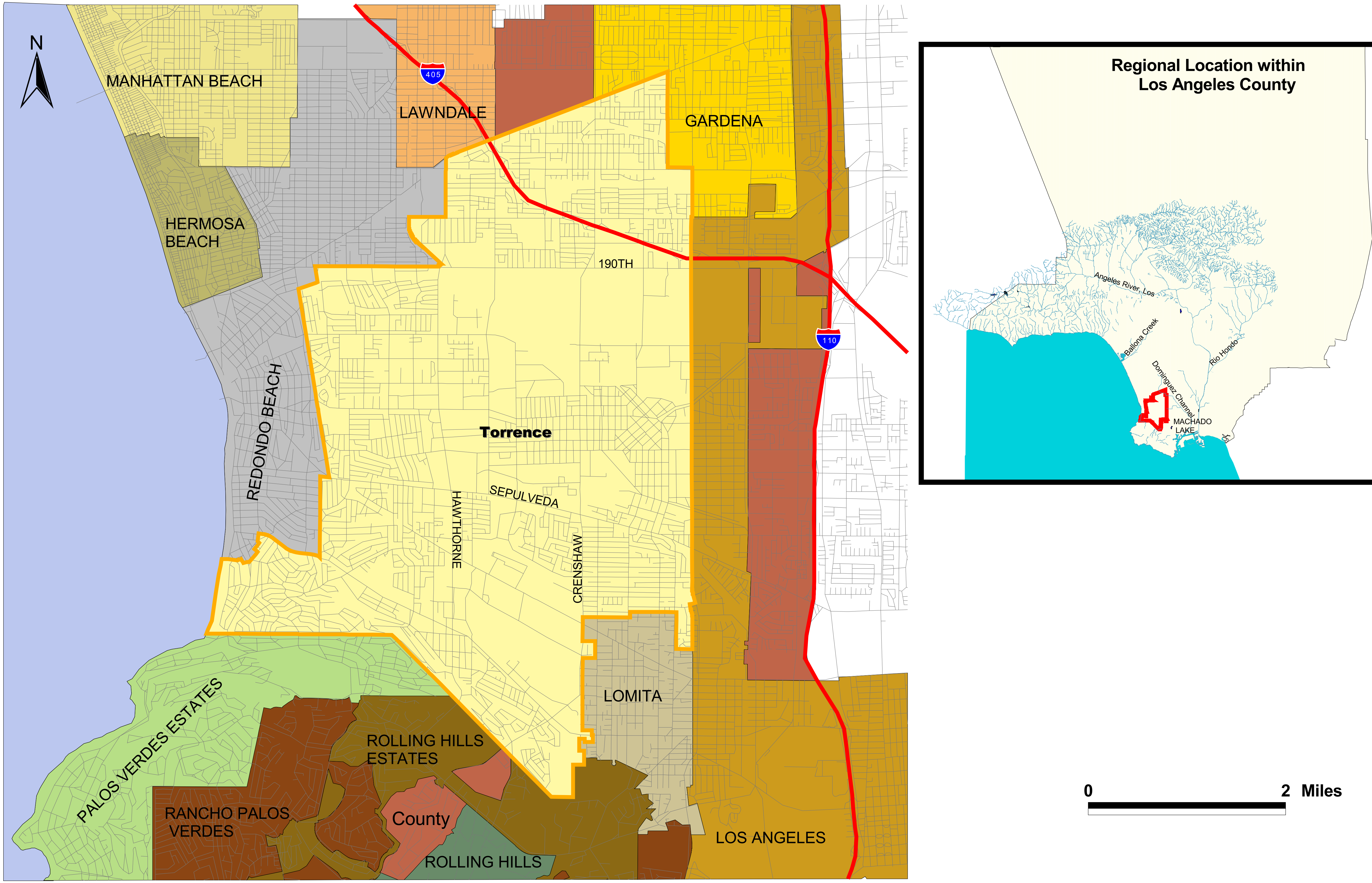


Figure 1 Regional Map of Torrance

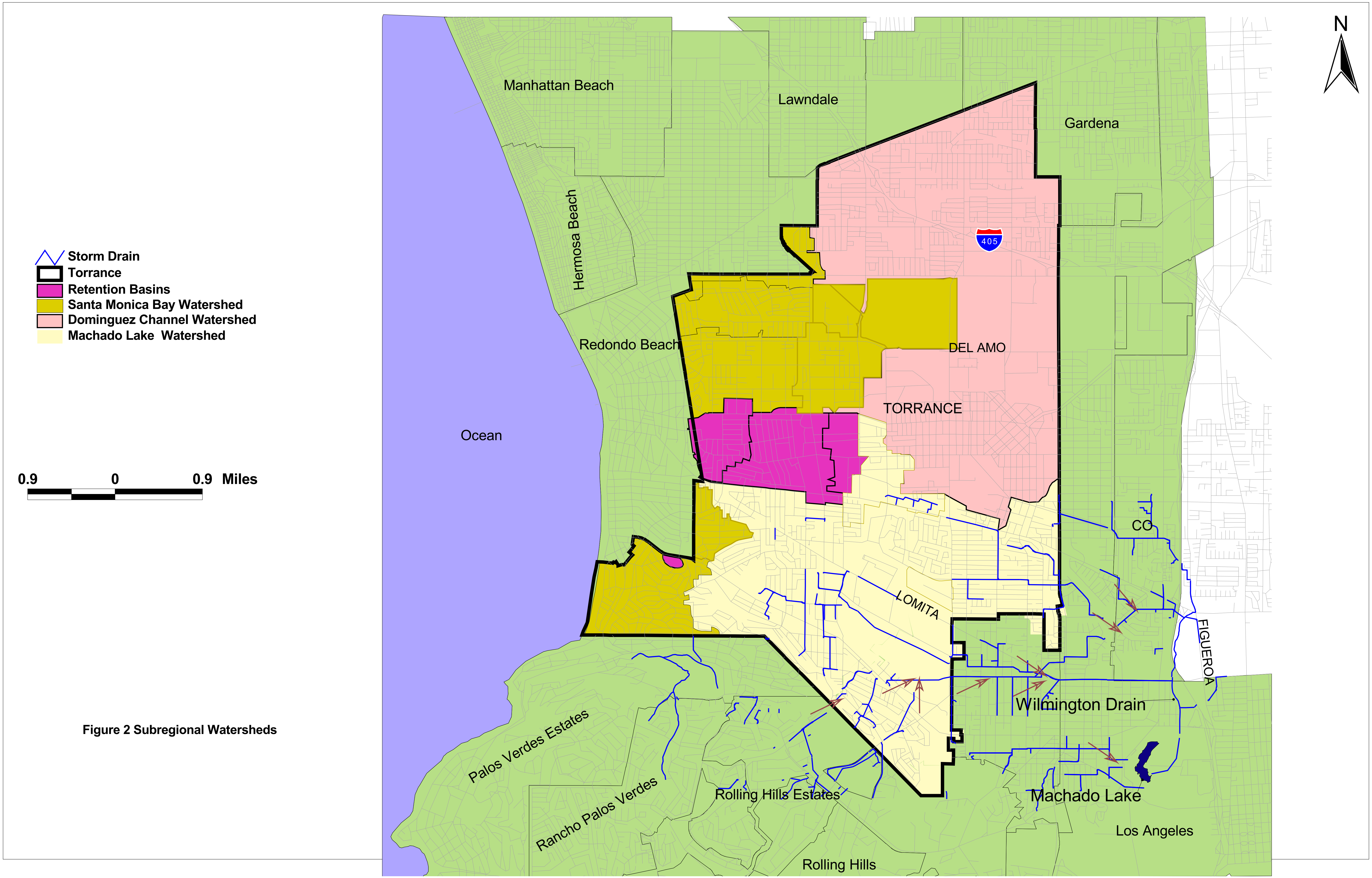


Figure 2 Subregional Watersheds

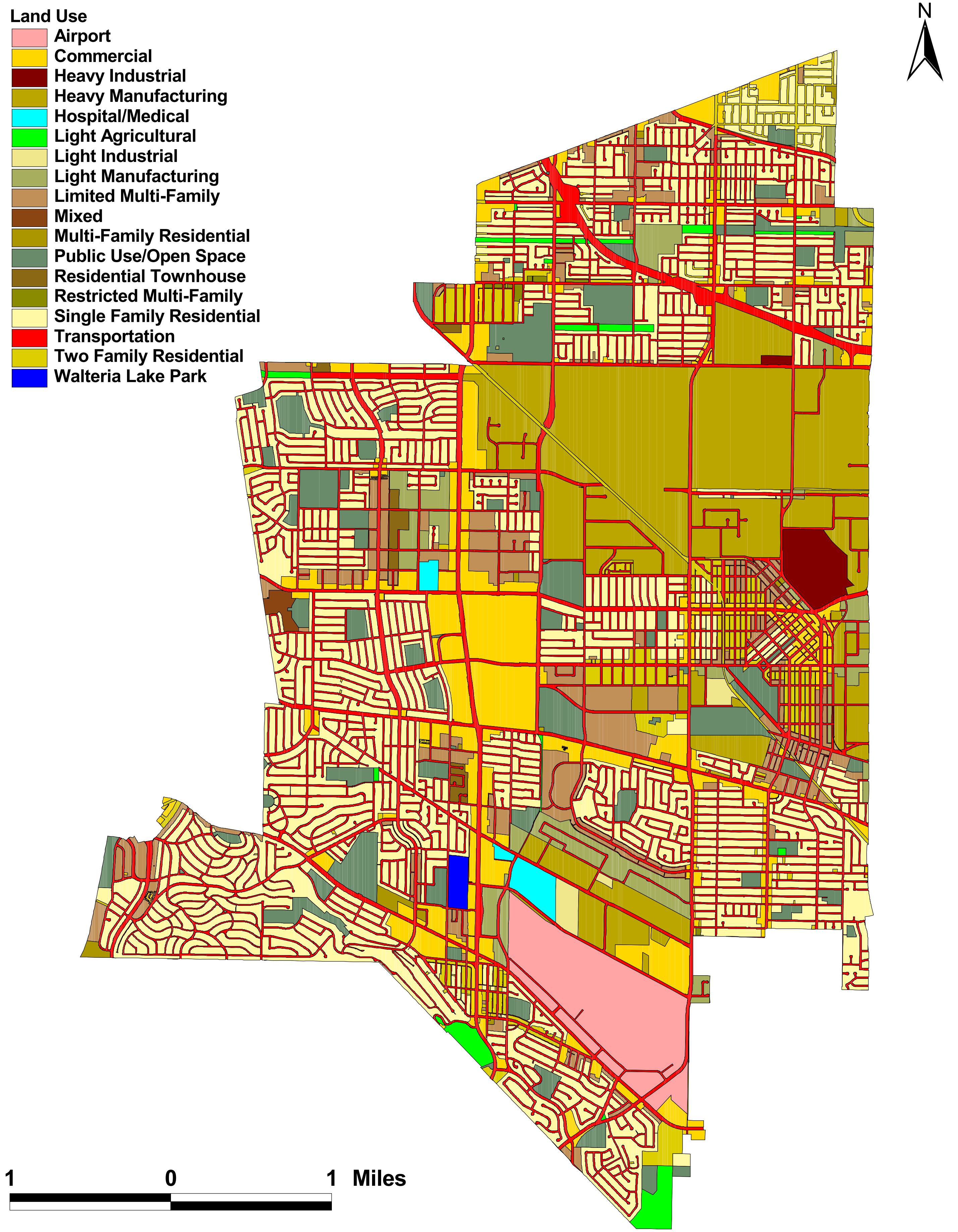


Figure 3 Existing Land Use of Torrance

Figure 4 2007 Satellite Imagery of Machado Lake and Ken Malloy Harbor Park Overview

1.3 Special Study Work Plan

This document provides the overall structure of the Special Study Work Plan with submittals to the Regional Board, as well as providing the initial Pre-BMP Implementation Study Plan (including a proposed field data collection and sampling plan). The Special Study Work Plan addresses the requirements of Optional Study No. 3 to assess compliance with WLAs for total nitrogen and total phosphorus originating from the City's watersheds. The scope of work for this plan includes the following:

- Pre-BMP Implementation Study Period - Including conducting dry weather sampling as outlined within this submittal as well as reviewing water quality models developed by LA County for wet weather events and Machado Lake.
- BMP Evaluation and Selection Study Report - This study report is to be submitted at a later date (see proposed schedule of work plan elements), and will summarize the collected field data and the applicable results obtained from the regional water quality model being developed by LA County for wet weather conditions. The field data and the water quality model data will be used to assess compliance with WLAs under the TMDL. Based on the assessment of compliance, the BMP and Selection Study Report will identify and screen structural BMPs for mitigation to bring the City into compliance with the TMDL.
- Monitoring and Reporting Plan - Subsequent to acceptance by the Regional Board of the findings and conclusions of the City's BMP Evaluation and Selection Study Report, the City will submit an MRP specific to the needs for assessment of future compliance with the TMDL.
- BMP Implementation Report - This report will summarize the monitoring data collected after 12 months of BMP implementation and will provide to the Regional Board an assessment of the success of the structural BMPs implemented by the City to support compliance with the TMDL.

The actual start date for the sampling will be determined following the Regional Board's approval of this Special Study Work Plan. Other conditions that may affect the sampling schedule are weather and equipment conditions and availability. The schedule for the work plan is summarized in Table 3.

The Special Study Work Plan identifies the proposed tasks the City agrees to perform, their timelines, and the roles and responsibilities of various parties in completing the work. The purpose of this document is to serve as a starting point for work planning discussions between the City and the Regional Board.

Table 3 Schedule or Work Plan Elements

ID	Work Plan Element	Schedule
1	Special Study Work Plan	May, 2011 (submittal)
2	Regional Board Review/Approval	June, 2011 (approval)
3	Pre-BMP Implementation Study	July, 2011 – July, 2012 (field sampling)
4	BMP Evaluation, Monitoring and Reporting Plan	September, 2011 (submittal)
5	Regional Review/Approval	August, 2012 (approval)
6	BMP Implementation	Nov., 2012 (implementation)
7	BMP Implementation Report	Nov., 2013 (submittal)

2.0 PRE-BMP IMPLEMENTATION STUDY

2.1 Introduction

The Pre-BMP Implementation Study includes a 12-month FSP and evaluation of regional water quality models for wet weather conditions and Machado Lake to assess the City's current compliance with WLAs. The FSP covers sample collection methods, analytical procedures, data analysis and reporting, and health and safety aspects. The FSP will generate a variety of data including discharge rates and flow volumes, the concentrations of chemical parameters, and the measurement of physical parameters. Utilizing the mass balance approach, the data will be used to estimate the mass of nutrients originating from the City as well as nearby agencies discharging stormwater into the City's storm drain system. The data will also be examined for patterns and trends, comparing stormwater quality between different sampling locations over time.

The Pre-BMP Implementation Study will be undertaken once approval is obtained from the Regional Board for the Special Study Work Plan.

The remaining sections of this document contain the FSP providing field sampling methods and analytical procedures that will be used to collect dry weather water quality data and continuous flow data.

2.2 Objectives of the Pre-BMP Implementation Study

The Pre-BMP Implementation Study will provide the City data needed to assess water quality impacts to the City's drainage network. The objective of this study is to support the City's compliance with the Machado Lake Nutrient TMDL by performing Special Study No. 3. Data and information elements that are part of the Pre-BMP Implementation Study include:

1. Dry weather flow data including calculation of continuous volume data and water quality data obtained through field monitoring and sampling (data to be collected by implementing the FSP included within this document).

2. Estimates of wet weather stormwater quality impacts identified using an integrated water quality model developed by the City of Torrance. The water quality model is described in Section 2.2.1.
3. Identification of BMPs that will be implemented by the City to mitigate observed water quality impacts in the City's outflows to Machado Lake.

2.2.1 Pollutant Loading and Analysis Tool (PLAT)

In order to estimate wet weather stormwater quality impacts, the City has developed an integrated watershed modeling tool to simulate watershed hydrology, nutrient, sediment, and contaminant dynamics. This tool called Pollutant Loading and Analysis Tool (PLAT), incorporates existing and commonly used watershed models. The main models used by PLAT are PLOAD, Program for Predicting Polluting Particle Passage thru Pits, Puddles, and Ponds (P8), and U.S EPA SUSTAIN model. PLAT is based on spatially distributed inputs derived from high resolution satellite imagery. PLAT has four main components: pollutant hot-spots characterization, BMP screening, continuous simulation, and BMP design, optimization, and placement. The SUSTAIN model provides an optimization routine that helps identify the appropriate size of BMPs for treating stormwater runoff from respective source areas to meet TMDL reduction goals. The tool has been validated with results from the LA County Watershed Management Model System (WMMS).

3.0 FIELD SAMPLING PLAN

The 12-month FSP is designed to collect continuous flow data and discrete dry weather water quality data to support the overall study objectives summarized in Section 2.

3.1 Sampling Locations and Access

Site selection is a major challenge, given the scarcity of funding for sampling and laboratory analysis. The number of locations to be sampled was decided based on the program objectives, regulatory requirements, and the size and complexity of the drainage sub-basins and conveyance system. In addition, the frequency of sampling at each location was considered.

As a first step in the selection process, the City's watersheds, sub-basins and drainage system network were reviewed. Based on this review, nine locations were identified that could be used to characterize the flows in and out of each subbasin. Four of these locations are needed at a minimum to characterize the flows conveyed to Machado Lake. The final selection of sample locations was based on factors such as site permission, access, clustering, personal safety, equipment safety, and the likelihood that stormwater would flow at the location. Table 4 summarizes the proposed stormwater sampling locations, types, and characteristics. The general sampling locations are depicted on Figure 5. Appendix A shows detailed characteristics of each sampling location.

At a minimum, four sampling locations will meet the objectives of this program. However, the City will sample five additional locations, Tor-S3, Tor-S6, Tor-S7, Tor-S8, and Tor-S9 as shown on Figure 4 because the results will support critical decisions including identifying sources originating outside of the City's boundaries or sources not under the direct control of the City. The sampling locations Tor-S6, Tor-S7, Tor-S8, and Tor-S9 are discharge points for Rolling Hills and Palos Verdes Estates.

The sampling locations are described below.

<u>Tor-S1</u>

This site is located 40 ft north and 80 ft east of the intersection of Plaza Del Amo and Western Avenue. The total upstream drainage area is approximately 63 acres. The drainage area is mainly residential and commercial land use. Residential and commercial land uses represent 36 percent and 33 percent, respectively, of the drainage area. This site is easily accessible and safe for conducting sampling during both dry and wet weather conditions. The storm sewer conveying stormwater to this site is a 36-inch reinforced concrete pipe. This site is one of the four sites that will provide information on the amount of pollutants leaving the City limits.

Sampling Site: TOR-S1

Table 4 Sampling Location Characteristics

Sampling Location Name	Description	Land Use	GPS Coordinates	Associated Upstream Storm Drain Name	Diameter (in) and Material
Tor-S1	Located 40 ft north and 80 ft east of the intersection of Plaza Del Amo and Western Avenue. .	Residential/ commercial	33° 49.3572' 118° 18.5208'	City	36 RCP
Tor-S2	Approximately 50 ft west of 246th Place and Pennsylvania Avenue intersection.	Mixed	33°48.093' 118° 19.5252'	City	33 RCP
Tor-S3	Effluent of Walteria Lake, approximately 100 ft east of Madison St. and Skypark Drive intersection.	Mixed	33°48.6312 118° 20.8674'	Walteria Lake	54
Tor-S4	Approximately 210 ft north and 85 ft east of 236th Street and Western Avenue intersection.	Mostly residential	33° 48.7056' 118° 18.5196'	City	9'-2"Wx11'H RCB
Tor-S5	About 25 ft west of intersection of Bani Avenue and 250th Street (two pipes intersect from south and west).	Residential/ Airport	33° 47.8956' 118° 19.6872'	City	8'-9"Wx9'-7"H RCB
Tor-S6	Approximately 600 ft east of Estates Lane and Crenshaw Boulevard.	Mostly residential	33° 47.1822' 118° 20.43'	Rolling Hills Estates	36 RCP
Tor-S7	About 160 ft south and 280 ft east of Rolling Hills Road and Hawthorne Blvd. intersection. Will monitor dry weather flow originating from Rolling Hills Estates.	Mostly residential	33° 47.6826 118° 20.9232'	Rolling Hills Estates	10'x10' RCB
Tor-S8	About 500 ft northwest of Paseo De Las Tortugas and Mesa St. intersection. Will monitor dry weather flow originating from Rolling Hills Estates.	Mostly residential	33° 48.0522' 118° 21.4254'	Rolling Hills Estates	24 RCP
Tor-S9	About 830 ft east and 120 ft south of Paseo de las Tortugas and Vista Montana intersection. Will monitor dry weather flow originating from Palos Verdes Estates.	Mostly residential	33° 48.2742' 118° 21.7776'	Palos Verdes Estates	42 RCP

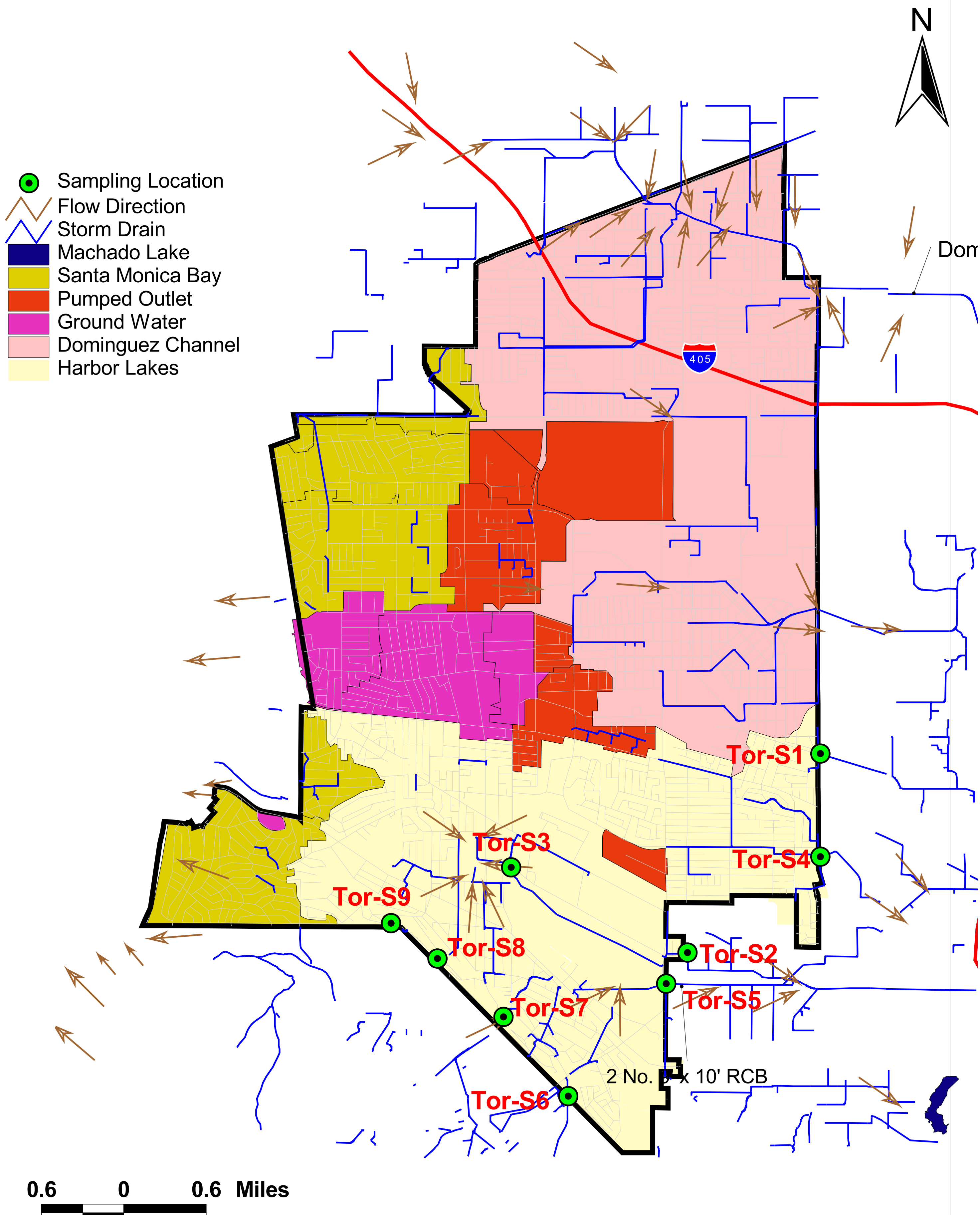


Figure 5 General Location Map of Sampling Locations

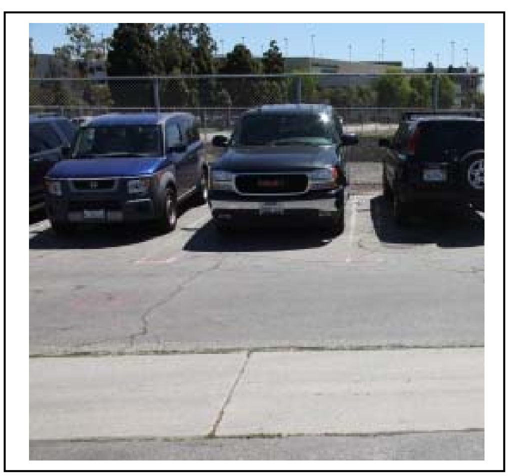
Tor-S2

Tor-S2 is approximately 50 ft west of the intersection of 246th Place and Pennsylvania Avenue. The total upstream drainage area is about 2,605 acres. The drainage area is a mixed land use, about 32 percent residential, 10 percent commercial and 11 percent industrial. The Torrance Airport accounts for 12 percent of the drainage area. Tor-S2 is easily accessible and safe for conducting sampling during both dry and wet weather conditions. Stormwater is conveyed to this site through an 8’ x 7’ reinforced concrete box. This site is one the four sites that will provide information to quantify the amount of pollutants leaving the City limits.

Sampling Site: TOR-S2

Tor-S3

This site, which is approximately 100 ft east of Madison St. and Skypark Drive intersection, will assist the City in characterizing discharges from Walteria Lake. The total upstream drainage area is approximately 2,285 acres. This site is upstream of Tor-S2. Land use is mixed with 37 percent residential, 10 percent commercial and 9 percent industrial. A 54-inch pipe conveys stormwater to this site. The site is easily accessible and safe for all weather sampling.



Sampling Site: TOR-S3

Tor-S4

Tor-S4 is approximately 210 ft north and 85 ft east of 236th Street and Western Avenue intersection. The total drainage area upstream of this sampling location is approximately 1,014 acres. Residential land use represents nearly 60 percent of the drainage area. Commercial and industrial land uses represent only 9 percent of the drainage area. The storm drain serving this site is a 9'-2" x 11' RCB. The site is safe for all weather sampling and it is easily accessible.

Sampling Site: TOR-S4

Tor-S5

This site is about 25 ft west of the intersection of Bani Avenue and 250th Street (two pipes intersect from south and west). This sampling site serves an upstream drainage area of approximately 661 acres. This site is mainly residential and airport land use; residential and airport land uses represent 43 and 24 percent of the drainage area, respectively. The storm drain discharging stormwater to this site is an 8'-9" x 9'-7' RCB. This site is easily accessible and safe for sampling activities.

Sampling Site: TOR-S5

<u>Tor-S6</u>

Tor-S6 is located at approximately 600 ft east of Estates Lane and Crenshaw Boulevard. This site will monitor flow entering the City's storm drain from Rolling Hills Estate. The sampling site is safe and easily accessible.

Sampling Site: TOR-S6

<u>Tor-S7</u>

This site is about 160 ft south and 280 ft east of Rolling Hills Road and Hawthorne Blvd. intersection. It will monitor dry weather flow originating from Rolling Hills Estates. The site is easily accessible and safe for sampling at all weather conditions.

Sampling Site: TOR-S7

<u>Tor-S8</u>

This site is located at about 500 ft northwest of Paseo De Las Tortugas and Mesa St. intersection. It will monitor dry weather flow originating from Rolling Hills Estates. The site is easily accessible and safe for sampling at all weather conditions.

Sampling Site: TOR-S8

<u>Tor-S9</u>

Tor-S9 is about 830 ft east and 120 ft south of Paseo de Las Tortugas and Vista Montana intersection. This site will monitor dry weather flow originating from Palos Verdes Estates. The site is accessible and safe for sampling activities.


Sampling Site: TOR-S9

3.2 Sample Collection Frequency

The City's sampling program consists of three major elements:

1. Monthly sampling during dry weather conditions for all sampling locations. Grab samples will be collected from each sampling location. Dry weather conditions must be preceded by at least 24 hours of no greater than trace precipitation or have an intensity of less than 0.1 inches of rain in a 24-hour period.

2. Samples will be collected from Tor-S3 during four discrete storm events and anytime time the LA County pumps stormwater from the Walteria Lake into the 54-inch storm drain. Pumping schedule will be obtained from LA County.

3. Continuous recording of stage or flow depth during dry weather periods for flow estimation will be collected from the proposed sample locations during dry weather flow conditions.

Regarding Tor-S3, one grab sample for each of the four storm events will be collected under the following conditions:

1. Sampling will occur during a storm event with at least 0.1 inch of precipitation (defined as a "measurable" event). Weather forecasts will be evaluated before deciding whether or not to sample a particular rain event. The monitoring manager will periodically establish a modem connection with each sampling unit to monitor rainfall, flow rates, and sampling activity. The monitoring manager will download stored data from the National Weather Service as needed.
2. Sampling will not occur at a frequency greater than once every 72 hours.
3. Sampling will not occur unless there has been at least 72 hours of continuous dry weather immediately preceding the "measurable" event.
4. Grab samples will be collected from this location during approximately the first 30 minutes to 1 hour of stormwater discharge (where possible).

The intention of the sample collection frequency and stormwater event requirements described above is to collect samples that are representative of runoff conditions from Tor-S3. No samples will be collected from the remaining eight sampling locations during storm events. The City's Pollutant Loading and Analysis Tool (PLAT) will be used to estimate nutrient loading for these sampling location during storm events.

3.3 Selection of Analytical Parameters

The City proposes to use a mass based WLA compliance option to evaluate TMDL compliance. Samples submitted for nutrients will be tested for ammonia-N (NH_3^+), ammonium, nitrite (NO_2), nitrate (NO_3), total Kjeldahl nitrogen (TKN), total phosphorus (TP), and phosphate (PO_4). Water samples submitted for conventional water parameters (general chemistry) will be tested for alkalinity, pH, chloride, total suspended solids (TSS), total solids, dissolved solids, turbidity, dissolved organic carbon (DOC), total organic carbon (TOC), and standard metals. The constituents to be sampled are listed in Table 5.

Table 5 Monitoring Constituents

Analyte	Method of Analysis	Detection Limits
NH_3^+	SM 4500-NH_3-H	0.02 mg/l
NO_3	SM 4500-NO_3-F	0.02 mg/l
NO_2	SM 4500-NO_3-F	0.01 mg/l
TKN	EPA 351.3	0.1 mg/l
TP	EPA 365.4	0.06 mg/l
PO_4	SM 4500-P-F	0.01 mg/l
TSS	EPA 160.2	0.5 mg/l
Turbidity	n/a	0.01 NTU

3.4 Continuous Flow Monitoring

Accurate assessment of flow is crucial to pollutant loads assessments and analysis. Continuous flow data will be collected as part of this sampling effort for all nine sampling locations. The primary benefit of these continuous monitoring sites is the ability to gauge the increase in flow due to a storm event and apply concentration data to calculate pollutant loading.

Global Water's FL16 Water Flow Logger will be used for flow data collection. The FL16 Water Flow Loggers will record over 81,000 depth, temperature, water flow and velocity readings in the drainage pipes. The specially engineered, non-fouling water level sensor works in depths as little as ½ inch and allows for deployment in manholes and other difficult to access areas without the need to enter the confined space.

FL16 Water Flow Recorder's user-friendly Windows-based software is tailored specifically for calculating water flows in partially filled sewer and drainage pipes using the Manning's Equation, with pull-down menus for selecting and entering the necessary information. The Water Flow Recorder software has a unique calibration feature which allows users to view calculated water velocity, compare this to actual measured data, and adjust the water flow parameters to calibrate for the water flow conditions of a specific application.

The flow measuring systems will be calibrated before data collection begins and that these will be re-calibrated monthly.

3.5 The Sampling Team

Grab samples from the nine sampling locations will be collected by a contract lab retained by the City. Pre-labeled sample bottles will be provided by the certified laboratory that will be conducting the analyses. The Sampling Team will be responsible for ensuring that all required equipment is ready for field operation. They are also responsible for performing the entire field sampling activities and most of the sampling preparation. Any member of the Sampling Team may recommend canceling sampling if the predicted conditions do not materialize or if health or safety of the team could be imperiled due to site conditions or extreme weather.

4.0 SAMPLE COLLECTION PROCEDURES

This section describes the sampling procedures, record keeping, sample handling, storage, and field quality control procedures that will be used during stormwater sampling.

4.1 Preparation for conducting the sampling

Several things will be done to prepare to conduct stormwater sampling. First, the laboratory to analyze the samples will be contacted. The following information will be sought from the lab:

- Type and size of bottles needed
- Procedures to filling the bottles
- Sample volume requirements
- Labels or additional forms required
- Explanation of the chain of custody form
- Sample preservation requirements and/or holding time restrictions
- Means of sample delivery to the lab
- Overnight delivery requirements
- Costs

Once a lab has been selected the sampling equipment (sampling bottles from a lab, sampling instruments, and personal safety equipment) will be made ready, as well as the field sheet to document the required information. Table 6 lists constituents and sample container requirements.

Field personnel will complete a field condition data sheet. The following items will be listed on the field sampling sheet and included in the stormwater discharge monitoring report:

- Person who conducted the sampling
- Date and time of discharge
- Length of storm event
- Time between sampled storm event and previous storm event (at least 72 hrs)
- Total rainfall during storm event
- Photo documentation

A field data sheet is attached as Appendix B.

4.1.1 Sampling Equipment

Monitoring equipment will be gathered ahead of time because opportunities to sample during rainfall events often come with little advanced notice. The following equipments will be required for the sampling efforts:

- Field forms
- Waterproof pens
- Permanent markers

- Powder-free nitrile gloves
- Clear glass jar for visual examinations
- Sample containers
- Sample preservatives
- Sample container labels
- COC forms
- COC seals
- Ice chests
- Ice
- Foul-weather gear
- Manhole sampler

Table 6 Monitoring Constituents and Sample Container Requirements

Analyte	Container	Volume	Preservation	Holding Time
NH_3^+	Plastic	50 ml	≤ 6°C H2SO4 PH < 2	28 days
NO_3	Plastic	50 ml	≤ 6°C, H2SO4 PH <2	48 hours
NO_2	Plastic	50 ml	≤ 6°C, H2SO4 PH <2	48 hours
TKN	Plastic	50 ml	≤ 6°C, H2SO4 PH <2	28 days
TP	Plastic	50 ml	≤ 6°C, H2SO4 PH <2	28 days
PO_4	Plastic	50 ml	≤ 6°C	48 hours
TSS	Plastic	200 ml	≤ 6°C	7 days

4.2 Sampling Method

Water samples will be collected from storm sewer manhole and outfall sites. All samples will be collected as individual grabs. Samples will be collected directly into sample containers or with a laboratory-supplied container attached to a pole with duct tape or other means. Sampling containers will be held with container openings facing upstream to prevent contamination during sampling. Field personnel will wear powder-free nitrile disposable gloves. Each sample will be given a field identification, tagged, and kept cool at 4 degrees C. Chain-of-custody (COC) procedures will be observed and samples delivered to the laboratory within the allowable holding times for each parameter.

It is assumed that sampling locations will have well-mixed conditions so that single grabs are representative of water quality. Field personnel will record the degree of turbulence or quiescence as well as the dimensions of the conveyance sampled and/or a description of water flowing in the conveyance. Field personnel will also record the date and time of sample collection and the flow rate.

Sampling containers for direct grabs (either by hand or with pole attached to laboratory supplied container) will be pre-cleaned by the laboratory. It will be made certain that if a sample is transferred (either for collection purposes or to form grab-composite samples), that only laboratory-supplied containers are permitted to come in contact with the sample.

4.3 Personal Safety

A Health and Safety Plan approved by the contract lab will be reviewed by the all field personnel before the sampling operations covered in this monitoring plan begin. Personal safety will be of primary concern while conducting all stormwater sampling related activities. All persons involved in the sampling operation will be made aware of the hazards associated with monitoring and should freely voice any concerns if potential hazards become apparent. The Occupational Safety and Health Administration (OSHA) provides regulations and guidance on occupational safety, many of which are directly applicable to the types of activities involved in stormwater monitoring. It is the direct responsibility of each person involved in the monitoring program to read the Health and Safety Plan and adhere to its requirements. The following list provides a few basic health and safety procedures that will help to create a safer sampling environment.

- Do not sample alone, a minimum of two-person field crews will be used for stormwater sampling.
- Do not enter a confined space without proper training, equipment, and surface support.
- Never remove or replace manhole covers with your bare hands or feet.
- Never leave an open manhole unattended.
- Do not start staging or sampling until traffic control has been established.

4.4 Clean Sampling Techniques

Clean sample collection techniques will be followed to minimize the potential for contamination of stormwater runoff samples. Care will be taken during all sampling operations to avoid contamination of the water samples by human, atmospheric, or other potential sources of contamination. The monitoring team should prevent contamination of any of the following items: composite bottles, lids, sample, tubing, and strainers.

4.5 Sample Packing and Shipping

Monitoring personnel will deliver the samples to the laboratory. Sample bottles will be placed in coolers or some other package that is rigid enough to provide protection of the samples and is insulated to keep samples cold. During packing, the sample from one monitoring location will not be separated into separate shipping containers unless bottles of one size need to be shipped together because of container size. If samples from a location are separated a copy of the field-sampling sheet pertaining to the bottles will be enclosed in each shipping container. Prior to shipping, all sample bottles will be recorded on the packing lists, which will include the shipping date and the method of transporting the samples. Samples will be delivered to the analytical laboratory within 4 hours of sampling to ensure the maximum holding time for bacteria of 6 hours is not exceeded.

4.6 Chain of Custody

After samples have been obtained and the collection procedures properly documented, a written record of the COC of each sample will be made. This record ensures that samples will not be tampered with or inadvertently compromised in any way, and it also tracks the requested analysis for the analytical laboratory. COC refers to the documented account of changes in possession that occur for samples.

The COC record tracks the sampling path from origin through laboratory analysis. Information necessary in the COC includes:

- Name of the persons collecting the sample(s).
- Date and time of sample collection.
- Location of sample collection.
- Names and signatures of all persons handling the samples in the field and in the laboratory.
- Laboratory analysis requested and control information (e.g., duplicate or spiked samples etc.) and any special instructions (e.g., time sensitive analyses).

To ensure that all necessary information is documented a COC form will accompany each sample or set of samples. COC forms will be printed on multipart carbonless paper so that all personnel handling the samples may obtain a copy. A COC record should accompany all sample shipments and the sample originator will retain a copy of the forms. When transferring custody of samples the transferee will sign and record the date and time of each transfer. Each person who takes custody will complete the appropriate portion of the chain of custody documentation. A sample COC form to be used for this field sampling is attached as Appendix C.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL

5.1 Data Quality Objective

The quality assurance/quality control (QA/QC) program will be implemented to satisfy the data quality objectives of the monitoring program. The primary data quality objectives are to obtain defensible data of acceptable sensitivity and quality to:

- Evaluate the stormwater management program.
- Evaluate stormwater quality.
- Evaluate of BMP as corrective measure.

The analytical laboratory selected for this study will evaluate the accuracy of its sample extraction and/or analytical procedures using spiked samples, which may include matrix spikes (MS), laboratory control samples (LCS) and surrogate spikes. Acceptable spike recoveries must fall within statistically derived laboratory “control limits.” Precision is the agreement among a set a replicate measurements of the same parameter. The analytical laboratory will evaluate precision by performing matrix spike duplicate (MSD), laboratory control sample duplicate (LCSD) and duplicate stormwater sample analyses (typically performed for inorganic parameters only). The data quality objectives also include obtaining data that are comparable and representative of the water quality conditions at each monitoring location. Comparable data will be collected if comparable sampling, analysis, QA/QC and reporting procedures are implemented throughout the monitoring program. Representative samples will be collected by performing sampling activities compliant with the procedures described in this monitoring plan. Duplicate samples will be collected and the results will be used to evaluate representativeness. Comparability expresses the confidence with which one data set can be compared to another. Data are comparable if collection techniques, measurement procedures, methods, and reporting are equivalent for the samples within a sample set. Data quality assurance objectives are summarized in Table 7.

Table 7 Quality Assurance Objective

Analyte	Units	Precision	Accuracy	Reporting Limit	Completeness
NH_3^+	mg/l	±20%	±30%	0.10 mg/l	90%
NO_3	mg/l	±20%	±30%	0.1 mg/l	90%
NO_2	mg/l	±20%	±30%	0.1 mg/l	90%
TKN	mg/l	±20%	±30%	0.1 mg/l	90%
TP	mg/l	±20%	±30%	0.1 mg/l	90%
PO_4	mg/l	±20%	±30%	0.025 mg/l	90%
TSS	mg/l	±20%	±30%	1 mg/l	90%

5.1.1 Field Quality Control Samples

Field quality control samples will be collected at a 10% frequency in order to provide quality performance information for the sampling program. One in ten samples submitted for analysis will be one of three field QC sample types: field blank; field duplicate; and/or performance evaluation blank. Table 8 lists the quality performance goals that each of the three types of field QC sample types is intended to address.

Table 8 Field Quality Control Sample Types

Quality Performance Goal	Field Blank	Field Duplicate	Performance Evaluation Blank
Minimize false positive results	X		X
Sample bottles free of contamination	X		
No contamination introduced by sampling process	X		
Measurement error attributable to sample inhomogeneity		X	

5.2 Field Quality Assurance/Quality Control

This section summarizes the QA/QC procedures that will be implemented by field personnel to evaluate sample contamination, sampling precision, and matrix interference.

5.2.1 Equipment Blanks

After the intermediate sample container or scoop is cleaned, an equipment blank will be collected by pouring reagent-grade water into the apparatus. The water will be transferred into sample bottles and analyzed for the full analytical suite.

5.2.2 Field Duplicate Samples

Field duplicate samples will be collected to evaluate the precision and representativeness of the sample collection procedures as well as sample homogeneity. The duplicate sample will be collected using the specified manual grab sampling techniques. Twice the volume required for the analytical suite will be collected with each duplicate sample. For grab samples, intermediate sample containers will be used, and the volume collected will be apportioned equally between the intermediate containers. The water in each intermediate container will be poured into a discrete set of sample bottles. One set of bottles will be labeled with fictitious sample identification and submitted “blind” to the laboratory.

5.2.3 Matrix Spike Samples

MS and MSD analyses will be performed by the laboratory using project samples. Field crews will submit twice the required sample volume for the sample selected as the matrix spike sample. Field personnel will identify the MS/MSD sample on the COC form.

5.3 Laboratory Quality Control

This sub-section summarizes the QC procedures the laboratory will perform and report with the analytical data packages. These procedures are not inclusive of the QA/QC that is required for compliance with the analytical method.

5.3.1 Method Blanks

A method blank is prepared using reagent-grade water, and is extracted and analyzed with each sample batch (typically 20 samples extracted and/or analyzed on a given day). Method blank results are used to identify potential sources of sample contamination resulting from laboratory procedures. Target analytes should not be detected in the method blank above the practical quantitative limit.

5.3.2 Matrix Spike and Laboratory Control Samples

MS, MSDs, LCS, and LCSDs will be performed by the laboratory to evaluate the accuracy of the sample extraction and analysis procedures. MS/MSDs will also be performed to evaluate matrix interference. Matrix interference is the effect of the sample matrix on the analysis, which may partially or completely mask the response of the analytical instrumentation to the target analyte(s). Matrix interference may affect the accuracy of the extraction and/or analysis procedures to varying degrees, and may bias the sample results high or low. The

MS/MSD is prepared by adding known quantities of target analytes to a sample. The sample is then extracted and/or analyzed as a typical environmental sample, and the results are reported as percent recovery.

6.0 DATA MANAGEMENT AND REPORTING

The sampling results will be reported by the laboratory as hard copy and as electronic files. Hard copy data will be entered into an electronic format, and checked at least once by a different person. Electronic submittal of results will be discussed with the analytical laboratory in advance of delivery and its format arranged. A separate record will be generated for each sample analysis.

In addition, the key information such as station ID, sample date and time, name of sampler, name of constituent, all results, units, detection limits, methods used, name of the laboratory, and any field notes will be entered into the database. Additional information, such as compositing of multiple samples, or the use of grab will also be included.

When reporting the laboratory results for each stormwater sample the following information will be provided:

- Sample site.
- Sample date and time.
- Sample number (or identification).
- Sampling technician(s).
- Detection limit and reliability limit of analytical procedure(s).
- Sample results with clearly specified units.

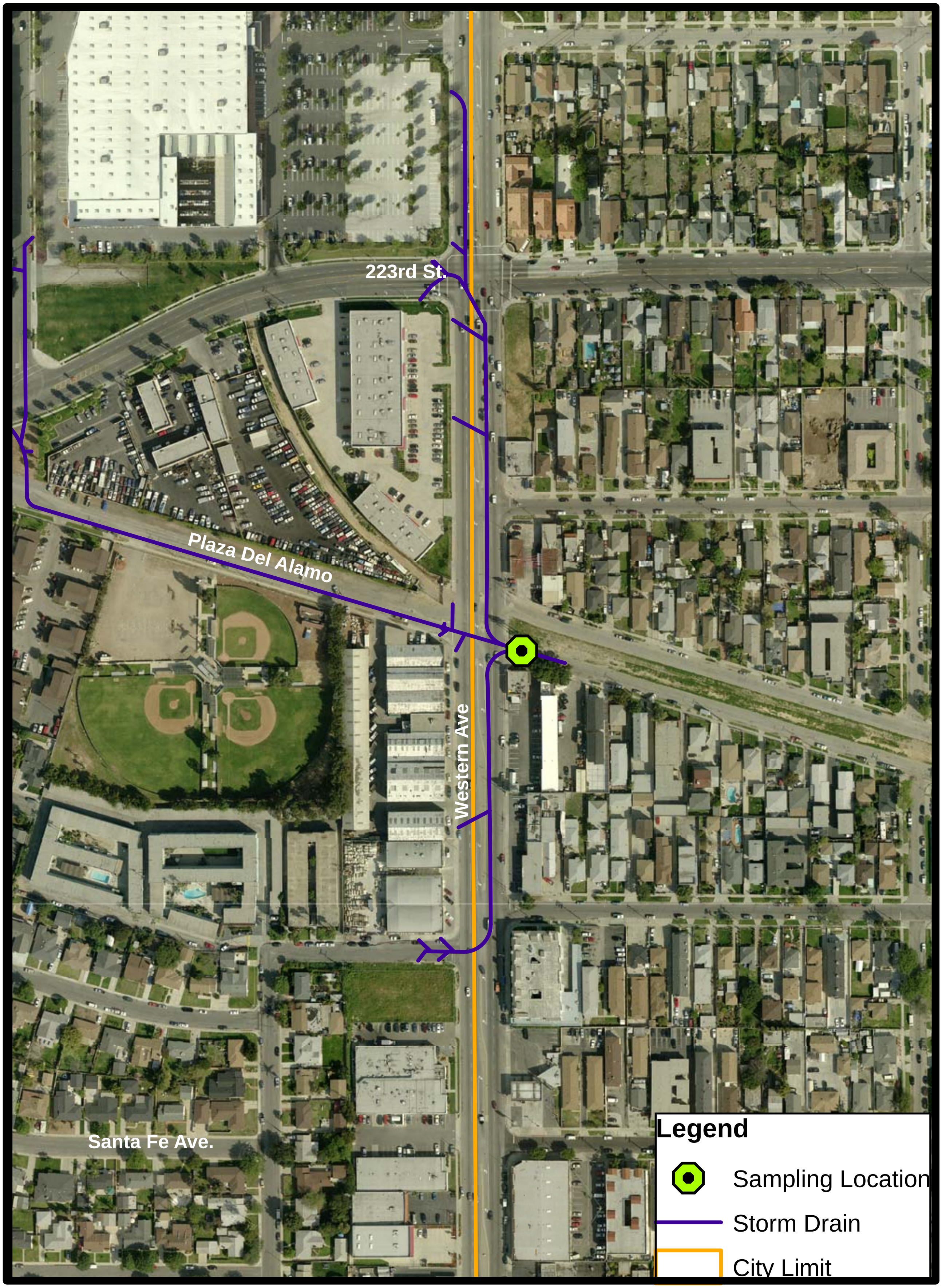
The results of all samples collected under this plan will be submitted to Regional Board in a monitoring report. Monitoring report will include:

- Introduction and background information
- Documentation and summary of each sampling event, including photos
- Electronic copies of field conditions data sheets
- Summary discussion of results
- Tabular results of all samples, including quality assurance quality control samples, in electronic format, (Excel)
- Evaluation data quality based on QAPP requirements.

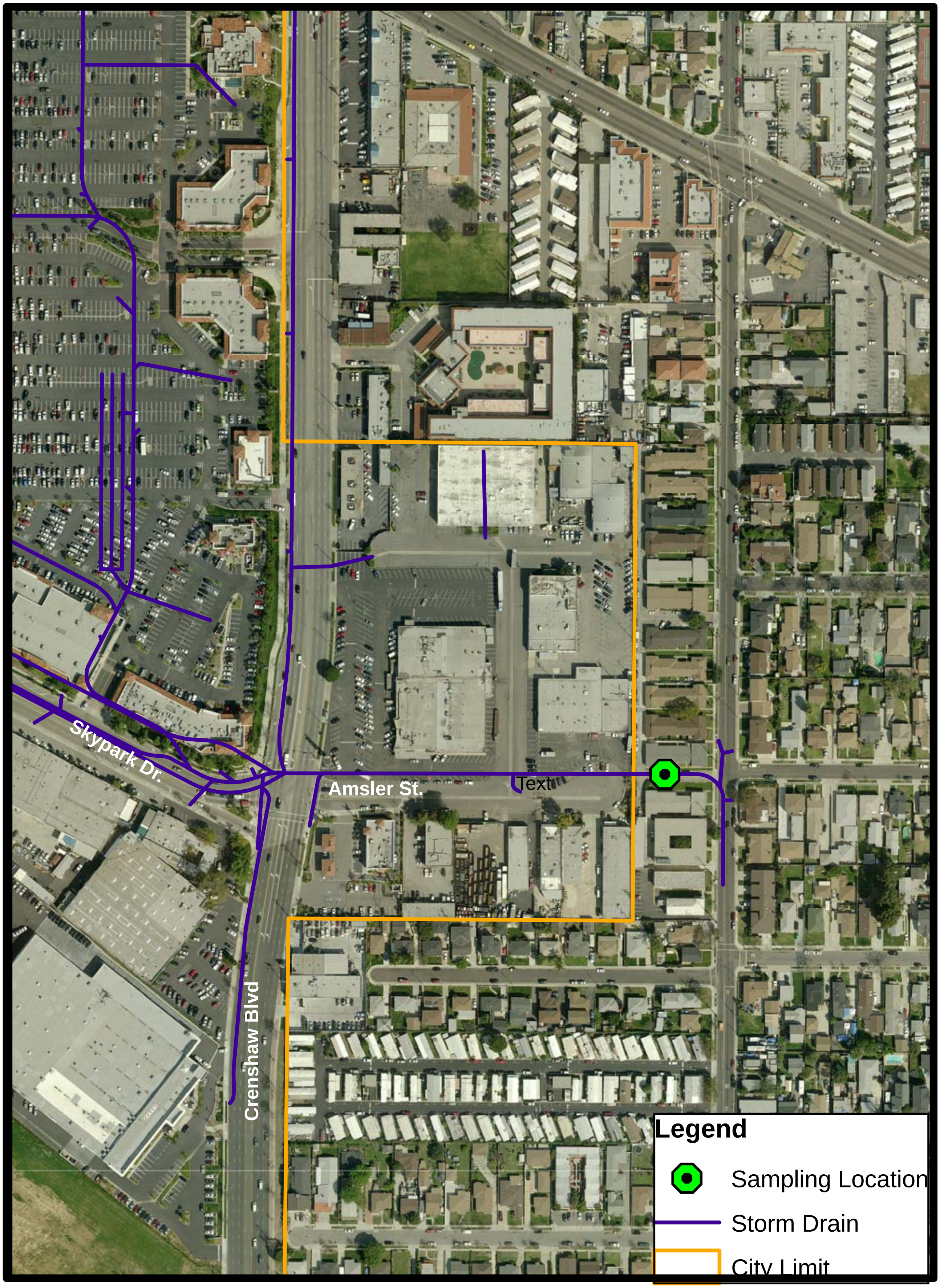
APPENDIX A

Detailed Maps of Sampling Locations

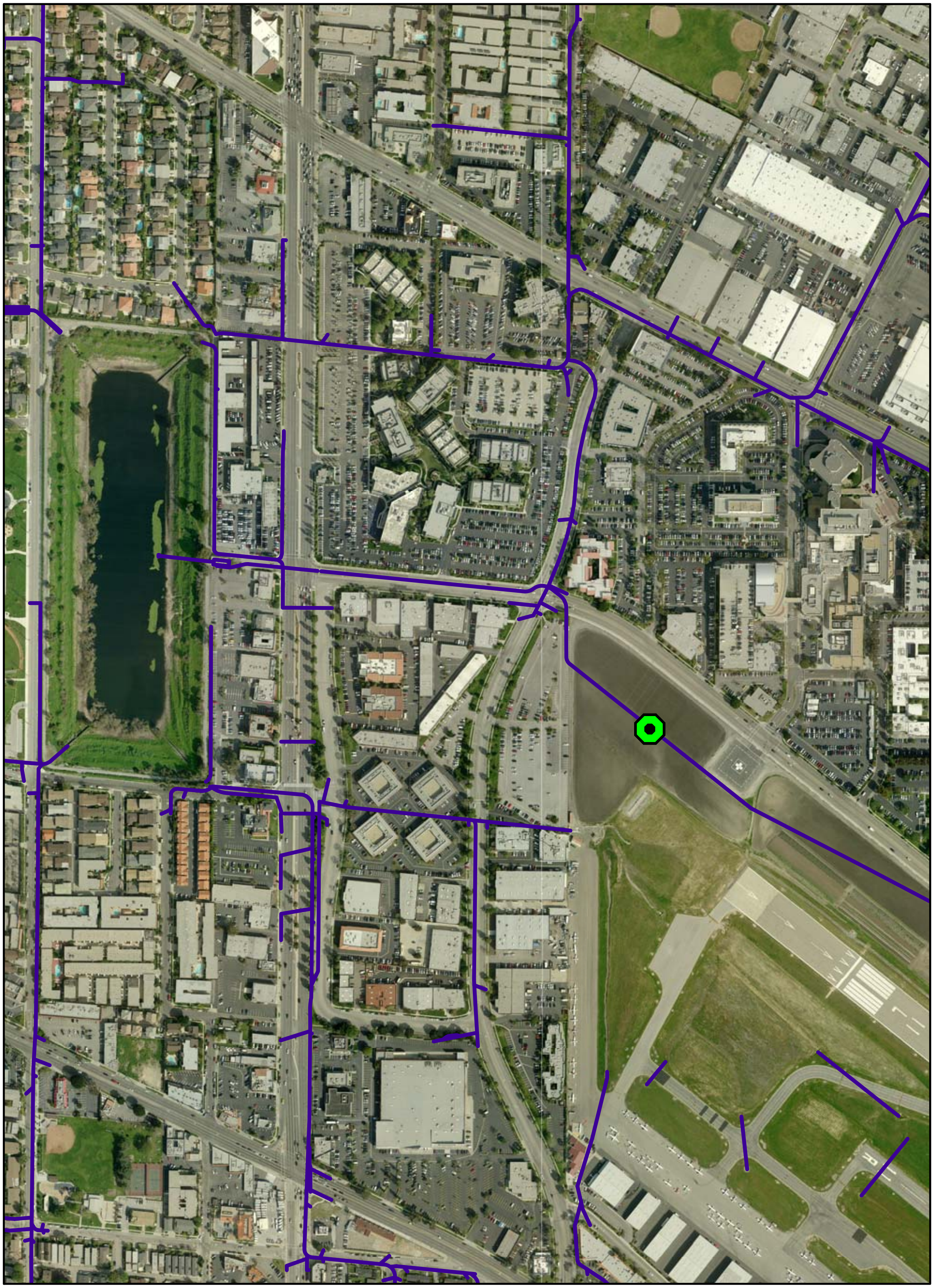
Stormwater Sampling Location - Tor-S1



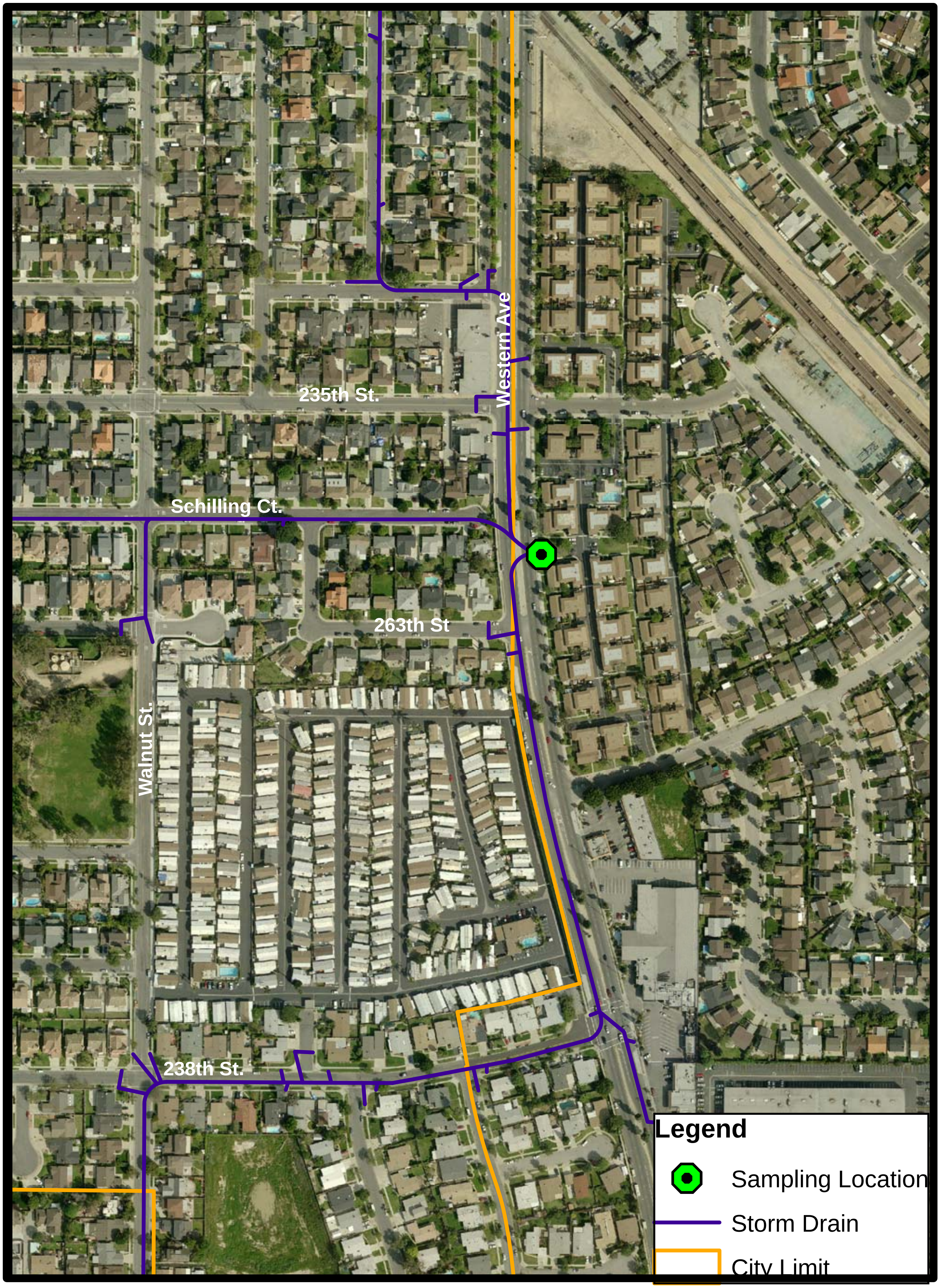
Stormwater Sampling Location - Tor-S2



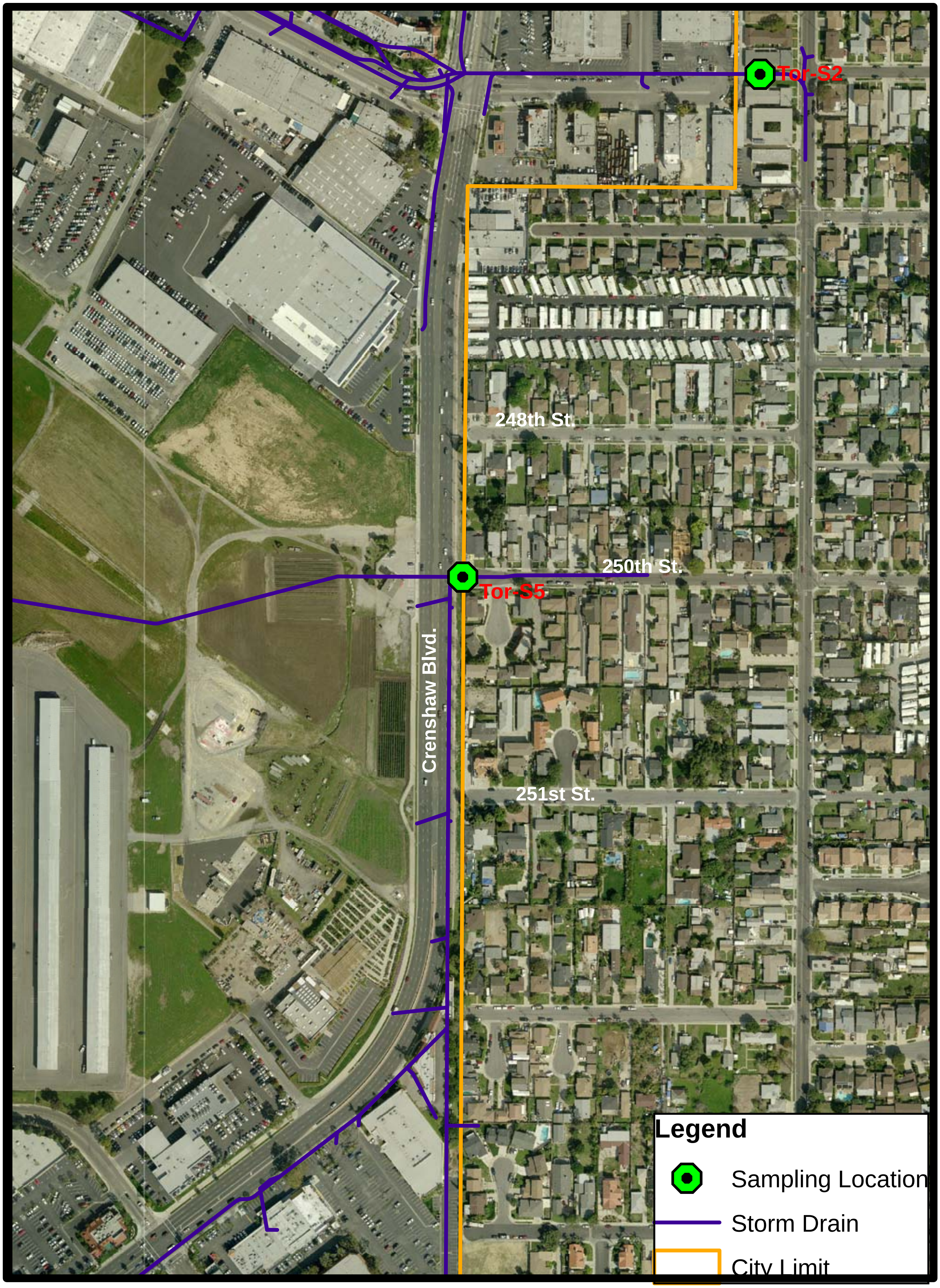
Stormwater Sampling Location: Tor-S3



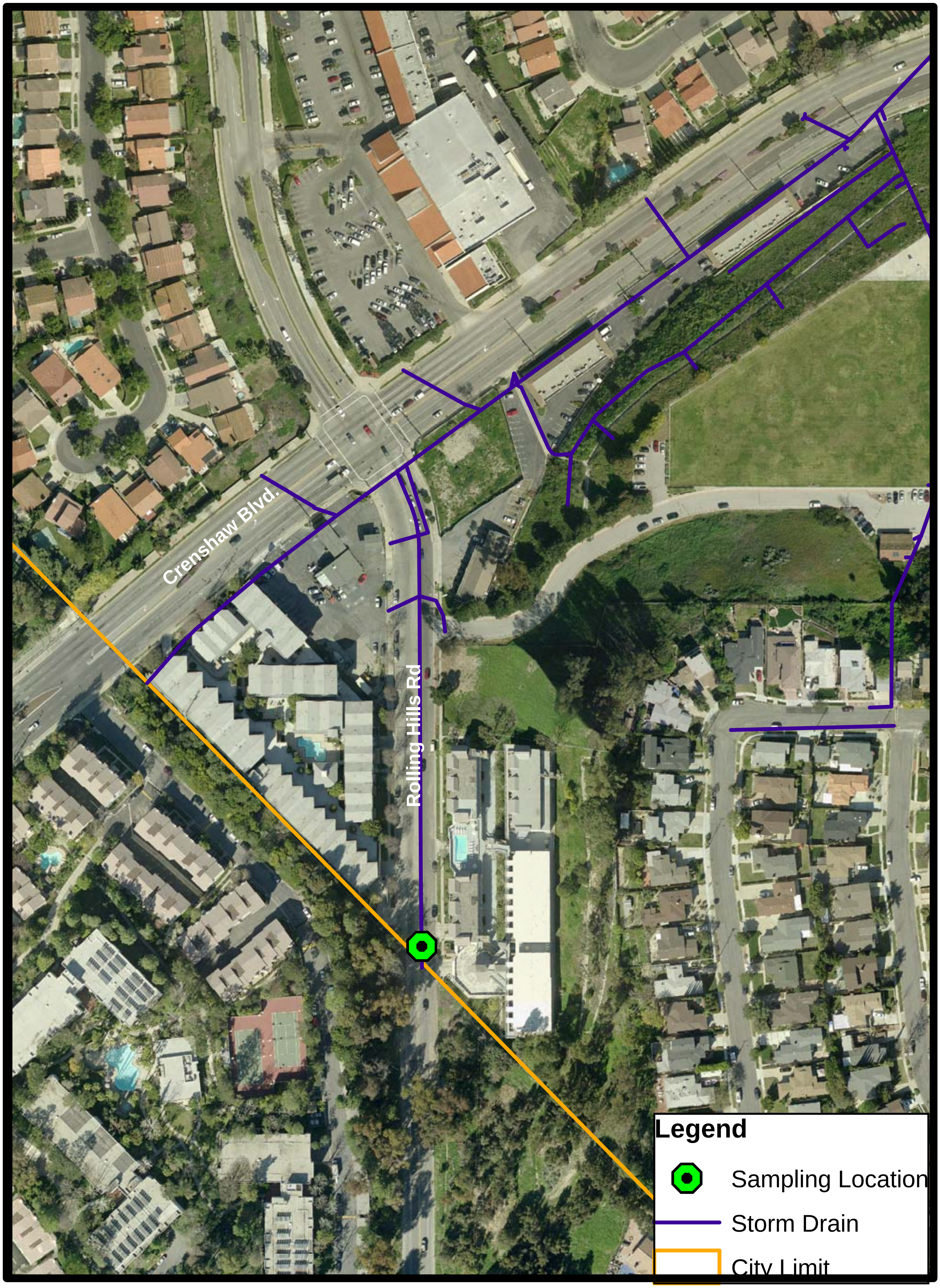
Stormwater Sampling Location - Tor-S4



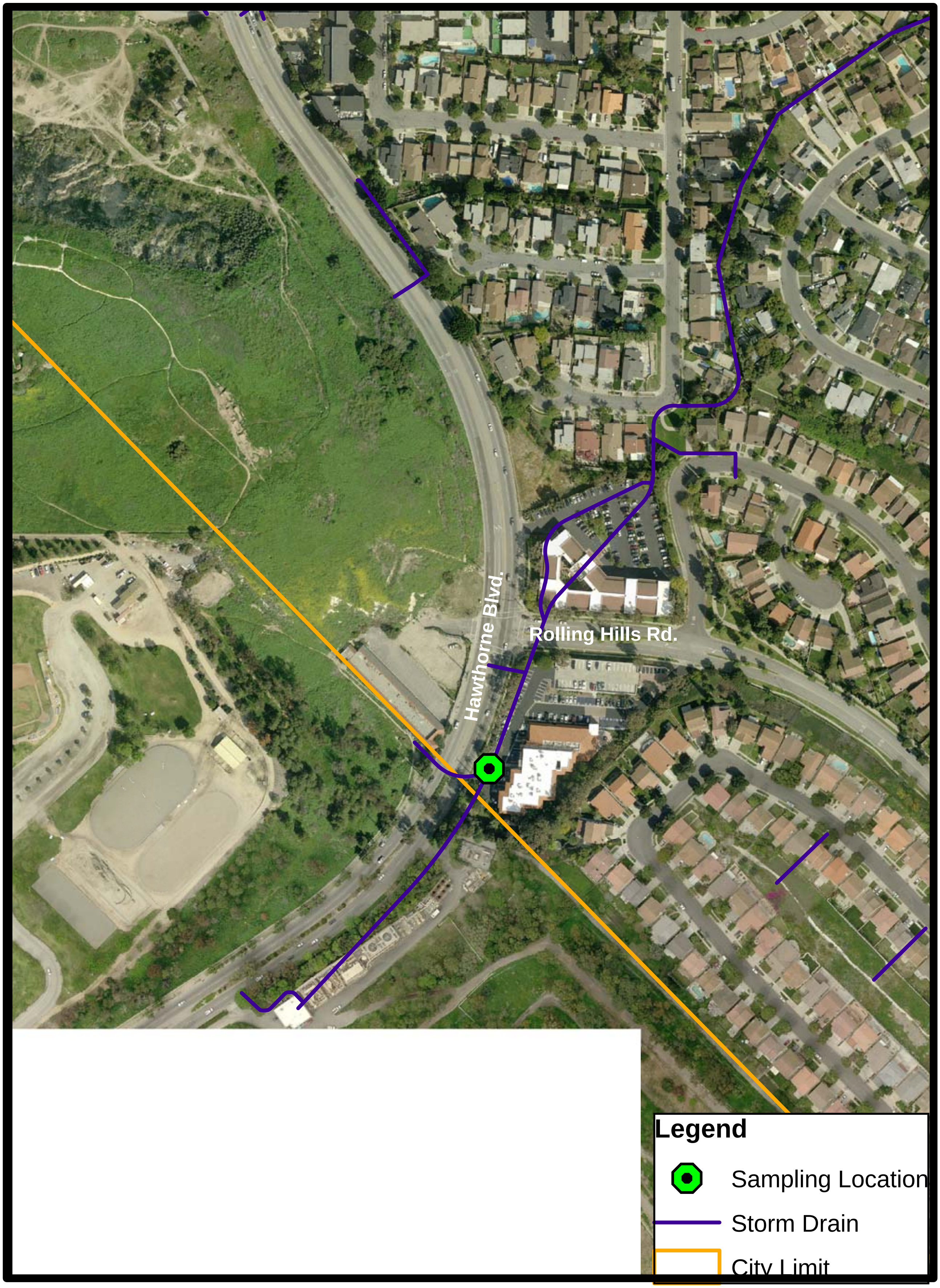
Stormwater Sampling Location - Tor-S5



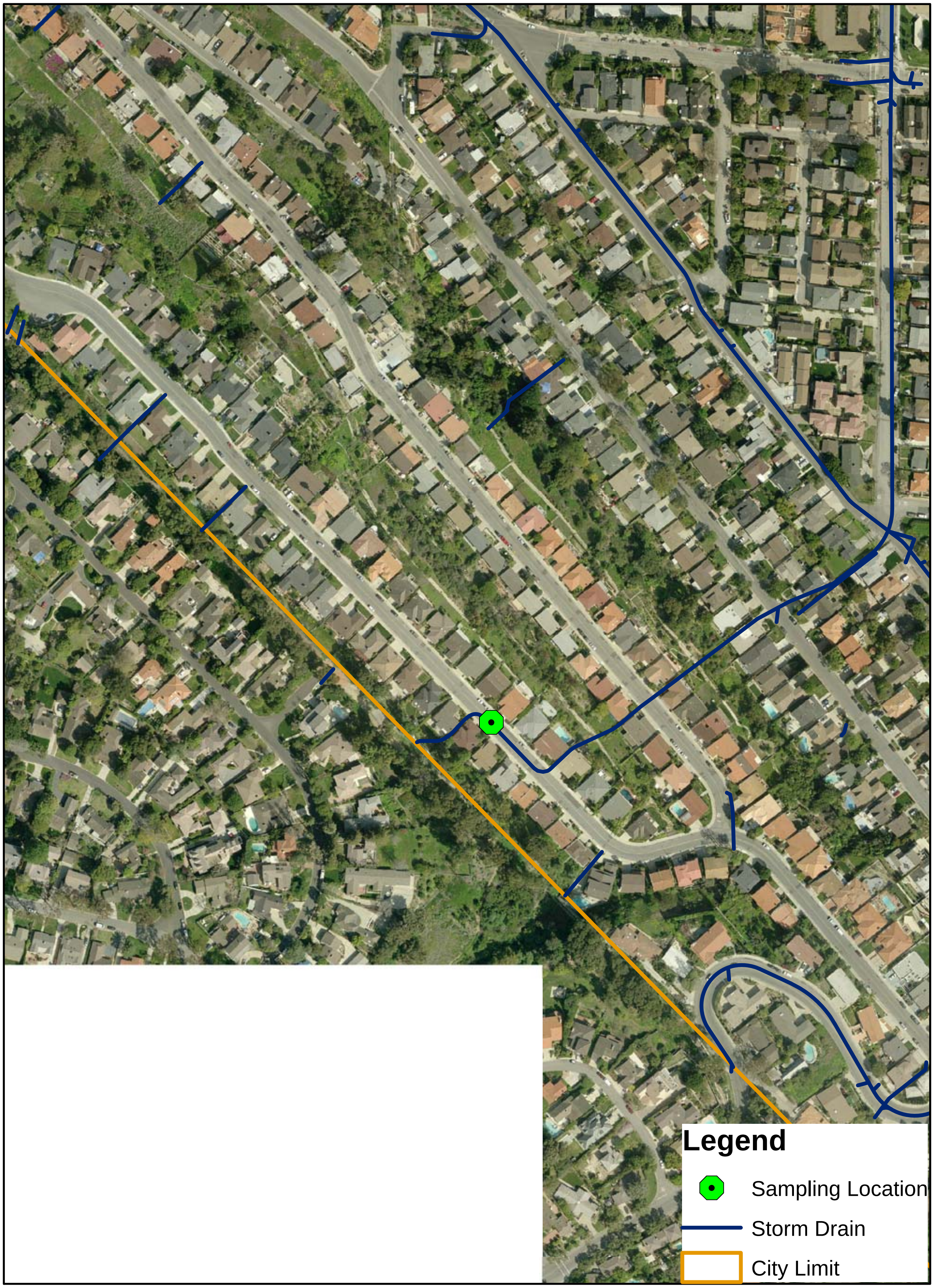
Stormwater Sampling Location - Tor-S6



Stormwater Sampling Location - Tor-S7



Stormwater Sampling Location - Tor-S8



Stormwater Sampling Location - Tor-S9

APPENDIX B

Field Data Sheet

Sampling Field Data

City of Torrance, California

Page______ of______

Area Letter & Name or Run #: ______________________

Run: Scheduled / Makeup / Reopen / Extra

Collected by:______________________________ **Initiated by:**______________________

Date Collected:______________________________ **Date/time Initiated:**______________________

Missed Station	Area Letter	Station #	Military Time	Boat /Land/ Clams/Mussels	Temp °C	Random / Adverse/ Extra	Condition or Adversity	Open or Closed	Wind	Salinity ‰	A-1 MPN/100 ml MF CFU/100ml EC MPN/100 ml	Comments

Remarks:

CHAIN OF CUSTODY:

Relinquished by:	Date, Time & Temp°C	# Samples	Relinquished to:	Received by:	Date, Time & Temp°C	# Samples
Circle Water Quality Lab: Boothbay or Lamoine			WQ Lab Staff Acceptance:			

Entered by: _______ **Date:**_______

APPENDIX C

Chain of Custody

GENERAL CHAIN-OF-CUSTODY FORM

EVIDENCE/PROPERTY CUSTODY			Tracking Number	
			Investigation ID Number	
NAME OF RECIPIENT FACILITY			LOCATION	
NAME, TITLE AND CONTACT NUMBER OF PERSON FROM WHOM RECEIVED			ADDRESS	
LOCATION FROM WHERE OBTAINED			REASON OBTAINED	DATE/TIME OBTAINED

ITEM NO	QUANTITY	DESCRIPTION OF ARTICLES (Include model, serial number, condition and unusual marks or scratches)

		CHAIN OF CUSTODY		
ITEM NO.	DATE	RELEASES BY	RECEIVED BY	PURPOSE OF CHANGE OF CUSTODY
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	

Chain-of-Custody (continued)

ITEM NO.	DATE	RELEASES BY	RECEIVED BY	PURPOSE OF CHANGE OF CUSTODY
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	

FINAL DISPOSAL ACTION		
RELEASE TO OWNER OR OTHER (NAME/ORGANIZATION)		
DESTROY		
OTHER (Specify)		
FINAL DISPOSAL AUTHORITY		
ON THIS DOCUMENT PERTAINING TO THE INQUIRY/INVESTIGATION INVOLVING;		
ITEM(S) (IS)(ARE) NO LONGER REQUIRED AS EVIDENCE AND MAY BE DOSPOSED AS INDICATED ABOVE. *If articles must be retained do not sign, but explain in separate correspondence.*		
(Typed or Printed Name & Organization)	(Signature)	(Date)
WITNESS TO DESTRUCTION EVIDENCE		
THE ARTICLES LISTED AT ITEM NUMBERS (WAS)(WERE) DESTROYED BY THE EVIDENCE CUSTODIAN IN MY PRESENCE, ON THE DATE INDICATED ABOVE		
(Typed or Printed Name & Organization)	(Signature)	(pole)

Beach Cities CIMP Appendix C

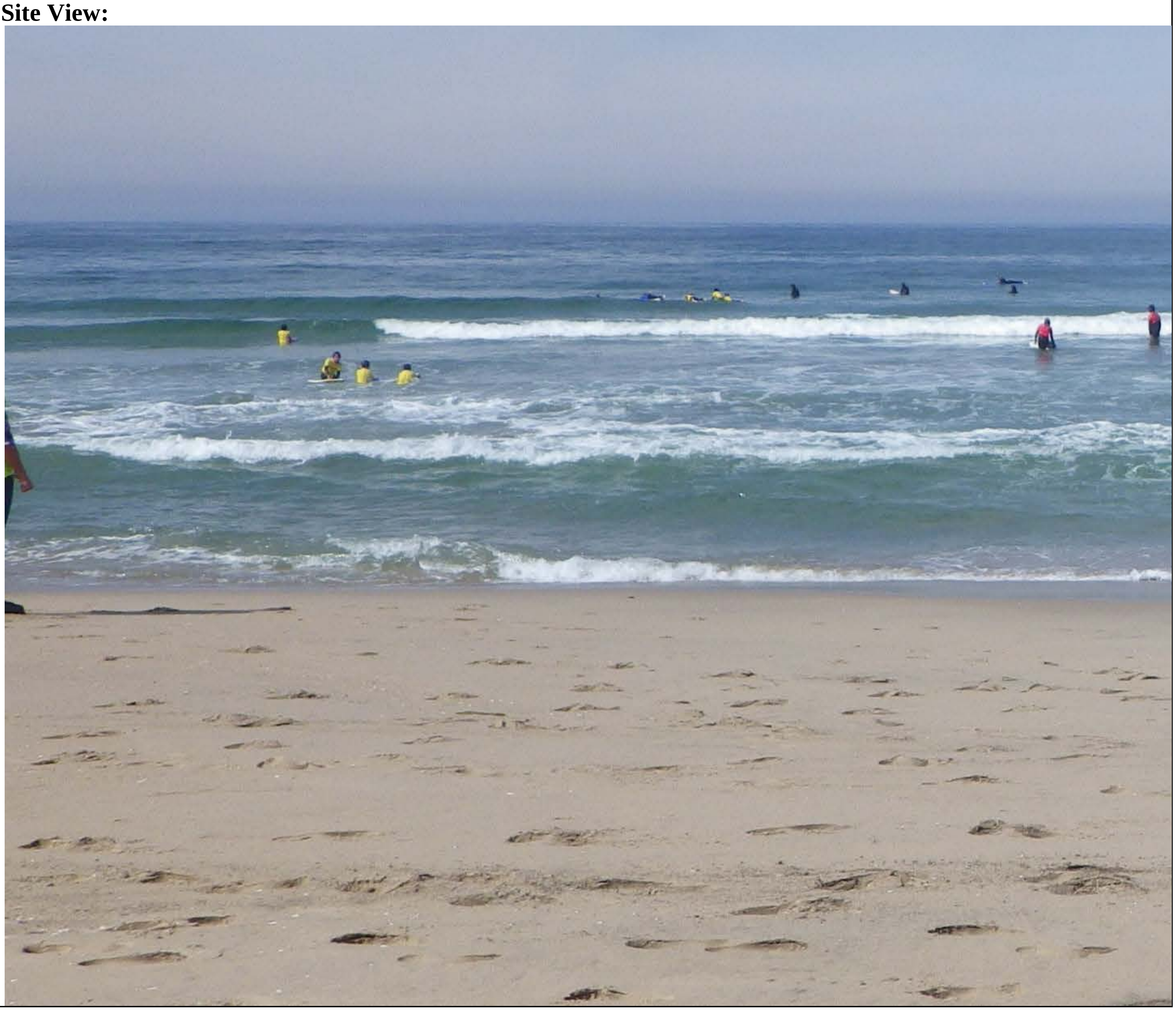
Monitoring Location Fact Sheets

July 2018

Receiving Water Monitoring Sites

Summary Sheet for RW-BCEG-1

Site ID: RW-BCEG-1	**Monitoring Type:** Receiving Water
Latitude: 33.892541	**Watershed:** Santa Monica Bay
Longitude: -118.421732	**Nearest Street Address:** 28th Street at Ocean Drive, Manhattan Beach, CA 90266
Thomas Guide Grid: pg 732 E5	
Site Description: RW-BCEG-1 is located offshore from outfall OF-BCEG-1 in the jurisdiction of the City of Manhattan Beach. Sampling would occur by boat based on plume or initial dilution characteristics and the safety determination of the Boat Captain.	
Site Location: See CIMP Figure 6	
Site View:	



Summary Sheet for RW-BCEG-2

Site ID: RW-BCEG-2	**Monitoring Type:** Receiving Water
Latitude: 33.851637	**Watershed:** Santa Monica Bay
Longitude: -118.402488	**Nearest Street Address:** 4 The Strand, Hermosa Beach, CA 90254
Thomas Guide Grid: pg 762 G4	
Site Description: RW-BCEG-2 is located offshore from Herondo Street in Hermosa Beach. This location is near the group shoreline center point. Sampling would occur by boat based on plume or initial dilution characteristics and the safety determination of the Boat Captain.	
Site Location: See CIMP Figure 6	
Site View: 	

Outfall Monitoring Sites

Summary Sheet for OF-BCEG-1

Site ID: OF-BCEG-1	**Monitoring Type:** Rotating Stormwater Outfall
Latitude: 33.89430	**Watershed:** Santa Monica Bay
Longitude: -118.41664	**Represented Area:** City of Manhattan Beach
Thomas Guide Grid: pg 732 E5	**Drainage System:** 28th Street Drain
Outfall Shape: Round	**HUC-12:** Manhattan Beach – Frontal Santa Monica Bay (180701040500)
Outfall Type: Manhole	**Nearest Street Address:** 2702 Ocean Drive, Manhattan Beach, CA 90266

	OF-BCEG-1 Catchment		**Manhattan Beach Portion of SMB MB HUC-12 area**		**Beach Cities WMG Portion of SMB MB HUC-12 area**	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agricultural	0	0%	0	0%	53.44	0.70%
Commercial	129.37	8.44%	207.63	9.98%	791.58	10.36%
Education	91.83	5.99%	120.53	5.80%	403.11	5.28%
Industrial	12.63	0.82%	12.77	0.61%	150.34	1.97%
Multi-Family Residential	100.83	6.58%	208.19	10.01%	1408.86	18.44%
Open Space	68.90	4.49%	107.72	5.18%	375.10	4.91%
Single Family Residential	1129.54	73.68%	1423	68.42%	4456.40	58.34%
Total	**1533.1**	**100%**	**2079.79**	**100%**	**7638.83**	**100%**
Municipal Jurisdiction						
Hermosa Beach	0	0%	0	0%	848.37	11.11%
Manhattan Beach	1533.00	99.99%	2079.8	100%	2079.79	27.23%
Redondo Beach	0.10	0.01%	0	0%	2599.58	34.03%
Torrance	0	0%	0	0%	2111.09	27.64%
Total	**1533.10**	**100%**	**2079.8**	**100%**	**7638.83**	**100%**

Site Description: OF-BCEG-1 is a manhole located on a one-lane, one-way street in a residential area just above the beach. There are two LFD's within the 28th Storm Drain System. The outfall manhole would normally be accessible without the risk of being blocked by a parked vehicle. Although traffic appears generally light, traffic controls should be placed at the street entrance to redirect through traffic from entering the street. Resident traffic would generally be impacted for less than ten minutes, while grab samples are collected. If parking is available near the access, delays may be avoided entirely.

Site Location: See CIMP Figure 9

Site View:

Summary Sheet for OF-BCEG-2

Site ID: OF-BCEG-2	**Monitoring Type:** Rotating Stormwater Outfall
Latitude: 33.86188	**Watershed:** Santa Monica Bay
Longitude: -118.40155	**Represented Area:** City of Hermosa Beach
Thomas Guide Grid: pg 762 G2	**Drainage System:** Hermosa Beach Pier
Outfall Shape: Round	**HUC-12:** Manhattan Beach – Frontal Santa Monica Bay (180701040500)
Outfall Type: Manhole	**Nearest Street Address:** 8 Pier Avenue, Hermosa Beach, CA 90254

	OF-BCEG-2 Catchment		**Hermosa Beach Portion of SMB MB HUC-12 area**		**Beach Cities WMG Portion of SMB MB HUC-12 area**	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agricultural	0	0%	0	0%	53.44	0.70%
Commercial	20.8	42.7%	129.92	15.31%	791.58	10.36%
Education	0	0%	16.27	1.92%	403.11	5.28%
Industrial	0	0%	13.3	1.57%	150.34	1.97%
Multi-Family Residential	23.24	47.7%	254.05	29.95%	1408.86	18.44%
Open Space	0.25	0.51%	51.39	6.06%	375.10	4.91%
Single Family Residential	4.43	9.09%	383.44	45.20%	4456.40	58.34%
Total	**48.72**	**100%**	**848.37**	**100%**	**7638.83**	**100%**
Municipal Jurisdiction						
Hermosa Beach	48.72	100%	848.37	100%	848.37	11.11%
Manhattan Beach	0	0%	0	0%	2079.79	27.23%
Redondo Beach	0	0%	0	0%	2599.58	34.03%
Torrance	0	0%	0	0%	2111.09	27.64%
Total	**48.72**	**100%**	**848.37**	**100%**	**7638.83**	**100%**

Site Description: OF-BCEG-2 is located near the west end of Pier Plaza in Hermosa Beach, immediately east of the bike path and in front of Hennessey's Tavern (8 Pier Avenue). Vehicle traffic is prohibited in Pier Plaza, but pedestrian traffic is typically heavy. The Hermosa Strand Infiltration Trench, which is immediately downstream, diverts both dry- and wet-weather flows from the Pier Avenue storm drain. This location is subject to backflow conditions from the ocean during high tide. Such conditions will be critical to assess prior to and while sampling.

Site Location: See CIMP Figure 10

Site View:

Summary Sheet for OF-BCEG-4a

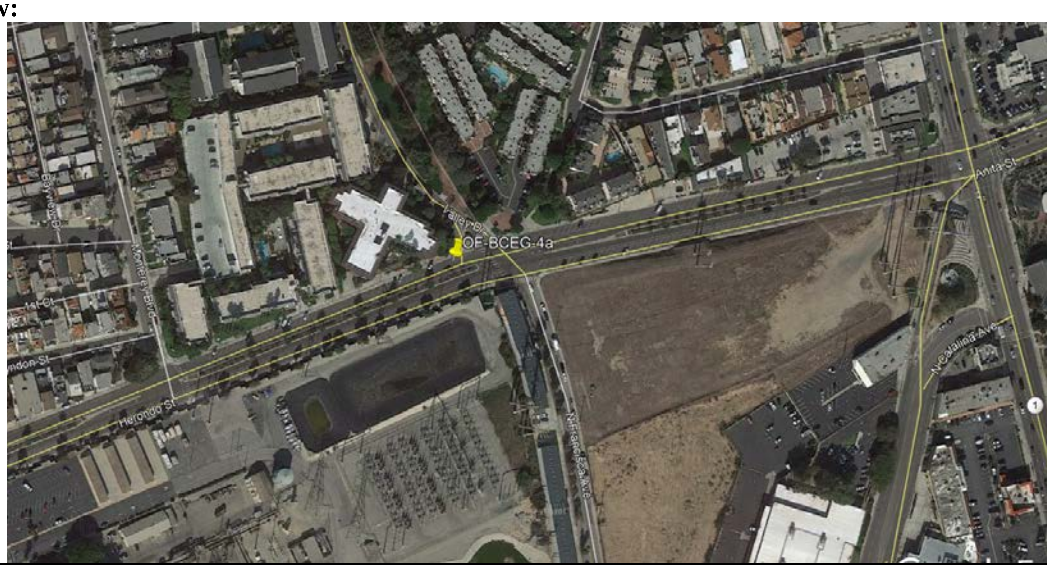
Site ID: OF-BCEG-4a	**Monitoring Type:** Rotating Stormwater Outfall
Latitude: 33.853775	**Watershed:** Santa Monica Bay
Longitude: -118.393725	**Represented Area:** City of Redondo Beach, City of Torrance
Thomas Guide Grid: pg 762 H3	**Drainage System:** Herondo Drain Subwatershed
Outfall Shape: Box	**HUC-12:** Manhattan Beach – Frontal Santa Monica Bay (180701040500)
Outfall Type: Manhole	**Nearest Street Address:** Valley Drive at Herondo St, Hermosa Beach, CA 90254

	OF-BCEG-4a Catchment		**Redondo/Torrance Portion of SMB MB HUC-12 area**		**Beach Cities WMG Portion of SMB MB HUC-12 area**	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agriculture	50.92	1.7%	53.44	1.13%	53.44	0.70%
Commercial	359.35	12.3%	454.03	9.64%	791.58	10.36%
Education	138.91	4.8%	266.31	5.65%	403.11	5.28%
Industrial	132.57	4.5%	124.27	2.64%	150.34	1.97%
Multi-Family Residential	574.96	19.7%	946.62	20.10%	1408.86	18.44%
Open Space	185.10	6.4%	215.99	4.59%	375.10	4.91%
Single Family Residential	1,472.13	50.5%	2650	56.25%	4456.40	58.34%
Total	**2,913.94**	**100%**	**4710.7**	**100.00%**	**7638.83**	**100%**
Municipal Jurisdiction						
Hermosa Beach	246.80	8.5%	0	0%	848.37	11.11%
Manhattan Beach	52.91	1.8%	0	0%	2079.79	27.23%
Redondo Beach	1,049.74	36.0%	2599.6	100%	2599.58	34.03%
Torrance	1,564.50	53.7%	2111.1	44.8%	2111.09	27.64%
Total	**2,913.94**	**100%**	**4710.7**	**100%**	**7638.83**	**100%**

Site Description: Located on the north side of Herondo Street, near the intersection of Valley Drive. The access manhole is not in the immediate traffic lane; however, traffic control is likely still necessary due to the general busyness of the street and the intersection.

Site Location: See CIMP Figure 11

Site View:



Summary Sheet for OF-BCEG-5

Site ID: OF-BCEG-5	**Monitoring Type:** Rotating Stormwater Outfall
Latitude: 33.894574	**Watershed:** Santa Monica Bay
Longitude: -118.378438	**Represented Area:** City of Manhattan Beach
Thomas Guide Grid: pg732 J5	**Drainage System:** Marine
Outfall Shape: Round	**HUC-12:** Lower Dominguez Channel (180701060102)
Outfall Type: Manhole	**Nearest Street Address:** 1856 Marine Avenue, Manhattan Beach, CA 90266

	OF-BCEG-5 Catchment		**Manhattan Beach Portion of Lower DC HUC-12 area**		**Beach Cities WMG Portion of Lower DC HUC-12 area**	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agricultural	0	0%	0	0%	106.13	1.42%
Commercial	121.9	33.40%	111.43	30.16%	1252.65	16.73%
Education	0	0%	0	0%	259.25	3.46%
Industrial	72.31	19.81%	77.45	20.96%	2012.17	26.88%
Multi-Family Residential	51.25	14.04%	51.25	13.87%	905.69	12.10%
Open Space	59.58	16.33%	56.89	15.40%	439.53	5.87%
Single Family Residential	59.91	16.42%	72.45	19.61%	2392.15	31.95%
Transportation	0	0%	0	0%	118.77	1.59%
Total	**364.95**	**100%**	**369.47**	**100%**	**7486.34**	**100%**
Municipal Jurisdiction						
Hermosa Beach	0	0%	0	0%	0	0%
Manhattan Beach	325.2	89.11%	369.47	100%	362.95	4.89%
Redondo Beach	1.24	0.34%	0	0%	1251.83	16.85%
Torrance	0	0%	0	0%	5812.65	78.26%
El Segundo[1]	38.51	10.55%	0	0%	0	0%
Total	**364.95**	**100%**	**369.47**	**100%**	**7427.43**	**100%**

Site Description: OF-BCEG-5 is located in Manhattan Beach at the intersection of Aviation Boulevard and Marine Avenue. It is in the east bound number one lane of Marine Avenue, 15' beyond the crosswalk.

Site Location: See CIMP Figure 12

Site View:

[1] El Segundo not part of Beach Cities WMG

Summary Sheet for OF-BCEG-6

Site ID: OF-BCEG-6	**Monitoring Type:** Rotating Stormwater Outfall
Latitude: 33.887345	**Watershed:** Santa Monica Bay
Longitude: -118.360899	**Represented Area:** City of Redondo Beach
Thomas Guide Grid: pg 733 C6	**Drainage System:** BI 569
Outfall Shape: Round	**HUC-12:** Lower Dominguez Channel (180701060102)
Outfall Type: Manhole	**Nearest Street Address:** 15808 Inglewood Avenue, Lawndale, CA 90260

	OF-BCEG-6 Catchment		**Redondo Beach Portion of Lower DC HUC-12 area**		**Beach Cities WMG Portion of Lower DC HUC-12 area**	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agricultural	6.03	0.77%	11.34	0.90%	106.13	1.42%
Commercial	51.08	6.55%	226	17.96%	1252.65	16.73%
Education	15.65	2.01%	15.69	1.25%	259.25	3.46%
Industrial	0.65	0.08%	199.46	15.85%	2012.17	26.88%
Multi-Family Residential	419.9	53.87%	463.49	36.83%	905.69	12.10%
Open Space	39.61	5.08%	59.63	4.74%	439.53	5.87%
Single Family Residential	246.58	31.63%	260.76	20.72%	2392.15	31.95%
Transportation	0	0%	22.21	1.76%	118.77	1.59%
Total	**779.5**	**100%**	**1258.6**	**100%**	**7486.34**	**100%**
Municipal Jurisdiction						
Hermosa Beach	0	0%	0	0%	0	0%
Manhattan Beach	7.59	0.97%	0	0%	362.95	4.89%
Redondo Beach	771.91	99.03%	1258.6	100%	1251.83	16.85%
Torrance	0	0%	0	0%	5812.65	78.26%
Total	**779.5**	**100%**	**1258.6**	**100%**	**7427.43**	**100%**

Site Description: OF-BCEG-6 is located 40' east of the intersection of Manhattan Beach Boulevard and Inglewood Avenue in the east bound number one lane of Manhattan Beach Boulevard. Traffic controls will be required for OF-BCEG-6 due to its location and traffic load.

Site Location: See CIMP Figure 13

Site View:

Summary Sheet for OF-BCEG-7

Site ID: OF-BCEG-7	**Monitoring Type:** Fixed Stormwater Outfall
Latitude: 33.83722	**Watershed:** Santa Monica Bay
Longitude: -118.30879	**Represented Area:** City of Torrance
Thomas Guide Grid: pg763 J5	**Drainage System:** Torrance Carson Lateral
Outfall Shape: Channel	**HUC-12:** Lower Dominguez Channel (180701060102)
Outfall Type: Reinforced Concrete Channel	**Nearest Street Address:** 21176 S. Western Avenue, Torrance, CA, 90501

	OF-BCEG-7 Catchment		**Torrance Portion of Lower DC HUC-12 area**		**Beach Cities WMG Portion of Lower DC HUC-12 area**	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Land Use Category						
Agricultural	20.22	0.61%	94.79	1.63%	106.13	1.42%
Commercial	514.41	15.52%	885.65	15.22%	1252.65	16.73%
Education	109.69	3.31%	243.56	4.19%	259.25	3.46%
Industrial	1576.1	47.56%	1729.2	29.71%	2012.17	26.88%
Multi-Family Residential	114.37	3.45%	391.35	6.72%	905.69	12.10%
Open Space	252.55	7.62%	320.16	5.50%	439.53	5.87%
Single Family Residential	710.21	21.43%	2058.5	35.37%	2392.15	31.95%
Transportation	16.51	0.50%	96.56	1.66%	118.77	1.59%
Total	**3314.1**	**100%**	**5819.8**	**100%**	**7486.34**	**100%**
Municipal Jurisdiction						
Hermosa Beach	0	0%	0	0%	0	0%
Manhattan Beach	0	0%	0	0%	362.95	4.89%
Redondo Beach	0	0%	0	0%	1251.83	16.85%
Torrance	3314.1	100%	5819.8	100%	5812.65	78.26%
Total	**3314.1**	**100%**	**5819.8**	**100%**	**7427.43**	**100%**

Site Description: OF-BCEG-7 is located at the Torrance Lateral headwaters at the intersection of S. Western Avenue and 212th Street. Access to the channel may require an encroachment permit from the Los Angeles County Department of Public Works (LACDPW) or Flood Control District (LACFCD).

Site Location: See CIMP Figure 14

Site View:

Beach Cities CIMP Appendix D
Analytical and Monitoring Procedures

July 2015

D.1 Analytical Procedures

The following sections discuss field and laboratory analytical procedures and data generation.

D.1.1 Field Parameters

Field meter will be calibrated in accordance to **Section D.2.1.3**. Portable field meters will measure field parameters within the specifications outlined in **Table D-1**.

Table D-1 Analytical Methods and Project Reporting Limits for Field Parameters

Parameter	Method	Range	Project RL
Current velocity	Electromagnetic	-0.5 to +20 ft/s	0.05 ft/s
pH	Electrometric	0 – 14 pH units	NA
Temperature	High stability thermistor	-5 – 50 oC	NA
Dissolved oxygen	Membrane	0 – 50 mg/L	0.5 mg/L
Turbidity	Nephelometric	0 – 3000 NTU	0.2 NTU
Conductivity	Graphite electrodes	0 – 10 mmhos/cm	2.5 umhos/cm

RL – Reporting Limit NA – Not applicable

D.1.2 Analytical Methods and Method Detection and Reporting Limits

The Method Detection Limit (MDL) is the minimum analyte concentration that can be measured and reported with a 99% confidence that the concentration is greater than zero. The Reporting Limit (RL) represents the concentration of an analyte that can be routinely measured in the sampled matrix within stated limits and with confidence in both identification and quantitation.

Under this monitoring program, RLs must be verifiable by having the lowest non-zero calibration standard or calibration check sample concentration at or less than the RL. RLs have been established in this CIMP based on the verifiable levels and general measurement capabilities demonstrated for each method. These RLs should be considered as maximum allowable RLs to be used for laboratory data reporting. Note that samples diluted for analysis may have sample-specific RLs that exceed these RLs. This will be unavoidable on occasion. However, if samples are consistently diluted to overcome matrix interferences, the analytical laboratory will be required to notify the Beach Cities WMG regarding how the sample preparation or test procedure in question will be modified to reduce matrix interferences so that project RLs can be met consistently. Non-promulgated methods are subject to additional analytical challenges.

Analytical methods and laboratory RLs are summarized in **Table D-2** and **Table D-3** for analysis in water, sediment, and tissue, respectively. For organic constituents, environmentally relevant detection limits will be used to the extent practicable. The RLs listed in **Table D-2** are consistent with the requirements of the available minimum levels provided in the MRP, except for total dissolved solids, which was set equal to the minimum level identified in the California State Water Resources Control Board's Surface Water Ambient Monitoring Program's (SWAMP) Quality Assurance Project Plan. Alternative methods with RLs that are at or below those in

Table D-2, and **Table D-3** are equivalent and can be used in place of the methods on **Table D-2** and **Table D-3**.

Prior to the analysis of any environmental samples, the laboratory must have demonstrated the ability to meet the minimum performance requirements for each analytical method presented in **Table D-2**. The initial demonstration of capability includes the ability to meet the project RLs, the ability to generate acceptable precision and accuracy, and other analytical and quality control parameters documented in this CIMP. Data quality objectives for precision and accuracy are summarized in **Table D-4**.

Table D-2 Analytical Methods and Project Reporting Limits (RL) for Laboratory Analysis of Water Samples

Parameter/Constituent	Method[(1)]	Units	Project RL	MRP Table E-2 ML
Toxicity				
Pimephales promelas	EPA-821-R-02-013 (1000.0) and EPA-821-R-02-012 (2000.0)	NA	NA	NA
Ceriodaphnia dubia	EPA-821-R-02-013 (1002.0) and 821-R-02-012 (2002.0)	NA	NA	NA
Selenastrum capricornutum	EPA-821-R-02-013 (1003.0)	NA	NA	NA
Strongylocentrotus purpuratus	EPA-600-R-95-136 (1002.0)	NA	NA	NA
Haliotis rufescens	EPA-600-R-95-136	NA	NA	NA
Bacteria				
Total coliform (marine waters)	SM 9221	MPN/100mL	10	10,000
Enterococcus (marine waters)	SM 9230	MPN/100mL	10	104
Fecal coliform (marine and fresh waters)	SM 9221	MPN/100mL	10	400
E. coli (fresh)	SM 9221	MPN/100mL	10	235
Conventional Pollutants				
Oil and Grease	EPA 1664A	mg/L	5	5
Cyanide	SM 4500-CN E	mg/L	0.005	0.005
General				
Specific Conductance	EPA 120.1	µs/cm	1	1
Total Hardness	SM 2340C	mg/L	2	2
Dissolved Organic Carbon	SM 5310B	mg/L	0.6	NA
Total Organic Carbon	SM 5310B	mg/L	1	1
Total Petroleum Hydrocarbon	EPA 1664	mg/L	5	5
Biochemical Oxygen Demand	SMOL-5210	mg/L	5	2
Chemical Oxygen Demand	SM 5220D	mg/L	20	20-900
MBAS	SM 5540C	mg/L	0.5	0.5

Table D-2 Analytical Methods and Project Reporting Limits (RL) for Laboratory Analysis of Water Samples

Parameter/Constituent	Method[1]	Units	Project RL	MRP Table E-2 ML
Chloride	EPA 300.0	mg/L	1	2
Fluoride	EPA 300.0	mg/L	0.1	0.1
Perchlorate	EPA 314.0	µg/L	4	4
Dissolved Phosphorus	SM 4500-P E	mg/L	0.05	0.05
Total Phosphorus	SM 4500-P E	mg/L	0.05	0.05
Orthophosphate-P	EPA 300.0	mg/L	0.2	NA
Ammonia (as N)	SM 4500-NH3 C	mg/L	0.1	0.1
Nitrate + Nitrite (as N)	EPA 300.0	mg/L	0.1	0.1
Nitrate (as N)	EPA 300.0	mg/L	0.1	0.1
Nitrite (as N)	EPA 300.0	mg/L	0.1	0.1
Total Kjehdahl Nitrogen (TKN)	SM 4500-NH3 C	mg/L	0.1	0.1
Total Alkalinity	SM 2320B	mg/L	2	2
Solids				
Suspended Sediment Concentration (SSC)	ASTMD 3977-97	mg/L	3	NA
Total Suspended Solids (TSS)	SM 2540D	mg/L	2	2
Total Dissolved Solids (TDS)	SM 2540C	mg/L	10	2
Volatile Suspended Solids	EPA 1684	mg/L	1	2
Metals in Freshwater (dissolved and total)				
Aluminum	EPA 200.8	µg/L	100	100
Antimony	EPA 200.8	µg/L	0.5	0.5
Arsenic	EPA 200.8	µg/L	1	1
Beryllium	EPA 200.8	µg/L	0.5	0.5
Cadmium	EPA 200.8	µg/L	0.25	0.25
Chromium (total)	EPA 200.8	µg/L	0.5	0.5
Chromium (Hexavalent)	EPA 200.8	µg/L	5	5
Copper	EPA 200.8	µg/L	0.5	0.5
Iron	EPA 200.8	µg/L	100	100
Lead	EPA 200.8	µg/L	0.5	0.5
Mercury	EPA 1631	µg/L	0.5	0.5
Nickel	EPA 200.8	µg/L	1	1
Selenium	EPA 200.8	µg/L	1	1
Silver	EPA 200.8	µg/L	0.25	0.25
Thallium	EPA 200.8	µg/L	1	1
Zinc	EPA 200.8	µg/L	1	1
Metals in Seawater (dissolved and total)				
Copper	EPA 1640	µg/L	1	NA
Lead	EPA 1640	µg/L	1	NA

Table D-2 Analytical Methods and Project Reporting Limits (RL) for Laboratory Analysis of Water Samples

Parameter/Constituent	Method(1)	Units	Project RL	MRP Table E-2 ML
Mercury	EPA 1631	µg/L	1	NA
Nickel	EPA 1640	µg/L	1	NA
Selenium	EPA 1640	µg/L	1	NA
Silver	EPA 1640	µg/L	1	NA
Zinc	EPA 1640	µg/L	1	NA
Organochlorine Pesticides				
Aldrin	EPA 608	ng/L	5	5
alpha-BHC	EPA 608	ng/L	10	10
beta-BHC	EPA 608	ng/L	5	5
delta-BHC	EPA 608	ng/L	5	5
gamma-BHC (Lindane)	EPA 608	ng/L	20	20
Chlordane-alpha	EPA 608	ng/L	100	100
Chlordane-gamma	EPA 608	ng/L	100	100
Oxychlordane	EPA 608	ng/L	200	NA
Cis-nonachlor	EPA 608	ng/L	200	NA
Trans-nonachlor	EPA 608	ng/L	200	NA
2,4'-DDD	EPA 608	ng/L	2	NA
2,4'-DDE	EPA 608	ng/L	2	NA
2,4'-DDT	EPA 608	ng/L	2	NA
4,4’-DDD	EPA 608	ng/L	50	50
4,4’-DDE	EPA 608	ng/L	50	50
4,4’-DDT	EPA 608	ng/L	10	10
Dieldrin	EPA 608	ng/L	10	10
Endosulfan I	EPA 608	ng/L	20	20
Endosulfan II	EPA 608	ng/L	10	10
Endosulfan Sulfate	EPA 608	ng/L	50	50
Endrin	EPA 608	ng/L	10	10
Endrin Aldehyde	EPA 608	ng/L	10	10
Heptachlor	EPA 608	ng/L	10	10
Heptachlor Epoxide	EPA 608	ng/L	10	10
Toxaphene	EPA 608	ng/L	500	500
PCBs				
Congeners (8, 18, 28, 31, 33, 37, 44, 49, 52, 56, 60, 66, 70, 74, 77, 81, 87, 95, 97, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 132, 138, 141, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 174, 177, 180, 183, 187, 189, 194, 195, 201,	EPA 608	ng/L	2	NA

Table D-2 Analytical Methods and Project Reporting Limits (RL) for Laboratory Analysis of Water Samples

Parameter/Constituent	Method[1]	Units	Project RL	MRP Table E-2 ML
203, 206, and 209)				
Aroclors (1016, 1221, 1232, 1242, 1248, 1254, 1260)	EPA 608	ng/L	500	500
Organophosphorus Pesticides				
Chlorpyrifos	EPA 614	ng/L	50	50
Diazinon	EPA 614	ng/L	10	10
Malathion	EPA 614	ng/L	1000	1000
Triazine				
Atrazine	EPA 530	µg/L	2	2
Cyanazine	EPA 530	µg/L	2	2
Prometryn	EPA 530	µg/L	2	2
Simazine	EPA 530	µg/L	2	2
Herbicides				
2,4-D	EPA 8151A	µg/L	10	10
Glyphosate	EPA 547	µg/L	5	5
2,4,5-TP-SILVEX	EPA 8151A	µg/L	0.5	0.5
Semivolatile Organic Compounds (SVOCs)				
1,2-Diphenylhydrazine	EPA 625	µg/L	1	1
2,4,6-Trichlorophenol	EPA 625	µg/L	10	10
2,4-Dichlorophenol	EPA 625	µg/L	1	1
2,4-Dimethylphenol	EPA 625	µg/L	2	2
2,4-Dinitrophenol	EPA 625	µg/L	5	5
2,4-Dinitrotoluene	EPA 625	µg/L	5	5
2,6-Dinitrotoluene	EPA 625	µg/L	5	5
2-Chloronaphthalene	EPA 625	µg/L	10	10
2-Chlorophenol	EPA 625	µg/L	2	2
2-Methyl-4,6-dinitrophenol	EPA 625	µg/L	5	5
2-Nitrophenol	EPA 625	µg/L	10	10
3,3'-Dichlorobenzidine	EPA 625	µg/L	5	5
4-Bromophenyl phenyl ether	EPA 625	µg/L	5	5
4-Chloro-3-methylphenol	EPA 625	µg/L	1	1
4-Chlorophenyl phenyl ether	EPA 625	µg/L	5	5
4-Nitrophenol	EPA 625	µg/L	5	5
Acenaphthene	EPA 625	µg/L	1	1
Acenaphthylene	EPA 625	µg/L	2	2
Anthracene	EPA 625	µg/L	2	2
Benzidine	EPA 625	µg/L	5	5
Benzo(a)anthracene	EPA 625	µg/L	5	5

Table D-2 Analytical Methods and Project Reporting Limits (RL) for Laboratory Analysis of Water Samples

Parameter/Constituent	Method(1)	Units	Project RL	MRP Table E-2 ML
Benzo(a)pyrene	EPA 625	µg/L	2	2
Benzo(b)fluoranthene	EPA 625	µg/L	10	10
Benzo(g,h,i)perylene	EPA 625	µg/L	5	5
Benzo(k)fluoranthene	EPA 625	µg/L	2	2
Benzyl butyl phthalate	EPA 625	µg/L	10	10
bis(2-Chloroethoxy) methane	EPA 625	µg/L	5	5
bis(2-Chloroisopropyl) ether	EPA 625	µg/L	2	2
bis(2-Chloroethyl) ether	EPA 625	µg/L	1	1
bis(2-Ethylhexyl) phthalate	EPA 625	µg/L	5	5
Chrysene	EPA 625	µg/L	5	5
Dibenzo(a,h)anthracene	EPA 625	µg/L	0.1	0.1
Diethyl phthalate	EPA 625	µg/L	2	2
Dimethyl phthalate	EPA 625	µg/L	2	2
Di-n-butylphthalate	EPA 625	µg/L	10	10
Di-n-octylphthalate	EPA 625	µg/L	10	10
Fluoranthene	EPA 625	µg/L	0.05	0.05
Fluorene	EPA 625	µg/L	0.1	0.1
Hexachlorobenzene	EPA 625	µg/L	1	1
Hexachlorobutadiene	EPA 625	µg/L	1	1
Hexachloro-cyclo pentadiene	EPA 625	µg/L	5	5
Hexachloroethane	EPA 625	µg/L	1	1
Indeno(1,2,3-cd)pyrene	EPA 625	µg/L	0.05	0.05
Isophorone	EPA 625	µg/L	1	1
Naphthalene	EPA 625	µg/L	0.2	0.2
Nitrobenzene	EPA 625	µg/L	1	1
N-Nitroso-dimethyl amine	EPA 625	µg/L	5	5
N-Nitrosodiphenylamine	EPA 625	µg/L	1	1
N-Nitroso-di-n-propyl amine	EPA 625	µg/L	5	5
Pentachlorophenol	EPA 625	µg/L	2	2
Phenanthrene	EPA 625	µg/L	0.05	0.05
Total Phenols	EPA 625	mg/L	0.2	0.1
Phenol	EPA 625	µg/L	1	1
Pyrene	EPA 625	µg/L	0.05	0.05
Volatile Organic Compounds				
1,2,4-Trichlorobenzene	EPA 625	µg/L	1	1
1,2-Dichlorobenzene	EPA 625	µg/L	1	1
1,3-Dichlorobenzene	EPA 625	µg/L	1	1
1,4-Dichlorobenzene	EPA 625	µg/L	1	1

Table D-2 Analytical Methods and Project Reporting Limits (RL) for Laboratory Analysis of Water Samples

Parameter/Constituent	Method(1)	Units	Project RL	MRP Table E-2 ML
2-Chloroethyl vinyl ether	EPA 625	µg/L	1	1
Methyl tert-butyl ether (MTBE)	EPA 625	µg/L	1	1

Table D-3 Analytical Methods and Reporting Limits (RL) for Laboratory Analysis of Sediment

Parameter/Constituent	Method(1)	Units	Project RL
Metals			
Copper	EPA 6020	µg/dry g	0.05
Lead	EPA 6020	µg/dry g	0.05
Zinc	EPA 6020	µg/dry g	0.05

RL – Reporting Limit NA – Not applicable
Methods may be substituted by an equivalent method that is lower than or meets the project RL.

Table D-4 Data Quality Objectives

Parameter	Accuracy[2]	Precision[2]	Recovery	Completeness
Field Measurements				
Water Velocity (for Flow calc.)	2%	NA	NA	90%
pH	+ 0.2 pH units	+ 0.5 pH units	NA	90%
Temperature	+ 0.5 ºC	+ 5%	NA	90%
Dissolved Oxygen	+ 0.5 mg/L	+ 10%	NA	90%
Turbidity	10%	10%	NA	90%
Conductivity	5%	5%	NA	90%
Laboratory Analyses – Water				
Conventionals and Solids	80 – 120%	0 – 25%	80 – 120%	90%
Aquatic Toxicity[1]	(1)	(2)	NA	90%
Nutrients[3]	80 – 120%	0 – 25%	90 – 110%	90%
Metals[3]	75 – 125%	0 – 25%	75 – 125%	90%
Semi-Volatile Organics[3]	50 – 150%	0 – 25%	50 – 150%	90%
Volatile Organics[3]	50 – 150%	0 – 25%	50 – 150%	90%
Triazines[3]	50 – 150%	0 – 25%	50 – 150%	90%
Herbicides[3]	50 – 150%	0 – 25%	50 – 150%	90%
OC Pesticides[3]	50 – 150%	0 – 25%	50 – 150%	90%
PCB Congeners[3]	50 – 150%	0 – 25%	50 – 150%	90%
PCB Aroclors[3]	50 – 150%	0 – 25%	50 – 150%	90%
OP Pesticides[3]	50 – 150%	0 – 25%	50 – 150%	90%
Laboratory Analyses – Sediment				
Metals[3]	60 – 130%	0 – 30%	60 – 130%	90%

[1] Must meet all method performance criteria relative to the reference toxicant test.
[2] Must meet all method performance criteria relative to sample replicates.
[3] See **Table D-2** and **Table D-3** for a list of individual constituents in each water and sediment matrices, respectively.

D.1.2.1Method Detection Limit Studies

Any laboratory performing analyses under this program must routinely conduct MDL studies to document that the MDLs are less than or equal to the project-specified RLs. If any analytes have MDLs that do not meet the project RLs, the following steps must be taken:

- Perform a new MDL study using concentrations sufficient to prove analyte quantitation at concentrations less than or equal to the project-specified RLs per the procedure for the Determination of the Method Detection Limit presented in Revision 1.1, 40 Code of Federal Regulations (CFR) 136, 1984.
- No samples may be analyzed until the issue has been resolved. MDL study results must be available for review during audits, data review, or as requested. Current MDL study results must be reported for review and inclusion in project files.

An MDL is developed from seven aliquots of a standard containing all analytes of interest spiked at five times the expected MDL. These aliquots are processed and analyzed in the same manner as environmental samples. The results are then used to calculate the MDL. If the calculated MDL is less than 0.33 times the spiked concentration, another MDL study should be performed using lower spiked concentrations.

D.1.2.2Project Reporting Limits

Laboratories generally establish RLs that are reported with the analytical results—these may be called reporting limits, detection limits, reporting detection limits, or several other terms by the reporting laboratory. These laboratory limits must be less than or equal to the project RLs listed in **Table D-2**. Wherever possible, project RLs are lower than the relevant numeric criteria or toxicity thresholds. Laboratories performing analyses for this project must have documentation to support quantitation at the required levels.

D.1.2.3Laboratory Standards and Reagents

All stock standards and reagents used for standard solutions and extractions must be tracked through the laboratory. The preparation and use of all working standards must be documented according to procedures outlined in each laboratory’s Quality Assurance (QA) Manual; standards must be traceable according to USEPA, A2LA or National Institute for Standards and Technology (NIST) criteria. Records must have sufficient detail to allow determination of the identity, concentration, and viability of the standards, including any dilutions performed to obtain the working standard. Date of preparation, analyte or mixture, concentration, name of preparer, lot or cylinder number, and expiration date, if applicable, must be recorded on each working standard.

D.1.2.4Sample Containers, Storage, Preservation, and Holding Times

Sample containers must be pre-cleaned and certified free of contamination according to the USEPA specification for the appropriate methods. Sample container, storage and preservation, and holding time requirements are provided in **Table D-5**. The analytical laboratories will supply sample containers that already contain preservative (**Table D-5**), including ultra-pure hydrochloric and nitric acid, where applicable. After collection, samples will be stored at 4°C until arrival at the contract laboratory.

Table D-5 Sample Container, Sample Volume, Initial Preservation, and Holding Time Requirements for Parameters Analyzed at a Laboratory

Parameter	Sample Container	Sample Volume[1]	Immediate Processing and Storage	Holding Time
Water				
Toxicity				
Initial Screening Follow-Up Testing Phase I TIE	Glass or FLPE-lined jerrican	40 L	Store at 4°C	36 hours[2]
Total coliform, fecal coliform, and Enterococcus (marine waters)	PE	120 mL	$Na_2S_2O_3$ Store at 4ºC	8 hours
Fecal coliform, *E. coli* (fresh waters)	PE	120 mL		
Oil and Grease	PE	250 mL	HCl and Store at 4°C	28 days
Cyanide	PE	1 L	NaOH and Store at 4°C	14 days
Dissolved Organic Carbon (DOC)	PE	250 mL	Store at 4°C	Filter/28 days
Total Organic Carbon (TOC)	PE	250 mL	H_2SO_4 and Store at 4°C	28 days
Total Petroleum Hydrocarbon	Glass	1 L	HCl or H_2SO_4 and Store at 4°C	7/40 days[3]
Biochemical Oxygen Demand	PE	1L	Store at 4°C	48 hours
Chemical Oxygen Demand	PE	500 mL	H_2SO_4 and Store at 4°C	28 days
MBAS	PE	1 L	Store at 4°C	48 hours
Fluoride	PE	500 mL	None required	28 days
Chloride	PE	250 mL	Store at 4°C	28 days
Perchlorate	PE	500 mL	Store at 4°C	28 days
Nitrate Nitrogen Nitrite Nitrogen Orthophosphate-P	PE	250 mL	Store at 4°C	48 hours
Ammonia Nitrogen Total and Dissolved Phosphorus Organic Nitrogen Nitrate + Nitrite (as N)	Glass	250-mL	H_2SO_4 Store at 4°C	28 days
Total Kjehdahl Nitrogen (TKN)	PE	250 mL	H_2SO_4 Store at 4°C	28 days
Total Alkalinity	PE	500 mL	Store at 4°C	14 days
Suspended Sediment Concentration (SSC)	PE	250 mL	Store at 4°C	120 days
Total Suspended Solids (TSS)	PE	250 mL	Store at 4°C	7 days
Total Dissolved Solids (TDS)	PE	250 mL	Store at 4°C	7 days
Volatile Suspended Solids	PE	250 mL	Store at 4°C	7 days

Table D-5 Sample Container, Sample Volume, Initial Preservation, and Holding Time Requirements for Parameters Analyzed at a Laboratory

Parameter	Sample Container	Sample Volume[1]	Immediate Processing and Storage	Holding Time
Hardness	PE	500 mL	Store at 4°C	180 days
Metals				6 months[4]
Mercury	Glass	500 mL	Store at 4°C	48 Hours
PCBs, OC Pesticides, OP Pesticides, Triazine Pesticides	Amber glass	4 x 1 L	Store at 4°C	7/40 days[3]
Suspended Solids Analysis for Organics and Metals	Amber glass	20 x 1 L	Store at 4°C	1 year[5]
Herbicides	Glass	2 x 40 mL	Thiosulfate and Store at 4°C	14 days
Semivolatile Organic Compounds	Glass	2 x 1 L	Store at 4°C	7 days
Sediment				
Metals	Glass	2 x 8 oz jar	Store at 4°C	1 year[6]

PE – Polyethylene

[1] Additional volume may be required for QC analyses.

[2] Tests should be initiated within 36 hours of collection. The 36-hour hold time does not apply to subsequent analyses for TIEs. For interpretation of toxicity results, samples may be split from toxicity samples in the laboratory and analyzed for specific chemical parameters. All other sampling requirements for these samples are as specified in this document for the specific analytical method. Results of these analyses are not for any other use (e.g., characterization of ambient conditions) because of potential holding time exceedances and variance from sampling requirements. Sample volumes for follow-up testing and Phase I TIEs for sediments may change based on percent solids in previous samples. In addition, collection of sediment for follow-up testing and Phase I TIEs may change based on observations of toxicity in previous sampling events.

[3] 7/40 = 7 days to extract and 40 days from extraction to analysis.

[4] Six months after preservation.

[5] One year if frozen, otherwise 14 days to extract and 40 days from extraction to analysis.

[6] One year if frozen, otherwise 28 days.

D.1.3 Aquatic Toxicity Testing and Toxicity Identification Evaluations

The aquatic toxicity testing requirements outlined in the MS4 Permit are intended to determine whether water column toxicity is observed in targeted receiving waters and then assess which pollutant categories may potentially be causing the adverse aquatic effects. The results of aquatic toxicity testing are intended to guide future receiving and outfall water quality monitoring and contribute to the identification and control of toxicity causing pollutants in urban runoff through watershed control measures that may include: pollutant source controls, modified minimum control measures (MCMs) and Best Management Practices (BMPs). The following subsections outline the approach for conducting the Beach Cities WMG aquatic toxicity monitoring and evaluation. Control measures and management actions to address confirmed toxicity caused by urban runoff are addressed by the EWMP, either via currently identified management actions or those that are identified via adaptive management of the EWMP.

The approach to conducting aquatic toxicity monitoring is presented in **Figure D-1**, which describes a general evaluation process for each sample collected as part of routine sampling conducted twice per year in wet weather and once per year in dry weather. Monitoring begins in the receiving water and the information gained is used to identify constituents for monitoring at outfalls to support the identification of pollutants that need to be addressed in the EWMP. The sub-sections below describe the detailed process and its technical and logistical rationale. Although not specified for testing at this time, the saltwater toxicity testing approach is also provided if such testing is initiated.

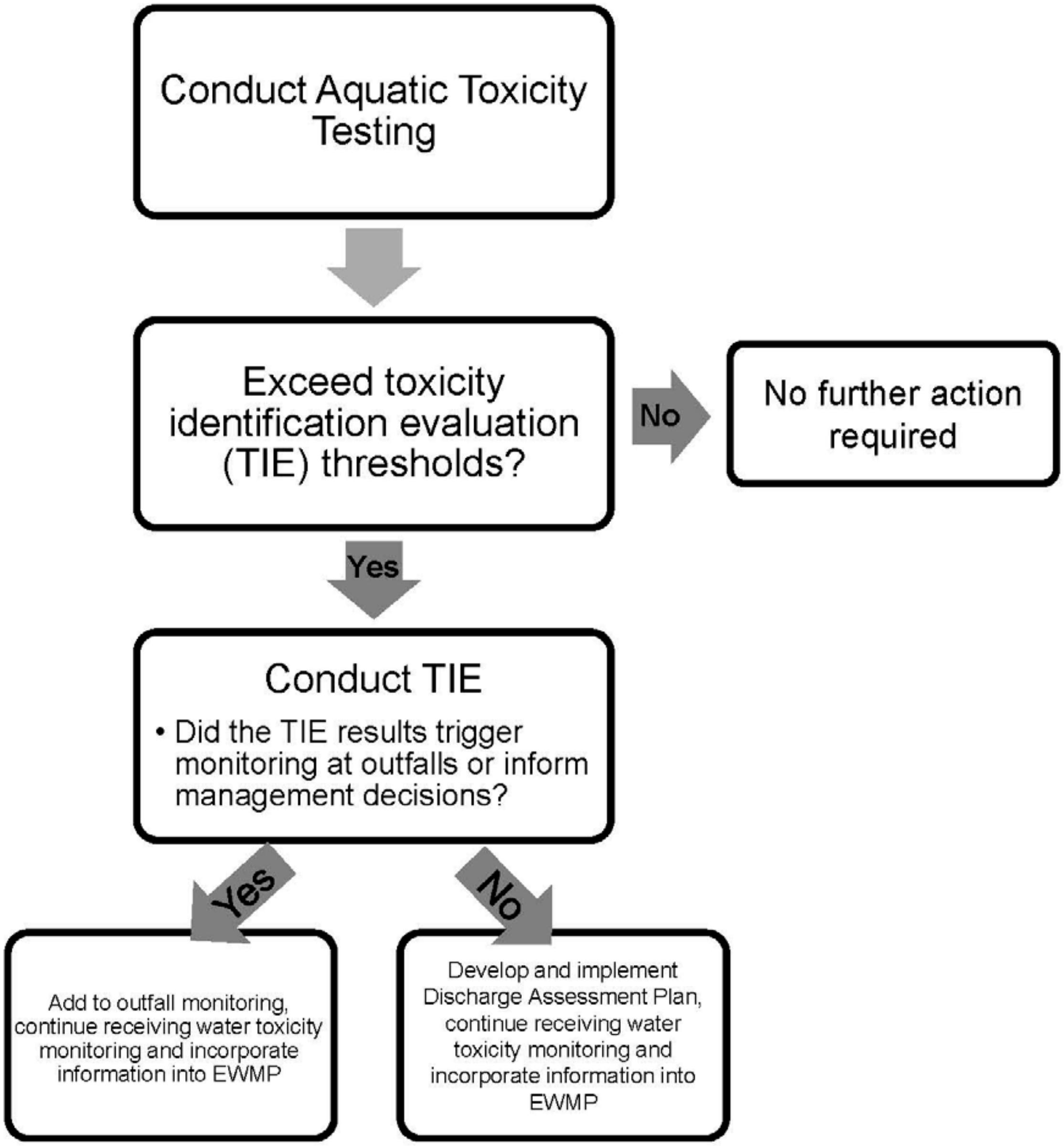


Figure D-1 Generalized Aquatic Toxicity Assessment Process

D.1.3.1Sensitive Species Selection

The MRP (page E-32) states that a sensitivity screening to select the most sensitive test species should be conducted unless “a sensitive test species has already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s), then monitoring shall be conducted using only that test species.” Previous relevant studies conducted in the watershed should be considered. Such studies may have been completed via previous MS4 sampling, wastewater NPDES sampling, or special studies conducted within the watershed. The following sub-sections discuss the species section process for assessing aquatic toxicity in receiving waters.

D.1.3.1.1 Freshwater Sensitive Species Selection

As described in the MRP (page E-31), if samples are collected in receiving waters with salinity less than 1 part per thousand (ppt), or from outfalls discharging to receiving waters with salinity less than 1 ppt, toxicity tests should be conducted on the most sensitive test species in accordance with species and short-term test methods in Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136). Static renewal freshwater toxicity test species identified in the MRP are:

- Fathead minnow, *Pimephales promelas* (Larval Survival and Growth Test Method 1000.04).
- Daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.05).
- Green alga, *Selenastrum capricornutum* (*Raphidocelis subcapitata*) (Growth Test 1003.0).

Low salinity (fresh) receiving water toxicity testing data, from within the Beach Cities WMG area, were not identified during CIMP preparation. Toxicity data from the Dominguez Channel and other regional receiving waters, suggest that organophosphate pesticides, pyrethroids, and metals may contribute to aquatic toxicity. Assuming the potential presence of these toxicants in the WMG area, relative sensitivity to these pollutants was a primary consideration in selecting from among the three common test species.

Ceriodaphnia dubia (*C. dubia*) is often used locally and reported upon nationally, as a broad spectrum test species that is sensitive for historical and current use pesticides and metals, and studies indicate that it is more sensitive to the toxicants of concern than *Pimephales promelas* (*P. promelas*) or *Selenastrum capricornutum* (*S. capricornutum*). In *Aquatic Life Ambient Freshwater Quality Criteria - Copper*, the USEPA reports greater sensitivity of *C. dubia* to copper (species mean acute value of 5.93 µg/l) than for *P. promelas* (species mean acute value of 69.93 µg/l; EPA, 2007). *C. dubia*’s relative sensitivity to copper, extends to multiple metals. Additionally, researchers at the University of California (UC), Davis reviewed available reported species sensitivity values in developing pesticide criteria for the Central Valley Regional Water Quality Control Board. In developing pesticide criteria for the Central Valley Regional Water Quality Control Board, researchers at University of California at Davis, reported higher sensitivity of *C. dubia* to diazinon and bifenthrin (species mean acute value of 0.34 µg/l and

0.105 µg/l) compared to *P. promelas* (species mean acute value of 7804 µg/l and 0.405 µg/l; Palumbo et al., 2010a,b). Additionally, in a stormwater study for the City of Stockton, urban stormwater runoff found acute and chronic toxicity to *C. dubia*, with no toxicity to *S. capricornutum* or *P. promelas* (Lee and Lee, 2001). The toxicity was attributed to organophosphate pesticides, indicating a higher sensitivity of *C. dubia* compared to *S. capricornutum* or *P. promelas*. While *P. promelas* is generally less sensitive to metals and pesticides, this species can be more sensitive to ammonia than *C. dubia*. However, as ammonia is not typically a constituent of concern for urban runoff and ammonia is not consistently observed above the toxic thresholds in the watershed, *P. promelas* is not considered a particularly sensitive species for evaluating the impacts of urban runoff in receiving waters in the watershed.

S. capricornutum is a species sensitive to herbicides; however, while sometimes present in urban runoff, herbicides are not identified as a potential toxicant in the watershed. Additionally, *S. capricornutum* is not considered the most sensitive species as it is not sensitive to pyrethroids or organophosphate pesticides and is not as sensitive to metals as *C. dubia*. Additionally, the *S. capricornutum* growth test can be affected by high concentrations of suspended and dissolved solids, color, and pH extremes, which can interfere with the determination of sample toxicity. As a result, it is common to manipulate the sample by centrifugation and filtration to remove solids in order to conduct the toxicity test; however, this process may affect the toxicity of the sample. In a study of urban highway stormwater runoff (Kayhanian et. al, 2008), *S. capricornutum* response to the stormwater samples was more variable than the *C. dubia* and the *P. promelas* and in some cases the algal growth was possibly enhanced due to the presence of stimulatory nutrients. Also, in a study on the City of Stockton urban stormwater runoff (Lee and Lee, 2001) the *S. capricornutum* tests rarely detected toxicity where the *C. dubia* and the *P. promelas* regularly detected toxicity.

Based on best professional judgment and local experience with the Permit identified fresh water species, *C. dubia* is most sensitive to the broadest range of potential toxicant(s) typically found in local fresh receiving waters impacted by urban runoff and will be selected for fresh water toxicity testing by the Beach Cities WMG. The species can be maintained laboratory cultures making them generally available year round. The simplicity of the test, the ease of interpreting results, and relatively small sample volume necessary to run the test, make the test a valuable screening tool. The ease of sample collection and higher sensitivity will support assessing the presence of ambient receiving water toxicity or long term effects of toxic stormwater over time. As such, toxicity testing in the freshwater portions of the watershed will be conducted using *C. dubia*. However, *C. dubia* test organisms are typically cultured in moderately hard waters (80-100 mg/L $CaCO_3$) and can have increased sensitivity to elevated water hardness greater than 400 mg/L $CaCO_3$), which is beyond their typical habitat range. Because of this, in instances where hardness in site waters exceeds 400 mg/L ($CaCO_3$), an alternative test species may be used. Daphnia magna is more tolerant to high hardness levels and is a suitable substitution for *C. dubia* in these instances (Cowgill and Milazzo, 1990).

D.1.3.1.2 Saltwater Sensitive Species Selection

Samples collected in receiving waters with salinity equal to or greater than 1 ppt or from outfalls discharging to receiving waters with salinity that is equal to or greater than 1 ppt, should be tested using the most sensitive test species in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms (EPA/600/R-95/136, 1995)*. The marine and estuarine test species identified in the MRP are:

- A static renewal toxicity test with the topsmelt, *Atherinops affinis* (Larval Survival and Growth Test Method 1006.015).
- A static non-renewal toxicity test with the purple sea urchin, *Strongylocentrotus purpuratus* (Fertilization Test Method 1008.0).
- A static non-renewal toxicity test with the giant kelp, *Macrocystis pyrifera* (Germination and Growth Test Method 1009.0).

In addition to the three species identified in the MRP, the red abalone, *Haliotis rufescens* (*H. rufescens*), larval development test was also considered given the extensive use in region.

Although all the species mentioned have been demonstrated as sensitive to a wide variety of toxicants and have been subject to numerous inter- and intra-laboratory testing using standardized toxicants, two species: *Macrocystis pyrifera* (*M. pyrifera*) and *Atherinops affinis* (*A. affinis*); have limitations when used to assess the toxicity of stormwater, as compared to the sea urchin fertilization test and the red abalone larval development test.

The method for *M. pyrifera* is a 48-hour chronic toxicity test that measures the percent zoospore germination and the length of the gametophyte germ tube. Although the test may be sensitive to herbicides, fungicides, and treatment plant effluent, the use of *M. pyrifera* as a test species for stormwater monitoring may not be ideal. Obtaining sporophylls for stormwater testing could also be a limiting factor for selecting this test. Collection of *M. pyrifera sporophylls* from the field is necessary prior to initiating the test and the target holding time for any receiving water or stormwater sample is 36 hours; however, 72 hours is the maximum time a sample may be held prior to test initiation. During the dry season, meeting the 36-72 hour holding time will be achievable; however, field collection during wet weather may be delayed beyond the maximum holding time due to heavy seas and inaccessible collection sites. In addition, collection of *M. pyrifera sporophylls* during the storm season may include increased safety risks that can be avoided by selection of a different species.

The *A. affinis* test measures the survival and growth test of a larval fish over seven days. At the end of seven days of exposure to a suspected toxicant, the number of surviving fish are recorded, along with their weights, and compared to those exposed to non-contaminated seawater. Positive characteristics of the *A. affiniss* chronic test include the ability to purchase test organisms from commercial suppliers as well as being one of the few indigenous test species that may be used to test undiluted stormwater by the addition of artificial sea salts to within the range of marine receiving waters. Unfortunately, the tolerance of *A. affinis* to chemicals in artificial sea salts may also explain their lack of sensitivity to changes in water quality compared to other test organisms such as the sea urchin or red abalone. There are concerns with the comparability of conducting a seven-day exposure test when most rain events do not occur over a seven-day period.

The *Strongylocentrotus purpuratus* (*S. purpuratus*) fertilization test measures the ability of *S. purpuratus* sperm to fertilize an egg when exposed to a suspected toxicant. The *S. purpuratus* fertilization has been selected as a chronic toxicity test organism in previous MS4 permits and has been used to assess ambient receiving water toxicity, sediment pore water toxicity, as well as stormwater toxicity. The *S. purpuratus* fertilization test is also among the most sensitive test species to metals. The adult test organisms may be purchased and held in the lab prior to fertilization, and the sample volume necessary to conduct the test is small with respect to the other suggested tests. The minimal exposure period (20 min) allows for a large number of tests to be conducted over a short period of time and permits the testing of toxicants that may lose their potency over long periods of time.

The red abalone larval development test measures the percent of abnormal shell development in larvae exposed to toxic samples for 48 hours. The red abalone is commonly used to test treatment plant effluent, but has had limited use in stormwater compared to the *S. purpuratus* fertilization test. The advantages of the red abalone test include a sensitive endpoint, the ability to purchase abalone from commercial suppliers and hold test organisms prior to spawning, and low variability in results compared to other species (e.g., *S. purpuratus* fertilization test). Thus, though not listed as a potential test species for use in stormwater monitoring in the MS4 permit, it was considered as a potentially sensitive species for the purposes of selecting the most sensitive species.

Due to the limitations of the giant kelp germination and growth test and the topsmelt survival and growth test, in addition to not being particularly sensitive to the constituents identified as problematic in stormwater water runoff from the watershed, these tests are not considered particularly helpful in supporting the identification of pollutants of concern. Based on the sensitivity, smaller test volume requirements, their ability to be housed in the lab prior to testing, and shorter exposure times, the *S. purpuratus* fertilization test and the red abalone development test will be considered during sensitive species selection to measure toxicity in marine and estuarine environments. Based on historical data of the sensitivity of the *S. purpuratus* and red abalone tests, and the limiting factors associated with the topsmelt and giant kelp tests, the sensitive species test for marine and estuarine species will be conducted with the *S. purpuratus* and red abalone tests. Species screening was determined to be appropriate for these two species (as opposed to selecting just one) as testing conducted within the region with both species have shown varying sensitivity. Thus, it is appropriate to test both to determine sensitivity at a given site. After the screening testing is completed, monitoring will be conducted with the most-sensitive species.

D.1.3.2Testing Period

The following subsections characterize the toxicity testing periods for samples collected during dry and wet weather conditions.

D.1.3.2.1 Freshwater Testing Periods

Acute toxicity tests would normally be utilized for stormwater toxicity testing to be consistent with the relatively shorter exposure periods of watershed species to potential urban stormwater toxicants and would be conducted in accordance with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (EPA, 2002b). Despite the test duration not being typical of stormwater flows, Board staff has directed that a chronic testing period (typically 7 days) be used for toxicity testing for both survival and reproductive/growth endpoints for *C. dubia* in samples. Chronic testing will be conducted on undiluted samples in accordance with Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (USEPA, 2002a). Although the utilization of chronic tests to assess wet weather samples, may generate results that are unrepresentative of receiving water conditions, chronic toxicity testing will be used for freshwater testing.

D.1.3.2.2 Saltwater Testing Period

Two marine and estuarine toxicity species tests utilize methods that have short durations (20 minutes for the *S. purpuratus* fertilization test and 48 hours for the *H. rufescens* development test), the end points are sub-lethal and can be considered representative of acute or chronic effects. Both test species and test methods are suitable for wet weather and dry weather monitoring. Chronic toxicity testing will be used for saltwater testing.

D.1.3.3Toxicity Endpoint Assessment and Toxicity Identification Evaluation Triggers

As directed by the Permit MRP, acute and chronic toxicity test endpoints will be analyzed using the Test of Significant Toxicity (TST) t-test approach specified by the USEPA (USEPA, 2010). The Permit specifies that the chronic in-stream waste concentration (IWC) be set at 100% receiving water for receiving water samples and 100% discharge for outfall samples. Follow-up triggers are generally based on the Permit specified statistical assessment as described below.

For acute *C. dubia* toxicity testing, follow up toxicity identification evaluation (TIE) testing is warranted if a statistically significant 50% difference in mortality is observed between the sample and laboratory control, a toxicity identification evaluation (TIE) will be performed. TIE procedures are further discussed in detail in the following subsection. Experience conducting TIEs in regional receiving waters supports using a 50% mortality trigger to provide a reasonable opportunity for a successful TIE. During 2003 and 2004 TMDL monitoring in the Calleguas Creek Watershed (CCW), TIEs were initiated for samples exceeding the 50% threshold, the majority of which displayed 100% mortality. In that study, toxicity had degraded in approximately 40% of the samples on which the procedures were initiated making the effort unsuccessful in pinpointing specific toxicants. The Regional Board approved monitoring program for the CCW Toxicity, Chlorpyrifos and Diazinon TMDL utilizes a 50% threshold for TIE initiation. Additionally, a 50% mortality threshold is utilized in the Ventura County MS4 Permit.

For chronic *C. dubia* toxicity testing, if a statistically significant 50% difference in mortality is observed between the sample and laboratory control, a TIE will be performed. If a statistically significant 50% difference in a sub-lethal endpoint is observed between the sample and laboratory control, a confirmatory sample will be collected from the receiving water within two weeks of obtaining the results of the initial sample. If a statistically significant 50% difference in mortality or sub-lethal endpoint is observed between the sample and laboratory control on the confirmatory sample, a TIE will be performed.

For the chronic marine and estuarine tests, the percent effect will be calculated. The percent effect is defined as the difference between the mean control response and the mean IWC response divided by the control response, multiplied by 100. A TIE will be performed if the percent effect value is equal to or greater than 50 percent. The TIE procedures will be initiated as soon as possible after the toxicity trigger threshold is observed to reduce the potential for loss of toxicity during sample storage. If the cause of toxicity is readily apparent or is caused by pathogen related mortality (PRM) or epibiont interference, the result will be rejected. In cases where significant endpoint toxicity effects greater than 50% are observed in the original sample, but the follow-up TIE positive control "signal" is not statistically significant, the cause of toxicity will be considered non-persistent and no sample follow-up testing is required. Future test results should be evaluated to determine if parallel TIE treatments are necessary to provide an opportunity to identify the cause of toxicity.

D.1.3.4Toxicity Identification Evaluation Approach

The results of toxicity testing will be used to trigger further investigations to determine the cause of observed laboratory toxicity. The primary purpose of conducting TIEs is to support the identification of management actions that will remove toxicants from the receiving waters. Successful TIEs will guide adaptive outfall monitoring strategies to identify and analyze for suspect pollutant(s) and guide source control efforts

The TIE approach is divided into three phases as described in USEPA's 1991 Methods for Aquatic Toxicity Identification Evaluations – Phase I Toxicity Characterization Procedures – Second Edition (EPA/600/6-9/003) and briefly summarized as follows:

- Phase I utilizes methods to characterize the physical/chemical nature of the constituents which cause toxicity. Such characteristics as solubility, volatility and filterability are determined without specifically identifying the toxicants. Phase I results are intended as a first step in specifically identifying the toxicants but the data generated can also be used to develop treatment methods that remove the toxicity without specifically identifying the toxicants.
- Phase II utilizes methods to specifically identify toxicants, or toxicant pollutant class.
- Phase III utilizes methods to confirm the identity of suspected toxicant(s).

TIE methods will generally adhere to USEPA procedures documented in conducting TIEs (USEPA, 1991, 1992, 1993a-b). A Phase I TIE will be conducted on samples that exceed the TIE. Water quality data will be reviewed to support future evaluation of potential toxicants. TIEs will perform the manipulations described in **Table D-6**.

Toxicity causation will be tentatively identified based on the treatments in **Table D-6** and, when possible, the results verified based on water column chemistry analyses. After an initial determination of the cause of toxicity, the information may be used during future TIEs to target the expected toxicant (s) or provide new treatments to narrowly identify the toxicant cause(s).

Moreover, if the toxicant or toxicant class is not initially identified, toxicity monitoring during subsequent events will confirm if the toxicant is persistent or a short-term episodic occurrence.

Table D-6 Aquatic Toxicity Identification Evaluation (TIE) Sample Manipulations

TIE Sample Manipulation	Expected Response
Adjust to between pH 7 and 8.5	Alters toxicity in pH sensitive compounds (i.e., ammonia and some trace metals)
Filtration or centrifugation	Removes particulates and associated toxicants
Ethylene Diamine Tetra Acetic Acid (EDTA)	Chelates trace metals, particularly divalent cationic metals
Sodium thiosulfate (STS) addition	Reduces toxicants attributable to oxidants (i.e., chlorine) and some trace metals
Piperonyl Butoxide (PBO)	Reduces toxicity from organophosphate pesticides such as diazinon, chlorpyrifos and malathion, and enhances pyrethroid toxicity
Carboxylesterase addition[(1)]	Hydrolyzes pyrethroids
Solid Phase Extraction (SPE) with C18 column	Removes non-polar organics (including pesticides) and some relatively non-polar metal chelates
Sequential Solvent Extraction of C18 column	Further resolution of SPE-extracted compounds for chemical analyses
No Manipulation	Baseline test for comparing the relative effectiveness of other manipulations

Carboxylesterase addition has been used in recent studies to help identify pyrethroid-associated toxicity (Wheelock et al., 2004; Weston and Amweg, 2007). However, this treatment is experimental in nature and should be used along with other pyrethroid-targeted TIE treatments (e.g., PBO addition).

As the primary goals of conducting TIEs is to identify pollutants for incorporation into outfall monitoring, narrowing the list of toxicants following Phase I TIEs via Phase II or III TIEs is not necessary if the toxicant class determined during the Phase I TIE is sufficient for: (1) identifying additional pollutants for outfall monitoring; and/or (2) identifying control measures. Thus, if the specific pollutant(s) or the analytical class of pollutant (e.g., metals that are analyzed via USEPA Method 200.8) are identified then sufficient information is available to inform the addition of pollutants to outfall monitoring.

Phase II TIEs may be utilized to identify specific toxicants in a sample if information beyond that gained via the Phase I TIE and review of chemistry data is needed to identify monitoring or management actions. Phase III TIEs will be conducted following any Phase II TIEs.

TIEs will be considered inconclusive if:

- The toxicity is persistent (i.e., observed in the positive control), and
- The cause of toxicity cannot be attributed to a class of constituents (e.g., insecticides, metals, etc.) that can be targeted for monitoring or additional source controls.

If (1) a combination of causes act in a synergistic or additive manner are identified; (2) the toxicity can be removed with a treatment or combination of the TIE treatments; or (3) the analysis of water quality data collected during the same event identifies the pollutant or analytical class of pollutants, the result of a TIE is considered conclusive.

Note that the MRP (page E-33) allows a TIE Prioritization Metric to be used in ranking sites for TIEs. As the extent to which TIEs will be conducted is unknown, prioritization cannot be assessed at this time, but may be utilized in the future based on the results of toxicity monitoring and the CIMP adaptive management.

D.1.3.5Discharge Assessment

The Beach Cities WMG will prepare a Discharge Assessment Plan (DAP), if TIEs, from consecutive sampling events, are inconclusive. The Discharge Assessment will only be initiated after consecutive inconclusive TIEs, because of the inherit variability associated with the toxicity and TIE testing methods. The DAP will consider observed receiving and outfall toxicants, above known species effect levels and the relevant exposure periods compared to the duration of the observed toxicity. The DAP will identify:

- Additional potential receiving water toxicity monitoring to evaluate the spatial extent of toxicity.
- The toxicity test species to be utilized. If a different species is proposed, justification for the substitution will be provided.
- The number and location of monitoring sites and their spatial relation to the observed receiving water toxicity.
- The number of monitoring events that will be conducted, a schedule for conducting the monitoring, and a process for evaluating the completion of the assessment monitoring.

The DAP will be submitted to Regional Board staff for comment within 60 days of receipt of notification of the second consecutive inconclusive result. If no comments are received within 30 days, it will be assumed that the approach is appropriate for the given situation and the DAP will be implemented within 90-days of submittal. If comments are received within 30 days, the Plan will be resubmitted to Regional Board staff and the DAP will be implemented within 90-days of submittal of a version of the Plan that does not receive comments from Regional Board staff.

D.1.3.6Follow Up on Toxicity Testing Results

The MRP (page E-33) indicates the following actions should be taken when a toxicant or class of toxicants is identified through a TIE:

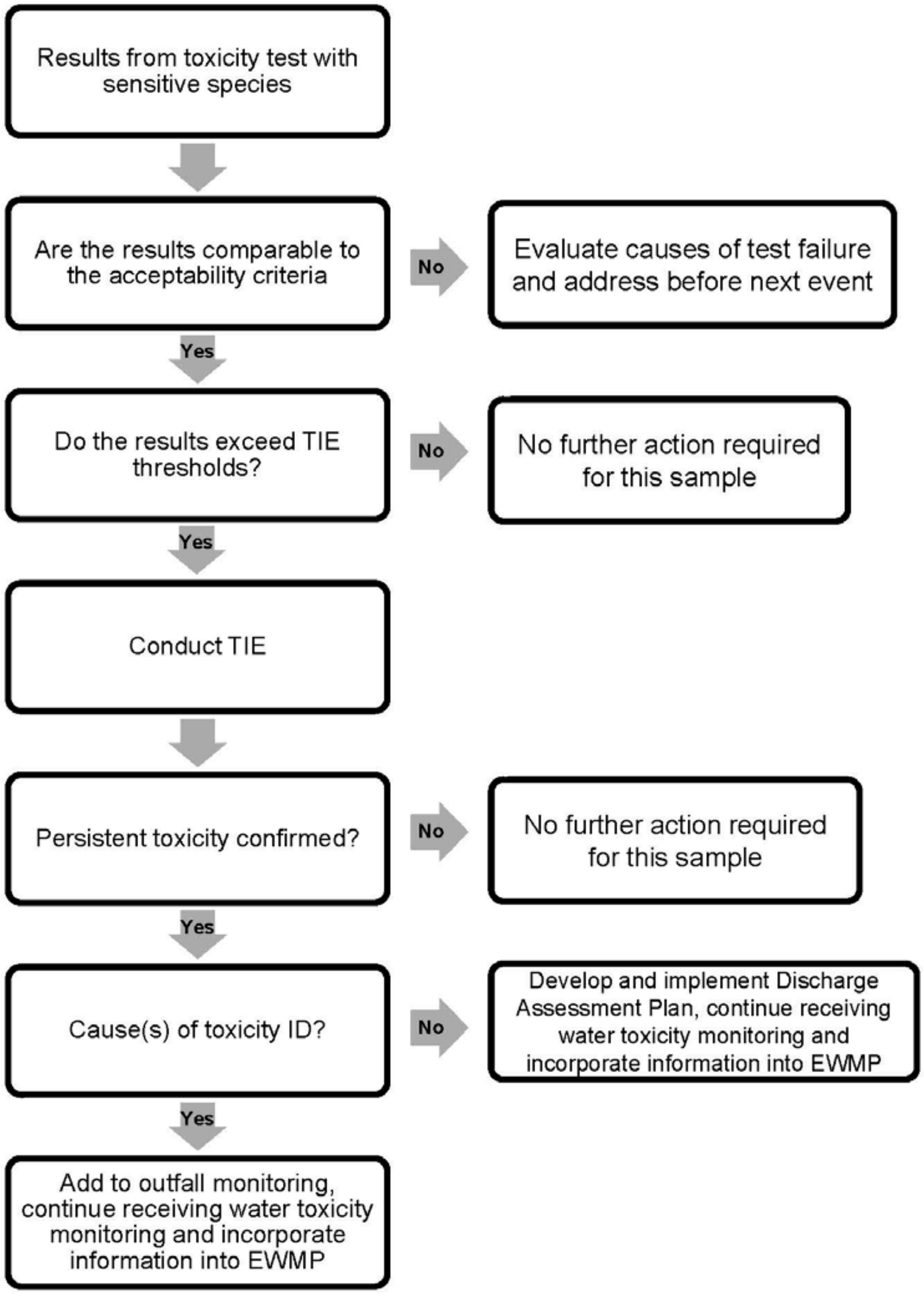
- Beach Cities WMG Members shall analyze for the toxicant(s) during the next scheduled sampling event in the discharge from the outfall(s) upstream of the receiving water location.
- If the toxicant is present in the discharge from the outfall at levels above the applicable receiving water limitation, a toxicity reduction evaluation (TRE) will be performed for that toxicant.
- The list of constituents monitored at outfalls identified in the CIMP will be modified based on the results of the TIEs.

Monitoring for constituents identified based on the results of a TIE will occur as soon as feasible following the completion of a successful TIE (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of a successful TIE).

The requirements of the TREs will be met as part of the adaptive management process in the Beach Cities WMG rather than conducted via the CIMP. The identification and implementation of control measures to address the causes of toxicity are tied to management of the stormwater program, not the CIMP. It is expected that the requirements of TREs will only be conducted for toxicants that are not already addressed by an existing Permit requirement (i.e., TMDLs) or existing or planned management actions.

D.1.3.7Summary of Aquatic Toxicity Monitoring

The approach to conducting aquatic toxicity monitoring as described in the previous sections is summarized in detail in **Figure D-2**. The intent of the approach is to identify the cause of toxicity observed in receiving water to the extent possible with the toxicity testing tools available, thereby directing outfall monitoring for the pollutants causing toxicity with the ultimate goal of supporting the development and implementation of management actions.



Test failure includes pathogen or epibont interference, which should be addressed prior to the next toxicity sampling event.

For freshwater, the TIE threshold is equal to or greater than 50% (≥50%) mortality in an acute (wet weather) or chronic (dry weather) test. If a ≥50% effect in a sub-lethal endpoint for chronic test is observed during dry weather, a follow up sample will be collected within two weeks of the completion of the initial sample collection. If the follow up sample exhibits a ≥50% effect, a TIE will be initiated.

For marine waters and estuarine waters, the TIE threshold is the percent effect value ≥50%. If a ≥50% or greater effect is observed during dry weather a follow up sample will be collected within two weeks of the initial sample collection and if the follow up sample exhibits a ≥50% effect, a TIE will be initiated.

The goal of conducting Phase I TIEs is to identify the cause of toxicity so that outfall monitoring can incorporate the toxicant(s) into the list of constituents monitored during outfall monitoring. Thus, if specific toxicant(s) or the analytical class of toxicants (i.e., metals that are analyzed via EPA Method 200.8) are identified, sufficient information is available to inform the addition of pollutants to the list of pollutants monitored during outfall monitoring.

Figure D-2 Detailed Aquatic Toxicity Assessment Process

D.1.4 List of Laboratories Conducting Analysis

The chosen laboratories will be able to meet the measurement quality objectives set forth in **Table D-2** through **Table C-5**. Laboratories will meet California Environmental Laboratory Accreditation Program (ELAP) and/or National Environmental Laboratory Accreditation Program (NELAP) certifications and any data quality requirements specified in this document. Due to contracting procedures and solicitation requirements, qualified laboratories have not yet been selected to carry out the analytical responsibilities described in this CIMP. Selected laboratories will be listed, per the example shown in **Table D-7**, along with lab certification information. Following the completion of the first monitoring year, the pertinent laboratory specific information will be included in the Integrated Monitoring Compliance Report Section of the Annual Report. At the end of all future monitoring years the Beach Cities WMG will assess the laboratories performance and at that time a new laboratory may be chosen.

Table D-7 Summary of Laboratories Conducting Analysis for the Beach Cities WMG CIMP

Laboratory(1)	General Category of Analysis	Lab Certification No. & Expiration Date(2)

Information for all laboratories will be added to this table following their selection and upon CIMP update.
Lab certifications are renewed on an annual basis.

D.1.4.1 Alternate Laboratories

In the event that the laboratories selected to perform analyses for the CIMP are unable to fulfill data quality requirements outlined herein (e.g., due to instrument malfunction), alternate laboratories need to meet the same requirements that the primary labs have met. The original laboratory selected may recommend a qualified laboratory to act as a substitute. However, the final decision regarding alternate laboratory selection rests with the Beach Cities WMG.

D.2 Sampling Methods and Sample Handling

The sections below discuss the steps to be taken to properly prepare for initiate water quality sampling for the CIMP.

D.2.1 Monitoring Event Preparation

Monitoring event preparation includes preparation of field equipment, placing bottle orders, and contacting the necessary personnel regarding site access and schedule. The following steps will be completed two weeks prior to each sampling event (a condensed timeline may be appropriate in storm events, which may need to be completed on short notice):

- Contact laboratories to order sample containers and to coordinate sample transportation details.
- Confirm scheduled monitoring date with field crew(s), and set-up sampling day itinerary including sample drop-off.
- Prepare equipment.

- Prepare sample container labels and apply to bottles.
- Prepare the monitoring event summary and field log sheets to indicate the type of field measurements, field observations and samples to be collected at each of the monitoring sites.
- Verify that field analytical equipment is operating properly (i.e., check batteries, calibrate, etc.).

Table D-8 provides a checklist of field equipment to prepare prior to each monitoring event.

D.2.1.1Bottle Order/Preparation

Sample container orders will be placed with the appropriate analytical laboratory at least two weeks prior to each sampling event. Containers will be ordered for all water samples, including quality control samples, as well as extra containers in case the need arises for intermediate containers or a replacement. The containers must be the proper type and size and contain preservative as appropriate for the specified laboratory analytical methods.

Table D-8 Field Equipment Checklist

☐	Monitoring Plan
☐	Sample Containers plus Extras with Extra Lids
☐	Pre-Printed, Waterproof Labels (extra blank sheets)
☐	Event Summary Sheets
☐	Field Log Sheets
☐	Chain of Custody Forms
☐	Bubble Wrap
☐	Coolers with Ice
☐	Tape Measure
☐	Paper Towels or “Rags in a Box”
☐	Safety Equipment
☐	First Aid Kit
☐	Cellular Telephone
☐	Gate Keys
☐	Hip Waders
☐	Plastic Trash Bags
☐	Sealable Plastic Bags
☐	Grab Pole
☐	Clean Secondary Container(s)
☐	Field Measurement Equipment
☐	New Powder-Free Nitrile Gloves
☐	Writing Utensils
☐	Stop Watch
☐	Camera
☐	Blank Water

Table D-5 presents the proper container type, volume, and immediate processing and storage needs. The field crew must inventory sample containers upon receipt from the laboratory to ensure that adequate containers have been provided to meet analytical requirements for each monitoring event. After each event, any bottles used to collect water samples will be cleaned by the laboratory and either picked up by or shipped to the field crew.

D.2.1.2 Container Labeling and Sample Identification Scheme

All samples will be identified with a unique identification code to ensure that results are properly reported and interpreted. Samples will be identified such that the site, sampling location, matrix, sampling equipment and sample type (i.e., environmental sample or QC sample) can be distinguished by a data reviewer or user. Sample identification codes will consist of a site identification code, a matrix code, and a unique sample identification code. The format for sample identification codes is AAAA - ### - XXX, where:

- AAAA indicates the unique site ID for each Beach Cities WMG monitoring site.
- ###- identifies the sequentially numbered monitoring event or sample collection date, where # is an optional indicator for re-samples collected for the same event. Sample events are numbered from 001 to 999 and will not be repeated.
- XXX identifies the sample number unique to a sample bottle collected for a single event. Sample bottles are numbered sequentially from 001 to 999 and will not be repeated within a single event.

Custom bottle labels should be produced using blank waterproof labels and labeling software. This approach will allow the site and analytical constituent information to be entered in advance and printed as needed prior to each monitoring event. Labels will be placed on the appropriate bottles in a dry environment; applying labels to wet sample bottles should be avoided. Labels should be placed on sides of bottles rather than on bottle caps. All sample containers will be pre-labeled before each sampling event to the extent practicable. Pre-labeling sample containers simplifies field activities, leaving only sample collection time and date and field crew initials to be filled out in the field. Labels should include the following information:

- Program Name
- Station ID
- Sample ID
- Date
- Collection Time
- Sampling Personnel
- Analytical Requirements
- Preservative Requirements
- Analytical Laboratory

D.2.1.3 Field Meter Calibration

Calibration of field measurement equipment is performed as described in the owner's manuals for each individual instrument. Each individual field crew will be responsible for calibrating their field measurement equipment. Field monitoring equipment must meet the requirements outlined in **Table D-1** and be calibrated before field events based on manufacturer guidance, but at a minimum prior to each event. **Table D-9** outlines the typical field instrument calibration procedures for each piece of equipment requiring calibration. Each calibration will be documented on each event's calibration log sheet (presented in Appendix E).

If calibration results do not meet manufacturer specifications, the field crew should first try to recalibrate using fresh aliquots of calibration solution. If recalibration is unsuccessful, new calibration solution should be used and/or maintenance should be performed. Each attempt should be recorded on the equipment calibration log. If the calibration results cannot meet manufacturer's specifications, the field crew should use a spare field measuring device that can be successfully calibrated. If a spare field measuring device that can be successfully calibrated is unavailable, field crews shall note the use of unsuccessfully calibrated equipment on each appropriate field log sheet. Additionally, the Beach Cities WMG should be notified.

Calibration should be verified using at least one calibration fluid within the expected range of field measurements, both immediately following calibration and at the end of each monitoring day. Individual parameters should be recalibrated if the field meters do not measure a calibration fluid within the range of accuracy presented in **Table D-1**. Calibration verification documentation will be retained in the event's calibration verification log (presented in Appendix E).

Table D-9 Calibration of Field Measurement Equipment

Equipment / Instrument	Calibration and Verification Description	Frequency of Calibration	Frequency of Calibration Verification	Responsible Party
pH Probe	Calibration using standard buffer solutions. Use of mid-range buffer to verify successful calibration.	Day prior to or 1st day of sampling event	After calibration and at the end of each sampling day	Individual Sampling Crews
Temperature	Is factory-set and requires no subsequent calibration.			
Dissolved Oxygen Probe	Calibrated using water saturated air environment. DO measurement of water-saturated air will be performed and compared to a standard table of DO concentrations in water as a function of temperature and barometric pressure to verify successful calibration.			
Conductivity	Follow manufacturer's specifications. Use of mid-range conductivity standard to verify successful calibration.			
Turbidity	Follow manufacturer's specifications. Use of mid-range turbidity standard to verify successful calibration.			

D.2.1.4 Weather Conditions

Monitoring will occur during dry and wet conditions. Dry weather occurs on days with less than 0.1 inch of rain and more than three days after a rain event of 0.1 inch or greater within the watershed, as measured from at least 50 percent of Los Angeles County controlled rain gauges within the watershed. Wet will be defined as a storm event of greater than or equal to 0.1 inch of precipitation, as measured from at least 50 percent of the Los Angeles County controlled rain gauges within the watershed.

Note that if rainfall begins after dry weather monitoring has been initiated then dry weather monitoring will be suspended and continued on a subsequent day when weather conditions meet the dry weather conditions. Generally, grab samples will be collected during dry weather and composite samples will be collected during wet weather. Grab samples will be used for dry weather sampling events because the composition of the receiving water will change less over time; and thus, the grab sample can sufficiently characterize the receiving water. The use of grab samples during dry weather is consistent with similar programs within the region. To sufficiently characterize the outfalls during wet weather, flow- or time-weighted (3-hour duration, samples collected at 20-minute intervals) manual or automated composite samples will be used for wet weather sampling events. Receiving waters will be characterized during wet weather by single grab sample at the Santa Monica Bay offshore stations, and by flow-weighted composite sample at the S28 Dominguez Channel mass emission station. Grab samples may be utilized to collect wet weather sampling in certain situations, which may include, but are not limited to, when the constituent of interest requires the use of grab samples (e.g., E. coli, oil and grease, cyanide), situations where it is unsafe to collect composite samples, or to perform investigative monitoring where composite sampling may not be warranted.

The Permit MRP includes specific criteria for the scheduling of some monitoring events. Wet weather receiving water and stormwater outfall based monitoring shall target the first storm event predicted to produce at least 0.25 inch of rain, with a 70% or greater probability, 24 hours before the start of the event. For dry weather receiving water monitoring, one sample event must take place during the historically driest month. Aquatic toxicity samples should also be collected during these two critical flow events.

The first significant rain event of the storm year (first flush) will be monitored. The targeted storm events for wet weather sampling will be selected based on a reasonable probability that the events will result in substantially increased flows over at least 12 hours. Sufficient precipitation is needed to produce runoff and increase flow. The decision to sample a storm event will be made in consultation with weather forecasting information services after a quantitative precipitation forecast (QPF) has been determined. All efforts will be made to collect wet weather samples from all sites during a single targeted storm event. However, safety or other factors may make it infeasible to collect samples from a given storm event. For example, storm events that will require field crews to collect wet weather samples during holidays and/or weekends may not be sampled due to sample collection or laboratory staffing constraints.

For a storm to be tracked and the sampling team mobilized, the first flush event will have a predicted rainfall of at least 0.25 inches, with at least a 70 percent probability of rainfall, 24 hours prior to the forecasted time of storm initiation. Subsequent storm events must meet similar tracking and flow objectives, as well as be separated by a minimum of three days of dry weather, defined as rainfall of less than 0.1" per day. Antecedent conditions will be based on the LACDPW rain gage listed in **Table D-10**. Data can be obtained at http://dpw.lacounty.gov/wrd/Precip/index.cfm by clicking the 'See Data' link in the "Near Real-Time Precipitation Map" section. The web page displays a map showing real-time rainfall totals (in inches) for different rain gages. Although the default precipitation period is 24 hours, the user can view rainfall totals over different durations. Data from the rain gages is updated every 10 minutes.

Table D-10 Real-Time Gage Used to Define Weather Conditions for CIMP Monitoring [1]

Rainfall Gage	Operator	Latitude	Longitude
Manhattan Beach (373)	Los Angeles County Department of Public Works	33°53'01"N	118°23'21"W
Redondo Beach Yard (372)		33°51'25"N	118°23'00"W

Information for the gage can be found at http://dpw.lacounty.gov/wrd/Precip/alertlist.cfm.

Wet weather sample event mobilization would be planned when a rainfall of 0.25 inches over a 6- to 12-hour period is predicted with 70% or greater probability, 24 hours before the start of the event. The sampling crew should prepare to depart in advance of the forecasted time of initial rainfall, adjusting for traffic and sample site requirements. The initiation of composite samples should be targeted for collection within 2 hours of local rainfall. The National Weather Service's weather forecast for the Beach Cities WMG EWMP area can be accessed on-line at http://www.wrh.noaa.gov/lox/ then click on the location of the Beach Cities WMG EWMP area on the area map. From the forecast page, the link to "Quantitative Precipitation Forecast" provides forecasted precipitation in inches for the next 24 hours, in 3-hour increments for the first 12 hours and in 6-hour increments for the last 12 hours.

D.2.2 Sample Handling

Proper sampling handling ensures the samples will comply with the monitoring methods and analytical hold time and provides traceable documentation throughout the history of the sample.

D.2.2.1 Documentation Procedures

The Beach Cities WMG is responsible for ensuring that each field sampling team adheres to proper custody and documentation procedures. Field log sheets documenting sample collection and other monitoring activities for each site will be bound in a separate master logbook for each event. Field personnel have the following responsibilities:

- Keep an accurate written record of sample collection activities on the field log sheets.
- Ensure that all field log sheet entries are legible and contain accurate and inclusive documentation of all field activities.
- Note errors or changes using a single line to cross out the entry and date and initial the change.
- Ensure that a label is affixed to each sample collected and that the labels uniquely identify samples with a sample ID, site ID, date and time of sample collection and the sampling crew initials.
- Complete the chain of custody forms accurately and legibly.

D.2.2.2 Field Documentation/Field Log

Field crews will keep a field log book for each sampling event that contains a calibration log sheet, a field log sheet for each site, and appropriate contact information. The following items should be recorded on the field log sheet for each sampling event:

- Monitoring station location (Station ID);
- Date and time(s) of sample collection;
- Name(s) of sampling personnel;
- Sample collection depth;
- Sample ID numbers and unique IDs for any replicate or blank samples;
- QC sample type (if appropriate);
- Requested analyses (specific parameters or method references);
- Sample type (e.g., grab or composite);
- The results of field measurements (e.g., flow, temperature, dissolved oxygen, pH, conductivity, turbidity) and the time that measurements were made;
- Qualitative descriptions of relevant water conditions (e.g., water color, flow level, clarity) or weather (e.g., wind, rain) at the time of sample collection;
- Trash observations (presence/absence);
- Observations of recreational activities;

- A description of any unusual occurrences associated with the sampling event, particularly those that may affect sample or data quality.

The field log will be scanned into a PDF within one week of the conclusion of each sampling event. Alternatively, all measurements could be collected on an electronic device such as laptop or tablet computer. **Appendix E** contains an example of the field log sheet.

D.2.2.3 Sample Handling and Shipment

The field crews will maintain custody of samples during each monitoring event. Chain-of-custody (COC) forms will accompany all samples during shipment to contract laboratories to identify the shipment contents. All water quality samples will be transported to the analytical laboratory by the field crew or by courier. The original COC form will accompany the shipment, and a signed copy of the COC form will be sent, typically via email or fax, by the laboratory to the field crew to be retained in the project file.

While in the field, samples will be stored on ice in an insulated container. Samples that must be shipped to the laboratory must be examined to ensure that container lids are tight and placed on ice to maintain the appropriate temperature. The ice packed with samples must be approximately 2 inches deep at the top and bottom of the cooler, and must contact each sample to maintain temperature. The original COC form(s) will be double-bagged in re-sealable plastic bags and either taped to the outside of the cooler or to the inside lid. Samples must be shipped to the contract laboratory according to transportation standards. The method(s) of shipment, courier name, and other pertinent information should be entered in the “Received By” or “Remarks” section of the COC form.

Coolers must be sealed with packing tape before shipping, unless transported by field or lab personnel, and must not leak. It is assumed that samples in tape-sealed ice chests are secure whether being transported by common carrier or by commercial package delivery. The laboratory’s sample receiving department will examine the shipment of samples for correct documentation, proper preservation and compliance with holding times.

The following procedures are used to prevent bottle breakage and cross-contamination:

- Bubble wrap or foam pouches are used to keep glass bottles from contacting one another to prevent breakage, re-sealable bags will be used if available.
- All samples are transported inside hard plastic coolers or other contamination-free shipping containers.
- If arrangements are not made in advance, the laboratory’s sample receiving personnel must be notified prior to sample shipment.

All samples remaining after successful completion of analyses will be disposed of properly. It is the responsibility of the personnel of each analytical laboratory to ensure that all applicable regulations are followed in the disposal of samples or related chemicals. Samples will be stored and transported as noted in **Table D-5**. Samples not analyzed locally will be sent on the same day that the sample collection process is completed, if possible. Samples will be delivered to the appropriate laboratory as will be indicated in **Table D-11**. Note that due to procurement procedures, the analytical laboratories have not been identified at this time. Information for all laboratories will be added to this table following their selection. All appropriate contacts will be listed along with lab certification information in **Table D-11**.

Table D-11 Information on Laboratories Conducting Analysis for the Beach Cities WMG EWMP Group CIMP

Laboratory[1]	General Category of Analysis	Shipping Method	Contact	Phone	Address	Lab Certification No. & Expiration Date(2)

[1] Information for all laboratories will be added to this table following their selection and upon CIMP update.
Lab certifications are renewed on an annual basis.

D.2.2.4 Chain-of-Custody Forms

Sample custody procedures provide a mechanism for documenting information related to sample collection and handling. Sample custody must be traceable from the time of sample collection until results are reported. A sample is considered under custody if:

- It is in actual possession.
- It is in view after in physical possession.
- It is placed in a secure area (accessible by or under the scrutiny of authorized personnel only after in possession).

A COC form must be completed after sample collection and prior to sample shipment or release. The COC form, sample labels, and field documentation will be cross-checked to verify sample identification, type of analyses, number of containers, sample volume, preservatives, and type of containers. A complete COC form is to accompany the transfer of samples to the analyzing laboratory. A typical COC form is presented in **Appendix E**.

D.2.2.5 Laboratory Custody Procedures

Laboratories will follow sample custody procedures as outlined in their Quality Assurance (QA) Manual. The QA Manual should be available, at the laboratory, upon request. Laboratories shall maintain custody logs sufficient to track each sample submitted and to analyze or preserve each sample within specified holding times. The following sample control activities must be conducted at the laboratory:

- Initial sample login and verification of samples received with the COC form;
- Document any discrepancies noted during login on the COC;
- Initiate internal laboratory custody procedures;
- Verify sample preservation (e.g., temperature);
- Notify the Beach Cities WMG if any problems or discrepancies are identified; and,
- Perform proper sample storage protocols, including daily refrigerator temperature monitoring and sample security.

Laboratories shall maintain records to document that the above procedures are followed. Once samples have been analyzed, samples will be stored at the laboratory for at least 60 days. After this period, samples may be disposed of properly.

D.2.3 Field Protocols

Briefly, the key aspects of quality control associated with field protocols for sample collection for eventual chemical and toxicological analyses are as follows:

- Field personnel will be thoroughly trained in the proper use of sample collection gear and will be able to distinguish acceptable versus unacceptable water samples in accordance with pre-established criteria.
- Field personnel will be thoroughly trained to recognize and avoid potential sources of sample contamination (e.g., engine exhaust, ice used for cooling).
- Sampling gear and utensils which come in direct contact with the sample will be made of non-contaminating materials (e.g., borosilicate glass, high-quality stainless steel and/or Teflon™, according to protocol) and will be thoroughly cleaned between sampling stations according to appropriate cleaning protocol (rinsing thoroughly at minimum).
- Sample containers will be of the recommended material and contaminant free (i.e., pre-cleaned).
- Conditions for sample collection, preservation, and holding times will be followed.

Field crews will be comprised of two persons per crew, minimum. To ensure safety, field crews will have the necessary field equipment such as safety vest, steel toe boots/or rubber boots, nitrile gloves, lighting, if required, etc. Other constraints on sampling events include, but are not limited to, lab closures and toxicity testing organism availability. Sampling events should proceed in the following manner:

- Before leaving the sampling crew base of operations, confirm number and type of sample containers as well as the complete equipment list.
- Proceed to the first sampling site.
- Fill-out the general information on the field log sheet.
- Collect the environmental and quality assurance/quality control (QA/QC) samples indicated on the event summary sheet and store samples appropriately. Using the field log sheet, confirm that all appropriate containers were filled.
- Collect field measurements and observations, and record these on the field log sheet.
- Repeat the procedures in steps 3, 4, and 5 for each of the remaining sampling sites.
- Complete the COC forms using the information on the field log sheets.
- After sample collection is completed, deliver and/or ship samples to appropriate laboratory.

D.2.4 Sample Collection

All samples will be collected in a manner appropriate for the specific analytical methods to be used. The proper sampling techniques, outlined in this section, will ensure that the collected samples are representative of the waterbodies sampled. Should field crews feel that it is unsafe to collect samples for any reason, the field crews **SHOULD NOT COLLECT** a sample and note on the field log that the sample was not collected, why the sample was not collected, and provide photo documentation, if feasible. Because a significant storm event is based on predicted rainfall, it is recognized that this monitoring may be triggered without 0.25 inches of rainfall actually occurring. In this case, the monitoring event will still qualify as meeting this requirement provided that sufficient sample volume is collected to do all required laboratory analysis. Documentation will be provided showing the predicted rainfall amount.

D.2.4.1 Overview of Sampling Techniques

As described below, the method used to collect water samples is dependent on the depth, flow, and sampling location (receiving water, outfall). Nonetheless, in all cases:

- Throughout each sample collection event, the sampler should exercise aseptic techniques to avoid any contamination (i.e., do not touch the inner surfaces or lip edges of the sample bottle or cap).
- The sampler should use clean, powder-free, nitrile gloves for each site to prevent contamination.
- When collecting the sample, the sampler should not breathe, sneeze, or cough in the direction of the container.
- Gloves should be changed if they are soiled, or if the potential for cross-contamination exists from handling sampling materials or samples.
- While the sample is collected, the bottle lid shall not be placed on the ground.
- The sampler should not eat or drink during sample collection.
- The sampler should not smoke during sample collection.
- Each person on the field crew should wear clean clothing that is free of dirt, grease, or other substances that could contaminate the sampling apparatus or sample bottles.
- Sampling should not occur near a running vehicle. Vehicles should not be parked within the immediate sample collection area, even non-running vehicles.
- When the sample is collected, ample air space should be left in the bottle to facilitate mixing by shaking for lab analysis, unless otherwise required by the method.
- After the sample is collected and the cap is tightly screwed back on the bottle, the time of sampling should be recorded on the field log sheet.
- Any QA/QC samples that are collected should be also be noted on the field log sheet and labeled according the convention described in **Section D.2.1** of this Attachment.
- Samples should be stored as previously described.
- COC forms should be filled out as described in **Section D.2.2** of this Attachment and delivered to the appropriate laboratory as soon as feasible to ensure hold times are met.

To prevent contamination of samples, clean metal sampling techniques using USEPA protocols outlined in USEPA Method 1669[1] will be used throughout all phases of the water sample collection. The protocol for clean metal sampling, based on USEPA Method 1669, is summarized below:

1 USEPA. April 1995. *Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels.* EPA 821-R-95-034.

- Samples are collected in rigorously pre-cleaned sample bottles with any tubing specially processed to clean sampling standards.
- At least two persons, wearing clean, powder-free nitrile or latex gloves at all times, are required on a sampling crew.
- One person, referred to as “dirty hands”, opens only the outer bag of all double-bagged sample bottles.
- The other person, referred to as “clean hands”, reaches into the outer bag, opens the inner bag and removes the clean sample bottle.
- Clean hands rinses the bottle at least two times by submerging the bottle, removing the bottle lid, filling the bottle approximately one-third full, replacing the bottle lid, gently shaking and then emptying the bottle. Clean hands then collects the sample by submerging the bottle, removing the lid, filling the bottle and replacing the bottle cap while the bottle is still submerged.
- After the sample is collected, the sample bottle is double-bagged in the opposite order from which it was removed from the same double-bagging.
- Clean, powder-free gloves are changed whenever something not known to be clean has been touched.

D.2.4.2Field Measurements and Observations

Field measurements will be collected and observations made at each sampling site during sample collection. Field measurements will include the parameters identified in the CIMP for which a laboratory analysis is not being conducted. Field monitoring equipment must meet the requirements outlined in **Table D-4**. Field measurements for sediment samples shall be collected from within one meter of the sediment. All field measurement results and field observations will be recorded on a field log sheet similar to the one presented in **Appendix E** and as described in **Section D.2.2** of this Attachment.

Measurements (except for flow) will be collected at approximately mid-stream, mid-depth at the location of greatest flow (if feasible) with a Hydrolab DS4 multi-probe meter, or comparable instrument(s). If at any time the collection of field measurements by wading appears to be unsafe, field crews will not attempt to collect mid-stream, mid-depth measurements. Rather, field measurements will be made either directly from a stable, unobstructed area at the channel edge, or by using a telescoping pole and intermediate container to obtain a sample for field measurements and for filling sample containers. For situations where flows are not sufficiently deep to submerge the probes, an intermediate container will be utilized. The location of field measurements will be documented on the field log sheet.

Flow measurements will be collected as outlined in the following subsections at freshwater receiving water and non-stormwater outfall monitoring sites. Regardless of measurement technique used, if a staff gage is present the gage height will be noted. Field crews may not be able to measure flow at several sites during wet weather because of inaccessibility of the site. If this is the case, site inaccessibility will be documented on the field log sheet.

The field sampling crew has the primary responsibility for responding to failures in the sampling or measurement systems. Deviations from established monitoring protocols will be documented in the comment section of the field log sheet and noted in the post event summaries. If monitoring equipment fails, monitoring personnel will report the problem in the notes section of the field log sheet and will not record data values for the variables in question. Broken equipment will be replaced or repaired prior to the next field use. Data collected using faulty equipment will not be used.

D.2.4.2.1 Velocity Meter Flow Measurements

For sampling sites where water is deep enough (>0.1-foot) a velocity meter will be utilized. For these cases, velocity will be measured at approximately equal increments across the width of the flowing water using a Marsh-McBirney Flo-Mate® velocity meter2 or equivalent, which uses an electromagnetic velocity sensor. A "flow pole" will be used to measure the water depth at each measurement point and to properly align the sensor so that the depth of each velocity measurement is approximately equal to 0.6 * total depth, which is representative of the average velocity. The distance between velocity measurements taken across the stream is dependent on the total width. No more than 10% of the flow will pass through any one cross section.

D.2.4.2.2 Shallow Sheet Flow Measurements

If the depth of flow does not allow for the measurement of flow with a velocity meter (<0.1-foot) a "float" will be used to measure the velocity of the flowing water. The width, depth, velocity, cross section, and corresponding flow rate will be estimated as follows:

- **Sheet flow width:** The width (W) of the flowing water (not the entire part of the channel that is damp) is measured at the "top", "middle", and "bottom" of a marked-off distance – generally 10 feet (e.g., for a 10-foot marked-off section, W_{Top} is measured at 0-feet, W_{Mid} is measured at 5 feet, and W_{Bottom} is measured at 10 feet).
- **Sheet flow depth:** The depth of the sheet flow is measured at the top, middle, and bottom of the marked-off distance. Specifically, the depth (D) of the sheet flow is measured at 25%, 50%, and 75% of the flowing width (e.g., $D_{50\%}^{Mid}$ is the depth of the water at middle of the section in the middle of the sheet flow) at each of the width measurement locations. It is assumed that the depth at the edge of the sheet flow (i.e., at 0% and 100% of the flowing width) is zero.
- **Representative cross-section:** Based on the collected depth and width measurements, the representative cross-sectional area across the marked-off sheet flow is approximated as follows:

2 For more information, see http://marsh-mcbirney.com/Products/2000.htm

$$\text{Representative Cross Section} =$$
$$Average\ \{[\frac{W_{Top}}{4}\times(\frac{D^{Top}_{25\%}}{2}+\frac{\left(D^{Top}_{50\%}+D^{Top}_{25\%}\right)}{2}+\frac{\left(D^{Top}_{75\%}+D^{Top}_{50\%}\right)}{2}+\frac{D^{Top}_{75\%}}{2})],$$
$$[\frac{W_{Mid}}{4}\times(\frac{D^{Mid}_{25\%}}{2}+\frac{\left(D^{Mid}_{50\%}+D^{Mid}_{25\%}\right)}{2}+\frac{\left(D^{Mid}_{75\%}+D^{Mid}_{50\%}\right)}{2}+\frac{D^{Mid}_{75\%}}{2})],$$
$$[\frac{W_{Bottom}}{4}\times(\frac{D^{Bottom}_{25\%}}{2}+\frac{\left(D^{Bottom}_{50\%}+D^{Bottom}_{25\%}\right)}{2}+\frac{\left(D^{Bottom}_{75\%}+D^{Bottom}_{50\%}\right)}{2}+\frac{D^{Bottom}_{75\%}}{2})]\}$$

- **Sheet flow velocity:** Velocity is calculated based on the amount of time it took a float to travel the marked-off distance (typically 10-feet or more). Floats are normally pieces of leaves, litter, or floatables (suds, etc.). The time it takes the float to travel the marked-off distance is measured at least three times. Then average velocity is calculated as follows:

$$\text{Average Surface Velocity} = \frac{\text{Distance Marked off for Float Measurement}}{\text{Average Time for Float to Travel Marked off Distance}}$$

- **Flow Rate calculation:** For sheet flows, based on the above measurements/estimates, the estimated flow rate, Q, is calculated by:

  Q = f x (Representative Cross Section) x (Average Surface Velocity)

The coefficient f is used to account for friction effects of the channel bottom. That is, the float travels on the water surface, which is the most rapidly-traveling portion of the water column. The average velocity, not the surface velocity, determines the flow rate, and thus f is used to "convert" surface velocity to average velocity. In general, the value of f typically ranges from 0.60 – 0.90 (USGS 1982). Based on flow rate measurements taken during the LA River Bacteria Source Identification Study (CREST 2008) a value of 0.75 will be used for f.

D.2.4.2.3 Free-Flowing Outfalls

Some storm drain outfalls are free-flowing, meaning the runoff falls from an elevated outfall into the channel, which allows for collection of the entire flowing stream of water into a container of known volume (e.g., graduated bucket or graduated Ziploc bag). The time it takes to fill the known volume is measured using a stopwatch, and recorded on the field log. The time it takes to fill the container will be measured three times and averaged to ensure that the calculated discharge is representative. In some cases, a small portion of the runoff may flow around or under the container. For each measurement, "percent capture", or the proportion of flow estimated to enter the bucket, will be recorded. For free-flowing outfalls, the estimated flow rate, Q, is calculated by:

$$Q = Average\,[\frac{\text{Filled container Volume}}{(\text{Time to Fill Container})\times(\text{Estimated Capture})}]$$

Based on measurements of free-flowing outfalls during the LA River Bacteria Source Identification Study (CREST, 2008), estimated capture typically ranges from 0.75 – 1.0.

D.2.4.2.4 Manhole Flow Rate Estimation

Several alternative methods maybe applied to flow estimation in manholes, depending on field conditions. Shallow manholes may be most effectively assessed using a velocity meter as characterized in this section. Alternatively, runoff depth may be assessed using "dipsticks" or staff gauges to assess runoff water depth and compared with the facility design plans to allow an open channel flow rate calculation as indicated above. In situations where flow weighted compositing is required, an ultrasonic depth measurement may be suitable especially for mid-depth manholes of 10 to 30 feet in depth. Final decisions regarding development of this data will be made following monitoring consultant selection.

D.2.4.3Sampling Techniques for the Collection of Water

The following subsections provide details on the various techniques that can be utilized to collect water quality samples. Should field crews feel that it is unsafe to collect samples for any reason, the field crews **SHOULD NOT COLLECT** a sample and note on the field log that the sample was not collected, why the sample was not collected, and provide photo documentation, if feasible.

D.2.4.3.1 Direct Submission: Hand Technique

Where practical, all grab samples will be collected by direct submersion at mid-stream, mid-depth using the following procedures:

- Follow the standard sampling procedures described in **Section D.2.4.1** of this Attachment.
- Remove the lid, submerge the container to mid-stream/mid-depth, let the container fill and secure the lid. In the case of mercury samples, remove the lid underwater to reduce the potential for contamination from the air.
- Place the sample on ice.
- Collect the remaining samples including quality control samples, if required, using the same protocols described above.

Follow the sample handling procedures described in **Section D.2.2** of this Attachment.

D.2.4.3.2 Intermediate Container Technique

Samples may be collected with the use of a clean intermediate container, if necessary, following the steps listed below. An intermediate container may include a container that is similar in composition to the sample container, a pre-cleaned pitcher made of the same material as the sample container, or a Ziploc bag. An intermediate container should not be reused at a different site without appropriate cleaning.

- Follow the standard sampling procedures described in **Section D.2.4.1** of this Attachment.
- Submerge the intermediate container to mid-stream/mid-depth (if possible), let the container fill, and quickly transfer the sample into the individual sample container(s) and secure the lid(s).
- Place the sample(s) on ice.
- Collect remaining samples including quality control samples, if required, using the same protocols described above.
- Follow the sample handling procedures described in **Section D.2.2** of this Attachment.

Some flows may be too shallow to fill a container without using an intermediate container. When collecting samples from shallow sheet flows it is very important to not scoop up algae, sediment, or other particulate matter on the bottom because such debris is not representative of flowing water. To prevent scooping up such debris either: (1) find a spot where the bottom is relatively clean and allow the sterile intermediate container to fill without scooping; or (2) lay a clean sterile Ziploc® bag on the bottom and collect the water sample from on top of the bag. A fresh Ziploc® bag must be used at each site.

D.2.4.3.4 Pumping

Samples may be collected with the use of a peristaltic pump and specially cleaned tubing following the steps listed below. Sample tubing should not be reused at a different site without appropriate cleaning.

- Follow the standard sampling procedures described in **Section D.2.4.1** of this Attachment.
- Attach pre-cleaned tubing into the pump, exercising caution to avoid allowing tubing ends to touch any surface known not to be clean. A separate length of clean tubing must be used at each sample location for which the pump is used.
- Place one end of the tubing below the surface of the water. To the extent possible, avoid placing the tubing near the bottom so that settled solids are not pumped into the sample container.
- Hold the other end of the tubing over the opening of the sample container, exercising care not to touch the tubing to the sample container.
- Pump the necessary sample volume into the sample container and secure the lid.
- Place the sample on ice.
- Collect remaining samples including quality control samples, if required, using the same protocols described above.

Follow the sample handling procedures described in **Section D.2.2** of this Attachment.

D.2.4.3.5 Autosamplers

Automatic sample compositors (autosamplers) are used to characterize the entire flow of a storm in one analysis. They can be programmed to take aliquots at either time- or flow-based specified intervals. Before beginning setup in the field, it is recommended to read the manufacturer’s instructions. The general steps to set up the autosampler are described below:

- Connect power source to autosampler. This can be in the form of a battery or a power cable.
- Install pre-cleaned tubing into the pump. Clean tubing will be used at each site and for each event, in order to minimize contamination.
- Attach strainer to intake end of the tubing and install in sampling channel.
- If running flow based composite samples; install flow sensor in sampling channel and connect it to the automatic compositor.
- Label and install composite bottle(s). If sampler is not refrigerated, then add enough ice to the composite bottle chamber to keep sample cold for the duration of sampling or until such time as ice can be refreshed. Make sure not to contaminate the inside of the composite bottle with any of the ice.
- Program the autosampler as per the manufacturer’s instructions and make sure the autosampler is powered and running before leaving the site.

After the sample collection is completed the following steps must be taken to ensure proper sample handling:

- Upon returning to the site, check the status of the autosampler and record any errors or missed samples. Note on the field log the time of the last sample, as this will be used for filling out the COCs.
- Remove the composite bottle and store on ice. If dissolved metals are required, then begin the sample filtration process outlined in the following subsection, within 15 minutes of the last composite sample, unless compositing must occur at another location, in which case the filtration process should occur as soon as possible upon sample compositing.
- Power down autosampler and leave sampling site.

The composite sample will need to be split into the separate analysis bottles either before being shipped to the laboratory or at the laboratory. This is best done in a clean and weatherproof environment, using clean sampling technique.

D.2.4.3.6 Dissolved Metals Field Filtration

Samples for dissolved metals will be filtered by the laboratory. In the event samples for dissolved metals are required to be filtered in the field, the following method for dissolved field filtration will be conducted. A 50mL plastic syringe with a 0.45μm filter attached will be used to collect and filter the dissolved metals sample in the field. The apparatus will either come certified pre-cleaned from the manufacturer and confirmed by the analytical laboratory or be pre-cleaned by and confirmed by the analytical laboratory at least once per year. The apparatus will be double bagged in Ziploc plastic bags. Alternative an equivalent method may be utilized, if necessary.

To collect the sample for dissolved metals, first collect the total metals sample using clean sampling techniques. The dissolved sample will be taken from this container. Immediately prior to collecting the dissolved sample, shake the total metals sample. To collect the dissolved metals sample using clean sampling techniques, remove the syringe from the bag and place the tip of the syringe into the bottle containing the total metals sample and draw up 50 mL of sample into the syringe. Next, remove the filter from the zip-lock bag and screw it tightly into the tip of the syringe. Then put the tip of the syringe with the filter into the clean dissolved metals container and push the sample through the filter taking care not to touch the inside surface of the sample container with the apparatus. The sample volume needs to be a minimum of 20 mL. If the filter becomes clogged prior to generating 20 mL of sample, remove and dispose of the used filter and replace it with a new clean filter (using the clean sampling techniques). Continue to filter the sample. When 20 mL has been collected, cap the sample bottle tightly and store on ice for delivery to the laboratory.

D.2.4.4Receiving Water Sample Collection

Receiving water sites are located approximately 1,000 feet offshore and a boat will be used to access the site. Determination when and where to precisely sample is health and safety dependent and will be determined by the Boat Captain, based on predicted and observed conditions. Samples will be collected as grab samples, which are discrete individual samples. Should field crews feel that it is unsafe to collect samples for any reason, the field crews **SHOULD NOT COLLECT** a sample and note on the field log that the sample was not collected, why the sample was not collected, and provide photo documentation, if feasible.

Grab samples will be used for dry weather sampling events and will be collected as described in **Section D.2.4.3** of this Attachment. Monitoring site configuration and consideration of safety will dictate grab sample collection technique. The potential exists for monitoring sites to lack discernable flow. The lack of discernable flow may generate unrepresentative data. To address the potential confounding interference that can occur under such conditions, sites sampled should be assessed for the following conditions and sampled or not sampled accordingly:

- Pools of water with no flow or no visible connection to another surface water body should not be sampled. The field log should be completed for non-water quality data (including date and time of visit) and the site condition should be photo-documented.
- Flowing water (i.e., based on visual observations, flow measurements, and a photo-documented assessment of conditions immediately upstream and downstream of the sampling site) site should be sampled.

It is the combined responsibility of all members of the sampling crew to determine if the performance requirements of the specific sampling method have been met, and to collect additional samples if required. If the performance requirements outlined above or documented in sampling protocols are not met, the sample will be re-collected. If contamination of the sample container is suspected, a fresh sample container will be used. The SMB EWMP Group will be contacted if at any time the sampling crew has questions about procedures or issues based on site-specific conditions.

D.2.4.5Stormwater Outfall Sample Collection

Stormwater outfalls will be monitored with methods similar to those discussed in **Section D.2.4.4** of this Attachment. Sampling will not be undertaken if the outfalls are not flowing or if conditions exist where the receiving water is back-flowing into the outfall. It is the combined responsibility of all members of the sampling crew to determine if the performance requirements of the specific sampling method have been met, and to collect additional samples if required. If the performance requirements outlined above or documented in sampling protocols are not met, the sample will be re-collected. If contamination of the sample container is suspected, a fresh sample container will be used. The Beach Cities WMG will be contacted if at any time the sampling crew has questions about procedures or issues based on site-specific conditions. Two outfall sites are located in major arterial roadways and would be collected as grab samples to avoid extended traffic delays and risks from traffic related accidents. Other outfall sites that can be safely accessed over the sampling duration would be sampled as time-weighted equal volume aliquots, collected either manually or using an auto-sampler, which would be composited by the selected analytical laboratory. A time-weighted composite is created by mixing multiple aliquots collected at equally specified time intervals.

D.2.4.6Preparation for Outfall Surveys

Preparation for outfall surveys includes preparation of field equipment, placing bottle orders, and contacting the necessary personnel regarding site access and schedule. The following steps should be completed two weeks prior to each outfall survey:

- Check weather reports and LACDPW rain gage to ensure that antecedent dry weather conditions are suitable.
- Contact appropriate Flood Maintenance Division personnel from LACDPW to notify them of dates and times of any activities in flood control channels.
- Contact laboratories to order bottles and to coordinate sample pick-ups.
- Confirm scheduled sampling date with field crews.
- Set-up sampling day itinerary including sample drop-offs and pick-ups.
- Compile field equipment.
- Prepare sample labels.
- Prepare event summaries to indicate the type of field measurements, field observations, and samples to be taken at each of the outfalls.
- Prepare COCs.
- Charge the batteries of field tablets (if used).

D.2.4.6.1 Non-Stormwater Sample Collection

Water quality samples will be collected consistent with the dry weather requirements outlined in the receiving water monitoring section using the direct submersion, intermediate container, shallow sheet flow, or pumping methods described in **Section D.2.4.3** of this Attachment.

D.2.4.7Stormborne Sediment Collection

No sediment collection sampling would be conducted under this program in the receiving waters. Data from the BIGHT analysis will be used to evaluate data and applicability of control measures.

D.2.4.8 Bioaccumulation Sample Collection

No Bioaccumulation sampling will be conducted under this program.

D.2.4.9 Trash Monitoring

The Beach Cities WMG members are implementing the Santa Monica Bay Debris TMDLs through the installation of full capture devices. As such, no specific monitoring is required or will be conducted for the Santa Monica Bay Debris TMDLs for these jurisdictions.

D.2.4.10 Plastic Pellet Monitoring

See **Appendix A** for details on plastic pellet monitoring and reporting requirements.

D.2.4.11 Quality Control Sample Collection

Quality control samples will be collected in conjunction with representative samples to verify data quality. Quality control samples collected in the field will generally be collected in the same manner as environmental samples. Detailed descriptions of quality control samples are presented in **Section D.3** of this Attachment.

D.3 Quality Assurance/Quality Control

This section describes the quality assurance and quality control requirements and processes. Quality control samples will be collected in conjunction with environmental samples to verify data quality. Quality control samples collected in the field will generally be collected in the same manner as environmental samples. There are no requirements for quality control for field analysis of general parameters (e.g., temperature, pH, conductivity, dissolved oxygen, and pH) outlined in the SWAMP. However, field crews will be required to calibrate equipment as outlined in **Section D.2** of this Attachment. **Table D-12** presents the quality assurance parameter addressed by each quality assurance requirement as well as the appropriate corrective action if the acceptance limit is exceeded.

Table D-12 Quality Control Requirements

Quality Control Sample Type	QA Parameter	Frequency[1]	Acceptance Limits	Corrective Action
Quality Control Requirements – Field				
Equipment Blanks	Contamination	5% of all samples[2]	<MDL	Identify equipment contamination source. Qualify data as needed.
Field Blank	Contamination	5% of all samples	<MDL	Examine field log. Identify contamination source. Qualify data as needed.
Field Duplicate	Precision	5% of all samples	RPD < 25% if |Difference| > RL	Reanalyze both samples if possible. Identify variability source. Qualify data as needed.
Quality Control Requirements – Laboratory				
Method Blank	Contamination	1 per analytical batch	< MDL	Identify contamination source. Reanalyze method blank and all samples in batch. Qualify data as needed.
Lab Duplicate	Precision	1 per analytical batch	RPD < 25% if |Difference| > RL	Recalibrate and reanalyze.
Matrix Spike	Accuracy	1 per analytical batch	80-120% recovery for GWQC 75-125% for Metals 50-150% Recovery for Pesticides [3]	Check LCS/CRM recovery. Attempt to correct matrix problem and reanalyze samples. Qualify data as needed.
Matrix Spike Duplicate	Precision	1 per analytical batch	RPD < 30% if |Difference| > RL	Check lab duplicate RPD. Attempt to correct matrix interference and reanalyze samples. Qualify data as needed.
Laboratory Control Sample (or CRM or Blank Spike)	Accuracy	1 per analytical batch	80-120% Recovery for GWQC 75-125% for Metals 50-150% Recovery for Pesticides[3]	Recalibrate and reanalyze LCS/ CRM and samples.
Blank Spike Duplicate	Precision	1 per analytical batch	RPD < 25% if |Difference| > RL	Check lab duplicate RPD. Attempt to correct matrix problem and reanalyze samples. Qualify data as needed.
Surrogate Spike	Accuracy	Each environmental and	30-150% Recovery3	Check surrogate recovery in LCS. Attempt to correct

Table D-12 Quality Control Requirements

Quality Control Sample Type	QA Parameter	Frequency[(1)]	Acceptance Limits	Corrective Action
(Organics Only)		lab QC sample		matrix problem and reanalyze sample. Qualify data as needed.

MDL = Method Detection Limit   RL = Reporting Limit   RPD = Relative Percent Difference
LCS = Laboratory Control Sample/Standard   CRM = Certified/ Standard Reference Material
GWQC = General Water Quality Constituents
"Analytical batch" refers to a number of samples (not to exceed 20 environmental samples plus the associated quality control samples) that are similar in matrix type and processed/prepared together under the same conditions and same reagents (equivalent to preparation batch).
Equipment blanks will be collected by the field crew before using the equipment to collect sample.
Or control limits set at + 3 standard deviations based on actual laboratory data.

D.3.1 QA/QC Requirements and Objectives

D.3.1.1Comparability

Comparability of the data can be defined as the similarity of data generated by different monitoring programs. For this monitoring program, this objective will be ensured mainly through use of standardized procedures for field measurements, sample collection, sample preparation, laboratory analysis, and site selection; adherence to quality assurance protocols and holding times; and reporting in standard units. Additionally, comparability of analytical data will be addressed through the use of standard operating procedures and extensive analyst training at the analyzing laboratory.

D.3.1.2Representativeness

Representativeness can be defined as the degree to which the environmental data generated by the monitoring program accurately and precisely represent actual environmental conditions. For the CIMP, this objective will be addressed by the overall design of the program. Representativeness is attained through the selection of sampling locations, methods, and frequencies for each parameter of interest, and by maintaining the integrity of each sample after collection. Sampling locations were chosen that are representative of various areas within the watershed and discharges from the MS4, which will allow for the characterization of the watershed and impacts MS4 discharges may have on water quality.

D.3.1.3Completeness

Data completeness is a measure of the amount of successfully collected and validated data relative to the amount of data planned to be collected for the project. It is usually expressed as a percentage value. A project objective for percent completeness is typically based on the percentage of the data needed for the program or study to reach valid conclusions.

Because the CIMP is intended to be a long term monitoring program, data that are not successfully collected during a specific sample event will not be recollected at a later date. Rather subsequent events conducted over the course of the monitoring will provide robust data sets to appropriately characterize conditions at individual sampling sites and the watershed in general. For this reason, most of the data planned for collection cannot be considered absolutely critical, and it is difficult to set a meaningful objective for data completeness.

However, some reasonable objectives for data are desirable, if only to measure the effectiveness of the program when conditions allow for the collection of samples (i.e., flow is present). The program goals for data completeness, shown in **Table D-4**, are based on the planned sampling frequency, SWAMP recommendations, and a subjective determination of the relative importance of the monitoring element within the CIMP. If, however, sampling sites do not allow for the collection of enough samples to provide representative data due to conditions (i.e., no flow) alternate sites will be considered. Data completeness will be evaluated on a yearly basis.

D.3.2 QA/QC Field Procedures

Quality control samples to be prepared in the field will consist of equipment blanks, field blanks, and field duplicates as described below.

D.3.2.1Equipment Blanks

The purpose of analyzing equipment blanks is to demonstrate that sampling equipment is free from contamination. Equipment blanks will be collected by the analytical laboratory responsible for cleaning equipment and analyzed for relevant pollutants before sending the equipment to the field crew. Equipment blanks will consist of laboratory-prepared blank water (certified to be contaminant-free by the laboratory) processed through the sampling equipment that will be used to collect environmental samples.

The equipment blanks will be analyzed using the same analytical methods specified for environmental samples. If any analytes of interest are detected at levels greater than the MDL, the source(s) of contamination will be identified and eliminated (if possible), the affected batch of equipment will be re-cleaned, and new equipment blanks will be prepared and analyzed before the equipment is returned to the field crew for use.

D.3.2.2Field Blanks

The purpose of analyzing field blanks is to demonstrate that sampling procedures do not result in contamination of the environmental samples. Per the Quality Assurance Management Plan for SWAMP (SWRCB, 2008) field blanks are to be collected as follows:

- At a frequency of 5% of samples collected for the following constituents: trace metals in water (including mercury), VOC samples in water and sediment, DOC samples in water, and bacteria samples.

- Field blanks for other media and analytes should be conducted upon initiation of sampling, and if field blank performance is acceptable (as described in **Table D-12**), further collection and analysis of field blanks for these other media and analytes need only be performed on an as-needed basis, or during field performance audits. An as-needed basis for the Beach Cities WMG CIMP will be annually.

Field blanks will consist of laboratory-prepared blank water (certified to be contaminant-free by the laboratory) processed through the sampling equipment using the same procedures used for environmental samples.

If any analytes of interest are detected at levels greater than the MDL, the source(s) of contamination should be identified and eliminated, if possible. The sampling crew should be notified so that the source of contamination can be identified (if possible) and corrective measures taken prior to the next sampling event.

D.3.2.3Field Duplicates

The purpose of analyzing field duplicates is to demonstrate the precision of sampling and analytical processes. Field duplicates will be prepared at the rate of 5% of all samples, and analyzed along with the associated environmental samples. Field duplicates will consist of two samples collected simultaneously, to the extent practicable. If the Relative Percent Difference (RPD) of field duplicate results is greater than the percentage stated in **Table D-12** and the absolute difference is greater than the RL, both samples should be reanalyzed, if possible. The sampling crew should be notified so that the source of sampling variability can be identified (if possible) and corrective measures taken prior to the next sampling event.

D.3.3 QA/QC Laboratory Analyses

Quality control samples prepared in the laboratory will consist of method blanks, laboratory duplicates, matrix spikes/duplicates, laboratory control samples (standard reference materials), and toxicity quality controls.

D.3.3. 1 Method Blanks

The purpose of analyzing method blanks is to demonstrate that sample preparation and analytical procedures do not result in sample contamination. Method blanks will be prepared and analyzed by the contract laboratory at a rate of at least one for each analytical batch. Method blanks will consist of laboratory-prepared blank water processed along with the batch of environmental samples. If the result for a single method blank is greater than the MDL, or if the average blank concentration plus two standard deviations of three or more blanks is greater than the RL, the source(s) of contamination should be corrected, and the associated samples should be reanalyzed.

D.3.3.2Laboratory Blanks

The purpose of analyzing laboratory duplicates is to demonstrate the precision of the sample preparation and analytical methods. Laboratory duplicates will be analyzed at the rate of one pair per sample batch. Laboratory duplicates will consist of duplicate laboratory fortified method blanks. If the RPD for any analyte is greater than the percentage stated in **Table D-12** and the absolute difference between duplicates is greater than the RL, the analytical process is not being performed adequately for that analyte. In this case, the sample batch should be prepared again, and laboratory duplicates should be reanalyzed.

D.3.3.3Matrix Spikes and Matrix Spike Duplicates

The purpose of analyzing matrix spikes and matrix spike duplicates is to demonstrate the performance of the sample preparation and analytical methods in a particular sample matrix. Matrix spikes and matrix spike duplicates will be analyzed at the rate of one pair per sample batch. Each matrix spike and matrix spike duplicate will consist of an aliquot of laboratory-fortified environmental sample. Spike concentrations should be added at five to ten times the reporting limit for the analyte of interest.

If the matrix spike recovery of any analyte is outside the acceptable range, the results for that analyte have failed to meet acceptance criteria. If recovery of laboratory control samples is acceptable, the analytical process is being performed adequately for that analyte, and the problem is attributable to the sample matrix. An attempt will be made to correct the problem (e.g., by dilution, concentration, etc.), and the samples and matrix spikes will be re-analyzed.

If the matrix spike duplicate RPD for any analyte is outside the acceptable range, the results for that analyte have failed to meet acceptance criteria. If the RPD for laboratory duplicates is acceptable, the analytical process is being performed adequately for that analyte, and the problem is attributable to the sample matrix. An attempt will be made to correct the problem (e.g., by dilution, concentration, etc.), and the samples and matrix spikes will be re-analyzed.

D.3.3.4Laboratory Control Samples

The purpose of analyzing laboratory control samples (or a standard reference material) is to demonstrate the accuracy of the sample preparation and analytical methods. Laboratory control samples will be analyzed at the rate of one per sample batch. Laboratory control samples will consist of laboratory fortified method blanks or a standard reference material. If recovery of any analyte is outside the acceptable range, the analytical process is not being performed adequately for that analyte. In this case, the sample batch should be prepared again, and the laboratory control sample should be reanalyzed.

D.3.3.5Surrogate Spikes

Surrogate recovery results are used to evaluate the accuracy of analytical measurements for organics analyses on a sample-specific basis. A surrogate is a compound (or compounds) added by the laboratory to method blanks, samples, matrix spikes, and matrix spike duplicates prior to sample preparation, as specified in the analytical methodology. Surrogates are generally brominated, fluorinated or isotopically labeled compounds that are not usually present in environmental media. Results are expressed as percent recovery of the surrogate spike. Surrogate spikes are applicable for analysis of semi-volatile, PCBs and pesticides.

D.3.3.6Toxicity Quality Control

For aquatic toxicity tests, the acceptability of test results is determined primarily by performance-based criteria for test organisms, culture and test conditions, and the results of control bioassays. Control bioassays include monthly reference toxicant testing. Test acceptability requirements are documented in the method documents for each bioassay method.

D.4 Instrument/Equipment Calibration and Frequency

Frequencies and procedures for calibration of analytical equipment used by each contract laboratory are documented in the QA Manual for that laboratory. Any deficiencies in analytical equipment calibration should be managed in accordance with the QA Manual for each contract laboratory. Any deficiencies that affect analysis of samples submitted through this program must be reported to the Beach Cities WMG. Laboratory QA Manuals are available for review at the analyzing laboratory.

D.5 Toxicity Follow-Up Monitoring Requirements

The following memorandum, provided by the Los Angeles Regional Board, provides clarification on follow-up monitoring requirements in response to observed toxicity in receiving waters, and is therefore incorporated into the Beach Cities CIMP.

Los Angeles Regional Water Quality Control Board

TO: Los Angeles County MS4 Permittees and City of Long Beach

FROM: Samuel Unger, P.E.
Executive Officer Samuel Unger

DATE: August 7, 2015

SUBJECT: CLARIFICATION REGARDING FOLLOW-UP MONITORING REQUIREMENTS IN RESPONSE TO OBSERVED TOXICITY IN RECEIVING WATERS PURSUANT TO THE MONITORING & REPORTING PROGRAM (ATTACHMENT E) OF THE LOS ANGELES COUNTY MS4 PERMIT (ORDER NO. R4-2012-0175)

The Los Angeles County MS4 Permit, Attachment E requires chronic aquatic toxicity monitoring in receiving waters during both wet and dry weather conditions to determine whether designated beneficial uses are fully supported. Further, Attachment E requires additional monitoring at MS4 outfalls where aquatic toxicity is present above a certain effect level in downstream receiving waters to determine whether MS4 discharges are causing or contributing to the aquatic toxicity. In this situation, outfall monitoring must either entail monitoring for specific pollutants identified in a toxicity identification evaluation (TIE) in the downstream receiving water, or for aquatic toxicity itself, where the specific pollutants could not be identified through the TIE conducted on the downstream receiving water.

In its comments on the draft Integrated Monitoring Programs (IMPs) and Coordinated Integrated Monitoring Programs (CIMPs) submitted per the Los Angeles County MS4 Permit, the Los Angeles Water Board provided clarification and recommendations to Permittees regarding aquatic toxicity monitoring, particularly pertaining to the requirement to conduct chronic toxicity tests in dry and wet weather conditions and requirements for conducting a TIE and outfall monitoring. Subsequently, on December 9, 2014, Board staff met with several Permittees regarding its comments. During this meeting it was apparent that further clarification was necessary regarding requirements for follow-up monitoring when aquatic toxicity is present in downstream receiving waters. This memo provides additional clarification and applies to all IMPs and CIMPs developed pursuant to Part VI.B of the Los Angeles County MS4 Permit and Part VII.B of the City of Long Beach MS4 Permit.

It is acknowledged, however, that this memo may not address every situation that is encountered. We encourage the Permittees to approach toxicity testing and the TIE and TRE procedures thoughtfully and thoroughly in the interest of identifying and eliminating any source(s) of toxicity in MS4 discharges as expeditiously as possible and to consult with Los Angeles Water Board staff if you need assistance or clarification.

If you have any questions regarding these clarifications, please contact Renee Purdy at Renee.Purdy@waterboards.ca.gov or Shirley Birosik at Shirley.Birosik@waterboards.ca.gov.

The memo addresses requirements for follow-up monitoring in four **receiving water** scenarios where toxicity is present:

- Toxicity is present, but not above the TIE trigger as defined in Attachment E, Part XII.I.1[1];
- Toxicity is present above the TIE trigger and the TIE identifies the constituent(s) causing the toxicity;
- Toxicity is present above the TIE trigger during wet weather, but the TIE is inconclusive; and
- Toxicity is present above the TIE trigger during dry weather, but the TIE is inconclusive.

The memo also addresses the several scenarios once **outfall** toxicity testing has been triggered. Attached to the memo are several simplified flowcharts to aid in understanding the process.

An **inconclusive TIE** is one for which the cause of toxicity cannot be identified after the conclusion of TIE Phases I and II.

An inconclusive TIE is defined as a TIE for which the cause of toxicity cannot be attributed to a constituent or class of constituents (e.g., metals, insecticides, etc.) that can be targeted for monitoring even after conducting appropriate Phase I and Phase II TIE treatments. This outcome may result from either non-persistent toxicity such that the TIE treatments cannot be successfully completed on the toxic sample, or from the inability with available Phase I and Phase II TIE treatments to isolate the constituent or class of constituents causing the toxicity. If the TIE is inconclusive due to non-persistent toxicity, the Los Angeles Water Board expects that Permittees will proactively identify and implement actions during the subsequent upstream and/or outfall toxicity sampling event to improve the likelihood of a conclusive TIE, while also following the steps below. Where a TIE is inconclusive due to the inability to determine the constituent(s) causing the toxicity, Permittees should evaluate further steps to improve the TIE outcome including sensitive species selection, QA/QC, and the need to conduct Phases I through III of a TIE, among others.

If a TIE is inconclusive:
- ✓ Check QA/QC
- ✓ Evaluate sensitive species selection
- ✓ Initiate future TIEs earlier (to address non-persistent toxicity)
- ✓ Conduct all phases of TIE

[1] Permit references correspond to the Los Angeles County MS4 Permit (Order No. R4-2012-0175)

TRIGGERS FOR ADDING TOXICITY MONITORING TO *UPSTREAM RECEIVING WATER MONITORING / OUTFALL MONITORING*:

1. If toxicity is present as determined based on a fail of the Test of Significant Toxicity (TST) t-test as specified in the Permit (Attachment E, Part XII.G.4) during wet or dry weather, but not above the TIE trigger (which is defined as when the survival or sublethal endpoint demonstrates a >=50 Percent Effect at the IWC as per Attachment E, Part XII.I.1), then:
    a. Toxicity monitoring will be added to the next existing upstream receiving water site(s) during the same condition (wet or dry weather) for which toxicity was determined to be present. Monitoring for toxicity at the next existing upstream receiving water site(s) will occur during the next monitoring event that is at least 30 days following the original toxicity sample collection. Toxicity monitoring at individual receiving water sites will continue until (1) the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST t-test during the same condition) is met at the receiving water site or (2) a TIE is triggered and conclusively identifies the constituent or class of constituents causing toxicity, in which case the process outlined in Bullet 2 below is followed. OR
    b. If there is no upstream receiving water monitoring site already established as part of the monitoring program, continue receiving water toxicity monitoring at the original site until (1) the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST t-test during the same condition) is met at the original receiving water site or (2) a TIE is triggered at the original site and conclusively identifies the constituent or class of constituents causing toxicity, in which case the process outlined in Bullet 2 below is followed. Also, conduct an evaluation similar to the TRE outlined in Attachment E, Part XII.J to identify, to the extent practicable, the source(s) of toxicity with the goal of identifying cause(s) of toxicity, paying particular attention to sources of potential constituent(s) causing toxicity (e.g., fipronil).
        i. If there is no upstream receiving water monitoring site already established as part of the monitoring program and toxicity is present during dry weather, actions taken as part of the non-stormwater program (e.g., source identification and elimination or treatment of unauthorized non-stormwater discharges that are a source of pollutants) should be utilized to support the TRE.
        ii. If there is no upstream receiving water monitoring site already established as part of the monitoring program and toxicity is present during wet weather, consider the following actions to support TRE: evaluating land uses and potential associated source(s) in the drainage area, evaluation of other permitted discharges, and evaluation of inspection activities. AND
    c. If there is no upstream receiving monitoring site already established as part of the monitoring program and more than one occurrence of a fail of the TST t-test occurs at the original receiving water site within 3 years, then evaluate opportunities to conduct toxicity monitoring at upstream receiving water sites (either newly established or sites utilized by other monitoring programs), including tributaries.

2. If toxicity is present at a level exceeding the TIE trigger and the <u>TIE identifies the constituent or class of constituents causing toxicity</u>, then:
    a. Do not add toxicity monitoring to upstream sites. AND
    a. During the same condition, add the identified constituent or constituents within the class of constituents[2] to the monitoring site where toxicity was identified, the upstream receiving water site(s), and upstream outfall site(s) starting with the next monitoring event that is at least 45 days following the toxicity sample collection. Monitoring for the identified constituent(s) will continue until the deactivation criterion (i.e., two consecutive samples do not exceed Receiving Water Limitations (RWLs), Water Quality Based Effluent Limitations (WQBELs), or other appropriate threshold or guideline if there is no numeric RWL or WQBEL, for the identified constituents during the same condition) is met at the individual site. Where constituent(s) are identified in the outfall(s) above the RWL(s), WQBEL(s), or other appropriate threshold or guideline commence TRE at each corresponding outfall location per Attachment E, Part XII.J.
3. If toxicity is present at a level exceeding the TIE trigger during <u>wet weather</u> and the <u>TIE is inconclusive</u>, then:
    a. Add toxicity monitoring to the next existing upstream receiving water site(s) during the next monitoring event that is at least 45 days following the original toxicity sample collection. Toxicity monitoring at individual receiving water site(s) will continue until (1) the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST t-test during the same condition) is met at the receiving water site or (2) a TIE is triggered and conclusively identifies the constituent or class of constituents causing toxicity, in which case the process outlined in Bullet 2 above is followed. AND
    b. The second inconclusive TIE in 3 years during wet weather would trigger outfall toxicity testing at upstream outfall sites (i.e., (1) outfall sites located between the receiving water site and the nearest upstream receiving water site located on the same waterbody and (2) outfall sites located on tributaries that have a confluence with the waterbody where the confluence is located between the receiving water site and the nearest upstream receiving water site located on the same waterbody) following the process outlined below in "Steps Related Outfall Toxicity Testing" during the next monitoring event that is at least 45 days following the original toxicity sample collection. OR
    c. As an alternative to the outfall monitoring described in Bullet 3.b., Permittees may propose an alternative approach any time after the first inconclusive TIE, which could include utilizing upstream receiving water sites (either newly established or sites utilized by other monitoring programs), including tributaries, additional outfall sites, and/or different outfall sites. However, the outfall monitoring approach described in Bullet 3.b. must be followed until Regional Water Board EO approval of the alternative approach.

[2] Using appropriate detection limits

4. If toxicity is present at a level exceeding the TIE trigger during dry weather and the TIE is inconclusive, then:
    a. Add toxicity monitoring to the next existing upstream receiving water site(s) during the next monitoring event that is at least 45 days following the original toxicity sample collection. Toxicity monitoring at individual receiving water site(s) will continue until (1) the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST t-test during the same condition) is met at the receiving water site or (2) a TIE is triggered and conclusively identifies the constituent or class of constituents causing toxicity, in which case the process outlined in Bullet 2 above is followed during the next monitoring event that is at least 45 days following the original toxicity sample collection. AND
    b. Add toxicity testing to upstream outfall sites (i.e., (1) outfall sites located between the receiving water site and the nearest upstream receiving water site located on the same waterbody and (2) outfall sites located on tributaries that have a confluence with the waterbody where the confluence is located between the receiving water site and the nearest upstream receiving water site located on the same waterbody) following the process outlined below in "Steps Related Outfall Toxicity Testing" during the next monitoring event that is at least 45 days following the original toxicity sample collection. OR
    c. As an alternative to the outfall monitoring described in Bullet 4.b above, Permittees may propose an alternative approach any time after the first inconclusive TIE, which could include utilizing upstream receiving water sites (either newly established or sites utilized by other monitoring programs), including tributaries, additional outfall sites, and/or different outfall sites. However, the outfall monitoring approach described in Bullet 4.b above must be followed until Regional Water Board EO approval of the alternative approach.

STEPS RELATED TO *OUTFALL TOXICITY TESTING* ONCE TRIGGERED:

1. If toxicity is not present as determined based on pass of the TST t-test as specified in the Permit, then continue toxicity testing during the same condition
2. (i.e. wet or dry weather) until (1) meeting the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST t-test during the same condition), or (2) a TIE conducted at the downstream receiving water site conclusively identifies the constituent or class of constituents causing toxicity, or (3) the discharge is eliminated.
3. If toxicity is present as determined based on fail of the TST t-test as specified in the Permit, but not above the TIE trigger, then continue toxicity testing during the same condition until (1) meeting the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST t-test during the same condition), or (2) a TIE conducted at a downstream receiving water site conclusively identifies the constituent or class of constituents causing toxicity, or (3) the discharge is eliminated. Concurrently conduct an evaluation similar to the TRE in Attachment E, Part XII.J to identify, to the extent practicable, the source(s) of toxicity with the goal of addressing cause(s) of toxicity, paying particular attention to sources of potential constituent(s) causing toxicity (e.g., fipronil).

a. If toxicity is present in the non-stormwater discharge, actions taken as part of the non-stormwater program (e.g., source identification and elimination or treatment of unauthorized non-stormwater discharges that are a source of pollutants) should be utilized to support the TRE.
b. If toxicity is present in the stormwater discharge, consider the following actions to support the TRE: evaluating land uses and potential associated source(s) in the drainage area, evaluation of other permitted discharges, and evaluation of inspection activities.

4. If toxicity is present at a level exceeding the TIE trigger and the <u>TIE identifies the constituent or class of constituents causing toxicity</u>, then:
   a. Discontinue toxicity testing at the outfall. AND
   b. Add the identified constituent or constituents within the identified class of constituents[3] during the same condition starting with the next monitoring event that is at least 45 days following the toxicity sample collection and monitor for those constituents at the outfall until meeting the deactivation criterion for those constituents (i.e., two consecutive samples do not exceed RWLs, WQBELs, or other appropriate threshold or guideline if there is no numeric RWL or WQBEL, for identified constituents), while simultaneously performing a TRE for the constituent(s) causing toxicity per Attachment E, Part XII.J.
5. If toxicity is present at a level exceeding the TIE trigger and the <u>TIE is inconclusive</u>, then continue toxicity testing during the same condition until (1) meeting the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST t-test during the same condition), or (2) a TIE identifies the constituent or class of constituents causing toxicity (proceed with following the process outlined in Bullet 3, above), or (3) eliminate the discharge. Concurrently conduct an evaluation similar to the TRE in Attachment E, Part XII.J to identify, to the extent practicable, the source(s) of toxicity with the goal of addressing cause(s) of toxicity, paying particular attention to identifying sources of potential constituent(s) causing toxicity that may not have been evaluated in the TIE (e.g., fipronil).
   a. If the TIE is inconclusive in the <u>non-stormwater discharge</u>, actions taken as part of the non-stormwater program (e.g., source identification and elimination or treatment of unauthorized non-stormwater discharges that are a source of pollutants) should be utilized to support the TRE.
   b. If the TIE is inconclusive in the <u>stormwater discharge</u>, consider the following actions to support the TRE: evaluating land uses and potential associated source(s) in the drainage area, evaluation of other permitted discharges, and evaluation of inspection activities.

[3] Using appropriate detection limits

Receiving Water Toxicity Present but Does *NOT* Exceed TIE Trigger

Upstream RW Site Exists?

No

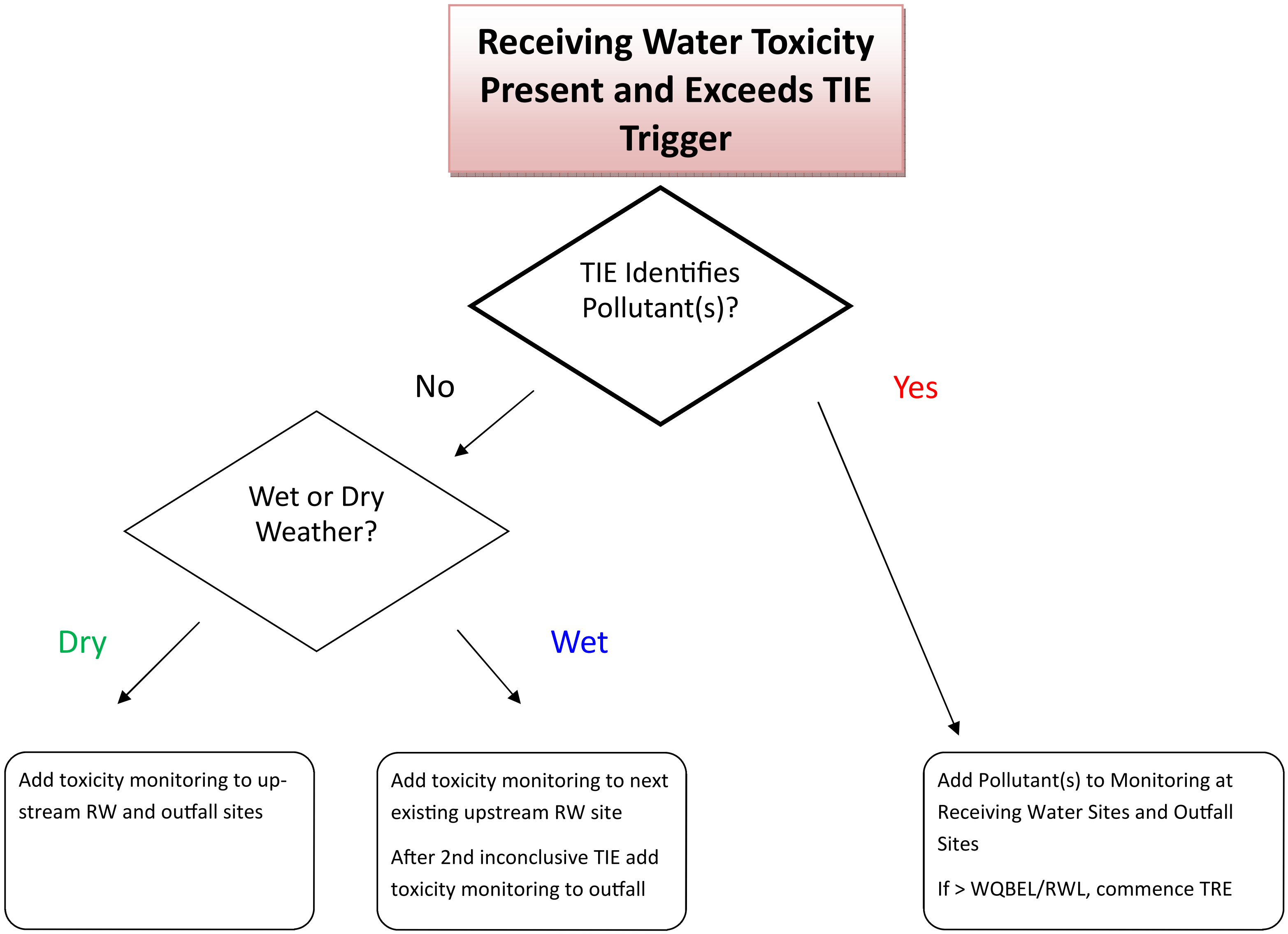
Continue monitoring toxicity at existing site

Conduct TRE-like evaluation

Evaluate potential for upstream monitoring

Yes

Add toxicity testing under same conditions (wet/dry)


Receiving Water Toxicity Present and Exceeds TIE Trigger
TIE Identifies Pollutant(s)?
No
Yes
Wet or Dry Weather?
Dry
Wet
Add toxicity monitoring to up-stream RW and outfall sites
Add toxicity monitoring to next existing upstream RW site
After 2nd inconclusive TIE add toxicity monitoring to outfall
Add Pollutant(s) to Monitoring at Receiving Water Sites and Outfall Sites
If > WQBEL/RWL, commence TRE

Outfall Toxicity Testing Once Triggered

No Toxicity

Continue toxicity testing during same condition (wet/dry) until deactivation criterion met or until pollutant identified at RW site through TIE or discharge otherwise eliminated

Toxicity < TIE Trigger

Continue toxicity testing

Conduct TRE-like evaluation

Toxicity > TIE Trigger and Pollutant(s) Identified

Add pollutant(s) to monitoring

Conduct TRE

Toxicity > TIE Trigger and TIE Inconclusive

Continue toxicity testing

Conduct TRE-like evaluation

Beach Cities CIMP Appendix E

Survey of Laboratories Minimum Levels Summary

July 2015

Summary of Laboratory Capabilities

Analytical Method	Analyte	Permit ML	Unit	Advanced Technology Laboratories			BSK Associates		CalScience Laboratories			ES Babcock			Orange Coast			Weck Labs	
				PQL	MDL	Comment	MRL	MDL	RL	MDL	Comment	MRL	MDL	Comment	MRL	MDL	Comment	MRL	MDL
Conventional Pollutants																			
EPA 1664A	Oil and Grease	5	mg/L	2	1.9		5	0.718				2.5	0.92					5	1.3
EPA 413.2	Oil and Grease	5	mg/L						1	0.33									
SM 5220B	Oil and Grease	5	mg/L				5	0.718							5	2.64			
EPA 420.1	Total Phenols	0.1	mg/L	0.03	0.02		[a]	[a]	0.1	0.046					0.5[b]	0.033[b]	0.1 possible	0.01	0.0042
EPA 420.4	Total Phenols	0.1	mg/L				[a]	[a]				0.02	0.016						
SM 4500-CN- E	Cyanide	0.005	mg/L	0.0005	0.00019		0.005	0.0017	0.001	0.00069		0.005	0.0049		0.02[a]	0.0059[a]			
ASTM D7511	Cyanide	0.005	mg/L															0.002	0.00048
SM 4500-H+ B	pH	0 - 14	pH	0.1	0.1	Field test	[a]	[a]	0.01	0.01		1	1		0-14	0-14		0.1	0.1
SM 2550B	Temperature	N/A	C	N/A	N/A	Field test	[a]	[a]				1	1						
SM 4500-O G	Dissolved Oxygen	Sensitivity to 5	mg/L	1	1	Field test	[a]	[a]	0.01	0.01		0.1	0.1		0.1	0.1		1	0.5
Bacteria (single sample limits)																			
SM9221B	Total coliform (marine waters)	10,000	MPN/100ml	[a]	[a]		2		1	1		2	2		[a]	[a]	contract	2	
SM9221B/E	Enterococcus (marine waters)	104	MPN/100ml	[a]	[a]		[a]	[a]	1	1					[a]	[a]	contract	1	
SM 9230B	Enterococcus (marine waters)	104	MPN/100ml	[a]	[a]		[a]	[a]				2	2		[a]	[a]	contract		
SM 9221E	Fecal coliform (marine & fresh waters)	400	MPN/100ml	[a]	[a]		2					2	2		[a]	[a]	contract	2	
SM9230B	Fecal coliform (marine & fresh waters)	400	MPN/100ml	[a]	[a]				1	1					[a]	[a]	contract		
SM 9221E	E. coli (fresh waters)	235	MPN/100ml	[a]	[a]							2	2		[a]	[a]	contract		
SM9221B/F	E. coli (fresh waters)	235	MPN/100ml	[a]	[a]		2		1	1					[a]	[a]	contract	2	
General																			
SM 4500-P E	Dissolved Phosphorus	0.05	mg/L				0.01	0.007											
SM 4500-P E	Dissolved Phosphorus	0.05	mg/L	0.01	0.01				0.1[b]	0.026[b]					0.05	0.0076		0.01	0.00083
SM 4500-P B	Dissolved Phosphorus	0.05	mg/L									0.05	0.014						
SM 4500-P E	Total Phosphorus	0.05	mg/L	0.01	0.01				0.1[b]	0.022[b]					0.05	0.0076		0.01	0.0014
SM 4500-P B	Total Phosphorus	0.05	mg/L									0.05	0.014						
EPA 365.4	Total Phosphorus	0.05	mg/L				0.01	0.0068											
SM 2130 B	Turbidity	0.1	NTU			Field test	0.1	N/A	0.05	0.044		0.2	0.1						
EPA 180.1	Turbidity	0.1	NTU	0.1	0.1	Field test									0.5	0.064		0.1	0.024
SM 2540D	Total Suspended Solids	2	mg/L	1	1		5[b]	N/A	1	0.95		5[a]	2.8[a]	may reach with J flag or out of reach	2	2		2	
SM 2540C	Total Dissolved Solids	2	mg/L	10[a]	10[a]		1	N/A	1	0.82		10[a]	5.5[a]	may reach with J flag or out of reach	10[a]	7.99[a]		10[a]	4[a]
SM 2540E	Volatile Suspended Solids	2	mg/L	10[a]	5[a]		5[b]	N/A	1	1								[a]	[a]
EPA 160.4	Volatile Suspended Solids	2	mg/L	10[a]	5[a]							5[a]	5[a]	may reach with J flag or out of reach	5[a]	3.1[a]		5[a]	3.1[a]
SM 5310B	Total Organic Carbon	1	mg/L	0.3	0.09		0.2	0.047	0.5	0.24		0.7	0.16		1	0.388			
EPA 1664A	Total Petroleum Hydrocarbon	5	mg/L	2	0.61		1	0.72	1	0.8					5			[a]	[a]
EPA 418.1	Total Petroleum Hydrocarbon	5	mg/L						1	0.95		1	0.5						
SM 5210 B	Biochemical Oxygen Demand	2	mg/L	5[a]	5[a]		1	N/A	1	0.58		2	1		2	2		2	2
EPA 410.4	Chemical Oxygen Demand	20-900	mg/L	5	4.4		3	N/A							15	3.5		5	0.73
SM 5220 C	Chemical Oxygen Demand	20-900	mg/L						5	4.8									
SM 5220 D	Chemical Oxygen Demand	20-900	mg/L				3	1.1				10	6.3						
SM 4500-NH3 C	Total Ammonia-Nitrogen	0.1	mg/L	0.03	0.02		0.1	0.029	0.1	0.067		0.1	0.059		0.05	0.0345		0.1	0.048
EPA 351.2	Total Kjeldahl Nitrogen	0.1	mg/L	0.1	0.05		0.1	0.055	0.2[b]	0.047[b]		0.1	0.063		0.1			0.1	0.05
SM4500-NH3 C	Total Kjeldahl Nitrogen	0.1	mg/L	0.1	0.05										0.1				
SM 4500-NO3 F	Nitrate-Nitrite	0.1	mg/L	0.1	0.03		0.1	0.033	0.1	0.029		0.2[a]	0.11[a]	may reach with J flag or out of reach	0.1			0.1	0.02
SM 2320B	Alkalinity	2	mg/L	5[b]	1.6[b]		3[b]	N/A				3[b]	1.7[b]	may reach with J flag or out of reach	2	4.75		2	0.56
EPA 120.1	Specific Conductance	1	umho/cm	0.1	0.1	Field test	1	N/A							10	0.44			
SM 2510 B	Specific Conductance	1	umho/cm			Field test			1	0.5		1	1					1	0.23
SM 2340C	Total Hardness	2	mg/L	2	0.45				2	0.99					1	0.799			
SM 2340B/EP	Total Hardness	2	mg/L									3[b]	0.5[b]	may reach with J flag or out of reach					
EPA 200.7	Total Hardness	2	mg/L				0.1	0.0455										0.1	0.016

Summary of Laboratory Capabilities

Analytical Method	Analyte	Permit ML	Unit	Advanced Technology Laboratories			BSK Associates		CalScience Laboratories			ES Babcock			Orange Coast			Weck Labs	
				PQL	MDL	Comment	MRL	MDL	RL	MDL	Comment	MRL	MDL	Comment	MRL	MDL	Comment	MRL	MDL
SM 5540C	MBAS	0.5	mg/L	0.05	0.02		0.05	0.0055	0.1	0.064		0.05	0.035		0.05	0.0477		0.05	0.019
EPA 300.0	Chloride	2	mg/L	0.5	0.05		1	0.45	1	0.12		1	1		0.1	0.033		0.5	0.1
EPA 300.0	Fluoride	0.1	mg/L	0.1	0.06				0.1	0.025					0.1	0.015		0.1	0.02
SM 4500-F C	Fluoride	0.1	mg/L				0.1	0.015				0.1	0.05						
EPA 624	Methyl tertiary butyl ether (MTBE)	1	mg/L	0.0005	0.000259				0.0005	0.000059	524.2	0.003	0.00043					1	0.25
EPA 8260B	Methyl tertiary butyl ether (MTBE)	1	mg/L				0.5	0.1							1	0.2			
EPA 314.0	Perchlorate	4	µg/L	2	0.91		2	0.18				4	0.49		2	0.391		2	0.95
EPA 331.0 (M)	Perchlorate	4	µg/L						0.1	0.021									
Metals (Total & Dissolved)																			
EPA 200.8	Aluminum	100	µg/L	5	7.6		5	2.9							5	0.354		5	2.1
EPA 200.7	Aluminum	100	µg/L									100	25						
EPA 1640	Aluminum	100	µg/L						1	0.227									
EPA 200.8	Antimony	0.5	µg/L	0.5	0.11		0.5	0.34				0.5	0.25		0.5	0.0155		0.5	0.034
EPA 1640	Antimony	0.5	µg/L						0.05	0.0154									
EPA 200.8	Arsenic	1	µg/L	1	0.93		0.1	0.041				1	0.5		0.5	0.277		0.4	0.13
EPA 1640	Arsenic	1	µg/L						0.03	0.0122									
EPA 200.8	Beryllium	0.5	µg/L	0.5	0.11		0.5	0.36				0.5	0.25		0.1	0.0122		0.1	0.015
EPA 1640	Beryllium	0.5	µg/L						0.5	0.0635									
EPA 200.8	Cadmium	0.25	µg/L	0.5[b]	0.07[b]		0.25	0.025				0.25	0.12		0.1	0.0169		0.1	0.017
EPA 1640	Cadmium	0.25	µg/L						0.03	0.00567									
EPA 218.6	Chromium (Hexavalent)	5	µg/L	0.2	0.06		0.2	0.027				1	0.013		0.3			0.3	0.0048
EPA 7199	Chromium (Hexavalent)	5	µg/L						1	0.067									
EPA 200.8	Chromium (total)	0.5	µg/L	0.5	0.21		0.5	0.17				0.5	0.4		0.5	0.0702		0.2	0.024
EPA 1640	Chromium (total)	0.5	µg/L						0.5	0.164									
EPA 200.8	Copper	0.5	µg/L	1[b]	0.18[b]		0.5	0.33				0.5	0.4		0.1	0.0375		0.5	0.036
EPA 1640	Copper	0.5	µg/L						0.03	0.00898									
EPA 200.8	Iron	100	µg/L	10	5.7		10	0.61							10	1.86			
EPA 200.7	Iron	100	µg/L									50	2.3					0.01	0.011
EPA 1640	Iron	100	µg/L						0.5	0.0634									
EPA 200.8	Lead	0.5	µg/L	1[b]	0.08[b]		0.1	0.034				0.5	0.25		0.1	0.0745		0.2	0.024
EPA 1640	Lead	0.5	µg/L						0.03	0.0135									
EPA 245.1	Mercury	0.5	µg/L	0.2	0.06													0.05	0.0039
EPA 200.8	Mercury	0.5	µg/L				0.2	0.091							1[b]	0.02[b]			
EPA 200.8	Mercury	0.5	µg/L									0.2	0.033						
EPA 7470A	Mercury	0.5	µg/L						0.2	0.0453									
EPA 200.8	Nickel	1	µg/L	1	0.12		1	0.05				1	0.5		0.5	0.0326		0.8	0.091
EPA 1640	Nickel	1	µg/L						0.05	0.00607									
EPA 200.8	Selenium	1	µg/L	5[b]	0.28[b]		1	0.14				1	0.5		0.5	0.18		0.04	0.081
EPA 1640	Selenium	1	µg/L						0.05	0.0121									
EPA 200.8	Silver	0.25	µg/L	0.5[b]	0.08[b]		0.25	0.2				0.25	0.12		0.5[b]	0.0581[b]		0.2	0.012
EPA 1640	Silver	0.25	µg/L						0.05	0.00822									
EPA 200.8	Thallium	1	µg/L	0.5	0.09		1	0.21				1	0.5		0.5	0.0119		0.2	0.034
EPA 1640	Thallium	1	µg/L						0.03	0.0087									
EPA 200.8	Zinc	1	µg/L	10[a]	4.8[a]		1	0.45				1	0.66		1	0.356		1	0.5
EPA 1640	Zinc	1	µg/L						0.5	0.0736									
Semivolatile Organic Compounds																			
Acids																			
EPA 625	2-Chlorophenol	2	µg/L	5[b]	1.6[b]		0.5	0.11	0.5	0.13		2	1.8					1	0.28
EPA 8270	2-Chlorophenol	2	µg/L												2	0.02			

Summary of Laboratory Capabilities

Analytical Method	Analyte	Permit ML	Unit	Advanced Technology Laboratories			BSK Associates		CalScience Laboratories			ES Babcock			Orange Coast			Weck Labs	
				PQL	MDL	Comment	MRL	MDL	RL	MDL	Comment	MRL	MDL	Comment	MRL	MDL	Comment	MRL	MDL
EPA 625	4-Chloro-3-methylphenol	1	µg/L	5[a]	2.4[a]		0.5	0.1	0.5	0.12		1	1					1	0.23
EPA 8270	4-Chloro-3-methylphenol	1	µg/L												1	0.06			
EPA 625	2,4-Dichlorophenol	1	µg/L	5[a]	2.1[a]		0.5	0.1	0.5	0.12		1	1					1	0.26
EPA 8270	2,4-Dichlorophenol	1	µg/L												1	0.02			
EPA 625	2,4-Dimethylphenol	2	µg/L	5[b]	2[b]		0.5	0.15	1	0.22		1	1					1	0.3
EPA 8270	2,4-Dimethylphenol	2	µg/L												2	0.06			
EPA 625	2,4-Dinitrophenol	5	µg/L	50[b]	3.5[b]		1	0.27	5	1.3		5	1.6					5	1.6
EPA 8270	2,4-Dinitrophenol	5	µg/L												5	0.5			
EPA 625	2-Nitrophenol	10	µg/L	10	3		0.5	0.21	0.5	0.11		10	2.1					1	0.26
EPA 8270	2-Nitrophenol	10	µg/L												5	0.02			
EPA 625	4-Nitrophenol	5	µg/L	50[b]	2.1[b]		1	0.26	10[b]	0.52[b]		5	1.1					5	0.45
EPA 8270	4-Nitrophenol	5	µg/L												5	0.5			
EPA 625	Pentachlorophenol	2	µg/L	20[b]	2.3[b]		0.5	0.2	0.5	0.13		1	1					1	0.19
EPA 8151A	Pentachlorophenol	2	µg/L									0.6	0.42						
EPA 515.3	Pentachlorophenol	2	µg/L				0.2	0.011											
EPA 8270	Pentachlorophenol	2	µg/L												2	0.04			
EPA 625	Phenol	1	µg/L	10[b]	0.78[b]		0.5	0.1	0.5	0.06		1	1					1	0.16
EPA 8270	Phenol	1	µg/L												1	0.02			
EPA 625	2,4,6-Trichlorophenol	10	µg/L	10	3		0.5	0.14	0.5	0.15		10	1.9					1	0.22
EPA 8270	2,4,6-Trichlorophenol	10	µg/L												5	0.02			
Base/Neutral																			
EPA 625	Acenaphthene	1	µg/L	10[b]	0.72		0.01	0.004										1	0.4
EPA 625 SIM	Acenaphthene	1	µg/L									0.05	0.05					0.1	0.1
8310/8270SIM	Acenaphthene	1	µg/L						0.2	0.021					0.05	0.03			
EPA 625	Acenaphthylene	2	µg/L	10[b]	0.52[b]		0.01	0.0023										1	0.1
8310/8270SIM	Acenaphthylene	2	µg/L						0.2	0.018					0.05	0.005			
EPA 625 SIM	Acenaphthylene	2	µg/L									0.05	0.05					0.1	0.1
EPA 625	Anthracene	2	µg/L	10[b]	0.54[b]		0.01	0.002										1	0.34
EPA 625 SIM	Anthracene	2	µg/L									0.05	0.05					0.1	0.1
8310/8270SIM	Anthracene	2	µg/L						0.2	0.034					0.05	0.02			
EPA 625	Benzidine	5	µg/L	5	1.2		5	1.4	5	2.2		5	5					5	3.7
8270	Benzidine	5	µg/L												5	0.2			
EPA 625	1,2 Benzanthracene	5	µg/L	10[b]	0.54[b]	Benzo(a)Ant						0.05	0.05						
8310/8270SIM	Benz(a)anthracene	5	µg/L			1,2 Benzan			0.2	0.024					0.05	0.02			
EPA 625	Benzo(a)pyrene	2	µg/L	10[b]	1.8[b]		0.01	0.0033										1	0.13
EPA 625 SIM	Benzo(a)pyrene	2	µg/L									0.05	0.05					0.1	0.1
EPA 525.2	Benzo(a)pyrene	2	µg/L									0.1	0.09						
8310/8270SIM	Benzo(a)pyrene	2	µg/L						0.2	0.036					0.05	0.02			
EPA 625	Benzo(g,h,i)perylene	5	µg/L	10[b]	0.76[b]		0.01	0.0038										2	0.1
EPA 625 SIM	Benzo(g,h,i)perylene	5	µg/L									0.05	0.05					0.1	0.1
8310/8270SIM	Benzo(g,h,i)perylene	5	µg/L						0.2	0.022					0.05	0.03			
EPA 625	3,4 Benzoflouranthene	10	µg/L	10	0.58	Benzo(b)fluor	10	0.00207				0.05	0.05						
8310/8270SIM	Benzo(b)fluoranthene	10	µg/L			3,4 Benzofluoranth			0.2	0.025					0.05	0.02			
EPA 625	Benzo(k)flouranthene	2	µg/L	10[b]	0.62[b]		0.01	0.0028										1	0.22
8310/8270SIM	Benzo(k)fluoranthene	2	µg/L						0.2	0.023					0.05	0.02			
EPA 625 SIM	Benzo(k)flouranthene	2	µg/L									0.05	0.05					0.1	0.1
EPA 625	Bis(2-Chloroethoxy) methane	5	µg/L	10[b]	0.58[b]		0.5	0.1	0.5	0.066		5	1.8					1	0.25
8270	Bis(2-Chloroethoxy) methane	5	µg/L												5	0.07			
EPA 625	Bis(2-Chloroisopropyl) ether	2	µg/L	2	1.2		0.5	0.12	0.5	0.068		2	1.9					1	0.38

Summary of Laboratory Capabilities

Analytical Method	Analyte	Permit ML	Unit	Advanced Technology Laboratories			BSK Associates		CalScience Laboratories			ES Babcock			Orange Coast			Weck Labs	
				PQL	MDL	Comment	MRL	MDL	RL	MDL	Comment	MRL	MDL	Comment	MRL	MDL	Comment	MRL	MDL
8270	Bis(2-Chloroisopropyl) ether	2	µg/L												2	0.03			
EPA 625	Bis(2-Chloroethyl) ether	1	µg/L	5[b]	1.2[b]		0.5	0.15	0.5	0.096		1	1					1	0.27
8270	Bis(2-Chloroethyl) ether	1	µg/L												1	0.03			
EPA 625	Bis(2-Ethylhexyl) phthalate	5	µg/L	10[b]	0.63[b]		1	0.29	5	0.91		5	2.3					5	2.3
8270	Bis(2-Ethylhexyl) phthalate	5	µg/L												3	0.06			
EPA 625	4-Bromophenyl phenyl ether	5	µg/L	10[b]	0.54[b]		0.5	0.1	5	1.4		5	1.6					1	0.36
8270	4-Bromophenyl phenyl ether	5	µg/L												5	0.04			
EPA 625	Butyl benzyl phthalate	10	µg/L	10	0.56		0.5	0.1	5	1.2		10	1.6					1	0.18
8270	Butyl benzyl phthalate	10	µg/L												5	0.03			
EPA 625	2-Chloroethyl vinyl ether	1	µg/L						1	0.36		5[b]	1[b]	may reach with J flag or out of reach					
EPA 624	2-Chloroethyl vinyl ether	1	µg/L	0.5	0.27		1	0.39											
8260	2-Chloroethyl vinyl ether	1	µg/L												1	0.2			
EPA 625	2-Chloronaphthalene	10	µg/L	10	0.5		0.5	0.1	5	1.4		10	1.8					1	0.45
8270	2-Chloronaphthalene	10	µg/L												5	0.04			
EPA 625	4-Chlorophenyl phenyl ether	5	µg/L	10[b]	0.59[b]		0.5	0.23	5	1.3		5	1.8					1	0.41
8270	4-Chlorophenyl phenyl ether	5	µg/L												5	0.05			
EPA 625	Chrysene	5	µg/L	10[b]	0.56[b]		0.01	0.0011										1	0.19
EPA 625 SIM	Chrysene	5	µg/L									0.05	0.05					0.1	0.1
8310/8270SIM	Chrysene	5	µg/L						0.2	0.019					0.05	0.02			
EPA 625	Dibenzo(a,h)anthracene	0.1	µg/L	10[b]	0.72[b]		0.01	0.0031										2	0.08
EPA 625 SIM	Dibenzo(a,h)anthracene	0.1	µg/L									0.05	0.05					0.1	0.1
8310/8270SIM	Dibenzo(a,h)anthracene	0.1	µg/L						0.2[b]	0.027[b]					0.05	0.01			
EPA 625	1,3-Dichlorobenzene	1	µg/L	10[b]	0.56[b]		0.5	0.1	1	0.27								1	0.53
EPA 624	1,3-Dichlorobenzene	1	µg/L									0.5	0.15						
8270	1,3-Dichlorobenzene	1	µg/L												1	0.03			
EPA 625	1,4-Dichlorobenzene	1	µg/L	10[b]	0.66[b]		0.5	0.1	1	0.29		1	1					1	0.55
EPA 624	1,4-Dichlorobenzene	1	µg/L									0.5	0.072						
8270	1,4-Dichlorobenzene	1	µg/L												1	0.03			
EPA 625	1,2-Dichlorobenzene	1	µg/L	10	0.65		0.5	0.1	1	0.23		2	1.8					1	0.57
EPA 624	1,2-Dichlorobenzene	1	µg/L	0.5	0.44							0.5	0.2						
8270	1,2-Dichlorobenzene	1	µg/L												1	0.02			
EPA 625	3,3-Dichlorobenzidine	5	µg/L	5	3.3		1	0.54	5	1.2		5	2.1					5	1.2
8270	3,3'-Dichlorobenzidine	5	µg/L												5	0.4			
EPA 625	Diethyl phthalate	2	µg/L	10[b]	0.55[b]		0.5	0.1	0.5	0.1		2	1.8					1	0.15
8270	Diethyl phthalate	2	µg/L												2	0.03			
EPA 625	Dimethyl phthalate	2	µg/L	10[b]	0.63		0.5	0.1	0.5	0.11		2	1.7					1	0.18
8270	Dimethyl phthalate	2	µg/L												2	0.03			
EPA 625	di-n-Butyl phthalate	10	µg/L	10	0.7		0.5	0.14	0.5	0.073		10	1.9					1	0.24
8270	Di-n-butyl phthalate	10	µg/L												5	0.05			
EPA 625	2,4-Dinitrotoluene	5	µg/L	10[b]	0.83[b]		0.5	0.1	0.5	0.15		5	1.8					1	0.18
8270	2,4-Dinitrotoluene	5	µg/L												5	0.02			
EPA 625	2,6-Dinitrotoluene	5	µg/L	10[b]	0.7[b]		0.5	0.36	5	1.2		5	1.9					1	0.27
8270	2,6-Dinitrotoluene	5	µg/L												5	0.05			
EPA 625	4,6 Dinitro-2-methylphenol	5	µg/L	50[b]	3.5[b]		0.5	0.11	5	1.1		5	1.8					5	1.7
8270	4,6-Dinitro-2-methylphenol	5	µg/L												5	0.03			
EPA 625	1,2-Diphenylhydrazine	1	µg/L	10[b]	0.62[b]		0.5	0.1	0.5	0.098		1	1					1	0.25
8270	1,2-Diphenylhydrazine	1	µg/L												1	0.06			
EPA 625	di-n-Octyl phthalate	10	µg/L	10	0.58		0.5	0.1	5	1.2		10	2.6					1	0.19
8270	Di-n-octyl phthalate	10	µg/L												5	0.02			

Summary of Laboratory Capabilities																			
				Advanced Technology Laboratories			BSK Associates		CalScience Laboratories			ES Babcock			Orange Coast			Weck Labs	
Analytical Method	**Analyte**	**Permit ML**	**Unit**	**PQL**	**MDL**	**Comment**	**MRL**	**MDL**	**RL**	**MDL**	**Comment**	**MRL**	**MDL**	**Comment**	**MRL**	**MDL**	**Comment**	**MRL**	**MDL**
EPA 625	Fluoranthene	0.05	µg/L	10[b]	0.56[b]		0.01	0.0012										1	0.22
EPA 625 SIM	Fluoranthene	0.05	µg/L	2[b]	1.6[b]							0.05	0.05					0.05	0.05
8310/8270SIM	Fluoranthene	0.05	µg/L						0.2[b]	0.027[b]					0.05	0.009			
EPA 625	Fluorene	0.1	µg/L	10[b]	0.53[b]		0.01	0.0043										1	0.35
EPA 625 SIM	Fluorene	0.1	µg/L	2[b]	1.6[b]							0.05	0.05					0.1	0.1
8310/8270SIM	Fluorene	0.1	µg/L						0.2[b]	0.024[b]					0.05	0.02			
EPA 625	Hexachlorobenzene	1	µg/L	10[b]	0.78[b]		0.5	0.15	0.5	0.19		1	1					1	0.49
8270	Hexachlorobenzene	1	µg/L												1	0.03			
EPA 625	Hexachlorobutadiene	1	µg/L	20[b]	0.56[b]		0.5	0.13	1	0.33		1	1					1	0.47
8270	Hexachlorobutadiene	1	µg/L												1	0.05			
EPA 625	Hexachloro-cyclopentadiene	5	µg/L	10[b]	0.67[b]		0.5	0.14	0.5	0.15		5	1.7					5	1.5
8270	Hexachloro-cyclopentadiene	5	µg/L												5	0.2			
EPA 625	Hexachloroethane	1	µg/L	10[b]	0.69[b]		0.5	0.1	1	0.3		1	1					1	0.52
8270	Hexachloroethane	1	µg/L												1	0.02			
EPA 625	Indeno(1,2,3-cd)pyrene	0.05	µg/L	10[b]	1.5[b]		0.01	0.0027										2	1.2
EPA 625 SIM	Indeno(1,2,3-cd)pyrene	0.05	µg/L	2[b]	1.9[b]							0.05	0.05					0.05	0.05
8310/8270SIM	Indeno(1,2,3-cd)pyrene	0.05	µg/L						0.2	0.022					0.05	0.03			
EPA 625	Isophorone	1	µg/L	10[b]	0.6[b]		0.5	0.11	0.5	0.14		1	1					1	0.21
8270	Isophorone	1	µg/L												1	0.2			
EPA 625	Naphthalene	0.2	µg/L	10[b]	0.46[b]		0.01	0.0027										1	0.49
EPA 625 SIM	Naphthalene	0.2	µg/L	2[b]	1.8[b]							0.05	0.05					0.1	0.1
8310/8270SIM	Naphthalene	0.2	µg/L						0.2	0.023					0.05	0.01			
EPA 625	Nitrobenzene	1	µg/L	10[b]	0.65[b]		0.5	0.11	1	0.24		1	1					1	0.36
8270	Nitrobenzene	1	µg/L												1	0.02			
EPA 625	N-Nitroso-dimethyl amine	5	µg/L	50	1.9[b]		0.5	0.48	0.5	0.13		5	1.4					1	0.14
8270	N-Nitroso-dimethyl amine	5	µg/L												5	0.02			
EPA 625	N-Nitroso-diphenyl amine	1	µg/L	10[b]	0.57[b]		0.5	0.24	0.5	0.14		1	1					1	0.19
8270	N-Nitroso-diphenyl amine	1	µg/L												1	0.03			
EPA 625	N-Nitroso-di-n-propyl amine	5	µg/L	10[b]	0.72[b]		0.5	0.1	5	0.92		5	1.7					1	0.26
8270	N-Nitroso-di-n-propyl amine	5	µg/L												5	0.03			
EPA 625	Phenanthrene	0.05	µg/L	10[b]	0.56[b]		0.01	0.0024										1	0.32
EPA 625 SIM	Phenanthrene	0.05	µg/L	2[b]	1.8[b]							0.05	0.05					0.05	0.05
8310/8270SIM	Phenanthrene	0.05	µg/L						0.2[b]	0.031[b]					0.05	0.02			
EPA 625	Pyrene	0.05	µg/L	10[b]	0.57[b]		0.01	0.0014										1	0.25
EPA 625 SIM	Pyrene	0.05	µg/L	2[b]	1.6[b]							0.05	0.05					0.05	0.05
8310/8270SIM	Pyrene	0.05	µg/L						0.2[b]	0.025[b]					0.05	0.02			
EPA 625	1,2,4-Trichlorobenzene	1	µg/L	10[b]	0.53[b]		0.5	0.1				1	1					1	0.55
8270	1,2,4-Trichlorobenzene	1	µg/L						0.5	0.06					1	0.03			
Chlorinated Pesticides																			
EPA 608	Aldrin	0.005	µg/L	0.02[b]	0.003[b]		0.005	0.00079	0.004	0.00065		0.005	0.005		0.1[b]	0.0001[b]		0.005	0.0015
EPA 608	alpha-BHC	0.01	µg/L	0.02[b]	0.003[b]		0.005	0.0025	0.004	0.00067		0.01	0.01		0.2[b]	0.0002[b]		0.01	0.0018
EPA 608	beta-BHC	0.005	µg/L	0.02[b]	0.004[b]		0.005	0.00054	0.004	0.0015		0.005	0.005		0.2[b]	0.0009[b]		0.005	0.0031
EPA 608	delta-BHC	0.005	µg/L	0.02[b]	0.003[b]		0.005	0.0006	0.004	0.00066		0.005	0.005		0.2[b]	0.0003[b]		0.005	0.0025
EPA 608	gamma-BHC (lindane)	0.02	µg/L	0.02	0.004		0.005	0.0025	0.004	0.00093		0.02	0.02		0.2[b]	0.0002[b]		0.02	0.0021
EPA 608	alpha-chlordane	0.1	µg/L	0.02	0.003		0.1	0.026	0.004	0.00062		0.1	0.045	"chlordane"	0.1			0.01	0.0041
EPA 608	gamma-chlordane	0.1	µg/L	0.02	0.003		0.1	0.026	0.004	0.0006		0.1	0.045	"chlordane"	0.1			0.01	0.0044
EPA 608	4,4'-DDD	0.05	µg/L	0.05	0.004		0.005	0.00072	0.004	0.00061		0.05	0.016		0.05	0.0007		0.05	0.003
EPA 608	4,4'-DDE	0.05	µg/L	0.05	0.003		0.005	0.00061	0.004	0.00089		0.05	0.01		0.05	0.0002		0.05	0.0025
EPA 608	4,4'-DDT	0.01	µg/L	0.05[b]	0.004[b]		0.005	0.0007	0.004	0.00059		0.01	0.01		0.01	0.002		0.01	0.0031

Summary of Laboratory Capabilities

Analytical Method	Analyte	Permit ML	Unit	Advanced Technology Laboratories			BSK Associates		CalScience Laboratories			ES Babcock			Orange Coast			Weck Labs	
				PQL	MDL	Comment	MRL	MDL	RL	MDL	Comment	MRL	MDL	Comment	MRL	MDL	Comment	MRL	MDL
EPA 608	Dieldrin	0.01	µg/L	0.05[b]	0.004[b]		0.005	0.00097	0.004	0.00065		0.01	0.01		0.01	0.0002		0.01	0.0021
EPA 608	alpha-Endosulfan	0.02	µg/L	0.02	0.004		0.005	0.00089	0.004	0.00059		0.02	0.011		0.02	0.0002		0.02	0.0017
EPA 608	beta-Endosulfan	0.01	µg/L	0.05[b]	0.004[b]		0.005	0.0018	0.004	0.00065		0.01	0.01		0.01	0.0005		0.01	0.0019
EPA 608	Endosulfan sulfate	0.05	µg/L	0.05	0.004		0.005	0.00074	0.004	0.0006		0.05	0.044		0.05	0.0004		0.05	0.008
EPA 608	Endrin	0.01	µg/L	0.05[b]	0.003[b]		0.005	0.00081	0.004	0.00062		0.01	0.01		0.01	0.002		0.01	0.0028
EPA 608	Endrin aldehyde	0.01	µg/L	0.05[b]	0.005[b]		0.005	0.00067	0.004	0.00064		0.01	0.01		0.01	0.002		0.01	0.003
EPA 608	Heptachlor	0.01	µg/L	0.02[b]	0.003[b]		0.005	0.00069	0.004	0.00072		0.01	0.01		0.01	0.0003		0.01	0.0017
EPA 608	Heptachlor Epoxide	0.01	µg/L	0.02[b]	0.004[b]		0.005	0.00069	0.004	0.00068		0.01	0.01		0.01	0.0002		0.01	0.0019
EPA 608	Toxaphene	0.5	µg/L	2.5[b]	0.36[b]		0.1	0.035	0.05	0.0092		0.5	0.5		0.5	0.03		0.5	0.12
Polychlorinated Biphenyls																			
EPA 608	Aroclor-1016	0.5	µg/L	0.5	0.07		0.1	0.05	0.2	0.059		0.5	0.5		0.5			0.5	0.05
EPA 608	Aroclor-1221	0.5	µg/L	0.5	0.07		0.1	0.063	0.2	0.057		0.5	0.5		0.5			0.5	0.06
EPA 608	Aroclor-1232	0.5	µg/L	0.5	0.07		0.1	0.05	0.2	0.05		0.5	0.42		0.5			0.5	0.15
EPA 608	Aroclor-1242	0.5	µg/L	0.5	0.07		0.1	0.05	0.2	0.025		0.5	0.41		0.5			0.5	0.07
EPA 608	Aroclor-1248	0.5	µg/L	0.5	0.07		0.1	0.02	0.2	0.04		0.5	0.28		0.5			0.5	0.06
EPA 608	Aroclor-1254	0.5	µg/L	0.5	0.07		0.1	0.05	0.2	0.045		0.5	0.5		0.5			0.5	0.04
EPA 608	Aroclor-1260	0.5	µg/L	0.5	0.07		0.1	0.015	0.2	0.053		0.5	0.5		0.5			0.5	0.04
Organophosphate Pesticides																			
EPA 525.2	Atrazine	2	µg/L	0.1	0.1							0.5	0.063		0.1	0.034		0.1	0.022
EPA 8141B	Atrazine	2	µg/L						0.02	0.0044									
EPA 8270C	Atrazine	2	µg/L				0.1	0.028				4[b]	1.4[b]						
EPA 525.2	Chlorpyrifos	0.05	µg/L												0.01	0.0069		0.01	0.0069
EPA 8141B	Chlorpyrifos	0.05	µg/L	1[b]	1[b]				0.01	0.0026									
EPA 8270C	Chlorpyrifos	0.05	µg/L				0.01	0.0029				4[a]	1.2[a]	may reach with J flag or out of reach					
EPA 525.2	Cyanazine	2	µg/L	0.1	0.1													[a]	[a]
EPA 8141B	Cyanazine	2	µg/L						0.02	0.0035									
EPA 8270C	Cyanazine	2	µg/L				0.1	0.036							0.1	0.024			
EPA 525.2	Diazinon	0.01	µg/L	0.1[b]	0.1[b]				0.01	0.0026		0.25[a]	0.25[a]	may reach with J flag or out of reach	0.1	0.096		0.01	0.052
EPA 8141B	Diazinon	0.01	µg/L	1[b]	1[b]				0.01	0.0026									
EPA 8270C	Diazinon	0.01	µg/L				0.01	0.0036											
EPA 525.2	Malathion	1	µg/L												0.01	0.0076		0.01	0.0076
EPA 8141B	Malathion	1	µg/L	1	1				0.02	0.0055									
EPA 8270C	Malathion	1	µg/L				0.01	0.0046				4	0.073						
EPA 525.2	Prometryn	2	µg/L	0.1	0.1							2	0.079		0.1	0.036		0.1	0.024
EPA 8141B	Prometryn	2	µg/L						0.02	0.0039									
EPA 8270C	Prometryn	2	µg/L				0.1	0.019											
EPA 525.2	Simazine	2	µg/L	0.1	0.1		0.1	0.024				1	0.061		0.1	0.015		0.1	0.015
EPA 8141B	Simazine	2	µg/L						0.02	0.0045									
EPA 8270C	Simazine	2	µg/L				0.1	0.024				4[b]	0.84[b]						
Herbicides																			
EPA 515.3	2,4-D	10	µg/L	0.4	0.4		10	0.074										0.4	0.07
EPA 8151A	2,4-D	10	µg/L	0.5	0.5				5	1.8		10	0.17		2	0.083			
EPA 547	Glyphosate	5	µg/L	5	5		5	2.1	5	1.8	Sub to Weck	25[b]	4.5[b]	may reach with J flag or out of reach	5	1.8		5	1.8
EPA 8151A	2,4,5-TP-SILVEX	0.5	µg/L	0.5	0.5				0.5	0.22		1[b]	0.15[b]	may reach with J flag or out of reach	1[b]	0.074[b]			
EPA 515.3	2,4,5-TP-SILVEX	0.5	µg/L	0.2	0.2		1[b]	0.016[b]										0.2	0.09

[a] Laboratory is unable to test for or meet the Permit Minimum Level

[b] MDL is below Permit Minimum Level and will be reported with a “J” Flag qualifier

Beach Cities CIMP Appendix F

Los Angeles County Flood Control District Background Information

July 2015

LACFCD Background Information

In 1915, the Los Angeles County Flood Control Act established the LACFCD and empowered it to manage flood risk and conserve stormwater for groundwater recharge. In coordination with the United States Army Corps of Engineers the LACFCD developed and constructed a comprehensive system that provides for the regulation and control of flood waters through the use of reservoirs and flood channels. The system also controls debris, collects surface storm water from streets, and replenishes groundwater with storm water and imported and recycled waters. The LACFCD covers the 2,753 square-mile portion of Los Angeles County south of the east-west projection of Avenue S, excluding Catalina Island. It is a special district governed by the County of Los Angeles Board of Supervisors, and its functions are carried out by the Los Angeles County Department of Public Works. The LACFCD service area is shown in **Figure -1.**

Unlike cities and counties, the LACFCD does not own or operate any municipal sanitary sewer systems, public streets, roads, or highways. The LACFCD operates and maintains storm drains and other appurtenant drainage infrastructure within its service area. The LACFCD has no planning, zoning, development permitting, or other land use authority within its service area. The permittees that have such land use authority are responsible under the Permit for inspecting and controlling pollutants from industrial and commercial facilities, development projects, and development construction sites. (Permit, Part II.E, p. 17.)

The MS4 Permit language clarifies the unique role of the LACFCD in storm water management programs: "[g]iven the LACFCD's limited land use authority, it is appropriate for the LACFCD to have a separate and uniquely-tailored storm water management program. Accordingly, the storm water management program minimum control measures imposed on the LACFCD in Part VI.D of this Order differ in some ways from the minimum control measures imposed on other Permittees. Namely, aside from its own properties and facilities, the LACFCD is not subject to the Industrial/Commercial Facilities Program, the Planning and Land Development Program, and the Development Construction Program. However, as a discharger of storm and non-storm water, the LACFCD remains subject to the Public Information and Participation Program and the Illicit Connections and Illicit Discharges Elimination Program. Further, as the owner and operator of certain properties, facilities and infrastructure, the LACFCD remains subject to requirements of a Public Agency Activities Program." (Permit, Part II.F**,** p. 18.)

Consistent with the role and responsibilities of the LACFCD under the Permit, the [E]WMPs and CIMPs reflect the opportunities that are available for the LACFCD to collaborate with permittees having land use authority over the subject watershed area. In some instances, the opportunities are minimal, however the LACFCD remains responsible for compliance with certain aspects of the MS4 permit as discussed above.

During the development of the CIMP, LACFCD infrastructure was evaluated for monitoring opportunities. The LACFCD will be collaborating with the groups for all of the monitoring.

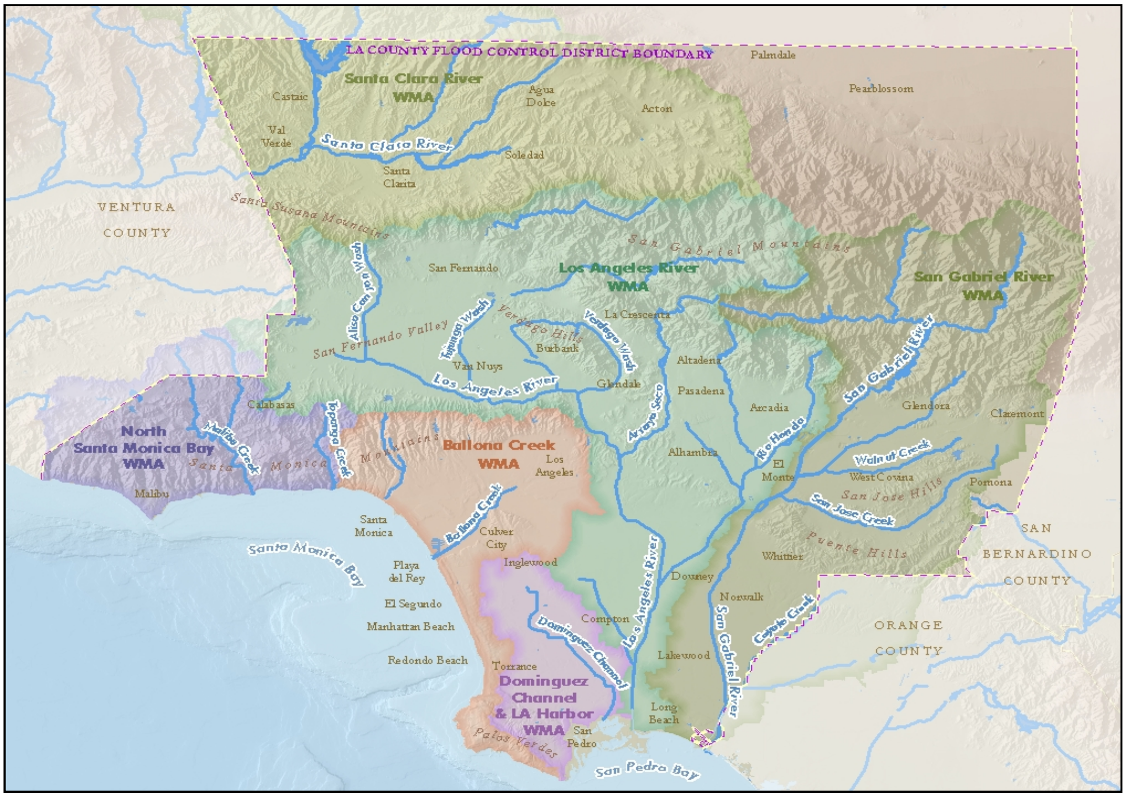


Figure F-1 Los Angeles County Flood Control District Service Area

Beach Cities CIMP Appendix G

Summary of Data at SMB Observational Monitoring Sites

July 2015

Table G-1. Observational Data Summary, 7/2/2012-5/25/2015

	Observations	*Station* SMB-O-6	SMB-O-7	SMB-O-8
Number of Dry Weather Days with Observations		85	74	83
Dry Weather Only	Number of Days Storm Drain Flow = "Dry"	55	43	48
	Percent of Dry Weather Days with Observations	65%	58%	58%
	Number of Days Storm Drain Flow = "Ponded"	9	6	2
	Percent of Dry Weather Days with Observations	11%	8%	2%
	Number of Days Storm Drain Flow = "Low Flow"	21	22	27
	Percent of Dry Weather Days with Observations	25%	30%	33%
	Number of Days Storm Drain Flow = "Medium Flow"	0	3	5
	Percent of Dry Weather Days with Observations	0%	4%	6%
	Number of Days Storm Drain Flow = "Heavy Flow"	0	0	1
	Percent of Dry Weather Days with Observations	0%	0%	1%
	Number of Days Reaches Surf = "Yes"*	2	8	9
	Percent of Dry Weather Days with Observations	2%	11%	11%

*Occasions of storm drain flow reported to be reaching the surf, but reported as “dry” or “ponded” have been excluded from this summary.

Table G-2. SMB-O-6 Dry Weather Observations for Flows Reaching Surf

Date	Storm Drain Flow
8/6/2012	Low Flow
8/20/2012	Low Flow

Table G-3. SMB-O-7 Dry Weather Observations for Flows Reaching Surf

Date	Storm Drain Flow*
5/13/2013	Low Flow
5/20/2013	Low Flow
5/27/2013	Low Flow
2/17/2014	Medium Flow
3/10/2014	Low Flow
6/16/2014	Medium Flow
12/29/2014	Low Flow
1/5/2015	Low Flow

*Occasions of storm drain flow reported to be reaching the surf, but reported as “dry” or “ponded” have been excluded from this summary.

Table G-4. SMB-O-8 Dry Weather Observations for Flows Reaching Surf

Date	Storm Drain Flow*
8/13/2012	Low Flow
12/10/2012	Low Flow
8/19/2013	Low Flow
8/26/2013	Heavy Flow
4/7/2014	Low Flow
4/14/2014	Medium Flow
4/21/2014	Medium Flow
4/28/2014	Low Flow
4/20/2015	Low Flow

*Occasions of storm drain flow reported to be reaching the surf, but reported as “dry” or “ponded” have been excluded from this summary.