INTEGRATED MONITORING PROGRAM LONG BEACH INNER HARBOR, LONG BEACH OUTER HARBOR, AND EASTERN SAN PEDRO BAY – IMP 8.1

Prepared for

City of Long Beach

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LIST OF ACRONYMS AND ABBREVIATIONS

BMP	best management practice
CCMRP	Coordinated Compliance Monitoring and Reporting Plan
CDFW	California Department of Fish and Wildlife
CETIS	Comprehensive Environmental Toxicity Information System
City	City of Long Beach
cm	centimeter
CWA	Clean Water Act
DDT	dichlorodiphenyltrichloroethane
DO	dissolved oxygen
Harbor Toxics TMDL	Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL
HUC	Hydrologic Unit Code
IMP	Integrated Monitoring Program
ITP	Incidental Take Permit
IWC	in-stream waste concentration
mm	millimeter
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Stormwater Sewer System
NPDES	National Pollutant Discharge Elimination System
NSWD	non-stormwater discharge
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
Port	Port of Long Beach
ppt	part per thousand
RMC	Regional Monitoring Coalition
RWL	Receiving Water Limitation
RWQCB	Los Angeles Regional Water Quality Control Board
SCB	Southern California Bight

SOP	Standard Operating Procedure
SQO	Sediment Quality Objective
SWAMP	Surface Water Ambient Monitoring Program
T/E	threatened or endangered
TIE	Toxicity Identification Evaluation
TMDL	total maximum daily load
TRE	toxicity reduction evaluation
TSS	total suspended solids
TST	Test of Significant Toxicity
USEPA	U.S. Environmental Protection Agency
WMP	Watershed Management Program
WQBEL	water-quality based effluent limit

1 INTRODUCTION

This Integrated Monitoring Program (IMP) was developed pursuant to the provisions of National Pollutant Discharge Elimination System (NPDES) Permit No. CAS004003 (Order No. R4-2014-0024; RWQCB 2014; hereafter referred to as MS4 [Municipal Separate Stormwater Sewer System] Permit) and was submitted as Section 8.1 of Appendix A-8-1 IMP (hereafter referred to as IMP 8.1) to the City of Long Beach's (City's) Watershed Management Program (WMP; City of Long Beach 2014). This IMP covers the Port of Long Beach (Port) area, which includes Long Beach Inner Harbor, Long Beach Outer Harbor, and Eastern San Pedro Bay but excludes a nearshore area to Eastern San Pedro Bay (i.e., San Pedro Bay HUC-12 [180701060703]) of which the MS4 is owned and operated by the City. The San Pedro Bay HUC-12 is included in Section 8.2 of Appendix A-8-1 IMP (hereafter referred to as IMP 8.2) to the WMP. This IMP consists of receiving water monitoring, total maximum daily load (TMDL) compliance monitoring, stormwater and non-stormwater outfall monitoring, new development/redevelopment effectiveness tracking, and a regional study.

2 WATERBODY-POLLUTANT CLASSIFICATION

Waterbody-pollutant combination has been prioritized and is summarized in Table 1. The highest priority water quality issues include all Category 1 waterbody-pollutant combinations due to their listing in the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL (Harbor Toxics TMDL; RWQCB 2011). These waterbody-pollutant combinations include copper, lead, zinc, total polycyclic aromatic hydrocarbons (PAHs), total dichlorodiphenyltrichloroethanes (DDTs), and total polychlorinated biphenyls (PCBs) in sediment for Inner Harbor, Outer Harbor, and eastern San Pedro Bay. All high priority pollutants in Long Beach Inner Harbor, Long Beach Outer Harbor, and eastern San Pedro Bay are included in a TMDL compliance regional monitoring program, which is conducted by the Regional Monitoring Coalition (RMC). The Harbor Toxics TMDL encouraged formation of a regional monitoring coalition for TMDL compliance monitoring. The City and the Port have been actively involved in the RMC since its formation in 2013. The RMC's Coordinated Compliance Monitoring and Reporting Plan (CCMRP; Anchor QEA 2014) was approved by the Los Angeles Regional Water Quality Control Board (RWQCB) on June 6, 2014. The RMC's first sediment sampling event was conducted in coordination with the Bight 2013 program. The first water and fish tissue sampling events were conducted in September 2014. Medium priority pollutants in Long Beach Inner Harbor, Long Beach Outer Harbor, and eastern San Pedro Bay are also included in the TMDL monitoring, except for Bis(2-ethylhexyl)phthalate in water, which will be monitored via receiving water monitoring.

Table 1

Water Quality Issue Prioritization

Waterbody	Highest Priority	High Priority			Medium Priority	
	Sediment	Water	Sediment	Fish	Water	Sediment
Long Beach Inner Harbor	Copper, lead, zinc, total PAHs, total DDTs, total PCBs, benthic community effects, toxicity	None	Mercury	Total chlordanes	Bis(2-ethylhexyl)phthalate, copper, mercury, zinc, chrysene, pyrene	None
Long Beach Outer Harbor	Copper, lead, zinc, total PAHs, total DDTs, total PCBs, toxicity	None	None	None	Pyrene, bis(2-ethylhexyl)phthalate	Nickel
Los Angeles River Estuary	Copper, lead, zinc, total DDTs, total PCBs, total PAHs, total coliform, fecal coliform, enterococcus	Trash	Chlordane, toxicity	None	None	None
Eastern San Pedro Bay	Copper, lead, zinc, total PAHs, total DDTs, total PCBs, toxicity	None	None	None	Pyrene, bis(2-ethylhexyl)phthalate	None

Notes:
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl

3 MONITORING SITES AND APPROACH

Proposed monitoring locations for receiving water monitoring and TMDL compliance monitoring are summarized in Table 2.

3.1 Receiving Water Monitoring Sites

In coordination with the Harbor Toxics TMDL monitoring plan (i.e., CCMRP), one station was selected in Outer Long Beach Harbor (equivalent to CCMRP Station 16) and one station was selected in eastern San Pedro Bay (equivalent to CCMRP Station 18). Detailed methods are provided in the CCMRP. See Figure 1 for sample locations. For efficiency, it is recommended that the monitoring conducted to satisfy the requirements of the TMDL satisfies the receiving water monitoring requirements of the IMP. The CCMRP monitoring results and evaluation will be submitted in its entirety with the IMP Annual Report.

3.2 TMDL Monitoring Sites

The Harbor Toxics TMDL requires all 22 locations for monitoring (Figure 2). CCMRP Stations 1 through 11 are located within Port of Los Angeles waters, and CCMRP Stations 12-22 (see Figure 1) are located in Long Beach Inner Harbor, Long Beach Outer Harbor, and eastern San Pedro Bay. Detailed methods are provided in the CCMRP. For efficiency, it is recommended that the monitoring conducted to satisfy the requirements of the TMDL satisfies the receiving water monitoring requirements of the IMP. The CCMRP monitoring results and evaluation will be submitted in its entirety with the IMP Annual Report.

3.3 MS4 Stormwater Outfall Monitoring Sites

There are 224 stormwater outfalls within the Harbor District (the Port). Fifteen of the outfalls on Pier H are not owned or operated by the Port but rather by the City, and they discharge to Los Angeles River Estuary. All 209 stormwater outfalls that are owned and operated by the Port discharge to Long Beach Inner or Outer Harbor, with the exception of five outfalls that discharge to the Los Angeles River Estuary and six outfalls that drain to Eastern San Pedro Bay.

Part VIII. A.2 in Attachment E to the MS4 permit, Monitoring and Reporting Program (MRP), contains criteria when selecting outfalls for stormwater monitoring.

> *"a. The storm water outfall based monitoring program should ensure representative data by monitoring at least one major outfall per subwatershed (HUC-12 or HUC-12 equivalent) drainage area, within the Permittee's jurisdiction, or alternate approaches as approved in an IMP or CIMP.*
>
> *b. The drainage(s) to the selected outfall(s) shall be representative of the land uses within the Discharger's jurisdiction.*
>
> *c. If the Discharger implements an IMP, to the extent possible, the selected outfalls shall not receive drainage from another jurisdiction. If this is not possible, the Discharger shall conduct 'upstream' and 'downstream' monitoring as the system enters and exits the Discharger's jurisdiction.*
>
> *d. The Discharger shall select outfalls with configurations that facilitate accurate flow measurement and consideration of safety of monitoring personnel.*
>
> *e. The specific location of sample collection may be within the MS4 upstream of the actual outfall to the receiving water if field safety or accurate flow measurement require it."*

The Port area consists of two HUC-12 equivalent subwatersheds (HUC 180701050402 and HUC 180701060701).[1] There are three major outfalls identified in Table 3 of the MS4 Permit (outfalls 112, 114, and 117). While not listed in Table 3 of the MS4 Permit, outfalls 118 and 119 are also major outfalls, with outfall diameters at or greater than 42 inches. The Port does not believe these major MS4 outfalls are representative of overall Port land uses. For instance, outfalls 117 through 119 drain an automobile distribution facility as well as a lightly used roadway. The automobile distribution facility is not representative of the major Port land uses. Over 80% of Port land use is set aside for container and break bulk operations. Outfall 114 drains a catchment which is largely commercial and a portion of which is outside of the Harbor District. All of the major outfalls, including outfall 112 are submerged during high tides, which makes collecting representative stormwater samples challenging. As such, the Port determined that the five major outfalls are not representative

[1] As discussed in Section 1, outfall monitoring for the nearshore area San Pedro Bay HUC-12 (180701060703) is included in the IMP 8.2.

of the overall land uses within the Port. Alternatively, the Port proposes to monitor stormwater discharges from two sampling stations, one each from the two HUC-12 equivalent subwatersheds within the Port and representative of Port land uses (Figure 1). The first station (Outfall No. 85) will be located in Middle Harbor (HUC 180701050402). The second station will be located on Piers S (HUC 180701060701); however, due to the tidal nature of the outfall for this drainage area, samples will be collected at the nearest upstream non-tidal access point (Pump Station No. 7). Outfall 85 drains a large portion of Pier D, which includes the Middle Harbor Container Terminal. This outfall represents more than half of the Port's landside operations. Pump station 7 drains a large portion of Pier S, which currently includes an active construction project along with roadways used by trucks for cargo movement and other industrial and commercial land uses, including oil operations. Both of these locations are representative of the majority of Port land uses.

Locations of the major and minor outfalls in the Port are presented in Figure A-1. Further, land uses in the Port are presented in Figure B-1, land uses in two HUC units within the Port are in Figure B-2, and land uses in catchments for the two stormwater outfall monitoring stations are presented in Figure B-3 in Attachment B. Tables B-1 through B-3 in Attachment B summarize land uses for the entire Port area, for sub-basins within the Port, and for catchment for the two stormwater outfall monitoring stations in the Port respectively.

Chemical and physical parameters for the stormwater outfall monitoring are discussed in Section 5 and summarized in Table 5. In addition to meeting the permit requirements, the Port will develop an approach to analyze PCBs and DDTs in stormwater samples using high resolution/low detection analytical methods. These high resolution/low detection analytical methods will enable the Port to accurately characterize PCB and DDT loads in stormwater.

Table 2

Monitoring Site Designation and Monitoring Function

Site Name	Waterbody	Type of Site	Location in WGS84	
			Latitude (N)	Longitude (W)
Outfall 85	Inner Long Beach Harbor	MS4/Stormwater Outfall water	33.763596	-118.219756
Pump Station 7	Inner Long Beach Harbor	MS4/Stormwater Outfall water	33.759708	-118.237000
CCMRP Station 16	Outer Long Beach Harbor	Receiving Water/TMDL water, sediment, and fish	33.731449	-118.221000
CCMRP Station 18	Eastern San Pedro Bay	Receiving Water/TMDL water and sediment	33.736671	-118.131591
CCMRP Station 12	Inner Harbor Long Beach	TMDL water and sediment	33.768331	-118.228351
CCMRP Station 13	Inner Harbor Long Beach	TMDL water and sediment	33.753832	-118.216340
CCMRP Station 14	Inner Harbor Long Beach	TMDL water and sediment	33.748982	-118.230825
CCMRP Station 15	Inner Harbor Long Beach	TMDL water and sediment	33.742143	-118.199488
CCMRP Station 17	Outer Harbor Long Beach	TMDL water and sediment	33.727594	-118.186058
CCMRP Station 18	Eastern San Pedro Bay	TMDL water and sediment	33.753832	-118.181332
CCMRP Station 20	Eastern San Pedro Bay	TMDL water, sediment, and fish	33.725480	-118.157332
CCMRP Station 21	Los Angeles River Estuary	Receiving Water/TMDL water and sediment	33.756444	-118.157332
CCMRP Station 22	Los Angeles River Estuary	TMDL water and sediment	33.761013	-118.202111

Notes:
Latitude and longitude are in decimal degrees.
CCMRP = Coordinated Compliance Monitoring and Reporting Plan
MS4 = Municipal Separate Stormwater Sewer System
N = North
TMDL = Total Maximum Daily Load
W = South

Figure 1
Integrated Monitoring Program Monitoring Sites
Integrated Monitoring Program for Long Beach Inner Harbor, Long Beach Outer Harbor, and Eastern San Pedro Bay

Figure 1

IMP Monitoring Sites in Long Beach Inner Harbor, Long Beach Outer Harbor, and Eastern San Pedro Bay.

Table 2 contains the coordinates of these sites.

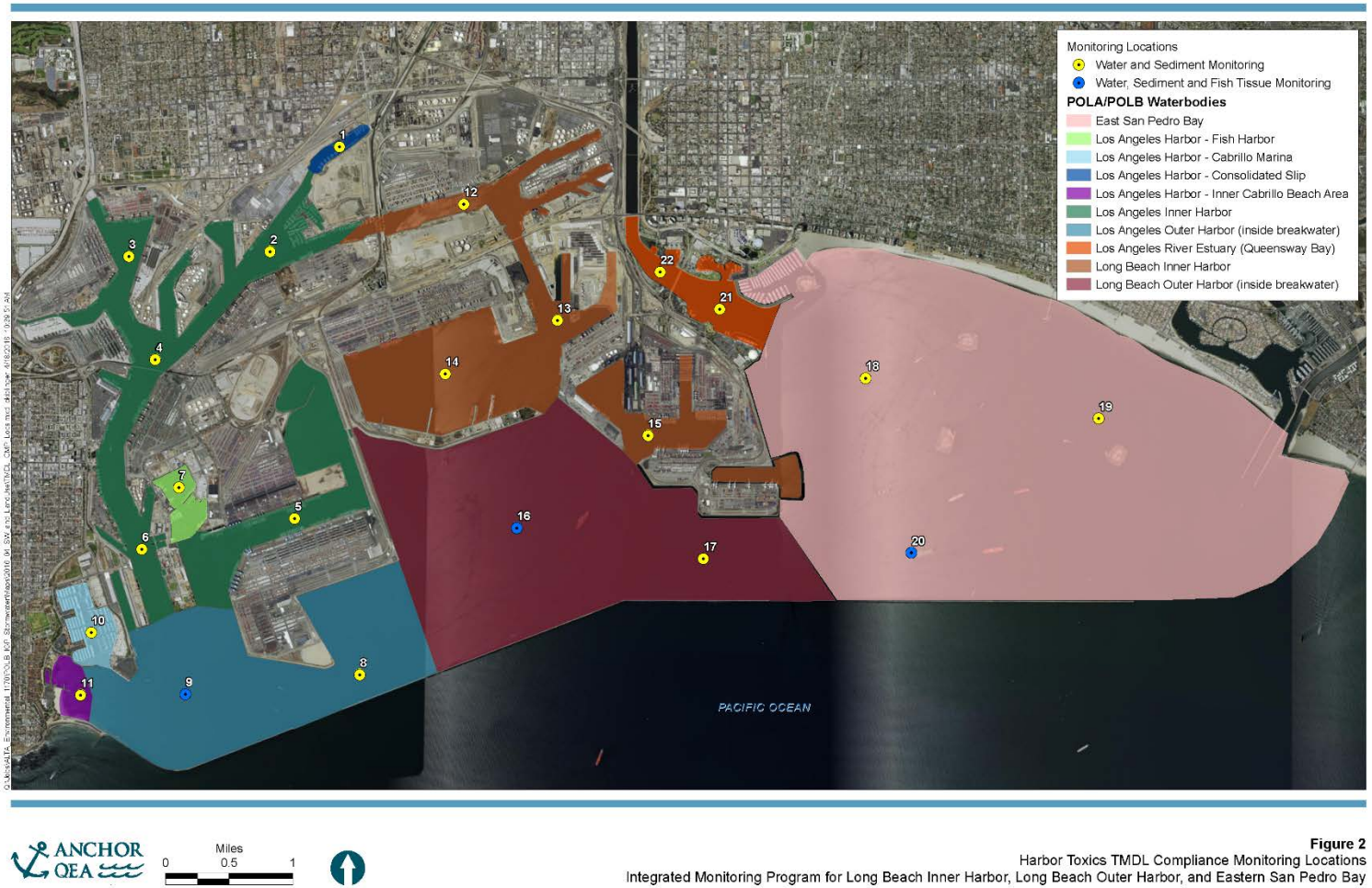

Figure 2
Harbor Toxics TMDL Compliance Monitoring Locations
Integrated Monitoring Program for Long Beach Inner Harbor, Long Beach Outer Harbor, and Eastern San Pedro Bay

Figure 2

Harbor Toxics TMDL Coordinated Compliance Monitoring and Reporting Plan, CCMRP Monitoring Stations in Greater Los Angeles and Long Beach Harbor waters

Stations 12 through 22 are located within Long Beach Inner and Outer Harbor waters and eastern San Pedro Bay.

3.4 Non-stormwater Outfall Monitoring

3.4.1 Stormwater Outfalls in the Port

As discussed in Section 3.3, there are 224 stormwater outfalls within the Port, including 15 outfalls owned and operated by the City. All 224 stormwater outfalls will be subject to the Port's Non-stormwater Outfall Monitoring Program.

3.4.2 Port's Illicit Discharge Detection and Elimination Program

The Port has developed an Illicit Discharge Detection and Elimination Program to detect, investigate, and eliminate illicit discharges, including illegal dumping, into its system. On an quarterly basis, the Port will conduct visual screening of all 224 outfalls. Please refer to the sections below for further detail.

3.4.3 Outfall Inventory

The Port has developed a GIS database covering the entire Port stormwater system. This database includes an inventory of all 224 stormwater outfalls. Each outfall is labeled with a unique identifier, GIS coordinates, outfall size, and photographs. The database allows Port staff to look at the upstream stormwater lines, including the line size, drain inlet locations, and drainage basins. Through this database, upstream sources of potential non-stormwater discharges (NSWDs) for each Port outfall have been identified and can be referred to when necessary.

3.4.4 Outfall Screening

Although the MS4 Permit requires the permittee to conduct one screening during the permit term, the Port will conduct the outfall screening quarterly. The quarterly screening will be performed via visual observations of all 224 stormwater outfalls in the Port on days with no precipitation, in an effort to detect and eliminate unauthorized NSWDs. No-precipitation days are defined as days where precipitation is less than 0.1 inch and at least 3 days after a rain event (≥ 0.1 inch of rain).

The observations will be accomplished using a small vessel narrow enough to fit in between closely constructed piles and access outfalls located beneath wharf faces. Inspections are scheduled to coincide with low tide. The following notations will be made:

- Estimation of flow
- Presence or absence of flow/moisture
- Presence or absence of sheens
- Presence or absence of sludge
- Odor (if any)
- Other abnormal conditions (color, etc.)

When indications of a possible significant non-stormwater or illicit discharge (e.g., petroleum sheen or surfactants) are observed during the course of the visual observation, a water sample will be collected for analysis, if possible. Not all outfalls are accessible, and at certain outfalls, sampling cannot be safely conducted because of physical restrictions in outfall locations (e.g., vessel at berth, water-side construction, outfall submerged due to tides). In such instances, a notation will be made on the reporting sheet, documenting the obstruction. See Attachment D for the Port's Non-stormwater Discharge Observation Survey Form.

3.4.5 Inventory of Outfalls with Non-stormwater Discharges

A detailed report will be generated, noting observations made at accessible outfalls and will be submitted to the Port Environmental Planning Division. Because of the Port's geography, many of the storm-drain lines are at or below the groundwater table, resulting in the potential for dry-weather flow to be present at some outfalls due to groundwater infiltration into the MS4. Such flow is generally minimal, with no sheen, odor, or color present. If unimpacted flows are observed at these outfalls, it will be noted as an authorized NSWD and will not be considered as a significant NSWD.

3.4.6 Significant Non-stormwater Discharge and Prioritization of Source Investigation

The Port will consider a stormwater outfall with evidence of ongoing potential illegal dumping or illicit connections as a significant NSWD. Potential illegal dumping or illicit

connections (significant non-stormwater discharge) are determined based on specific criteria, as follows:

- Flow rate. Using a time-to-fill-a bottle technique, flow rate shall not be greater than 1 liter per 25 seconds.
- Specific conductance. Due to the elevation in certain Port locations, seawater/groundwater intrusion may occur, which should not be considered a significant non-stormwater discharge. Specific conductance will be measured from a single grab sample of the discharge (samples will be collected from a vessel and only when safe). Samples with measurements greater than or equal to 5,000 µS/centimeter (i.e., 5 mS/cm) are indicative of seawater/groundwater intrusion, and no further action will be required. Samples with measurements less than 5,000 µS/cm may be indicative of freshwater or industrial wastewater.
- Visual observations. Once it has been determined that there is sufficient flow indicative of freshwater or industrial wastewater discharges, then visual observations will be made to determine if a sheen, debris, or odor is present in the runoff.

If there is evidence of ongoing potential illegal dumping or illicit connections to the storm drain system, the Port Environmental Planning Division will be immediately contacted to begin a source investigation. A survey at an outfall with significant NSWD will be updated quarterly and submitted with the IMP annual report. Upon identification of outfalls with significant NSWD, Port staff will use the GIS database to determine possible sources of the flow. Because all of the outfalls discharge to the Clean Water Act (CWA) Section 303(d)-listed waterbodies, which TMDLs were developed for (i.e., Long Beach Inner Harbor, Long Beach Outer Harbor, Eastern San Pedro Bay, and Los Angeles River Estuary), the Port will conduct a source investigation for all outfalls determined to have significant NSWD, instead of prioritizing a subset of the outfalls with significant non-stormwater outfalls. The Port will also conduct source investigations for 100% of the outfalls with significant NSWD by March, 28, 2017. The MRP requires that source investigations be conducted for no less than 25% of the outfalls determined to have significant NSWD by March 28, 2017, and 100% of the outfalls determined to have significant NSWD by March 28, 2019, as specified in the Permit.

Using the Port's GIS stormdrain system database, Port staff can identify possible upstream sources of significant NSWDs for each Port outfall and refer to when necessary. If a source investigation indicates that the discharge originates from a jurisdiction upstream of the boundaries of the Port area, the appropriate jurisdiction and the RWQCB will be notified in writing of the discharge within 30 days of the determination. All existing information regarding documentation and characterization of the data, contribution determination efforts, and efforts taken to identify its source will be included. Investigations will be concluded if authorized, natural, or essential conditionally exempt flows are found to be the source of the discharge. If the discharge is determined to be due to non-essential conditionally exempt, illicit, or unknown discharges, further investigations will be considered to assess whether the discharge can be eliminated.

Alternatively, if the discharge is either non-essential conditionally exempt or of an unknown source, additional investigations may be conducted to demonstrate that it is not causing or contributing to receiving water impairments.

3.4.7 Monitoring Non-stormwater Exceeding Criteria

As required in the MRP (Part II.D.4), outfalls with significant NSWDs that remain unaddressed after a source identification will be monitored. After completion of a source investigation, outfalls found to convey NSWDs that could not be abated, and were identified as illicit, conditionally exempt but non-essential or unknown, will be monitored. Monitoring will be initiated within 90 days of completing the source investigations or as soon as the first scheduled dry-weather survey.

All samples will be taken from a vessel. The Port will collect single grab samples for testing. Use of automated samplers or collecting flow-weighted composite samples will not be feasible for this program, due to the number of outfalls observed, land-side access restrictions, and the inability to remain at a single location for an extended period of time due to security concerns. Sample results will be reviewed and discussed with possible upstream sources. The non-stormwater monitoring will be conducted quarterly.

The MRP (Section IX.G.1) specifies the minimum parameters for monitoring of NSW discharges. Determination of monitoring parameters at each site requires consideration of a number of factors applicable to each site. Monitoring parameters will include the following:

- Estimated flow.
- Pollutants assigned a water-quality based effluent limit (WQBEL) or receiving water limitation to implement TMDL provisions for the respective receiving water.
- Other pollutants identified on the CWA Section 303(d) List for the receiving water or downstream receiving waters.
- Pollutants identified in a Toxicity Identification Evaluation (TIE) conducted in response to observed aquatic toxicity during dry weather at the nearest downstream receiving water monitoring station during the last sample event or, aquatic toxicity testing at the upstream outfall site(s) where the TIE conducted on the receiving water sample was inconclusive. If the discharge exhibits aquatic toxicity, then a TIE shall be conducted.
- Other parameters in Table E-2 identified as exceeding the lowest applicable water quality objective at the nearest downstream receiving water station per Part VI.A.

See Table 5 for the list of parameters for the non-stormwater monitoring.

The monitoring frequency may be reduced and a specific parameter may be eliminated if the first year monitoring data do not exceed WQBELs, non-stormwater Action Levels, or water quality standards for other pollutants identified on the CWA Section 303(d) List for the receiving water or downstream receiving water. A written request will be submitted to the Executive Officer of the RWQCB for the reduction of the monitoring frequency or the elimination of a monitoring parameter.

3.4.8 Reassessment of Non-stormwater Outfall Screening and Monitoring

Part IX.B.2 in the MRP requires one reassessment of the non-stormwater outfall-based screening and monitoring program prior to March 28, 2019. The Port will conduct the screening quarterly and also reassess the screening and monitoring program annually in order to determine whether changes or updates are needed.

Table 3 summarizes the Port Non-stormwater Outfall Screening and Monitoring Program.

Table 3
Outline of the NSW Outfall Screening and Monitoring Program

Element	Description	Scheduled Completion
1. Outfall Screening	Quarterly visual observation of all 224 outfalls in the Port	MS4 NSW outfall monitoring completed quarterly
2. Identification of outfalls with significant NSWD (Part IX.C of the MRP)	Identification of a stormwater outfall with evidence of ongoing potential illegal dumping or illicit connections as significant NSWD	Concurrent with quarterly outfall screening; for year 2016, completed by December 28, 2016
3. Inventory of Outfalls with NSWD (Part IX.D of the MRP)	A detailed report noting observation of NSWD, significant NSWD, and no discharge	Concurrent with outfall screening; for year 2016, completed by December 28, 2016
4. Prioritized source investigation (Part IX.E of the MRP)	All outfalls with significant NSWD will be prioritized for source investigation	Concurrent with outfall screening
5. Identify sources of significant NSWD (Part IX.F of the MRP)	Source identification will be performed for all outfalls with significant NSWD	Complete source investigations for 100% of the outfalls with significant NSWD by March, 28, 2017
6. Monitoring NSWD exceeding criteria (Part IX.G of the MRP)	Monitor outfalls determined to convey significant NSWD comprising either unknown or conditionally exempt non-essential discharges or illicit discharges that cannot be abated	Monitoring will commence within 90 days of completing the source investigations

Notes:
MRP = Monitoring and Reporting Program
MS4 = Municipal Separate Stormwater Sewer System
NSW=non-stormwater
NSWD = non-stormwater discharge

3.5 New Development/Redevelopment Effectiveness Tracking

The MRP requires that permittees develop a New Development/Redevelopment Effectiveness tracking program. The Port has developed mechanisms for tracking information related to new and redevelopment projects that are subject to post-construction best management practice (BMP) requirements in Part VI.D.7 of the MS4 Permit. Within the Harbor District, Port staff review all Harbor Development Permits to determine whether construction of the project will or will not require permit coverage and whether post-

construction BMPs will be applicable. Harbor Development Permits are required for any construction within the Port. For all projects that do not require further tracking of post-construction BMPs, the Port requires that the project applicant complete and follow a stormwater BMP checklist, ensuring that appropriate BMPs are implemented during construction. For those new development/redevelopment projects that require tracking and post-construction BMPs, the Port uses MS4Front™. MS4 Front is an online, GIS-based comprehensive database designed to assist MS4 permittees in managing permit compliance, tracking ongoing inspections and project milestones, and ensuring that all new development and redevelopment projects implement appropriate post-construction BMPs prior to closing out the construction stormwater permit. Through MS4Front, the Port tracks Harbor Development Permit applications, inspection, and enforcement activities as well as post-construction BMP installation and maintenance requirements.

3.6 Regional Studies

There are three large long-term regional monitoring programs that are conducted in the area inclusive of this IMP. The Port actively participates in two regional monitoring programs: the Southern California Bight (SCB) Regional Monitoring Program and the Biological Baseline Study. In addition, Heal the Bay manages the Beach Report.

3.6.1 Southern California Bight Regional Monitoring Program

The SCB is the approximate 400 miles of coastline from Point Conception in Santa Barbara County to Cabo Colnett in Ensenada, Mexico. The Southern California Coastal Water Research Project coordinates an extensive monitoring program within the SCB approximately every 5 years. The Bight program began in 1994, and data gathered during monitoring events have allowed for long-term tracking of benthic communities, fisheries, water quality, sediment chemistry and toxicity, and the general health of the SCB over time. This complex program incorporates multiple agencies and organizations, and as such, a series of guidance documents for field data collection, laboratory analyses, quality assurance, and data management have been created for each monitoring event.

The Port currently participates in the Bight monitoring programs. Since 2013, the sediment quality component of the Harbor Toxics TMDL has been integrated with the Bight monitoring program.

3.6.2 Biological Baseline Study

The Port currently participates in San Pedro Bay-wide Biological Baseline Studies in coordination with the Port of Los Angeles. This comprehensive regional program consists of studies to evaluate the area's physical and ecological characteristics, including kelp and eelgrass habitat, plankton, fish, and marine bird populations. The Biological Baseline Study is conducted approximately every 5 years.

4 MONITORING SCHEDULE AND FREQUENCIES

Monitoring schedule and frequencies for the receiving water monitoring at CCMRP Stations 16 and 18, the Harbor Toxics TMDL monitoring at CCMRP stations 12 through 22, and the MS4 stormwater outfall monitoring stations are summarized in Table 4.

4.1 Receiving Water Monitoring Sites

Water column samples will be collected three times annually, two during wet-weather events and one during a dry-weather event, in order to coordinate with the RMC Harbor Toxics TMDL coordinated compliance monitoring. Two wet-weather events instead of three wet-weather events as specified in the MRP are deemed sufficient. This is because water column testing (physical parameters) at various depths performed in the TMDL monitoring according to the CCMRP will provide better data on mixing using total suspended solids (TSS). Besides two receiving water stations, an additional 20 TMDL CCMRP stations cover greater areas of receiving waters than typical nearshore monitoring for MS4 permits, minimizing potential water-based deployments for catching two wet-weather events versus three wet-weather events.

The first large storm of the season will be targeted as one of the two wet-weather events and will have a predicted rainfall of at least 0.25 inch (0.64 centimeter) with a 70% probability of rainfall at least 24 hours prior to the event start time. The subsequent storm event will consist of a storm that produces at least 0.1 inch (0.25 cm) of precipitation per day and separated by an antecedent dry period (less than 0.1 inch [0.25 cm] of rain per day) of at least 72 hours.

The first dry-weather receiving water monitoring will start at two stations in the dry season of 2015, assuming the IMP is approved prior to the dry season. The first wet-weather receiving water monitoring will start in the wet season of 2015-2016 assuming the IMP is approved prior to the wet season.

Aquatic toxicity testing will be conducted for all three (two wet and one dry weather) sampling events for the first year at CCMRP stations 16, 18, and 21. If all toxicity tests from

the three sampling events show no toxicity, a written request will be submitted to the Executive Officer of the RWQCB to discontinue aquatic toxicity tests for the following year

4.2 TMDL Monitoring Sites

Sampling schedule and frequency are specified in the CCMRP. At stations 12 through 22, the schedule is designed for the next 10 years and segmented by season, where fall is defined as October 1 to December 31, winter is January 1 to March, spring is April 1 to June 30, and summer is July 1 to September 30. Water quality monitoring is to occur three times annually during two wet-weather events and one dry-weather event. The wet-weather events will consist of two in winter, and the dry-weather event will be in summer. Sediment quality monitoring will occur at every station two times every 5 years. The sampling is scheduled in summer during the years 2016, 2018, 2021, 2023, 2026, and 2028. Fish tissue sampling will occur at two stations (stations 16 and 20) biennially. The sampling is scheduled in summer during the years 2016, 2018, 2020, 2022, 2024, 2026, and 2028.

4.3 Stormwater Outfall Monitoring Sites

The Port proposes to sample three wet events per year, as required in the MRP. The first storm of the season will be targeted. The first storm is defined as having a predicted rainfall of at least 0.25 inch at a 70% probability or rainfall at least 24 hours prior to the event start time. Two additional wet-weather events occurring in the same wet-weather season will be sampled. Depending on the seasonal forecast (e.g., drought vs. wet years), these additional wet-weather events will consist of a storm that produces at least 0.1 inch of rain per day, but consideration will be given to monitor larger storm events (0.5 inch or greater) if forecasted. All storm events will be separated by an antecedent dry period (less than 0.1 inch of rain per day) of at least 72 hours. The first wet-weather receiving water monitoring will start in the wet season of 2015 to 2016, assuming the IMP is approved prior to the wet season.
Dry-weather monitoring will be implemented as part of the Port's ongoing non-stormwater outfall monitoring program.

Table 4

Schedule for Implementation of Monitoring Activities

Station		Type of monitoring	Dry 2015	Wet 2015/2016	Dry 2016	Wet 2016/2017	Dry 2017	Wet 2017/2018	Dry 2018
Receiving water/TMDL	CCMRP 16	Chemistry[1] and field measurements[6]	1	2	1	2	1	2	1
		Aquatic toxicity[2]	1	2	1	2	1	2	1
	CCMRP 18	Chemistry[1] and field measurements[6]	1	2	1	2	1	2	1
		Aquatic toxicity[2]	1	2	1	2	1	2	1
	CCMRP 21	Chemistry[1] and field measurements[6]	1	2	1	2	1	2	1
		Aquatic toxicity[2]	1	2	1	2	1	2	1
TMDL monitoring	CCMRP 12 - 22	Water column	1	2	1	2	1	2	1
		Sediment	0	0	1	0	0	0	1
		Fish tissue	0	0	1	0	0	0	1
Stormwater outfall	Outfall No. 85 and Pump Station No. 7	Chemistry[1] and field measurements[6]	0	3	0	3	0	3	0
Non-stormwater outfall	Outfalls	Inventory and screen[3]	Ongoing (1)	Ongoing (1)	Ongoing (1)	Ongoing (1)	Ongoing (1)	Ongoing (1)	Ongoing (1)
		Source ID[4]			Ongoing (1)		Ongoing (1)		Ongoing (1)
		Monitoring[5]			Ongoing	Ongoing	Ongoing	Ongoing	Ongoing

Notes:

1 Table E-2 chemical analyses will be performed once during the first wet-weather event and once during the first dry-weather event. Parameters that exceed method detection limits and available water quality objectives will continue to be monitored along with all parameters included as Category 1, 2, or 3 waterbody-pollutant classifications for the subject waterbody. Wet and dry weather chemical parameters will be separately assessed for purposes of continued monitoring. All parameters classified as highest, high, and medium priority waterbody-pollutants in the waterbody will continue to be monitored

during the permit cycle unless the parameters (primarily medium priority parameters) are shown to not be present at levels of concern on a consistent basis.

2 Aquatic toxicity testing will be conducted as necessary as a part of stormwater outfall-based monitoring and non-stormwater outfall based monitoring.

3 The Port will conduct quarterly non-stormwater outfall screening and reassessment. See Section 3.4.4

4 Source tracking and classification work depend upon the number of sites categorized as suspect outfalls with evidence of significant non-stormwater flow. See Section 3.4.6

5 Monitoring will be implemented quarterly during dry weather. Further investigation of significant non-stormwater discharges will be triggered based on flow rate, specific conductance (measured from a grab sample when safe to collect), and visual observations to determine if a sheen or odor is present. Refer to Section 3.4.6 for a definition of a significant non-stormwater discharge.

6 Field measurements include temperature, dissolved oxygen, pH, specific conductance (or salinity), and depth (see Sections 8.2.1.1 and 8.3.1).

CCMRP = Coordinated Compliance Monitoring and Reporting Plan

TBD = to be determined

TMDL = Total Maximum Daily Load

5 CHEMICAL/PHYSICAL PARAMETERS

Implementation of the IMP will be integrated with the Harbor Toxics TMDL compliance monitoring program. At a minimum, the IMP requires monitoring for the following parameters:

- Pollutants assigned a receiving water limitation derived from TMDL Waste Load Allocations
- Other pollutants identified on the CWA Section 303(d) List for the receiving water or downstream receiving waters
- Aquatic toxicity

Flow will not be monitored at receiving water stations. Suspended sediment concentration will not be monitored because Long Beach Harbor and San Pedro Bay are not listed on the CWA Section 303(d) List for sedimentation, siltation, or turbidity. TSS will be monitored because it is listed in the Harbor Toxics TMDL as a required analytical parameter to understand sedimentation sources.

The Harbor Toxics TMDL compliance monitoring program contains a set of analytical parameters that are required based on historical detections or known chemical sources to the marine habitat. The guidance for the IMP requires a greatly expanded list of parameters that have various relevancies to the marine environment. It is proposed that the expanded IMP analyte list (Table E-2) be implemented for the first wet and dry-weather receiving water quality monitoring events at the two receiving water stations (i.e., CCMRP Stations 16 and 18). Results of initial wet-weather and dry-weather monitoring at these two sites will be used to determine necessity of specific analytes beyond the TMDL required analyte list. As specified in the MS4 Permit, if the parameter was not detected in the first event or if the result is below the lowest applicable water quality objective, it does not need to be analyzed further (MRP, p. E-13).

Table 5 lists the analytical parameters required as part of the Harbor Toxics TMDL compliance monitoring program and identifies the additional parameters required to be monitored during the first wet (receiving water and stormwater outfall) and dry weather (receiving water only) monitoring events as part of this IMP.

Table 5

Parameters Monitoring Via Receiving Water Monitoring and TMDL Compliance Monitoring for Long Beach Inner Harbor, Long Beach Outer Harbor, and Eastern San Pedro Bay

Parameter Group	Parameter	TMDL Monitoring			Additional Receiving Water Monitoring[1]	MS4 Stormwater Outfall Monitoring[7]	MS4 Non-stormwater Outfall Monitoring[7,8]
		Receiving Water	Sediment[5]	Fish			
Physical	Flow					Required	TBD
Conventional Pollutants	Oil and grease				Required	TBD[2]	TBD
	Total Phenols				Required	TBD[2]	TBD
	Cyanide				Required	TBD[2]	TBD
	pH				Required	Required	TBD
	Temperature				Required	Required	TBD
	Dissolved Oxygen				Required	Required	TBD
	Lipids			Required			
Bacteria (Single Sample Limits)	Total coliform (marine waters)				Required	TBD[2]	TBD
	Enterococcus (marine waters)				Required	TBD[2]	TBD
	Fecal coliform (marine and fresh waters)				Required	TBD[2]	TBD
General	Dissolved Phosphorus				Required	TBD[2]	TBD
	Total Phosphorus				Required	TBD[2]	TBD
	Turbidity				Required	TBD[2]	TBD
	Total Suspended Solids	Required				Required	TBD
	Total Dissolved Solids		Required		Required	TBD[2]	TBD
	Volatile Suspended Solids				Required	TBD[2]	TBD
	Total Organic Carbon		Required		Required	TBD[2]	TBD
	Total Petroleum Hydrocarbon				Required	TBD[2]	TBD

Parameter Group	Parameter	TMDL Monitoring			Additional Receiving Water Monitoring[1]	MS4 Stormwater Outfall Monitoring[7]	MS4 Non-stormwater Outfall Monitoring[7,8]
		Receiving Water	Sediment[5]	Fish			
	Biochemical Oxygen Demand				Required	TBD[2]	TBD
	Chemical Oxygen Demand				Required	TBD[2]	TBD
	Total Ammonia-Nitrogen				Required	TBD[2]	TBD
	Total Kieldahl Nitrogen				Required	TBD[2]	TBD
	Nitrate-Nitrite				Required	TBD[2]	TBD
	Alkalinity				Required	TBD[2]	TBD
	Specific Conductance				Required	Required	TBD
	Total Hardness				Required	Required	TBD
	MBAS				Required	TBD[2]	TBD
	Chloride				Required	TBD[2]	TBD
	Fluoride				Required	TBD[2]	TBD
	Methyl tertiary butyl ether (MTBE)				Required	TBD[2]	TBD
	Perchlorate				Required	TBD[2]	TBD
Metals	Aluminum				Required	TBD[2]	TBD
	Antimony				Required	TBD[2]	TBD
	Arsenic				Required	TBD[2]	TBD
	Beryllium				Required	TBD[2]	TBD
	Cadmium				Required	TBD[2]	TBD
	Chromium (total)				Required	TBD[2]	TBD
	Chromium (Hexavalent)				Required	TBD[2]	TBD
	Copper	Required	Required			Required	TBD
	Iron				Required	TBD[2]	TBD
	Lead	Required	Required			TBD[2]	TBD

Parameter Group	Parameter	TMDL Monitoring			Additional Receiving Water Monitoring[1]	MS4 Stormwater Outfall Monitoring[7]	MS4 Non-stormwater Outfall Monitoring[7,8]
		Receiving Water	Sediment[5]	Fish			
	Mercury				Required	TBD[2]	TBD
	Nickel				Required	TBD[2]	TBD
	Selenium				Required	TBD[2]	TBD
	Silver				Required	TBD[2]	TBD
	Thallium				Required	TBD[2]	TBD
	Zinc	Required	Required			Required	TBD
Semivolatile Organic Compounds	2-Chlorophenol				Required	TBD[2]	TBD
	4-Chloro-3-methylphenol				Required	TBD[2]	TBD
	2,4-Dichlorophenol				Required	TBD[2]	TBD
	2,4-Dimethylphenol				Required	TBD[2]	TBD
	2,4-Dinitrophenol				Required	TBD[2]	TBD
	2-Nitrophenol				Required	TBD[2]	TBD
	4-Nitrophenol				Required	TBD[2]	TBD
	Pentachlorophenol				Required	TBD[2]	TBD
	Phenol				Required	TBD[2]	TBD
	2,4,6-Trichlorophenol				Required	TBD[2]	TBD
	Acenaphthene		Required		Required	TBD[2]	TBD
	Acenaphthylene				Required	TBD[2]	TBD
	Anthracene		Required		Required	TBD[2]	TBD
	Benzidine				Required	TBD[2]	TBD
	1,2 Benzanthracene				Required	TBD[2]	TBD

Parameter Group	Parameter	TMDL Monitoring			Additional Receiving Water Monitoring[1]	MS4 Stormwater Outfall Monitoring[7]	MS4 Non-stormwater Outfall Monitoring[7,8]
		Receiving Water	Sediment[5]	Fish			
	Benzo(a)pyrene		Required		Required	TBD[2]	TBD
	Benzo[a]anthracene		Required		Required	TBD[2]	TBD
	Benzo(e)pyrene		Required		Required	TBD[2]	TBD
	Benzo(g,h,i)perylene				Required	TBD[2]	TBD
	Benzo(o,h,i)perylene				Required	TBD[2]	TBD
	3,4 Benzoflouranthene				Required	TBD[2]	TBD
	Benzo(k)flouranthene				Required	TBD[2]	TBD
	Biphenyl		Required				
	Bis(2-Chloroethoxy) methane				Required	TBD[2]	TBD
	Bis(2-Chloroisopropyl) ether				Required	TBD[2]	TBD
	Bis(2-Chloroethyl) ether				Required	TBD[2]	TBD
	Bis(2-Ethylhexl) phthalate				Required	TBD[2]	TBD
	4-Bromophenyl phenyl ether				Required	TBD[2]	TBD
	Butyl benzyl phthalate				Required	TBD[2]	TBD
	2-Chloroethyl vinyl ether				Required	TBD[2]	TBD
	2-Chloronaphthalene				Required	TBD[2]	TBD
	4-Chlorophenyl phenyl ether				Required	TBD[2]	TBD
	Chrysene		Required		Required	TBD[2]	TBD
	Dibenzo(a.h)anthracene		Required		Required	TBD[2]	TBD
	1,3-Dichlorobenzene				Required	TBD[2]	TBD
	1,4-Dichlorobenzene				Required	TBD[2]	TBD
	1,2-Dichlorobenzene				Required	TBD[2]	TBD
	3,3-Dichlorobenzidine				Required	TBD[2]	TBD

Parameter Group	Parameter	TMDL Monitoring			Additional Receiving Water Monitoring[1]	MS4 Stormwater Outfall Monitoring[7]	MS4 Non-stormwater Outfall Monitoring[7,8]
		Receiving Water	Sediment[5]	Fish			
	Diethyl phthalate				Required	TBD[2]	TBD
	Dimethyl phthalate				Required	TBD[2]	TBD
	di-n-Butyl phthalate				Required	TBD[2]	TBD
	2,4-Dinitrotoluene				Required	TBD[2]	TBD
	2,6-Dinitrotoluene				Required	TBD[2]	TBD
	4 ,6 Dinitro-2-methylphenol				Required	TBD[2]	TBD
	2,6- Dimetthylnapthalene		Required				
	1,2-Diphenylhydrazine				Required	TBD[2]	TBD
	di-n-Octylphthalate				Required	TBD[2]	TBD
	Fluoranthene		Required		Required	TBD[2]	TBD
	Fluorene		Required		Required	TBD[2]	TBD
	Hexachlorobenzene				Required	TBD[2]	TBD
	Hexachlorobutadiene				Required	TBD[2]	TBD
	Hexachloro-cyclopentadiene				Required	TBD[2]	TBD
	Hexachloroethane				Required	TBD[2]	TBD
	Indeno(1,2,3-cd)pyrene				Required	TBD[2]	TBD
	Isophorone				Required	TBD[2]	TBD
	1-Methylnapthalene		Required				
	2-Methylnapthalene		Required				
	1-Methylphenanthrene		Required				
	Naphthalene		Required		Required	TBD[2]	TBD
	Nitrobenzene				Required	TBD[2]	TBD
	N-Nitroso-dimethyl amine				Required	TBD[2]	TBD

Parameter Group	Parameter	TMDL Monitoring			Additional Receiving Water Monitoring[1]	MS4 Stormwater Outfall Monitoring[7]	MS4 Non-stormwater Outfall Monitoring[7,8]
		Receiving Water	Sediment[5]	Fish			
	N-Nitroso-diphenyl amine				Required	TBD[2]	TBD
	N-Nitroso-di-n-propyl amine				Required	TBD[2]	TBD
	Phenanthrene		Required		Required	TBD[2]	TBD
	Perylene		Required				
	Pyrene		Required		Required	TBD[2]	TBD
	1,2,4-Trichlorobenzene				Required	TBD[2]	TBD
	Total PAHs	Required				TBD[2]	TBD
Chlorinated Pesticides	Aldrin				Required	TBD[2]	TBD
	alpha-BHC				Required	TBD[2]	TBD
	beta-BHC				Required	TBD[2]	TBD
	delta-BHC				Required	TBD[2]	TBD
	gamma-BHC (lindane)				Required	TBD[2]	TBD
	alpha-chlordane		Required	Required	Required	TBD[2]	TBD
	gamma-chlordane		Required	Required	Required	TBD[2]	TBD
	Oxychlordane		Required	Required	Required	TBD[2]	TBD
	cis-Nonachlor		Required	Required	Required	TBD[2]	TBD
	trans-Nonachlor		Required	Required	Required	TBD[2]	TBD
	Total [9]Chlordane[3]		Required	Required	Required	TBD[2]	TBD
	2,4'-DDD	Required	Required	Required		Required[9]	TBD
	2,4'-DDE	Required	Required	Required		Required[9]	TBD
	2,4'DDT	Required	Required	Required		Required[9]	TBD
	4 4'-DDD	Required	Required	Required		Required[9]	TBD

Parameter Group	Parameter	TMDL Monitoring			Additional Receiving Water Monitoring[1]	MS4 Stormwater Outfall Monitoring[7]	MS4 Non-stormwater Outfall Monitoring[7,8]
		Receiving Water	Sediment[5]	Fish			
	4,4'-DDE	Required	Required	Required		Required[9]	TBD
	4,4'-DDT	Required	Required	Required		Required[9]	TBD
	Total DDTs	Required	Required	Required		Required[9]	TBD
	Dieldrin		Required	Required	Required	TBD[2]	TBD
	alpha-Endosulfan				Required	TBD[2]	TBD
	beta-Endosulfan				Required	TBD[2]	TBD
	Endosulfan sulfate				Required	TBD[2]	TBD
	Endrin				Required	TBD[2]	TBD
	Endrin aldehyde				Required	TBD[2]	TBD
	Heotachlor				Required	TBD[2]	TBD
	Heptachlor Epoxide				Required	TBD[2]	TBD
	Toxaphene		Required	Required	Required	TBD[2]	TBD
Polychlorinated Biphenyls[4]	Aroclor-1016				Required	TBD[2]	TBD
	Aroclor-1221				Required	TBD[2]	TBD
	Aroclor-1232				Required	TBD[2]	TBD
	Aroclor-1242				Required	TBD[2]	TBD
	Aroclor-1248				Required	TBD[2]	TBD
	Aroclor-1254				Required	TBD[2]	TBD
	Aroclor-1260				Required	TBD[2]	TBD
	Total PCBs	Required	Required	Required		Required[9]	TBD
	CL3-PCB-18	Required	Required	Required			
	CL3-PCB-28	Required	Required	Required			

Parameter Group	Parameter	TMDL Monitoring			Additional Receiving Water Monitoring[1]	MS4 Stormwater Outfall Monitoring[7]	MS4 Non-stormwater Outfall Monitoring[7,8]
		Receiving Water	Sediment[5]	Fish			
	CL3-PCB-37	Required	Required	Required			
	CL4-PCB-44	Required	Required	Required			
	CL4-PCB-49	Required	Required	Required			
	CL4-PCB-52	Required	Required	Required			
	CL4-PCB-66	Required	Required	Required			
	CL4-PCB-70	Required	Required	Required			
	CL4-PCB-74	Required	Required	Required			
	CL4-PCB-77	Required	Required	Required			
	CL4-PCB-81	Required	Required	Required			
	CL5-PCB-87	Required	Required	Required			
	CL5-PCB-99	Required	Required	Required			
	CL5-PCB-101	Required	Required	Required			
	CL5-PCB-105	Required	Required	Required			
	CL5-PCB-110	Required	Required	Required			
	CL5-PCB-114	Required	Required	Required			
	CL5-PCB-118	Required	Required	Required			
	CL5-PCB-119	Required	Required	Required			
	CL5-PCB-123	Required	Required	Required			
	CL5-PCB-126	Required	Required	Required			
	CL6-PCB-128	Required	Required	Required			
	CL6-PCB-138	Required	Required	Required			
	CL6-PCB-149	Required	Required	Required			
	CL6-PCB-151	Required	Required	Required			

Parameter Group	Parameter	TMDL Monitoring			Additional Receiving Water Monitoring[1]	MS4 Stormwater Outfall Monitoring[7]	MS4 Non-stormwater Outfall Monitoring[7,8]
		Receiving Water	Sediment[5]	Fish			
	CL6-PCB-153	Required	Required	Required			
	CL6-PCB-156	Required	Required	Required			
	CL6-PCB-157	Required	Required	Required			
	CL6-PCB-158	Required	Required	Required			
	CL6-PCB-167	Required	Required	Required			
	CL6-PCB-168	Required	Required	Required			
	CL6-PCB-169	Required	Required	Required			
	CL7-PCB-170	Required	Required	Required			
	CL7-PCB-177	Required	Required	Required			
	CL7-PCB-180	Required	Required	Required			
	CL7-PCB-183	Required	Required	Required			
	CL7-PCB-187	Required	Required	Required			
	CL7-PCB-189	Required	Required	Required			
	CL8-PCB-194	Required	Required	Required			
	CL8-PCB-201	Required	Required	Required			
	CL9-PCB-206	Required	Required	Required			
Organophosphate Pesticides	Atrazine				Required	TBD[2]	TBD
	Chlorpyrifos				Required	TBD[2]	TBD
	Cyanazine				Required	TBD[2]	TBD
	Diazinon				Required	TBD[2]	TBD
	Malathion				Required	TBD[2]	TBD
	Prometryn				Required	TBD[2]	TBD
	Simazine				Required	TBD[2]	TBD

Parameter Group	Parameter	TMDL Monitoring			Additional Receiving Water Monitoring[1]	MS4 Stormwater Outfall Monitoring[7]	MS4 Non-stormwater Outfall Monitoring[7,8]
		Receiving Water	Sediment[5]	Fish			
Herbicides	2,4-D				Required	TBD[2]	TBD
	Glyphosate				Required	TBD[2]	TBD
	2,4,5-TP-SILVEX				Required	TBD[2]	TBD
Sediment Toxicity	Sediment toxicity[6]		Required				

Notes:

As specified in the MS4 Permit Appendix D Part III Section B, monitoring must be conducted according to test procedures approved under 40 CFR Part 136 for the analysis of pollutants unless another test procedure is required under 40 CFR Subchapters N or O or is otherwise specified in the MS4 Permit for such pollutants [40 CFR Sections 122.41(j)(4) and 122.44(i)(1)(iv)].

See the CCMRP for reporting limits of the analytical parameters required as part of the Harbor Toxics TMDL compliance monitoring program and Table E-2 of the MRP for minimum levels of the additional parameters required to be monitored during the first wet and dry weather monitoring events as part of this IMP.

1 Constituents required by Table E-2 are only required for the first monitoring event of the first significant rain event if a parameter is not detected at the method detection limit for its respective test method or the result is below the lowest applicable water quality objective and it is not one of the following: a field measurement[6] or flow measurement, total suspended solids, a pollutant identified on the Clean Water Act Section 303(d) list for sedimentation, or a pollutant assigned a receiving water limitation derived from the TMDL WLAs.

2 Constituents required by Table E-2 are only required if the lowest applicable water quality objective in the nearest downstream receiving water monitoring station is exceeded.

3 Total chlordane is calculated using the following compounds: alpha-chlordane, gamma-chlordane, oxychlordane, cis-nonachlor, and trans-nonachlor.

4 PCB resolution will vary by instrument and column and may increase reporting limits for some congeners.

5 Benthic community effects are included in the sediment line of evidence as part of the Harbor Toxics TMDL monitoring.

6 See the CCMRP for more details on sediment toxicity test

7 The MRP (Part VIII B. 1.c.ii for stormwater monitoring and Part IX. G.1.b for non-stormwater monitoring) requires monitoring of pollutants assigned a WQBEL derived from TMDL WLAs (Part VIII of the MS4 Permit). Part VIII.P of the MS4 Permit (Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL) includes total copper, total lead, total zinc, total DDTs, total PCBs, and total polycyclic aromatic hydrocarbons as water column WQBELs for Long Beach Inner Harbor, Long Beach Outer Harbor, and Eastern San Pedro Bay.

8 As required in the MRP (Part II.D.4), outfalls with significant non-stormwater discharges that remain unaddressed after source identification will be monitored for these parameters.

9 High resolution/low detection analytical method may be used for the MS4 stormwater outfall monitoring

CCMRP = Coordinated Compliance Monitoring and Reporting Plan

CFR = Code of Federal Regulations

IMP = Integrated Monitoring Program
MRP = Monitoring and Reporting Program
MS4 = Municipal Separate Stormwater Sewer System
PCB = polychlorinated biphenyl
TBD = to be determined
TMDL = Total Maximum Daily Load
WLA = Waste Load Allocation
WQBEL = water-quality based effluent limit

6 ADAPTIVE MANAGEMENT

The IMP will be reviewed on an annual basis to make any necessary adjustments to the monitoring sites, parameters, frequency of sampling, or sampling procedures. The IMP is intended to require modifications based upon annual monitoring results. Annual changes may include revisions in toxicity testing, parameters monitored at the receiving water monitoring sites, addition of new parameters to stormwater outfall sites, addition or relocation of monitoring sites, as well as a range of other program adjustments necessary to improve the ability of the program to monitor water quality improvements and identify major sources of contaminants in need of targeted control measures.

Waterbody-pollutant categories and the frequency of exceedance of available receiving water limitations are central to the monitoring approach. Pre-determined triggers will be used to determine if new parameters should be incorporated into the program or if monitoring of a parameter should be discontinued. Monitoring parameters will be adjusted based upon the following guidelines:

- Any parameter exceeding the minimum, appropriate water quality criteria listed in Appendix G during the wet and dry weather screening of Table E-2 parameters will be added to the monitoring list for the subject receiving water site and season.
- If a Table E-2 parameter exceeds receiving water criteria in one survey, the parameter will be added to the monitoring list of the representative and associated upstream stormwater outfall monitoring site(s) for a minimum of 2 years.
- If monitoring results of a Table E-2 parameter that was added to a stormwater outfall monitoring site indicate the parameter is not detected in excess of the lowest applicable water quality criterion for 2 consecutive years, monitoring of that parameter at the stormwater outfall monitoring site will be discontinued.
- Pollutants in waterbody/classification 3 will be removed from the list of monitored parameters at a stormwater outfall monitoring site if they are not detected at levels that exceed the minimum, appropriate water quality criteria for a period of 2 consecutive years.

A written request to reduce or eliminate the monitoring of specific parameters will be submitted to the RWQCB for Executive Officer approval.

7 AQUATIC TOXICITY TESTING AND TOXICITY IDENTIFICATION EVALUATIONS

Aquatic toxicity testing includes the evaluation of receiving water samples for toxicity and may support the identification of compounds that elicit a toxic response. Once the toxicity is determined to be present and significant, the causative agent may be determined in a TIE or other investigative action. After the causative agent(s) is identified a source analysis may be conducted to target BMPs to address the sources of toxicity. Receiving water samples are collected and analyzed twice per year in wet weather and once per year in dry weather and evaluated for toxicity. This section describes the testing program.

7.1 Sensitive Species Selection

Aquatic toxicity monitoring will be performed at receiving water monitoring stations CCMRP 16, CCMRP 18, and CCMRP 21, located in Long Beach Outer Harbor and East San Pedro Bay, respectively (Figure 1). Both stations are located in the marine environment. As described in the MRP, if samples are collected in receiving waters with salinity greater than or equal to 1 part per thousand (ppt), chronic toxicity testing will be conducted in accordance with test methods described in the *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; USEPA 1995). Acceptable marine toxicity tests and species identified in the MRP include:

- A static renewal toxicity test with the topsmelt*, Atherinops affinis (*Larval Survival and Growth Test Method 1006.01)
- 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)

Aquatic toxicity monitoring will be performed on the most sensitive test species. Because the most sensitive test species has not already been determined, a species sensitivity screening will be performed during the first year of monitoring. This includes toxicity testing using each of the three species described above for two wet-weather events and one dry-weather event. The most sensitive species determined during this screening process will be used for subsequent monitoring events. Rescreening will be performed in the fourth year

of the permit term. Because of seasonality in gamete availability, an alternative echinoderm species (sand dollar [*Dendraster excentricus*]) may be substituted for *S. purpuratus* if gravid urchins are unavailable, as described in Test Method 1008.0.

7.2 Testing Period

The testing periods for *S. purpuratus* and *M. pyrifera* is 40 minutes and 48 hours, respectively. Both tests are consistent with the relatively shorter exposure periods introduced during storm events. The testing period for *A. affinis* is typically 7 days. Wet-weather conditions in the region generally persist for less than the chronic testing period for *A. affinis*; therefore, this test is not representative of conditions found in the receiving water. Chronic testing will be conducted in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (USEPA 1995).

7.3 Toxicity Endpoint Assessment and Toxicity Identification Evaluation Triggers

The chronic toxicity test endpoint will be analyzed, per the MRP, using the U.S. Environmental Protection Agency's (USEPA's) Test of Significant Toxicity (TST) approach (USEPA 2010) as required in the MRP. The MRP specifies that the chronic in-stream waste concentration (IWC) is set at 100% receiving water for receiving water samples. TST passage or failure will be determined based on USEPA's TST Implementation Document (USEPA 2010) at a percent effect value equal to or greater than 50% at 100% receiving water as specified in the MRP. Although the TST approach requires only control and 100% receiving water sample, a full dilution series will be tested to estimate the degree of toxicity. This is because USEPA Region IX recently withdrew its approval of use of two concentrations of a control and an IWC (i.e., 100% receiving water) in lieu of the five concentrations plus a control when using the TST approach.[2] Therefore, use of a five

[2] USEPA Region IX February 11, 2015. A letter to Renee Spears at State Water Resources Control Board written by Eugenia McNaughton at USEPA Region IX. Previously, USEPA sent a letter approving a use of a control and an IWC as alternative test procedure (ATP) in lieu of multiple dilution series when using the TST to respond to the request from the State Water Resource Control Board. However, USEPA in its February 11, 2015 letter, withdrew its approval. This letter also states that USEPA proposed a rulemaking to revise 40 CFR § 136 in order to limit authority of an approval of ATP only to the Regional ATP Coordinator. If the

dilution series plus a control is required for toxicity testing even when using the TST. Federal regulations prohibit any modification of a USEPA-approved CWA analytical method [40 CFR §136.6(b)(3)].

A control and five concentrations will be tested (e.g., 100, 75, 50, 25, and 12.5%). In addition to the TST outcome (pass or fail), statistical analysis will be performed using the Comprehensive Environmental Toxicity Information System (CETIS). The statistical output will include the No Observed Effect Concentration, Lowest Observed Effect Concentration, and Median Effective Concentration. These non-TST endpoints are currently used for USEPA-approved toxicity test methods. These endpoints will be useful to validate and support the outcome of the TST. The TST outcome will provide only pass or fail. If a fail is determined, the non-TST endpoints will provide useful information regarding the level of toxicity observed to qualify and/or validate the TST outcome. In addition, toxicity monitoring results from the IMP can be compared to historical toxicity data in Long Beach Harbor water and eastern San Pedro Bay and to data from other toxicity monitoring programs using these non-TST endpoints in order to understand temporal and spatial trends.

A TIE will be triggered to identify the cause of toxicity if survival or sub-lethal endpoint demonstrates a percent effect value equal to or greater than 50% at the IWC.[3] TIE procedures will be initiated as soon as possible after the toxicity trigger threshold is observed to reduce the potential for loss of toxicity due to extended sample storage. In a case where a significant endpoint toxicity effect less than 50% is observed in the sample, follow-up actions for Scenario 1 will be taken, as in Section 7.5.

In cases where significant endpoint toxicity effects in excess of 50% are observed in the original sample, but the follow-up TIE baseline test is found to not be statistically significant, the cause of toxicity will be considered non-persistent, the TIE will be considered

rulemaking is completed, only a USEPA Regional ATP Coordinator will be allowed to approve an ATP and a permitting authority will be no longer allowed to approve an ATP.

[3] Difference between mean control and mean IWC response, divided by the mean control response, multiplied by 100

inconclusive, and follow-up actions for either Scenarios 3 (wet-weather sample) or Scenario 4 (dry-weather sample) will be taken, as in Section 7.5.

7.4 Toxicity 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 result in the control of pollutants causing toxicity in receiving waters. Successful TIEs will direct monitoring at outfall sampling sites to inform management actions. As such, the goal of conducting TIEs is to identify pollutant(s) that should be sampled during outfall monitoring so that management actions can be identified to address the pollutant(s).

The TIE approach as described in *Methods for Aquatic Toxicity Identification* (USEPA 1991) is divided into three phases, although some elements of the first two phases are often combined. Each of the three phases is briefly summarized below:

- Phase I describes methods to characterize the physical/chemical nature of the constituents that 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 to remove toxicity without specific identification of the toxicants.
- Phase II describes methods to specifically identify toxicants.
- Phase III describes methods to confirm the suspected toxicants.

A Phase I TIE will be conducted on samples that exceed the TIE trigger described in Section 7.3. Water quality data will be reviewed to support evaluation of potential toxicants. A range of sample manipulations may be conducted as part of the TIE process. The most common manipulations are described in Table 6. Information from previous chemical testing and/or TIE efforts will be used to determine which of these (or other) sample manipulations are most likely to provide useful information for identification of primary toxicants. TIE methods will generally adhere to USEPA procedures documented in conducting TIEs (USEPA 1991, 1992a, 1993a, 1993b).

Table 6

Phase I and II Toxicity Identification Evaluation Sample Treatments

Toxicity Identification Evaluation Sample Treatment	Description
Baseline (no manipulation)	For comparing changes in toxicity in other manipulations and evaluating changes in toxicity during storage
Graduated pH test	pH is adjusted to determine if toxicity can be attributed to compounds whose toxicity is pH-dependent (e.g., ammonia, some trace metals)
Filtration test	Particulate-associated toxicants are physically removed by filtration
Aeration test	Sample is aerated to evaluate effects of volatile toxicants (e.g., organic solvents)
Ethylenediamine-tetraacetic Acid (EDTA) addition test	A chelating compound; EDTA reduces toxicity caused by cationic metals
Sodium thiosulfate addition test	Reduces toxicity caused by oxidants (i.e., chlorine) and some trace metals
Piperonyl butoxide addition test	Reduces toxicity caused by organophosphate pesticides (i.e., diazinon, chlorpyrifos, malathion) and enhances toxicity caused by pyrethroids
Carboxylesterase addition	Removes toxicity caused by pyrethroids
Solid Phase Extraction with C18 column	Removes non-polar organics
Methanol Eluate test	Methanol is used to elute the C18 column to recover toxicants and confirm toxicity

The Port will identify the cause(s) of toxicity using a selection of treatments in Table 6, and if possible, using the results of water column chemistry analyses. After any initial assessments of the cause of toxicity, the information may be used during future events to modify the targeted treatments to more closely target the expected toxicant or class of toxicants. Moreover, if the toxicant or toxicant class is not initially identified, toxicity monitoring during subsequent events will confirm whether the toxicant is persistent or a short-term episodic occurrence.

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/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 classes of pollutants (e.g., metals) are

identified, then sufficient information is available to incorporate the additional pollutants into outfall monitoring and to start implementation of control measures to target the additional pollutants.

Phase II TIEs may be utilized to identify specific constituents causing toxicity in a given sample if the results of Phase I TIE testing and a review of available chemistry data fail to provide information necessary to identify constituents that warrant additional monitoring activities or management actions to identify likely sources of the toxicants and lead to elimination of the sources of these contaminants. Phase III TIEs will be conducted, as necessary, following any Phase II TIEs.

TIEs will be considered inconclusive if the cause of toxicity cannot be attributed to a class of constituents (e.g., pesticides and metals) that can be targeted for monitoring. This may result from non-persistent toxicity or the inability of TIE treatments to isolate the class of constituents causing toxicity. In cases of inconclusive TIEs, follow-up actions for either Scenario 3 (wet-weather sample) or Scenario 4 (dry-weather sample) will be taken, as described in Section 7.5.

The TIE is considered conclusive if:

- A combination of causes that act in a synergistic or additive manner are identified
- Toxicity can be removed with a treatment or combination of the TIE treatments
- Analysis of water quality data collected during the same event identifies the pollutant or analytical class of pollutants

7.5 Follow Up on Toxicity Testing Results

Follow-up actions on toxicity testing results will be in accordance with the memorandum issued by the RWQCB on August 7, 2015 (RWQCB 2015). This memorandum provides clarification on follow-up actions in response to observed toxicity in receiving water testing and addresses the following four receiving water scenarios:

1. Toxicity is observed but is below the TIE trigger
2. Toxicity is observed above the TIE trigger, and the TIE is conclusive (identifies the toxicant or class of toxicants)

3. Toxicity is observed above the TIE trigger during wet weather, but the TIE is inconclusive
4. Toxicity is observed above the TIE trigger during dry weather, but the TIE is inconclusive

Follow-up actions for each scenario are summarized as follows:

Scenario 1: Toxicity is observed but is below the TIE trigger.

a. If next existing upstream receiving water site exists, toxicity monitoring will be added to the next existing upstream receiving water site during the same condition (i.e., wet or dry weather for which toxicity was determined to be present). Monitoring for toxicity at the next existing upstream receiving water site 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 either: 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 Scenario 2 will be followed.
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 either: 1) the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST 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 Scenario 2 is followed. Also, an evaluation similar to the TRE outlined in Attachment E, Part XII.J will be conducted 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). The TRE-like evaluation will consider the following:
    i. If 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 NSWDs that are a source of pollutants) will be used to support the TRE.

ii. If toxicity is present during wet weather, the following actions will be consider 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.

c. Under Scenario 1, if more than one occurrence of a fail of the TST 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 used by other monitoring programs), including tributaries.

Scenario 2: Toxicity is observed above the TIE trigger, and the TIE is conclusive (identifies the toxicant or class of toxicants)

a. Toxicity monitoring to the next existing upstream site will not be added. Instead, during the same condition, the identified constituent or constituents within the class of constituents will be added to the monitoring site where toxicity was identified, the upstream receiving water site, and the upstream outfall site 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], 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.

Scenario 3: Toxicity is observed above the TIE trigger during wet weather, but the TIE is inconclusive.

a. Toxicity monitoring will be added to the next existing upstream receiving water site during the next monitoring event that is at least 45 days following the original toxicity sample collection. Toxicity monitoring at individual receiving water sites will continue until either: 1) the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST 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 Scenario 2 will be followed.

b. If the second inconclusive TIE in 3 years during wet weather occurs, outfall toxicity testing will be added 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). Outfall toxicity testing will be conducted according to the process outlined in "Steps Related to Outfall Toxicity Testing Once Triggered" of the memorandum. The outfall testing will be conducted during the next monitoring event that is at least 45 days following the original toxicity sample collection. For the outfall toxicity testing, the Port may propose an alternative approach any time after the first inconclusive TIE, which could include using upstream receiving water sites (either newly established or sites used by other monitoring programs), including tributaries, additional outfall sites, and/or different outfall sites. However, the Port will conduct outfall toxicity testing according to the memorandum until the RWQCB Executive Officer's approval of the alternative approach.

Scenario 4: Toxicity is observed above the TIE trigger during dry weather, but the TIE is inconclusive.

a. Toxicity monitoring will be added to the next existing upstream receiving water site 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 either: 1) the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST 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 Scenario 2 will be followed during the next monitoring event that is at least 45 days following the original toxicity sample collection.

b. Toxicity testing will be added 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). The outfall toxicity testing will be conducted according to the process outlined in "Steps Related to Outfall Toxicity Testing Once Triggered" of the memorandum. The outfall testing will be conducted during the next monitoring event that is at least 45 days following the original toxicity sample collection. For the outfall toxicity testing, the Port may propose an alternative approach any time after the first inconclusive TIE, which could include using upstream receiving water sites (either newly established or sites used by other monitoring programs), including tributaries, additional outfall sites, and/or different outfall sites. However, the Port will conduct outfall toxicity testing according to the memorandum until the RWQCB Executive Officer's approval of the alternative approach.

Once outfall toxicity testing is triggered under Scenarios 3 and 4, outfall toxicity testing will be conducted as follows.

Outfall Scenario 1: If toxicity is not present as determined based on pass of the TST as specified in the Permit.

a. Toxicity testing will be continued during the same condition (i.e., wet or dry weather) until either: 1) the deactivation criterion is met (i.e., two consecutive samples that pass the pass/fail TST during the same condition); or 2) a TIE is conducted at the downstream receiving water site that conclusively identifies the constituent or class of constituents causing toxicity; or 3) the discharge is eliminated.

Outfall Scenario 2: If toxicity is present as determined based on fail of the TST as specified in the Permit but not above the TIE trigger.

a. Toxicity testing will continue during the same condition until either: 1) the deactivation criterion is met (i.e., two consecutive samples that pass the pass/fail TST during the same condition); 2) a TIE is conducted at a downstream receiving water site that conclusively identifies the constituent or class of constituents causing toxicity; or 3) the discharge is eliminated. Concurrently, the Port will 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).

i. 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 NSWDs that are a source of pollutants) will be used to support the TRE.

ii. If toxicity is present in the stormwater discharge, the following actions will be considered 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.

Outfall Scenario 3: If toxicity is present at a level exceeding the TIE trigger, and the TIE identifies the constituent or class of constituents causing toxicity.

a. Toxicity testing will be discontinued at the outfall, and the identified constituent or constituents within the identified class of constituents will be added to outfall monitoring during the same condition starting with the next monitoring event. The next monitoring event will be at least 45 days following the toxicity sample collection. The monitoring for those constituents at the outfall will be continued 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.

Outfall Scenario 4: If toxicity is present at a level exceeding the TIE trigger, and the TIE is inconclusive.

a. Toxicity testing will be continued during the same condition until either: 1) meeting the deactivation criterion (i.e., two consecutive samples that pass the pass/fail TST t-test during the same condition); 2) a TIE identifies the constituent or class of constituents causing toxicity (proceed with following the process outlined in Outfall Scenario 3); 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). The TRE-like evaluation will consider the following:

i. If the TIE is inconclusive in the NSWD, actions taken as part of the non-stormwater program (e.g., source identification and elimination or treatment of unauthorized NSWDs that are a source of pollutants) will be used to support the TRE.

ii. If the TIE is inconclusive in the stormwater discharge, the following actions will be considered to support the TRE: evaluating land uses and potential associated source(s) in the drainage area, evaluation of other permitted.

8 MONITORING METHODOLOGY

8.1 Aquatic Toxicity Testing Method

During the first year of monitoring, chronic toxicity testing will be performed using three species, including *A. affinis*, *S. purpuratus*, and *M. pyrifera*. The most sensitive species will be testing during subsequent monitoring events. Toxicity testing will be performed on a control and five concentrations (e.g., 100, 75, 50, 25, and 12.5%). Table 7 provides sample volumes necessary for toxicity tests (both wet and dry weather) as well as minimum volumes necessary to fulfill Phase I TIE testing if necessary. As detailed in the previous section, the survival or sublethal endpoint will be assessed using the USEPA's TST procedure and CETIS to determine if there is a 50% difference between sample controls and the test waters and ultimately determine if further testing is necessary.

Table 7
Toxicity Test Volume Requirements for Aquatic Toxicity Testing

Test Organism	Toxicity Test Type	Test Concentration	Volume Required for Initial Test (L)	Minimum Volume Required for TIE (L)[1]
Marine Tests for Samples with Salinity ≥ 1.0 parts per thousand				
Topsmelt (*Atherinops affinis*)	Larval survival and growth test	0, 12.5, 25, 50, 75, and 100%	32	84
Purple sea urchin (*Strongylocentrotus purpuratus*)	Fertilization test	0, 12.5, 25, 50, 75, and 100%	1	10
Giant kelp (*Macrocystis pyrifera*)	Germination and growth test	0, 12.5, 25, 50, 75, and 100%	2	8

Notes:
The NPDES permit targets a 36-hour holding time for initiation of testing but allows a maximum holding time of 72 hours if necessary.
1 Minimum volume for TIE is for Phase 1 only.
L = liter
TIE = Toxicity Identification Evaluation

8.2 Receiving Water Monitoring

As specified in Appendix E – Monitoring and Reporting Program – Section IV.A.3, the IMP may be coordinated with other sampling programs to leverage resources. This section provides a summary of receiving water, sediment, and tissue monitoring methodology

proposed for the IMP, which is based on the CCMRP that was developed to satisfy the Harbor Toxics TMDL compliance monitoring program. The CCMRP was approved by the RWQCB on June 6, 2014. Implementation of the CCMRP satisfies the TMDL compliance monitoring requirements.

As presented previously (see Section 4), the TMDL compliance monitoring program contains a subset of analytical parameters required, at a minimum, for the first wet and dry weather receiving water quality monitoring events. Implementation of the IMP will require these additional analytical parameters to be tested at the frequency specified in the permit.

8.2.1 Water

Receiving water quality monitoring consists of in situ measurements and the collection of water samples for chemical analyses.

8.2.1.1 In Situ Measurements

For each sampling event and at each station, water depth and in situ[4] water quality parameters (temperature, dissolved oxygen [DO], pH, and specific conductance [or salinity]) will be collected. Water quality parameters and water depth will be recorded on a field data sheet.

The water depth at each station should be recorded using a probe or lead line. Water quality will be measured in situ at the station by immersing a multi-parameter instrument[5] into the water at the same location where the water sample is collected. The instrument must equilibrate for at least 1 minute before collecting temperature, pH, conductivity, and/or salinity measurements, and at least 90 seconds before collecting DO measurements. Because DO takes the longest to stabilize, this parameter will be recorded after temperature, pH, and salinity. In situ measurements will follow Standard Operating Procedures (SOPs) identified in the Surface Water Ambient Monitoring Program (SWAMP; MPSL-DFG 2007). SOPs

[4] Water quality parameter measurements may be taken in the laboratory immediately following sample collection if auto-samplers are used for sample collection or if weather conditions are unsuitable for field measurements.

[5] A multi-parameter instrument is preferred; however, multiple specific water quality parameter meters may also be used.

developed in support of the CCMRP may also be referenced. Water quality measurements will be collected at three depths during wet and dry weather events (surface, mid-water column, and bottom).

The MS4 Permit states that flow also be included as a parameter to be measured. At the point of a stormwater or dry weather discharge, it is appropriate to measure for flow. In these cases, flow measurements (i.e., the volume of water discharged per unit of time from a specific discharge point) may be used to calculate suspended sediment and pollutant loadings to a receiving waterbody. In contrast, at stations within a receiving waterbody, it is not appropriate to measure flow for two primary reasons:

- Tidal and wind currents (in bays and estuaries) or flows originating from upstream sources (in rivers and channels) will cause inaccurate flow measurements of the discharge after it mixes with receiving water.
- Mixing of the discharge with receiving water prevents calculations of loadings (i.e., the pollutant concentration multiplied by flow measurement) because the discharge and its suspended sediment and pollutant load is immediately diluted in the receiving water.

This IMP proposes to sample at locations within receiving waters. As such, flow will not be measured, because mixing and other hydrodynamic factors will confound the flow measurements and loading calculations.

8.2.1.2 Grab Samples

Samples will be collected during two sampling events per year at each location. Grab samples will be collected within the first 4 hours once rainfall has reached 0.1 inch at the nearest rain gauge. If discharge occurs during non-working hours, grab samples will be collected at facility operations if rainfall started within the prior 12 hours. The National Center for Atmospheric Research Models will be used to evaluate the Global Forecast System Model, North American Mesoscale Model, and the Rapid Refresh Model to predict and visualize forecasted systems up to 8 days in advance. Best judgement will be used to target storms likely to produce sufficient flows capable of being sampled.

Grab samples (i.e., instantaneous, not time- or flow-weighted composites) for analytical chemistry and bacteriological analyses will be taken only from the surface (upper 1 meter of water column) during wet and dry weather events. Multiple grab samples may be required at each station in order to provide sufficient water volume to complete all analyses required. Water samples will be collected with a grab sampler (e.g., Niskin or Van Dorn) that has been decontaminated prior to sample collection at each station. Sampling methods will generally conform to the USEPA's clean sampling methodology described in the SWAMP SOP (MPSL-DFG 2007). SOPs developed in support of the CCMRP may also be referenced.

Sample processing and handling for water chemistry will be conducted in accordance with guidance developed in the Quality Assurance Management Plan for the State of California's SWAMP (Pucket 2002). Aliquots for all required parameters will be taken directly from the grab sampler into appropriate containers or bottles. Water samples will be preserved, depending on the type of analysis, in the field in order to meet specified holding time. Water samples will be stored at less than 4°C until delivery to the appropriate analytical laboratory.

8.2.2 Sediment

Surface sediment samples will be collected at each station. Multiple grab samples may be required at each station in order to provide sufficient sediment volumes to complete all analyses required for the Sediment Quality Objective (SQO) Part 1 assessment (Bay et al. 2009). Sediment grabs will be evaluated for acceptance as outlined in the Bight Field Operations Manual, Section VIII (BCEC 2008).

Surface sediment grab sample procedures will be collected using a Van Veen sampler or similar sampling device as appropriate for the type of sediment sample being collected, as described in the Bight Field Operations Manual, Section VIII (BCEC 2008). SOPs developed in support of the CCMRP may also be referenced.

Sediment sample processing and handling for purposes of sediment chemical analyses, sediment toxicity, and benthic community assessment in support of the SQO Part 1 assessment will be performed in accordance with procedures specified in the

Sediment Quality Assessment Draft Technical Support Manual (Bay et al. 2009) and the Bight Field Operations Manual (BCEC 2008). SOPs developed in support of the CCMRP may also be referenced. Sediment samples for chemistry and toxicity analyses will be stored at less than 4 °C until delivery to the appropriate analytical laboratory. Benthic infauna samples will be stored in 10% buffered formalin in the short term and then subsequently transferred to 70% ethanol (or equivalent) for long-term storage.

8.2.3 Fish Tissue

Fish tissue samples will be collected and analyzed for chemical contaminants of concern. Sampling, processing, and testing methods will be carried out in accordance with Bight protocols (BCEC 2008, 2009). SOPs developed in support of the CCMRP may also be referenced. Necessary permits (e.g., scientific collection, incidental take) will be secured prior to fish collection. Applications and procedures for permits can be found online at the California Department of Fish and Wildlife (CDFW) website (CDFW 2013).

CDFW code section 1002 and Title 14 sections 650 and 670.7 requires a Scientific Collecting Permit to take, collect, capture, mark, or salvage, for scientific purposes, fish and invertebrates. CDFW section 2081(b) requires an Incidental Take Permit (ITP) for any species listed as threatened or endangered (T/E). Although none of the targeted species for this study are T/E species, it is possible that T/E species will be accidentally caught as by catch. An ITP is required for T/E species that are caught or handled in any way, even if they are returned to the ocean.

In addition, the permit holders must notify the local CDFW office prior to collection and submit a report of the animals taken under the permits within 30 days of the expiration date of the permits.

Composite samples of three fish species (white croaker, California halibut, and shiner surfperch) will be collected at two locations, one in eastern San Pedro Bay and one in Outer Long Beach Harbor.

When possible, fish will be collected using a semi-balloon, 7.6-meter headrope otter trawl following the methods in the Bight Field Operations Manual (BCEC 2008). If other methods need to be employed in the case that an otter trawl is not feasible (e.g., lampara net, beach seine, fish trap, or hook and line), SWAMP methods will be used (MPSL-DFG 2001). SOPs developed in support of the CCMRP may also be referenced.

Once the catch is onboard the vessel, the targeted species will be identified and separated for subsequent processing. At each station, 12 individuals of each fish species will be collected for further processing. There is currently no legal size limit for white croaker. An ocean fish contaminant survey was performed from 2002 to 2004 (NOAA 2007). In part, this survey sought to generate information on contaminants of concern for fish caught for sustenance in Southern California. Collection of white croaker for the Harbor Toxics TMDL study should be consistent with this survey, which recommended a minimum length of 160 millimeters (mm; total length). Collection of California halibut of legal size limit is preferred. The current regulations specify at least 22 inches (or 559 mm; total length) for California halibut (FGC 2012). Collection of adult shiner surfperch (i.e., second year age-class with a target length of 88 mm [Odenweller 1975]) is preferred. Additional individuals of the three target species and non-target species will be returned to the ocean as soon as possible to minimize loss. It should be noted that field personnel may encounter by catch species that are potentially harmful while sorting for targeted species. The Bight Field Operations Manual (BCEC 2008) and Fish Collection SOPs in Appendix A provide information on the safe handling of these organisms.

Each targeted fish kept will be tagged with a unique identification number and then measured for total length, fork length, and weight, and examined for gross pathology in accordance with guidance established in the Bight Field Operations Manual (BCEC 2008). Three composite samples per species per station will be created. A composite sample will be composed of four individuals; therefore, a total of 12 individuals per station are required. If more than 12 specimens are caught, then the 12 individuals best and most closely distributed about the 75th percentile of the length distribution of all individuals will be used for the composites. The selected 12 individual fish will then be arranged by size and the smallest four fish, the middle four fish, and the largest four fish within a species will be grouped for each composite to satisfy the 75% rule (the smallest individual in a composite is no less than 75% of the total length of the largest individual in a composite; USEPA 2000). This may

permit data evaluation based on size class, if necessary. Skin-off fillets will be used for white croaker, California halibut, and shiner surfperch to be consistent with the 2002 – 2004 Southern California Coastal Marine Fish Contaminants Survey (NOAA 2007). Dissection and compositing methods will be performed in the analytical laboratory in accordance with USEPA guidance (USEPA 2000).

Fish tissue will be analyzed for chemical parameters. Processing and preservation will be performed in accordance with the methods described in the Bight Field Operations Manual and Bioaccumulation Workplan (BCEC 2008, 2009). Fish will be processed in the field according to the steps below.

- Sacrifice fish and leave whole body intact.
- Blot fish dry and pack each fish in aluminum foil (shiny side out).
- Place each packed fish in a labeled, food-grade, resealable plastic bag and store on ice.
- Ship overnight to the analytical laboratory on wet or blue ice. If samples are held more than 24 hours, pack on dry ice.

Chain-of-custody forms will be maintained. Tissue compositing will be conducted by the analytical laboratory.

8.3 Stormwater Outfall Monitoring

This section provides a summary of the stormwater outfall monitoring methodology proposed for the IMP. A Sampling and Analysis Plan will be developed, detailing specific methods for collection of stormwater samples within the Port.

8.3.1 In Situ Measurements

For each sampling event and at each station, in situ[6] water quality parameters (temperature, DO, pH, and specific conductance [or salinity]) will be collected. Water quality parameters will be recorded on a field data sheet.

[6] Water quality parameter measurements may be taken in the laboratory immediately following sample collection if auto-samplers are used for sample collection or if weather conditions are unsuitable for field measurements.

Water quality will be measured in situ at the station by immersing a multi-parameter instrument[7] into the water at the same location where the water sample is collected or, dependent on flow, into a sample bottle containing the stormwater discharge. The instrument must equilibrate for at least 1 minute before collecting temperature, pH, and conductivity and at least 90 seconds before collecting DO measurements. Because DO takes the longest to stabilize, this parameter will be recorded after temperature, pH, and salinity. In situ measurements will follow SOPs identified in the Surface Water Ambient Monitoring Program (MPSL-DFG 2007).

8.3.2 Sampling Methodology

Flow-weighted composite samples will be collected during the first 24 hours of stormwater discharge or for the entire stormwater discharge if it is less than 24 hours. Grab samples will be collected for pathogen indicator bacteria, oil and grease, cyanide, and volatile organics.

Where feasible, sites will be set up to be completely automated for continuous data collection and sample collection. Flow rates will be monitored using ISCO (or comparable) flowmeters with an ultrasonic sensor, bubbler, or submerged pressure transducer as the primary level measuring device. Flow rates will be measured or estimated in accordance with the NPDES Storm Water Sampling Guidance Document (USEPA 1992b). The flowmeter will continuously measure level and calculate flow rates to actuate the automated sampler to achieve a flow-weighted sample.

Flow-weighted composite samples will be collected by taking sample aliquots across the hydrograph of the storm event. Based on the anticipated size of the storm, a flow-proportioned pacing will be programmed into the automated sampling equipment. The first sample aliquot will be taken at or shortly after the time that storm water runoff begins, and each subsequent aliquot of equal volume will be collected every time the pre-selected flow volume (flow-proportional pacing) discharges past the monitoring station. Individual flow-weighted sample aliquots will be collected sample approximately every 15 minutes. Some variation may occur depending on actual storm intensity and duration. Short duration

[7] A multi-parameter instrument is preferred; however, multiple specific water quality parameter meters may also be used.

storms will have more frequent sampling intervals where longer duration storms will have longer intervals, respectively. Sample pacing worksheets will be developed for each site based on a predicted precipitation size such that sufficient sample volume will be collected to analyze the required analytical methods desired.

Flow-weighted samples will be collected using an ISCO (or comparable) autosampler connected to 0.375-inch diameter Teflon lined tubing and a stainless steel (or Teflon) sample strainer. The sample strainer will be mounted at the point of discharge to ensure that the strainer remains submerged during sample flows to ensure sufficient volume during pumping and above tidally influenced waters within the storm drain system.

SOPs will be prepared to ensure field staff use standardized programming methods. The SOPs will be developed following the instrument manufacturer's recommendations for flow-weighted sample collection. If grab samples are necessary, samples will be collected manually with certified clean sample containers, taking care not to bias the sample during sample collection.

Sample processing and handling for water chemistry will be conducted in accordance with guidance developed in the Quality Assurance Management Plan for the State of California's SWAMP (Pucket 2002). Samples will be preserved, depending on the type of analysis, in the field in order to meet specified holding times. Water samples will be stored at less than 4 °C until delivery to the appropriate analytical laboratory. Samples for all required parameters will be taken from the flow-weighted composite at the laboratory.

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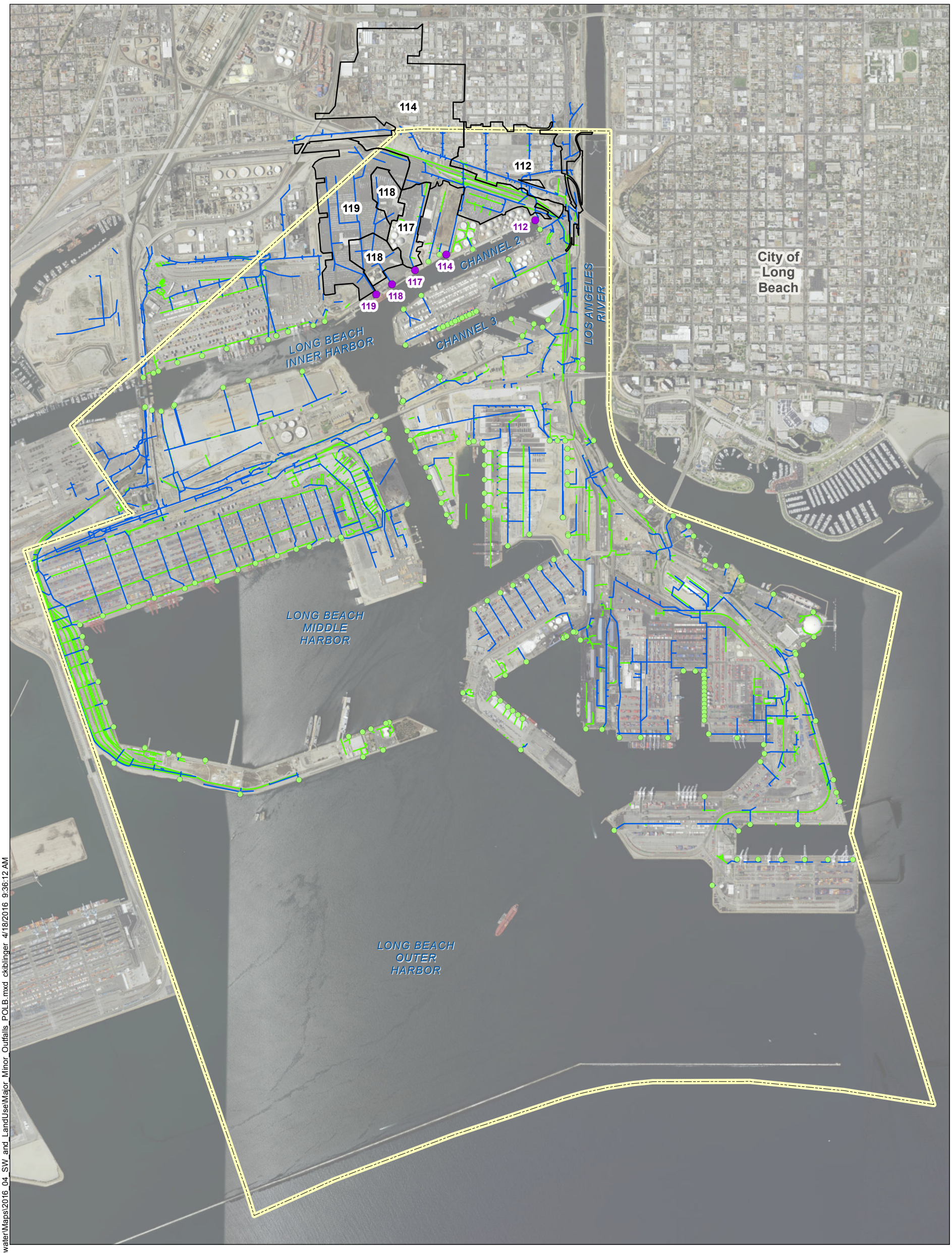
ATTACHMENTS

ATTACHMENT A
STORMWATER OUTFALL FIGURES AND TABLES



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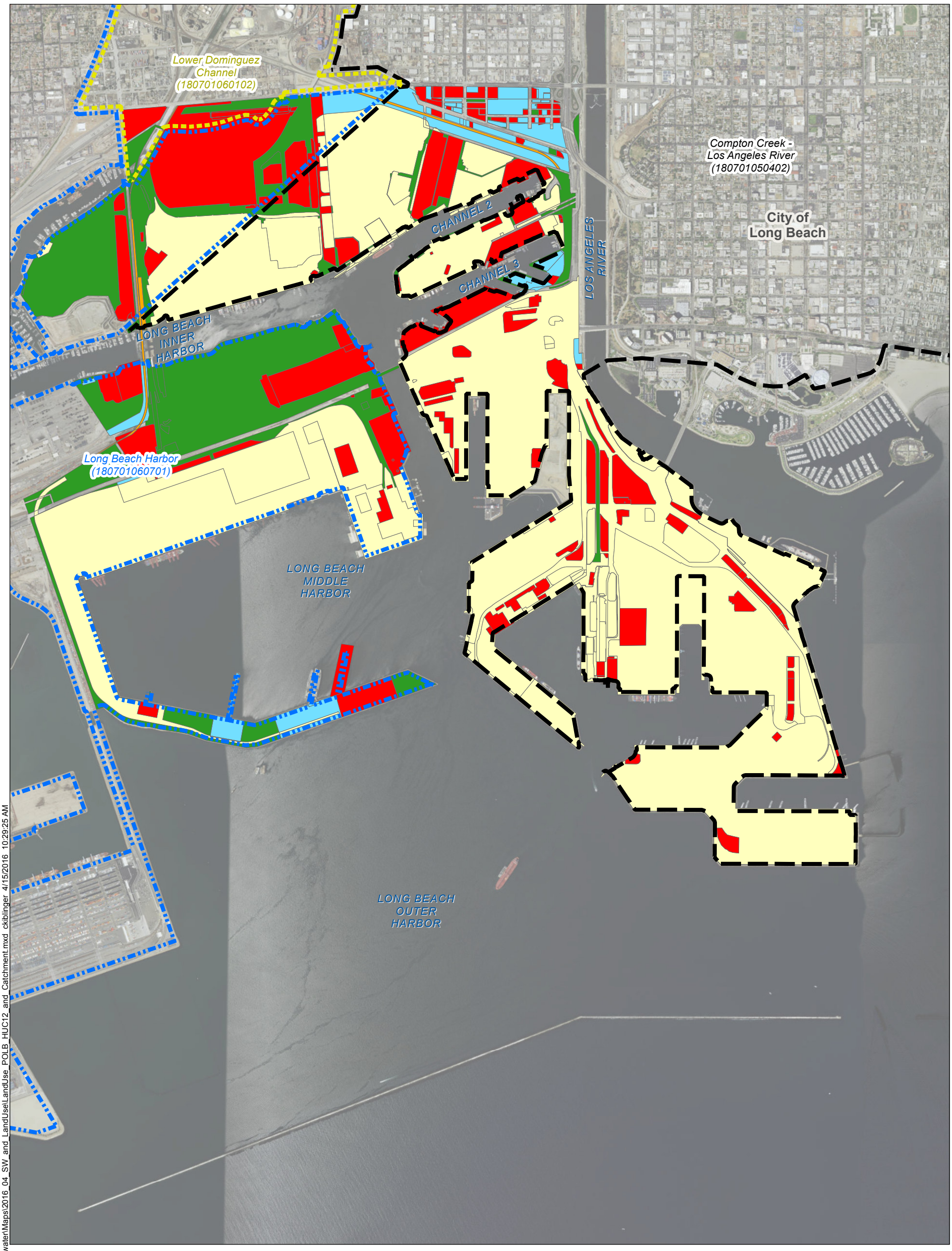
ANCHOR QEA

Figure A-1
Major and Minor Outfalls in the Port of Long Beach
Integrated Monitoring Program for Long Beach Inner Harbor, Long Beach Outer Harbor, and Eastern San Pedro Bay

ATTACHMENT B
LAND USE FIGURES AND TABLES

ANCHOR QEA

Figure B-1
Land Uses in the Port of Long Beach
Integrated Monitoring Program for Long Beach Inner Harbor, Long Beach Outer Harbor, and Eastern San Pedro Bay



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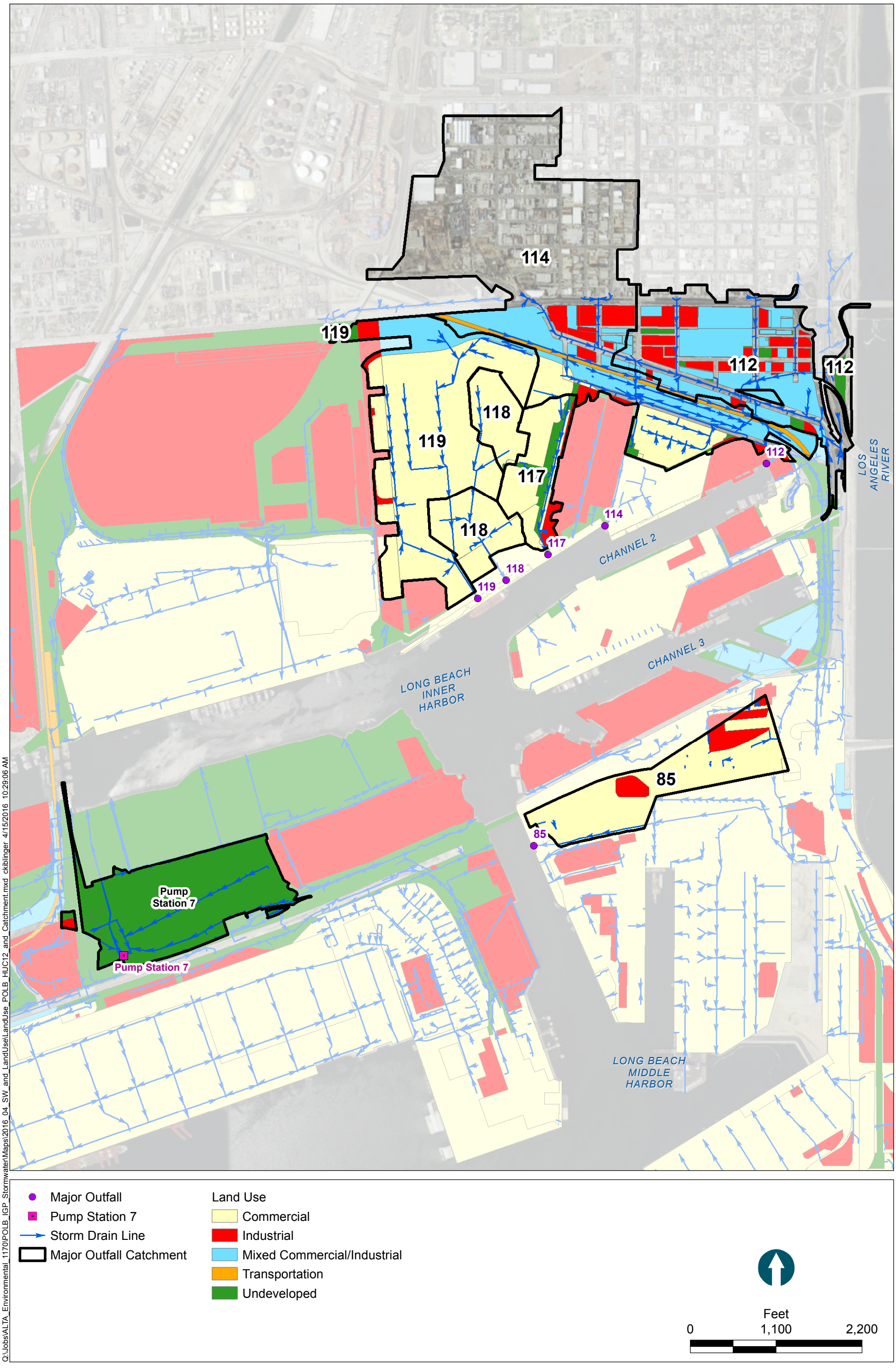
ANCHOR QEA

Figure B-2
Land Uses for Sub-basins in the Port of Long Beach
Integrated Monitoring Program for Long Beach Inner Harbor, Long Beach Outer Harbor, and Eastern San Pedro Bay



ANCHOR QEA

Figure B-3
Land Uses for Catchments in the Port of Long Beach
Integrated Monitoring Program for Long Beach Inner Harbor, Long Beach Outer Harbor, and Eastern San Pedro Bay

Table B-1

Land Uses and Areas in the Port of Long Beach

Land Use	Acres	%
Commercial	1990	69.0
Industrial	415	14.4
Mixed Commercial/Industrial	112	3.90
Transportation	8.96	0.31
Undeveloped	356	12.3
Total	**2,880**	**100**

Table B-2

Land Uses and Areas for Sub-basins in the Port of Long Beach

HUC 12	HUC 12 Name	Land Use	Acres	%
180701050402	Compton Creek – Los Angeles River	Commercial	1,540	79.1
		Industrial	269	13.8
		Mixed Commercial/Industrial	77.3	3.95
		Transportation	6.19	0.32
		Undeveloped	56.4	2.88
		Total	1,950	100
180701060102	Lower Dominguez Channel	Industrial	30.3	60.8
		Transportation	1.13	2.28
		Undeveloped	18.4	36.9
		Total	49.8	100
180701060701	Long Beach Harbor	Commercial	500	37.5
		Industrial	298	22.4
		Mixed Commercial/Industrial	49.0	3.68
		Transportation	7.54	0.57
		Undeveloped	478	35.9
		Total	1,330	100

Table B-3

Land Uses and Areas for Catchments in the Port of Long Beach

Outfall	Land Use	Acres	%
112	Industrial	13.2	26.1
	Mixed Commercial/Industrial	33.1	65.2
	Transportation	0.66	1.30
	Undeveloped	3.80	7.48
	Total	50.8	100
114	Commercial	19.4	28.8
	Industrial	10.6	15.8
	Mixed Commercial/Industrial	30.5	45.3
	Transportation	5.21	7.74
	Undeveloped	1.63	2.42
	Total	67.4	100
117	Commercial	17.8	71.0
	Industrial	2.88	11.47
	Undeveloped	4.40	17.6
	Total	25.1	100
118	Commercial	34.8	99.6
	Undeveloped	0.13	0.37
	Total	34.9	39.4
119	Commercial	88.7	85.7
	Industrial	3.26	3.15
	Mixed Commercial/Industrial	9.99	9.66
	Undeveloped	1.54	1.49
	Total	103	100
85	Commercial	42.3	85.5
	Industrial	7.18	14.52
	Total	49.5	100
Pump Station 7	Industrial	0.48	0.73
	Undeveloped	65.4	99.3
	Total	65.9	100

ATTACHMENT C
SUBMISSION SCHEDULE FOR MAPS AND DATABASE REQUIREMENTS

Part VII.A of the MRP requires a submission of maps and database elements; the status of submission for each element is summarized in Table C-1.

Table C-1
Maps and Data Base Requirements per Attachment E Part VII.A

Database Element	Status of Submission	
	Complete	Schedule
1. Surface water bodies receiving discharges from the MS4	Figures 1 and 2 of the IMP 8.1	
2. Subwatershed (HUC-12 or HUC-12 equivalent) boundaries	Figure 1 of the IMP 8.1	
3. Land use overlay	Figures B-1, B-2, B-3 of Attachment B to the IMP 8.1	
4. Effective Impervious Area (EIA) overlay (if available)		Not available
5. Jurisdictional boundaries	Figure 1 of the IMP 8.1	
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)	Figure A-1 of Attachment A to the IMP 8.1	
7. The location of all dry weather diversions	No diversion exists in the Harbor District (the Port)	
8. The location of all major MS4 outfalls within the Discharger's jurisdictional boundary. Each major outfall shall be assigned an alphanumeric identifier, which must be noted on the map	Figure A-1 of Attachment A to the IMP 8.1	
9. Notation of outfalls with significant NSWDs (to be updated annually)		Dec 28, 2016
10. Storm drain outfall catchment areas for each major outfall within the Discharger's jurisdiction	Figure A-1 of Attachment A to the IMP 8.1	
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. Latitude and longitude 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 NSWDs f. Storm water and non-storm water monitoring data	Completed (except for item e) via the Port's GIS database.	Item e (Dec 28, 2016)

ATTACHMENT D
NON-STORMWATER DISCHARGE OBSERVATION SURVEY FORM

Port of Long Beach
Non-Stormwater Discharge Observations
Date of Survey: August XX, XXXX

Outfall #	Characteristics				Weather Rain/Dry	Quantity	Possible Significant NSWD?	pH	Comments
	Sheen	Color	Odor	Sludge					
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
12A									
12B									
12C									
13									
14									
14E									
14A									
15									

Outfall #	Characteristics				Weather Rain/Dry	Quantity	Possible Significant NSWD?	pH	Comments
	Sheen	Color	Odor	Sludge					
16									
16A									
16B									
16D									
16C									
16E									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32A									
32B									
TEMP 23									

Outfall #	Characteristics				Weather Rain/Dry	Quantity	Possible Significant NSWD?	pH	Comments
	Sheen	Color	Odor	Sludge					
TEMP 22									
TEMP 21									
TEMP 20									
TEMP 19									
TEMP 18									
TEMP 17									
TEMP 16									
TEMP 15									
TEMP 14									
TEMP 13									
TEMP 12									
TEMP 11									
33									
TEMP-34									
TEMP-35									
37A									
38									
39									
40									
40A									
41									
42									
43									
44									

Outfall #	Characteristics				Weather Rain/Dry	Quantity	Possible Significant NSWD?	pH	Comments
	Sheen	Color	Odor	Sludge					
45									
46									
47									
48									
49									
50									
51									
52									
52A									
53									
54									
55									
56									
57									
58									
59									
60-78									
79									
80									
81									
81A									
82									
83									
84									

Outfall #	Characteristics				Weather Rain/Dry	Quantity	Possible Significant NSWD?	pH	Comments
	Sheen	Color	Odor	Sludge					
85									
86									
86A									
86B									
87									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									
106									
107									

Outfall #	Characteristics				Weather Rain/Dry	Quantity	Possible Significant NSWD?	pH	Comments
	Sheen	Color	Odor	Sludge					
108									
109									
110									
110A									
110B									
111									
112									
113									
114									
115									
116									
117									
118									
119									
119A									
120									
121									
122									
123									
124									
125									
126									
127									
128									

Outfall #	Characteristics				Weather Rain/Dry	Quantity	Possible Significant NSWD?	pH	Comments
	Sheen	Color	Odor	Sludge					
129									
130									
131									
132									
133									
133K									
133L									
133A									
133B									
133C									
133D									
133E									
133F									
133G									
133H									
133J									
133I									
134									
135									
136									
136A									
137									
138									
139									

Outfall #	Characteristics				Weather Rain/Dry	Quantity	Possible Significant NSWD?	pH	Comments
	Sheen	Color	Odor	Sludge					
140									
141									
142									
143									
144									
145									
146									
147									
148									
149									
150									
151									
152									
153									
154									
155									
156									
157-158									
159									
160									
161									
162									
163									
163A									

Outfall #	Characteristics				Weather Rain/Dry	Quantity	Possible Significant NSWD?	pH	Comments
	Sheen	Color	Odor	Sludge					
163B									
164									
165									
166									
167									
168									
169									

Observer _____ Date of Last Rain Over 0.1" _____

Note: "Quantity" is the approximate size of the observed outflow fall – i.e., drip, 2" wide or fills pipe ¼, ½. Tidal surge – waves breaking and flowing into pipe.