Los Cerritos Channel

Coordinated Integrated Monitoring Program

LOS CERRITOS CHANNEL **WATERSHED**

Participants

- Bellflower
- Cerritos
- Downey
- Lakewood
- Long Beach
- Paramount
- Signal Hill
- Los Angeles County Flood Control District

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ACRONYMS

ALERT	Automatic Local Evaluation in Real Time
AMEL	Average Monthly Effluent Limitation
Basin Plan	*Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*
BMP	Best Management Practices
BPJ	Best Professional Judgment
BOD	Biochemical Oxygen Demand 5-day @ 20 °C
CASQA	California Stormwater Quality Association
CCR	California Code of Regulations
CD	Compact Disc
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIMP	Coordinated Integrated Monitoring Program
CL	Control Limit
COD	Chemical Oxygen Demand
CTR	California Toxics Rule
CV	Coefficient of Variation
CWA	Clean Water Act
CWC	California Water Code
CWP	Center for Watershed Protection
Discharger	Los Angeles County MS4 Permittees
DNQ	Detected But Not Quantified
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
EFA	Effective Filtration Area
EIA	Effective Impervious Area
ELAP	California Department of Public Health Environmental Laboratory Accreditation Program
Facility	Los Angeles County MS4s
FEB	Fluorinated Ethylene Propylene
FIB	Fecal Indicator Bacteria
GIS	Geographical Information System
gpd	gallons per day
HUC	Hydrologic Unit Code
IC50	Concentration at which the organism is 50% inhibited
IC/ID	Illicit Connection and Illicit Discharge Elimination
IWC	In-Stream Waste Concentration
LA	Load Allocations
LACFCD	Los Angeles County Flood Control District
LARWQCB	Regional Water Quality Control Board, Los Angeles
LCC	Los Cerritos Channel
LID	Low Impact Development

LOEC	Lowest Observed Effect Concentration
MAL	Municipal Action Limits
MBAS	Methylene Blue Active Substances
MCM	Minimum Control Measure
mg/L	milligrams per Liter
MDEL	Maximum Daily Effluent Limitation
ME	Mass Emission
µg/L	micrograms per Liter
MDL	Method Detection Limit
MEC	Maximum Effluent Concentration
MGD	Million Gallons Per Day
ML	Minimum Level
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System
MTBE	Methyl tertiary-butyl ether
ND	Not Detected
NOEC	No Observable Effect Concentration
NPDES	National Pollutant Discharge Elimination System
NSW	Non-Stormwater
NTR	National Toxics Rule
Ocean Plan	Water Quality Control Plan for Ocean Waters of California
ORI	Outfall Reconnaissance Inventory
PCB	Polychlorinated Biphenyls
PWS	Primary Watershed Segment
PES	Polyester-reinforced polysulfone
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QPF	Quantified Precipitation Forecast
RAP	Reasonable Assurance Program
Regional Water Board	California Regional Water Quality Control Board, Los Angeles Region
RL	Reporting Limit
RPA	Reasonable Potential Analysis
RWL	Receiving Water Limitations
SIP	State Implementation Policy (Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California)
SMC	Stormwater Monitoring Coalition
SMR	Self-Monitoring Reports
SQO	Sediment Quality Objective
SSC	Suspended Sediment Concentration
State Water Board	California State Water Resources Control Board
SVOC	Semi-Volatile Organic Compound
SWAMP	State's Water Ambient Monitoring Program
SWS	Secondary Watershed Segment

TAC	Test Acceptability Criteria
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document
TSS	Total Suspended Solid
TST	Test of Significant Toxicity
TU_c	Chronic Toxicity Unit
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
WDR	Waste Discharge Requirements
WET	Whole Effluent Toxicity
WLA	Waste Load Allocations
WMA	Watershed Management Area
WMG	Waste Management Group
WMMS	Watershed Management Modeling System
WMP	Watershed Management Program
WQBELs	Water Quality-Based Effluent Limitations
WQS	Water Quality Standards
%	Percent

COORDINATED INTEGRATED MONITORING PROGRAM FOR THE LOS CERRITOS CHANNEL WATERSHED GROUP

1 Introduction

A Coordinated Integrated Monitoring Program (CIMP) is required to be submitted either separately or as part of a Watershed Management Plan (WMP). The CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 permit and TMDL monitoring requirements. This plan was developed to address five primary objectives which include:

- Assess the chemical, physical, and biological impacts of discharges from the MS4s on receiving waters.
- Assess compliance with receiving water limitations and water quality-based effluent limitations (WQBELs) established to implement TMDL wet and dry weather load allocations
- Characterize pollutant loads in MS4 discharges.
- Identify sources of pollutants in MS4 discharges.
- Measure and improve the effectiveness of pollutant controls implemented under the new MS4 permits.

Figure 1-1 provides a summary of all jurisdictions that are participating in both the WMP and the CIMP. The Los Angeles County Flood Control District includes the entire area addressed by the Los Cerritos Channel WMP and CIMP.

1.1 Monitoring Objectives

The Permit Monitoring and Reporting Program (MRP) for Los Angeles County[1] and the City of Long Beach[2] have equivalent requirements. The Los Cerritos Channel watershed is located in areas covered by both permits but the requirements differ only in terms of schedules. The City of Long Beach opted to participate in the WMP and CIMP being developed under the Los Angeles County Permit schedule but the major elements and primary objectives listed below are identical. The CIMP is required to incorporate the following elements and address the established objectives under each element:

- Receiving Water Monitoring (Wet and Dry Weather) (Part II.E.1 of the MRP)
    - Are receiving water limitations being met?
    - Are there trends in pollutant concentrations over time or during specified conditions?

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[1] Order No. R4-2012-0175, NPDES Permit No. CAS004001

[2] Order No. R4-2014-0024, NPDES Permit No. CAS004003

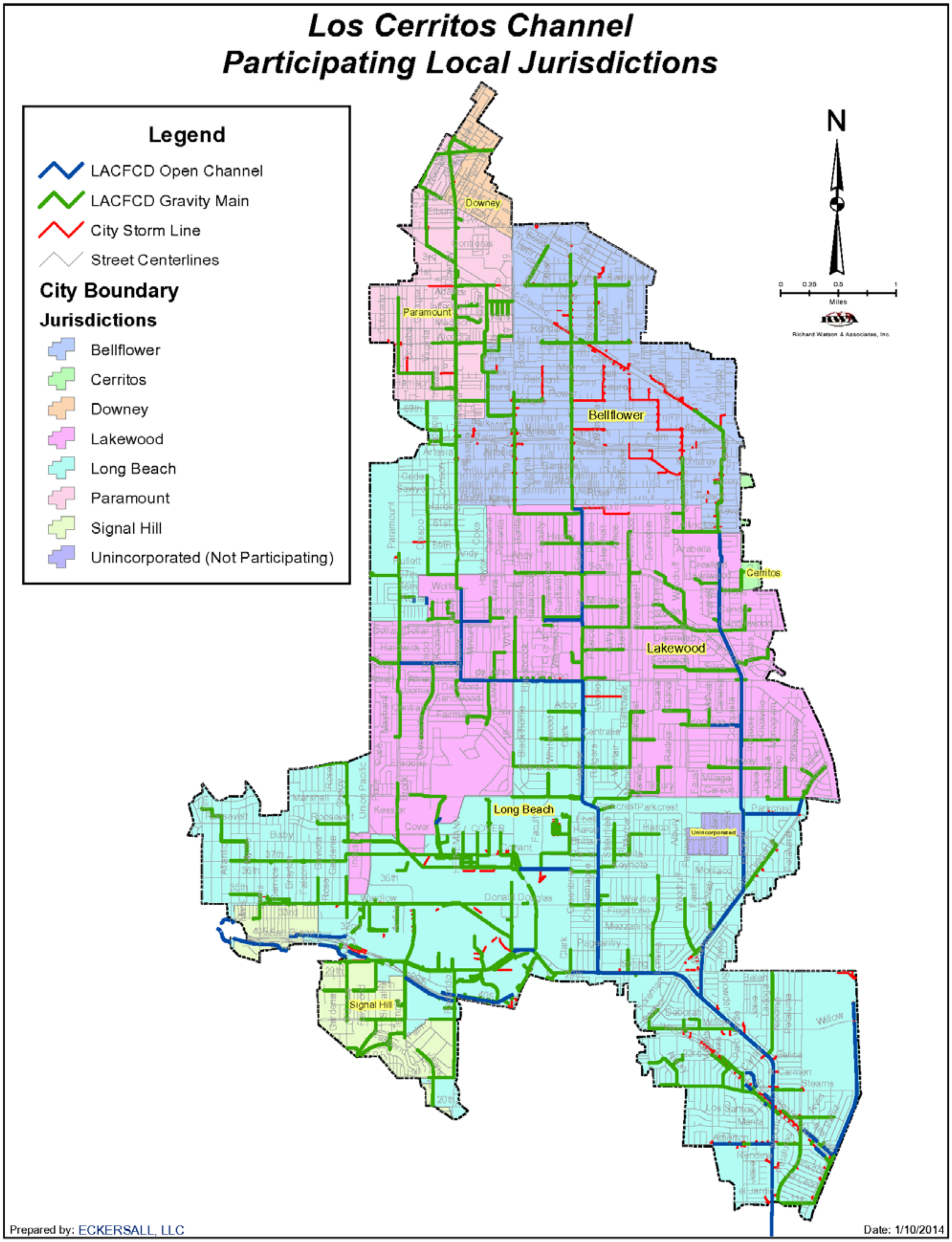

Figure 1-1. Jurisdictions Participating in the WMP and CIMP.

    - Are designated beneficial uses fully supported as determined by water chemistry, aquatic toxicity, and bioassessment monitoring?
- Stormwater Outfall Monitoring (Part II.E. 2 of the MRP)
    - How does the quality of the permittees' discharges compare to Municipal Action Limits (MALs)?
    - Are the permittees' discharges in compliance with applicable stormwater WQBELs derived from TMDL Waste Load Allocations (WLAs)?
    - Do the permittees' discharges cause or contribute to an exceedance of the receiving water limitations?
- Non-Stormwater Outfall Based Monitoring (Part II.E.3 of the MRP)
    - Are the permittees' discharges in compliance with non-stormwater WQBELs derived from TMDL WLAs.
    - How does the quality of the permittees' discharges compare to Non-Stormwater Action Levels?
    - Do the permittees' discharges cause or contribute to an exceedance of the receiving water limitations?
    - Do the permittees comply with the requirements of the Illicit Connection and Illegal Discharge Program?
- New Development/Re-Development Effectiveness Tracking (Part II.E.4 of the MRP)
    - Are the conditions established in building permits issued by the Permittees being met?
    - Are stormwater volumes associated with the design storm effectively retained on-site?
- Regional Studies
    - How do the permittees plan to participate in efforts to characterize the impact of the MS4 on receiving waters? Include participation in regional studies with the Southern California Stormwater Monitoring Coalition (SMC) and any special studies specified in TMDLs.

1.2 Monitoring Sites and Approach

The approach presented in this CIMP incorporates all objectives of the MRP but provides a customized approach to address the objectives identified in the MRP for Stormwater Outfall Monitoring based upon the unique characteristics of the LCC watershed. Unlike other WMGs in Los Angeles County, the LCC watershed does not receive flow from other WMGs. External contributions of contaminants are limited to atmospheric deposition originating predominantly from major transportation corridors and facilities.

1.2.1 Receiving Water

Receiving water quality monitoring will be conducted at the historic Los Cerritos Channel site at Stearns Street (LCC1). Originally, this location was considered a mass emission monitoring site for the City's stormwater program since it captures runoff stormwater originating from a large segment of the City. This site is also the compliance monitoring site for TMDL monitoring. This site is located about 100 feet downstream of a former U.S. Geological Survey (USGS) gaging station (Figure 1-2) and effectively marks the downstream extent of freshwater influences within the Channel. During low tides, freshwater extends down to the end of the concrete-lined channel below Atherton St. LCC1 marks the upper extent of tidal influence for all but the most extreme high tides. The portion of the Los Cerritos Channel listed as impaired for metals was identified as the 2.1 mile freshwater portion above the tidal prism. EPA (2010) used data from 10 years of both wet and dry weather monitoring at the LCC1 to establish the freshwater metals TMDL for the Los Cerritos Channel. This site now has a record of stormwater and dry weather water quality measurements that extend back for 13 years using consistent methods and, in most cases, consistent detection limits applicable to current receiving water limitations (RWLs).

1.2.2 Primary Watershed Segmentation (PWS) Monitoring

Stormwater outfall monitoring in the LCC watershed will be addressed by partitioning the watershed into segments that correspond to those used in the Los Cerritos Metals TMDLs to develop a model for estimating flow and pollutant loads. This allows the modeling information to be used to assist in directing sampling efforts to target areas of the watershed believed to contribute greater loads and verify the accuracy of the model. If the monitoring program identifies a segment of the watershed as contributing significantly higher pollutants loads than the segments, then further monitoring will be conducted to further identify and isolate the source. This "forensic" monitoring would further partition the watershed by monitoring of Secondary Watershed Segmentation (SWS) using more portable sampling stations.

PWS sampling is intended to assist in determining whether the permittees' discharges are causing or contributing to exceedance of receiving water limitations, assess whether the permittees' discharges are in compliance with applicable WQBELs derived from TMDL WLAs and with applicable action limits. The Los Cerritos Channel watershed is highly divided with a number of separate channels contributing flow. In practice, no clear distinction exists between the end of the storm drain system and the start of tributaries or receiving waters. Restricting monitoring sites to locations considered to be "outfall" sites would limit sampling to much smaller catchments that are intended to be representative of land use throughout the LCC watershed. This monitoring approach was not considered to be an effective strategy for identification of the major sources of contaminants and would provide limited assistance in directing effective implementation of control measures in this watershed.

Primary Watershed Segment (PWS) sites (Figure 1-2) were selected based upon:

- LSPC modeling results from the LCC Metals TMDL (U.S. EPA 2010);
- land use characteristics within the watershed; and
- the ability to isolate major portions of the watershed.

The LSPC model was used to simulate flows and metals concentrations in Los Cerritos Channel during development of the LCC Metals TMDLs. An updated version of the LSPC serves as the basis for the Los Angeles County Watershed Management Modeling System (WMMS). The model divided the watershed into 10 sub-basins (Figure 1-2) and developed loading estimates (Figure 1-3) for each of the sub-basins. The LSPC model results provided the primary guidance for selection of appropriate watershed monitoring sites. Site selection first considered sub-basins that the model identified as the most significant sources of metals. Potential sites were considered at locations near the downstream edge of each sub-basin and where runoff from each sub-basin could be effectively isolated. Land use information for within each sub-basin was then examined to determine dominant land uses within each segment and assure that all major land uses would be effectively sampled. Lastly, sites were selected to effectively represent a large proportion of the watershed and yet avoid large disparities in the sizes of each segment such that pollutant or sediment delivery ratios[3] would not vary substantially among monitoring sites.

Sites selected as PWS sites include SB4, SB10, SB8 and SB9 (Figure 1-2; Table 1-2). Each of these sites isolates significant proportions of their respective sub-basins (4, 10, 8 and 9). Together, these monitoring locations allow 68% of the entire watershed to be monitored. Once implemented, pollutant loading rates for each of the PWS sites can be compared to loads measured at the downstream receiving water site (LCC1) in order to assess potential discrepancy in load contributions and determine if further implementation of control measures is warranted

SB4 is located in the Los Cerritos Channel just west of Lakewood Blvd. and adjacent to the Long Beach Daugherty Airport. This site will effectively sample runoff from sub-basin 4. LSPC modeling indicated that this segment may be a significant source of both copper and zinc (Figure 1-3). Land use in this segment of the watershed (Table 1-1) is dominated equally by the Airport (classified as mixed urban in the model) and industrial land use. This segment represents approximately 13% of the entire LCC watershed.

SB10 is located in the Palo Verde Channel and will collect runoff from the Sub-Basin 10. This segment of the watershed is comprised largely of low-density residential neighborhoods (Table 1-1) and represents 19% of the entire LCC watershed. The LSPC model predicted that this portion of the watershed would produce moderate loads of copper, lead and zinc. This watershed is somewhat unique in its relatively large size (3403 acres) and having more than 77 percent residential land use (71% low density and 6.3% high density residential land use). Monitoring of this sub-basin is considered to be useful in validating the modeling results and providing improved estimates of trace metal loads from residential areas.

Sub-basins 8 and 9 are located in northern portion of the watershed (Figure 1-2) draining portions of Bellflower, Downey, Lakewood, Long Beach, and Paramount. LSPC modeling indicated that these two sub-basins would likely yield some of the highest loads of metals (Figure 1-3). Initial modeling indicated that sub-basin 9 was expected to have higher loads of copper, lead and zinc than most other areas. The model projected that copper and lead loading would be elevated in sub-basin 8 but this region was expected to produce slightly lower levels of zinc. Land uses in both sub-basins are predominantly residential with substantial amounts of commercial activities (Table 1-1). Together, these two sub-basins comprise over a third of the LCC watershed. Monitoring sites are located near the bottom of each of these sub-basins. SB8 is located in the Clark Channel just north of the Lakewood Civic Center and SB9 is located in the Del Amo Channel near Clark Avenue.

Monitoring at these four PWS sites will form the backbone of the program. This program allows for an adaptive process that enables resources to be focused on confirming modeling results and portions of the watershed that are significant sources of contaminants and flow. Wet weather monitoring at the

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[3] The delivery ratio of pollutant loads can be defined as the ratio of the discharged pollutant load delivered to the point of interest divided by the mass of pollutants generated at the source.

LCC1 receiving water monitoring site and the four PWS sites will be used to evaluate if one or more of these segments is contributing excessive loads of key pollutants.

Potential Secondary Watershed Segment (SWS) sites for forensic monitoring have been identified within each of the four sub-basins (Figure 1-2). SWS sites are identified by the name of the sub-basin monitoring site followed by a hyphen and a sequential number for each added site. For example, potential SWS sites in sub-basin 4 are identified as SB4-1 and SB4-2.

Where possible, these sites are positioned at locations that further dissect the sub-basins. In sub-basin 4, tentative SWS sites effectively divide the sub-basin into two areas of comparable size. SWS sites isolate major, but unequal branches of the drainages within both sub-basins 8 and 9. Sub-basin 10 has a more linear configuration that required locating potential SWS sites at two locations along the length of the sub-basin. These are sites where further monitoring would be conducted if one of more of the sub-basins is identified as having high pollutant loading rates. It is not anticipated that all secondary sampling locations will require sampling and it is possible that none will require further sampling.

Any sampling initiated at these SWS sites would be conducted with temporary installations designed to allow for installation within one day. Monitoring at these sites would utilize 24-hour, time-based sampling triggered by flow. Sampling would be conducted concurrently with sampling of the long-term sub-basin watershed sites (PWS sites) and the receiving water monitoring site (LCC1).

SWS sites will utilize time-based monitoring methods to aid in isolating areas that may be contributing excessive concentrations of contaminants. If monitoring data indicate that one of the two SWS sites has elevated concentrations of any contaminant of concern, additional upstream monitoring sites will be selected based upon the configuration of the upstream storm drains and land use. Monitoring equipment used for the paired secondary stations would then be relocated upstream in the targeted segment to better isolate potential sources.

1.2.3 Non-Stormwater Outfall Monitoring

Non-Stormwater Outfall Based Monitoring will be conducted throughout the major open channels of the Los Cerritos Channel Watershed. Initially, all pipes exceeding 12 inches in diameter and discharging either directly into the Los Cerritos Channel receiving water or into any of the open channels will be identified in the first screening survey. By the end of 2014, the database will be refined to determine which of the 12-inch to 36-inch pipes include discharges from areas with industrial land uses. Discharge pipes less than 36 inches and determined not to incorporate runoff from industrial land use areas will be excluded from further surveys. After completing an inventory of the outfalls, two more screening surveys will be conducted by the end of 2014 to document sites with persistent and significant non-stormwater flows. Subsequently, the source ID program will utilize an array of different methods to assist in determining whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows or unknown. These may include available drainage maps, information on existing dewatering permits or industrial discharges, and a combination of field tests and limited laboratory testing.

1.2.4 New Development/Re-Development Effectiveness Tracking

Participating agencies have developed mechanisms for tracking information related to new and re-development projects that are subject to post-construction best management practice requirements in Part VI.D.7 of the MS4 Permit.

1.2.5 Regional Studies

On behalf of the participating agencies, the Los Angeles County Flood Control District (LACFCD) will continue to provide financial and/or monitoring resources to the Southern California SMC Regional Watershed Monitoring Program, also known as the Regionally Consistent and Integrated Freshwater Stream Bioassessment Monitoring Program (Bioassessment Program). The Bioassessment Program was initiated in 2009 and is structured to occur in cycles of five years. Sampling under the first cycle concluded in 2013. The next five-year cycle is scheduled to begin in 2015, with additional special study monitoring scheduled to occur in 2014.

Permittee representatives will also participate in the SMC meetings and assist in development and implementation of selected and appropriate regional studies designed to improve stormwater characterization and impact assessment.

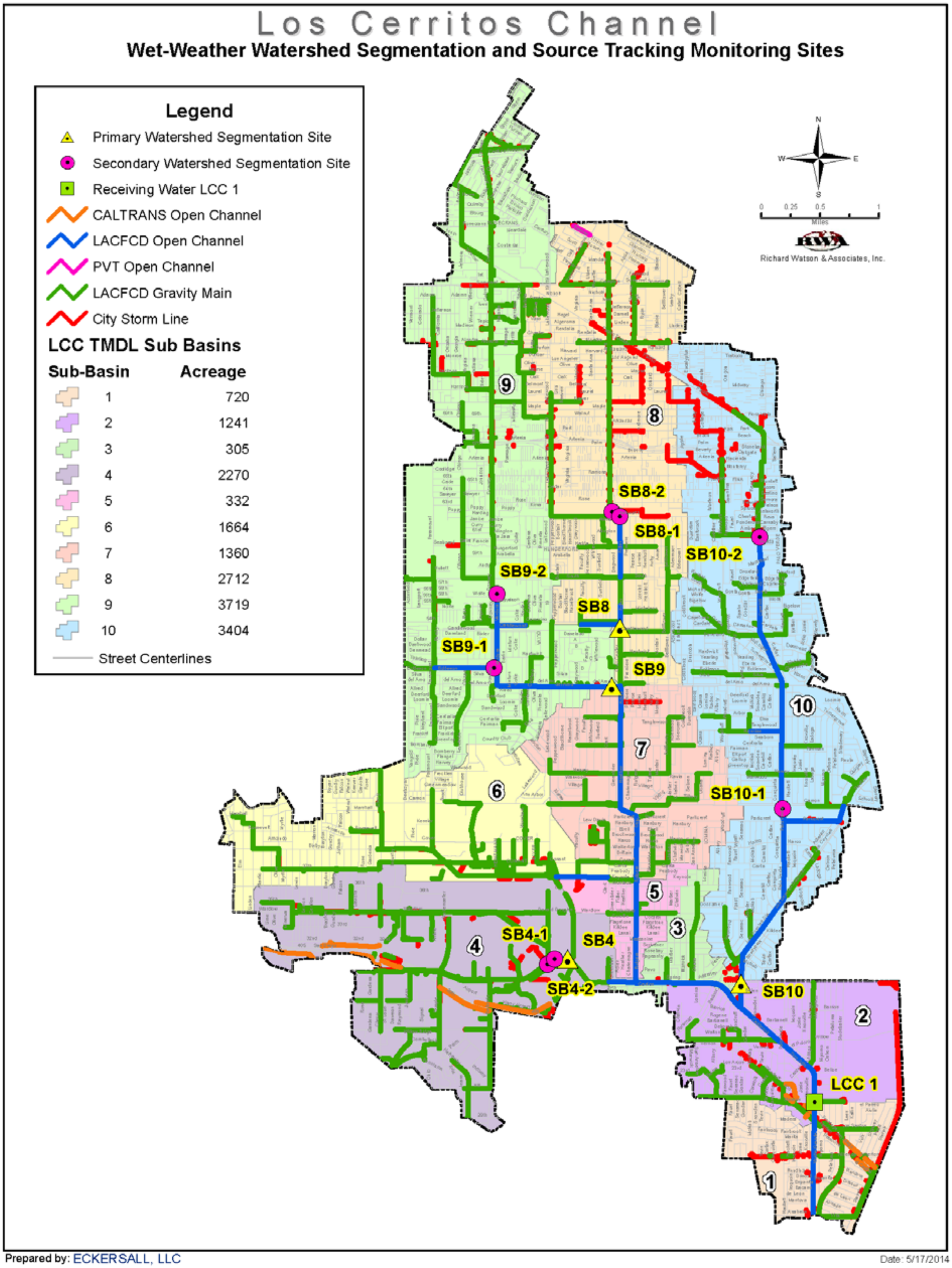
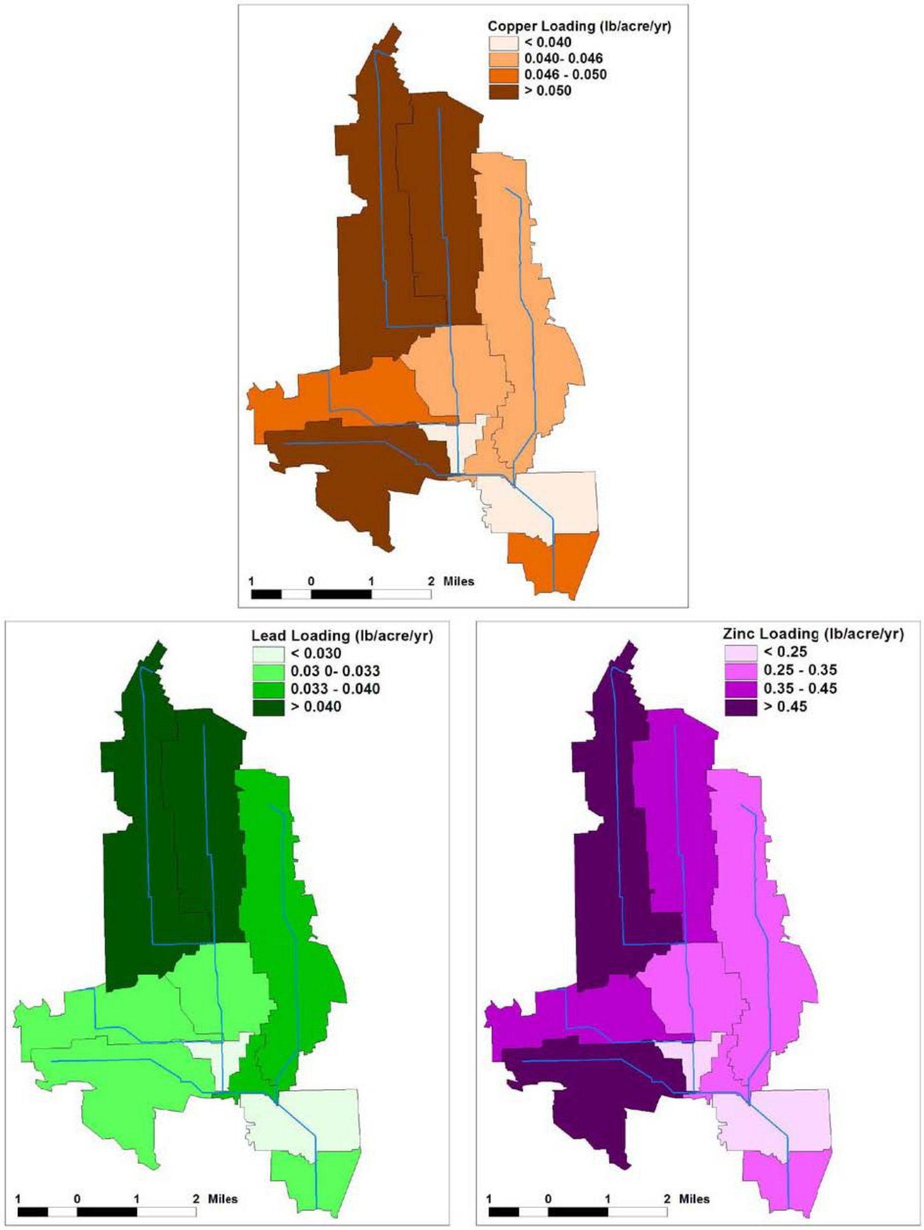


Figure 1-2. Locations of Potential Wet Weather Monitoring Sites in the Los Cerritos Channel Watershed.



Source: EPA 2010. Los Cerritos Channel Metals TMDL.

Figure 1-3. Estimated Concentrations of Metals from each Sub-Basin of the Los Cerritos Channel Watershed.

Table 1-1. Summary of Land Use Associated with Monitored Segments of the Los Cerritos Channel Watershed.

	SUB-BASIN NUMBER/ACREAGE				
Land Use	4	8	9	10	TOTAL[1]
Agriculture	0.0	37.3	42.4	50.0	130
Commercial	353	507	710	372	1941
Industrial	706	125	500	59.0	1390
HD Residential	40.0	371	491	213	1115
LD Residential	276	1,598	1,783	2,416	6072
Mixed Urban	753	13.6	120	142	1029
Open	144	60.4	63.9	152	419
Total Acres	2,271	2,712	3,710	3,403	12,096
		Total Watershed Acres			**17,716**
	SUB-BASIN NUMBER/%				
Land Cover	4	8	9	10	-
Agriculture	0.0	1.4	1.1	1.5	0.7
Commercial	15.5	18.7	19.1	10.9	11.0
Industrial	31.1	4.6	13.5	1.7	7.8
HD Residential	1.8	13.7	13.2	6.3	6.3
LD Residential	12.2	58.9	48.1	71.0	34.3
Mixed Urban	33.2	0.5	3.2	4.2	5.8
Open	6.3	2.2	1.7	4.5	2.4
Total %	13	15	21	19	68

HD= High Density, LD= Low Density

[1]Land use composition for all 10 sub-basins can be accessed in the Los Cerritos Channel Metals TMDLs (EPA 2010)

Table 1-2. Monitoring Site Designation and Monitoring Function.

Site Name	Site Description	Datum NAD83		Type of Site			
				Receiving Water	TMDL	WATERSHED	
		Latitude (N)	Longitude (W)			Primary	Secondary[1]
LCC1	Stearns Street	33.79538	118.10361	X	X	X	
SB4	Sub-basin 4 – Spring St. Drain	33.81306	118.13953		X	X	
SB8	Sub-basin 8 – Clark Drain	33.85384	118.13226		X	X	
SB9	Sub-basin 9 – Del Amo/Downey	33.84682	118.13370		X	X	
SB10	Sub-basin 10 – Palo Verde	33.81044	118.11430		X	X	
SB4-1	Northern Sub-basin[1]	33.81316	118.14235				X
SB4-2	Southern Sub-basin[1]	33.81288	118.14249				X
SB8-1	North Clark Channel[1]	33.86848	118.13355				X
SB8-2	West Clark Channel[1]	33.86783	118.13225				X
SB9-1	West Downey Channel[1]	33.84908	118.15978				X
SB9-2	North Downey Channel[1]	33.85844	118.15046				X
SB10-1	North Palo Verde Channel[1]	33.86546	118.11160				X
SB10-2	Mid Palo Verde Channel	33.83210	118.10836				X

[1] These locations are ***tentative*** sites and will be further evaluated as part of the adaptive management of the CIMP. Monitoring at secondary sites will be dependent upon the monitoring results at each of the Primary Watershed Sites.

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2 Overview of the Schedule and Sampling Frequencies for each CIMP Element

The CIMP will be implemented in a phased process (Table 2-1). Existing monitoring at LCC1 continues to be conducted, and the dry weather screening of major outfalls has commenced. Implementation of new monitoring programs and modifications to the existing monitoring program at LCC1 will be implemented beginning July 1, 2015 or 90 days after the approval of the CIMP, whichever is later.

Receiving Water Quality Monitoring

- Monitoring will occur at one Receiving Water Quality Monitoring Site, LCC1, which will also serve as the LCC Metals TMDL compliance site.
- Monitoring will be conducted during two dry weather and four wet weather events per year. This allows alignment of monitoring the Receiving Water and Stormwater Outfall Monitoring requirements of the Permit with TMDL Monitoring. Alignment of these monitoring requirements allows for a more efficient and cost effective program. The Watershed Group will use wet-weather monitoring results from the first year to consider requesting a reduction in frequency to three wet-weather events in the future. The fourth storm event is only for the purpose of fulfilling the TMDL requirements. Only copper, lead, zinc, total suspended solids (TSS), suspended sediment concentration (SSC), and hardness will be analyzed.
- Monitoring of the two dry weather flows will start in July 1, 2015 or 90 days after approval of the CIMP, whichever is later. Wet season monitoring will follow for four storm events during the 2015/16 wet season.
- Water quality testing during the critical dry weather flows (July) and during the first significant storm event of the year will incorporate the entire list of water quality parameters listed in Table E-2 of the MRP. Water quality testing during the remaining two wet weather events and one dry weather event will incorporate all constituents identified in Table 3.2 (See Section 3) for the Los Cerritos Channel receiving waters.
- If Table E-2 constituents are not detected at the specified Method Detection Limit (MDL) for their respective test method or if the results are below the lowest applicable water quality objective, and is not otherwise identified as being 303(d)-listed or part of an ongoing TMDL, the analyte will not be further analyzed. In accordance with the minimum requirements established in the Permit MRP (page E-16) parameters exceeding the lowest applicable water quality objective will continue to be analyzed for the remainder of the Order at the receiving water monitoring station.
- The Aquatic Toxicity Testing program will be initiated during the 2015 dry weather season at LCC1. Aquatic Toxicity Testing will be conducted during one dry weather monitoring event when critical low flow conditions are expected and during two storm events including the first major storm of the year.

Primary Watershed Segmentation (PWS) Stormwater Monitoring

- Due to water conservation in response to drought and greatly reduced dry-weather discharges, the drainage area is already in compliance with dry-weather copper WLA at Stearns Street. The watershed segment monitoring program is designed to help demonstrate compliance with wet-weather WLAs. A phased-in approach will be employed for monitoring sites.
- Two PWS sites, SB4 and SB10, will be installed and ready for monitoring during the 2015/16 wet season. SB8 and SB9 will be installed and prepared to monitor storm events during the 2016/17 wet season, and will complete the planned array of four PWS sites.
- Two portable monitoring units, SBX-1 and SBX-2, will be installed in 2017-2018 to monitor secondary watershed segments based on results of primary watershed segment monitoring.
- When possible, PWS sampling will be conducted concurrently with stormwater monitoring at LCC1. This will result in three monitored stormwater events for each PWS site as they are installed and ready for collection of flow-rated composite samples.
- Water quality testing at PWS sites will initially incorporate a list of general and conventional pollutants, *E. coli*, nutrients, and metals. A detailed list of analytes to be initially tested at PWS sites is addressed in Section 3.2.
- Additional water quality parameters listed in Table E-2 of the MRP may be incorporated based upon results of stormwater monitoring at the receiving water station, LCC1. These constituents will be added to monitoring requirements at PWS sites once an analyte is detected in stormwater runoff at LCC1 during two consecutive stormwater monitoring events. Similarly, if analytes added the PWS monitoring are not detected at PWS sites during two consecutive stormwater monitoring events, they will be removed from the required analytical list.
- Once a minimum of two seasons of wet weather monitoring data (six events) are available from a PWS site, data will be evaluated to determine if forensic monitoring is necessary to assist in source tracking and identifying upstream sources of key pollutants. Forensic monitoring would be conducted by further dividing the watershed with Secondary Watershed Segmentation (SWS) sites. Potential SWS sites have been identified for each of the four PWS sites but these sites will only be used if water quality constituents measured at the PWS sites are sufficiently elevated to warrant implementation of forensic monitoring.
- Sampling at SWS sites would be performed with temporary, mobile stormwater sampling stations used to take time-based composite samples and would focus on the specific analytes of concern as well as any appropriate ancillary analytes. Source tracking would be triggered if running averages measured at a PWS site exceeds Municipal Action Limits (MALs; Attachment G of the MRP) by more than 20% any analytes that have limits and that are required to be sampled at the PWS sites. Similarly, forensic sampling would also be conducted if the running average pollutant loading rates for Category 1 or 2 pollutants are found to exceed those measured at LCC1 (the Los Cerritos Channel receiving water/TMDL monitoring site) by more than 25%.

Non-Stormwater Outfall Monitoring Program

- Three initial surveys will be completed. The first will focus upon verification of outfalls as identified based upon available City and County GIS records, providing baseline photographic records, assessing flow, recording observations, and field water quality measurements. An inventory of outfalls above 12 inches in diameter will be created. The second and third screening surveys will expand field water quality testing to assist in the identification and classification of the discharge.
- Information from the three initial surveys will be used to determine which outfalls have significant discharges and classify these outfalls for further investigation. Information from the three surveys such as flow rates of the discharge, flow rates in the channel, the nature of the channel-earthen or concrete, and land uses in the drainage area will be used collectively to determine significance.
- Outfalls with significant flow will be classified for further investigation. Flow measurements, observations, field water quality tests and limited laboratory tests may be used to classify the remaining outfalls as either **Suspect Discharges**, **Potential Discharges** or **Unlikely** discharges of concern. Clean outfalls with no evidence of discharges or odors during the initial surveys will be classified as **Unlikely** sources of non-stormwater discharges and will not require further investigation.
- Outfalls considered having the highest risk for illicit discharges or illegal flows will be classified as **Suspect Discharges.** This will require multiple lines of evidence indicative of potential illicit discharges or persistent high flows that represent significant receiving waters contributions.
- Outfalls considered to be **Suspect Discharges** will be further classified and ranked for further investigations designed to identify the sources of these discharges and to determine whether discharges are illicit, exempt, conditionally exempt, conditionally exempt but non-essential flows or unknown.
- Suspect outfalls determined to have exempt or conditionally exempt discharges will be identified in annual reports along with the measures taken to identify the sources.
- Suspect outfalls identified with conditionally exempt but non-essential flows or flows from unknown sources will be first be subject to review to determine if suitable control measures can be implemented to eliminate the discharges.
- If discharges cannot be eliminated, they will be subjected to a periodic monitoring to document that sufficient measures are taken to control potential discharges of pollutants in the discharge.
- Source investigations for discharges from outfalls classified as suspect will be ongoing in order to meet the requirement that investigations are conducted for no less than 25% of the outfalls in the inventory by December 2015 and 100% of the outfalls in the inventory by December 2017.
- Outfalls classified as **Potential Discharges** will be reassessed during the permit.
- Outfalls with obvious illicit discharges will be immediately classified as such and investigated immediately.

Table 2-1. Schedule for Implementation of Monitoring Activities in the Los Cerritos Channel Watershed[7].

Task	Dry 2014	Dry 2015	Wet 2015-16	Dry 2016	Wet 2016-17	Dry 2017	Wet 2017-18	Dry 2018
Receiving Water/TMDL								
LCC1 Stearns St.	Note 6							
Chemistry[1]		2	4	2	4	2	4	2
Aquatic Toxicity		1	2	1	2	1	2	1
Primary Watershed Segments								
SB10			3		3		3	
SB4			3		3		3	
SB8					3		3	
SB9					3		3	
Secondary Watershed Segments[2]								
SBX-1							3	
SBX-2							3	
Non-Stormwater Outfall								
Inventory & Screen[3]	3							
Source ID[4]		Ongoing		Ongoing		Ongoing		Ongoing
Monitoring[5]				2		2		2

1. Table E-2 chemical analyses will be performed once during the first wet weather event and once during the first critical dry weather monitoring event. Constituents that exceed MDLs and available water quality objectives will continue to be monitored along with all constituents included as Category 1, 2 or 3 water body/pollutant classifications for the subject water body. Wet and dry weather chemical constituents will be separately assessed for purposes of continued monitoring. All constituents classified as category 1, 2, and 3 water body/pollutant in the water body will continue to be monitored during the permit cycle unless the constituents (primarily category 3 constituents) are shown to not be present at levels of concern on a consistent basis.
2. Initial locations of Secondary Watershed Segmentation (SWS) sites have been selected for each Primary Watershed Segment (PWS). Implementation of monitoring at SWS site will be dependent upon results of monitoring at PWS sites (e.g. exceedance of action limits).
3. Initial Inventory and Screening will be completed in three surveys before the end of 2014. One re-assessment of the Non-Stormwater Outfall Monitoring Program will be conducted prior to December 2017.
4. Investigations designed to track and classify discharges will start during the 2015 dry season. Source tracking and classification work depend upon the number of sites categorized as Suspect outfalls with evidence of significant flow.
5. Monitoring will be implemented if significant dry weather flows are identified at discharge points that are cannot be identified, are non-essential exempt flows, or identified as illicit flows that are not yet controlled. These sites will be initially monitored twice a year in conjunction with dry weather monitoring of the receiving water site.
6. Monitoring at LCC1 will continue to be conducted in accordance with the existing permit until the CIMP is approved.
7. The fourth storm event is only for the purpose of fulfilling the TMDL requirements. Only metals, TSS, SSC, and hardness will be analyzed.

3 Chemical/Physical Parameters

Section 2 of the WMP provides a detailed analysis of water quality priorities within the Los Cerritos Channel Watershed. Water quality priorities were established in accordance with Section C.5.a.ii of the Permit. The three Permit categories are defined as:

- **Category 1 (Highest Priority):** Water body-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R of the Order.
- **Category 2 (High Priority):** Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment.
- **Category 3 (Medium Priority):** Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance.

These Permit categories were intended to be specific to water bodies within the watershed but, in the case of the Los Cerritos Channel, data are limited to a single point in the watershed. Table 3-1 summarizes pollutants within each category.

Table 3-1. Waterbody-Pollutant Categories for the Los Cerritos Channel Watershed.

Category	Constituents
1	copper, lead, zinc, DDT, chlordane, PCBs, PAHs
2	ammonia, bis(2)ethylhexylphthalate, *E. coli*, pH
3	MBAS, enterococcus

The primary constituents of concern in the watershed are copper, lead and zinc which are part of the Los Cerritos Channel Metals TMDLs. Chlordane, DDTs, PCBs and PAHs are incorporated due to a 303(d) listing for chlordane in sediments downstream in the tidal portion of the channel and the Harbor Toxics TMDL for which the Los Cerritos Channel is considered part of the nearshore watershed[4]. Permittees in

[4] As recognized by the footnote in Attachment K-4 of the Permit, the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, Signal Hill, and the LACFCD have entered into an Amended Consent Decree with the United States and the State of California, including the Regional Board, pursuant to which the Regional Board has released the aforementioned entities from responsibility for toxic pollutants in the Dominguez Channel and the Greater Los Angeles and Long Beach Harbors. Accordingly, no inference should be drawn from the submission of this CIMP or from any action or implementation taken pursuant to it that the aforementioned entities are obligated to implement the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL, including this CIMP or any of the TMDL's other obligations or plans, or that the aforementioned entities have waived any rights under the Amended Consent Decree.

the nearshore watershed are separately contributing to monitoring requirements in the Harbor waters and the Los Angeles River Estuary. Therefore DDTs, PCBs and PAHs are not currently incorporated into the sampling requirements for the ME and PWS monitoring sites. Two other constituents, ammonia and pH, are 303(d) listed due to dry weather flows where extremely shallow flows cause a daily cycle of pH and result in calculated ammonia water quality criteria to be exceeded despite extremely low concentrations. Additional listings exist for minor exceedances of methylene blue active substances (MBAS) criteria and exceedance of coliform and enterococcus bacteria. Enterococcus bacteria are limited to LCC1 since this site discharges to an estuarine environment.

Table 3-2 summarizes the constituents that will be monitoring at the ME and PWS sites. These constituents will serve as the core of the monitoring program. In addition, sections VI.C.1.e and VI.D.1.d of the MRP require that a comprehensive list of constituents is screened once during the first major storm event of the year and once during a period of critical low flow. Results of this analytical screening process will determine which constituents need to be analyzed at the mass emission site for the remainder of the five-year cycle of the permit.

If a parameter is not detected above the Method Detection Limit (MDL) for its respective test method *or* the result is below the lowest applicable water quality objective, and is not otherwise identified as a basic monitoring requirement, a TMDL analyte or a 303(d) listing, it need not be further analyzed. If a parameter is detected exceeding the lowest applicable water quality objective during either the wet or dry weather screening then the parameter shall be analyzed for the remainder of the Order (2017) at the receiving water monitoring station where it was detected during the respective conditions (wet or dry).

Analytical tests will be reconsidered at least once during each permit cycle in order to assess the appropriateness of maintaining the analyte or suite of analyses in the testing requirements. Water quality criteria, analytical methods, analytical results consistently near detection limits, updated information with respect to sources or many other additional factors may contribute to factors may warrant reconsideration of the analyte. If an analyte listed in Table E-2 (Attachment E of the Permit) is not detected at levels of concern during two consecutive monitoring events representing the same seasonal conditions, the Watershed Group will submit a request to the Regional Board to remove the analyte from future sampling. This does not include constituents which are basic monitoring requirements. In order to avoid bias due to seasonal build-up/wash off, this evaluation would be limited to the comparisons of the first major storm of the season rather than data consecutive events from the same season.

Constituents requiring screening are listed in Table E-2 of the Monitoring and Reporting Program. These constituents are further broken out by major analytical groups in Table 3-3 through Table 3-9 below.

Table 3-2. Summary of Constituents to be Monitored on a Regular Basis at the Mass Emission Site (LCC1) and the Primary Watershed Segmentation (PWS) Sites.

CLASS OF MEASUREMENTS	MASS EMISSION SITE (LCC1)		PRIMARY WATERSHED SEGMENTATION (PWS) SITES
	Wet	Dry	Wet
Flow	4	2	3
Field Measurements (dissolved oxygen, pH, temperature, and specific conductivity)	4	2	3
MRP Table E-2 Constituents[1] (other than those specifically listed below)	1	1	
Aquatic Toxicity[5]	2	1	
General and Conventional Pollutants[6] (Table 3-3) (All <u>except</u> total phenols, turbidity, BOD_5, MTBE, and chloride and fluoride)	3	2	3
Microbiological Constituents (Table 3-4) *E.coli,* Total & Fecal Coliform, enterococcus[2] E.coli	3	2	 3
Nutrients (Table 3-5) - none required			
Organochlorine Pesticides and PCBs (Table 3-7) Chlordane[3]	3	2	
Metals[6] **(Table 3-6)** Cu, Pb, & Zn	4	2	3
Organophosphate Pesticides[4] (Table 3-8) - none required			
Semivolatile Organic Compounds (Table 3-9**)** bis(2)ethylhexylphthalate	3	2	

1. All Table E-2 constituents will be measured during the first major storm event of the season and the critical, low flow dry weather event (July) during the first year of the CIMP. Constituents that are detected above the lowest applicable WQOs during the first year of monitoring, will be analyzed for the remainder of the Order at the receiving water monitoring station where it was detected.
2. Analysis of all Fecal Indicator Bacteria (FIBs) will only be included for LCC1 that discharges directly to the Los Cerritos Channel Estuary. Enterococcus will not be analyzed at PWS sites since they do not discharge to marine or estuarine waters.
3. Chlordane components are based upon sum of chlordane-alpha, chlordane-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane consistent with the Harbor Toxics TMDL.
4. No organophosphate pesticides are required as part of the baseline program.
5. Aquatic toxicity may be triggered at PWS sites by results from LCC1.
6. The fourth storm event is only for the purpose of fulfilling the TMDL requirements. Only copper, lead, zinc, TSS, SSC, and hardness will be analyzed.

Analytical requirements for the program are broken out by analytical test requirements since many are associated with an analytical test suite. This is most evident with the semivolatile organic compounds analyzed by EPA Method 625. Although this section identifies recommended methods for each analyte, many of the target constituents can be addressed by alternative methods. Use of alternative analytical methods may be preferable in cases where a larger suite of target analytes can be tested and still enable meeting minimum levels (MLs) established for each analyte. Selection of analytical methods is intended to be performance-based to allow laboratories flexibility to utilize methods that meet or exceed MLs listed in the MRP. As an example, the following tables (Table 3-7 and Table 3-8) list separate EPA methods for organochlorine pesticides and aroclors, organophosphate pesticides and semivolatile organic compounds. Some laboratories choose to use EPA Method 625 for all of these test requirements. This approach is acceptable as long as the method meets the MLs listed in Table E-2 of the MRP and meet data quality objectives consistent with the State's Surface Water Ambient Monitoring Program (SWAMP), but other laboratories will use separate test protocol for organophosphate pesticides.

The critical dry weather event is defined as the period when historical in-stream flow records are the lowest or during the historically driest month. Point measurements of dry weather flows taken in Los Cerritos Channel between 2000 and 2014 have been relatively uniform between May and September of each year, but base flows have decreased to approximately 0.5 cfs in recent years. Rainfall during the summer dry season is minimal and only briefly impacts flows in the channel. As a result, it is expected that critical dry weather flow testing could be performed anytime between May and September. Nevertheless, regional data suggest that rainfall and flows in major watersheds (Los Angeles River and San Gabriel River watersheds) are least in July. As such, critical low flow monitoring will be conducted in July.

A more accurate assessment of critical dry weather flow conditions will be completed and available by the end of the 2014 dry season. Flumes equipped with stilling wells, pressure sensors and data loggers will be constructed and installed throughout the watershed for a period of 6-8 weeks. The work is part of a State-funded Proposition 84 study[5] intended to provide detailed, continuous records of water level, flow and temperature at each site for the duration of the deployment. Four of the flumes will be located at sites selected as PWS sites for this CIMP. These data will be used to determine if flow diminishes over the course of a few weeks or exhibits diurnal fluctuations as expected. Concurrent water samples will also be collected over three 24-hour time periods to analyze trace metals (especially copper, lead, and zinc) and nutrient loading. If differences are noted, forensic work will be conducted to identify and mitigate the source of the discharges. Although this work is not part of the CIMP, the results of this program will be utilized to refine the "critical dry weather flow period" and to help provide guidance with respect to segments most likely to contribute higher loads of metals during dry weather conditions.

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[5] Gateway Water Management Authority Agreement No. 12-423-550. Los Cerritos Channel Watershed Segmentation and Low Impact Development (LID) Project

3.2 General and Conventional Pollutants

Most of the general and conventional pollutants listed in Table 3-3 will continue to be analyzed as part of the base monitoring requirements for both receiving water and PWS/SWS sampling. These constituents are common contaminants in stormwater from urban environments. Some, such as turbidity, are redundant and best used as surrogates under special studies. Turbidity is often used as a surrogate for suspended solids but requires calibration to the source material. Turbidity measurements are recognized to lack comparability due to differences in equipment as well as the differences between static and dynamic measurements (Anderson 2005 - USGS National Field Manual for Collection of Water Quality Data, Chapter 6.7). Total suspended solids (TSS) and suspended sediment concentrations (SSC) directly examine particles associated with water samples and do not suffer from the problems associated with measuring turbidity. An integral part of the pollutant reduction strategy involves the reduction of discharged solids from the MS4, therefore both TSS and SSC will be monitored. Since SSC sampling protocols are not met by the automatic stormwater samplers designed to measure pollutants, SSC analysis will be done on a subsample of the composite sample. Rigorous subsampling protocols will be utilized in order to assure representative samples that can be related directly to the chemical results. The SSC sample analyses will add information to the current TSS analyses being run.

Other pollutants in this group have been tested in samples from LCC1 since 2000 and have not been detected. As an example, total phenols have never exceeded the ML of 0.1 mg/L in this watershed. MTBE and cyanide were analyzed during the first three years of the City of Long Beach Stormwater Monitoring Program. MTBE has only detected in 1 out of 11 samples and cyanide was never detected. Although perchlorate has not been analyzed in stormwater in the LCC watershed, industrial activities likely to result in perchlorate discharges do not exist in the watershed. Perchlorate will be screened at the receiving water site (LCC1) during the initial surveys but this contaminant is not expected to require continued analysis at any monitoring site.

In summary, sufficient evidence exists to eliminate total recoverable phenolic compounds, cyanide, turbidity and MTBE from further analysis. Perchlorate will be incorporated in the initial screening since it has not been tested but it is not expected that continued testing will be required. Most other constituents included in this list are common contaminants in stormwater runoff and will continue to be analyzed. Analysis of chloride and fluoride may be analyzed as needed to assist in differentiating potable water and groundwater sources during source tracking programs for the non-stormwater outfall monitoring program but will not be included in monitoring conducted for wet/dry weather receiving water monitoring or for monitoring of the PWS/SWS monitoring sites.

Table 3-3. Conventional Constituents, Analytical Methods and Quantitation Limits.

CONSTITUENTS CONVENTIONAL POLLUTANTS	METHOD	Target Reporting Limits mg/L
Oil and Grease	EPA1664	5
Total Petroleum Hydrocarbon	EPA 418.1	5
Total Suspended Solids	EPA 160.2	1
Suspended Sediment Concentration	ASTM D3977-97 (Method C)	0.5
Total Dissolved Solids	EPA 160.1	1
Volatile Suspended Solids	EPA 160.4	1
Total Organic Carbon	EPA 415.1	1
Biochemical Oxygen Demand	SM 5210B EPA 405.1	3
Chemical Oxygen Demand	EPA 410.1	4
Alkalinity	EPA 310.1	5
Specific Conductance	EPA 120.1	1 umho
Total Hardness	EPA 130.2	1
MBAS	EPA 425.1	0.02
Chloride	EPA300.0	2
Fluoride	EPA300.0	0.1
Perchlorate	EPA314.0	4 ug/L
Field Measurements	**METHOD**	**mg/L**
pH-field instrumentation	EPA 150.1	0 – 14
Temperature-field	In-situ	N/A
Dissolved Oxygen- field [1]	In-situ	Sensitivity to 5 mg/L

[1]Dissolved Oxygen will only be measured during dry weather surveys.

3.3 Microbiological Constituents

All four microbiological constituents used as fecal indicator bacteria (FIB) will continue to be monitored at the LCC1 Receiving Water monitoring site. Bacteria used as fecal indicators in marine waters will continue to be analyzed during wet and dry weather surveys due to being situated just above the Los Cerritos Channel Estuary. Only *E. coli* will be monitored at the four primary watershed segment sites since these are each located in freshwater portion of the watershed. Table 3-4 provides both upper and lower quantification limits for each FIB which was established to assure that quantifiable results are obtained. Upper quantitation limits are provided to assure that FIBs are quantified.

Table 3-4. Microbiological Constituents, Analytical Methods and Quantitation Limits.

BACTERIA[1]	Method	Lower Limits MPN/100ml	Upper Limits MPN/100ml
Total coliform (marine waters)	SM 9221B	<20	>2,400,000
Fecal coliform (marine waters)	SM 9221E	<20	>2,400,000
Enterococcus (marine waters)	SM 9230B/C	<20	>2,400,000
E. coli (fresh waters)	SM 9221E/ Colilert-QT	<10	>2,400,000

[1]Microbiological constituents will vary based upon sampling point. Total and fecal coliform and enterococcus will be measured only in marine waters or at locations where either the discharge point or receiving water body will impact marine waters. *E. coli* will be analyzed at sites within the freshwater portion of the watershed.

3.4 Nutrients

Nutrients (Table 3-5) are also considered as part of the base requirements for the monitoring program. These will be analyzed as part of the Table E-2 screening requirements during the first major storm event of the year and a critical dry weather sampling event at the receiving water site (LCC1). Nutrients have not been identified as exceeding any applicable RWL to date and are therefore not scheduled to be sampled as part of the ongoing program unless required based upon the initial screening. The current monitoring plan calls for separate analysis of nitrate-N and nitrite-N. Concentrations of nitrite-N have typically been low. If data indicates that concentrations of nitrite-N remain minimal, these analytes will be combined into one analytical procedure that quantifies both nitrate-N and nitrite-N at the same time.

Table 3-5. Nutrients, analytical methods, and quantitation limits

CONSTITUENT	METHOD	REPORTING LIMIT (mg/L)
Total Kjeldahl Nitrogen (TKN)[1]	EPA 351.1	0.50
Nitrate as Nitrogen (NO_3-N)[1,2]	EPA 300.0	0.10
Nitrite as Nitrogen (NO_2-N)[1,2]	EPA 300.0	0.05
Total Nitrogen[1]	calculation	NA
Ammonia as Nitrogen (NH_3-N)	EPA 350.1	0.10
Total Phosphorus	SM 4500-P E or F	0.1
Dissolved Phosphorus	SM 4500-P E or F	0.1

1. Total Nitrogen is the sum of TKN, nitrate, and nitrite.
2. Nitrate –N and Nitrite-N may be analyzed together using EPA 300

3.5 Total and Dissolved Trace Metals

A total of 16 trace metals are listed in Table E-2 of the MRP. Analytical methods and reporting limits for these elements are summarized in Table 3-6. Most metals will be analyzed by EPA Method 200.8 using ICP-MS to provide appropriate detection limits. Hexavalent chromium and mercury both require alternative methods. Neither hexavalent chromium nor mercury is commonly analyzed as part of stormwater programs. Hexavalent chromium has been analyzed at LACFCD's mass emission monitoring sites in both the Los Angeles River (S10) and the San Gabriel River (S14) for the past eight to ten years and has not been detected. Mercury has been detected at some mass emission monitoring sites but detections are not common at any. Analytical methods and detection limits used for the monitoring have been consistent with those required in Table E-2 of the MRP.

Measurement of mercury is generally not considered to be appropriate in flow-weighted composite samples taken with autosamplers due to its volatility. This becomes more of an issue when sampling is conducted near the limits of a peristaltic pump. Automatic stormwater samplers are not suitable for sampling stormwater at low detection limits (0.5 to 5 nanograms/liter). Grab samples will be taken for analysis of mercury in order to augment composite samples, which will be analyzed by EPA method 245.1. These grab samples will be analyzed by Method 1631E since this method is less subject to interferences and will be collected at the same time that monitoring crews pull other grab samples required by the monitoring program. Additional QAQC will be employed to support the extremely low detection limits required by the program.

Table 3-6. Metals Analytical Methods, and Quantitation Limits.

METALS (Dissolved & Total)	METHOD	Reporting Limit *ug/L*
Aluminum	EPA200.8	100
Antimony	EPA200.8	0.5
Arsenic	EPA200.8	0.5
Beryllium	EPA200.8	0.5
Cadmium	EPA200.8	0.25
Chromium (total)	EPA200.8	0.5
Chromium (Hexavalent)	EPA218.6	5
Copper	EPA200.8	0.5
Iron	EPA200.8	25
Lead	EPA200.8	0.5
Mercury	EPA245.1	0.2
Mercury (Low level)	EPA1631E	0.0005
Nickel	EPA200.8	1
Selenium	EPA200.8	1
Silver	EPA200.8	0.25
Thallium	EPA200.8	0.5
Zinc	EPA200.8	1

3.6 Organochlorine Pesticides and PCBs

Although organochlorine pesticides (OC pesticides) and PCBs are not commonly present in stormwater sampled at LCC1, they have periodically been detected at low concentrations. The analytical methods and detection limits for these compounds are summarized in Table 3-7. These compounds are specified in Table E-2 of the MRP. The MRP suggests that detection of any of these analytes in excess of the ML and/or applicable criteria will require continuation of the analysis through the period of the permit. Since this could be attributable to analytical issues, we have recommended more frequent reevaluation (refer to Section 3).

Since the OC pesticides are part of an analytical suite, detection of one compound would necessitate continuation of the entire suite. However, this would not require continuation of analysis of PCBs analyses if they are not detected in the early storm event and critical dry weather monitoring event. Monitoring for PCBs will be reported as the summation of aroclors and a minimum of 50 congeners, using EPA Method 8270 without the use of High Resolution Mass Spectrometry for routine monitoring.

Table 3-7. **Chlorinated Pesticides and PCB Analytical Methods, and Quantitation Limits**

CHLORINATED PESTICIDES	METHOD	Reporting Limit µg/L
Aldrin	EPA 608, 8081A	0.005
alpha-BHC	EPA 608, 8081A	0.01
beta-BHC	EPA 608, 8081A	0.005
delta-BHC	EPA 608, 8081A	0.005
gamma-BHC (lindane)	EPA 608, 8081A	0.02
alpha-chlordane	EPA 608, 8081A	0.1
gamma-chlordane	EPA 608, 8081A	0.1
Nonachlor-alpha	EPA 608, 8081A	0.1
Nonachlor-gamma	EPA 608, 8081A	0.1
Oxychlordane	EPA 608, 8081A	0.1
4,4'-DDD	EPA 608, 8081A	0.05
4,4'-DDE	EPA 608, 8081A	0.05
4,4'-DDT	EPA 608, 8081A	0.01
Dieldrin	EPA 608, 8081A	0.01
alpha-Endosulfan	EPA 608, 8081A	0.02
beta-Endosulfan	EPA 608, 8081A	0.01
Endosulfan sulfate	EPA 608, 8081A	0.05
Endrin	EPA 608, 8081A	0.01
Endrin aldehyde	EPA 608, 8081A	0.01
Heptachlor	EPA 608, 8081A	0.01
Heptachlor Epoxide	EPA 608, 8081A	0.01
Toxaphene	EPA 608, 8081A	0.5
POLYCHLORINATED BIPHENYLS[1]		
PCB 5	EPA Method 8270	0.005
PCB 8	EPA Method 8270	0.005
PCB 15	EPA Method 8270	0.005
PCB 18	EPA Method 8270	0.005
PCB 27	EPA Method 8270	0.005
PCB 28	EPA Method 8270	0.005
PCB 29	EPA Method 8270	0.005
PCB 31	EPA Method 8270	0.005
PCB 33	EPA Method 8270	0.005
PCB 44	EPA Method 8270	0.005
PCB 49	EPA Method 8270	0.005
PCB 52	EPA Method 8270	0.005
PCB 56	EPA Method 8270	0.005
PCB 60	EPA Method 8270	0.005
PCB 66	EPA Method 8270	0.005
PCB 70	EPA Method 8270	0.005
PCB 74	EPA Method 8270	0.005
PCB 87	EPA Method 8270	0.005
PCB 95	EPA Method 8270	0.005

PCB 97	EPA Method 8270	0.005
PCB 99	EPA Method 8270	0.005
PCB 101	EPA Method 8270	0.005
PCB 105	EPA Method 8270	0.005
PCB 110	EPA Method 8270	0.005
PCB 114	EPA Method 8270	0.005
PCB 118	EPA Method 8270	0.005
PCB 128	EPA Method 8270	0.005
PCB 137	EPA Method 8270	0.005
PCB 138	EPA Method 8270	0.005
PCB 141	EPA Method 8270	0.005
PCB 149	EPA Method 8270	0.005
PCB 151	EPA Method 8270	0.005
PCB 153	EPA Method 8270	0.005
PCB 156	EPA Method 8270	0.005
PCB 157	EPA Method 8270	0.005
PCB 158	EPA Method 8270	0.005
PCB 170	EPA Method 8270	0.005
PCB 174	EPA Method 8270	0.005
PCB 177	EPA Method 8270	0.005
PCB 180	EPA Method 8270	0.005
PCB 183	EPA Method 8270	0.005
PCB 187	EPA Method 8270	0.005
PCB 189	EPA Method 8270	0.005
PCB 194	EPA Method 8270	0.005
PCB 195	EPA Method 8270	0.005
PCB 200	EPA Method 8270	0.005
PCB 201	EPA Method 8270	0.005
PCB 203	EPA Method 8270	0.005
PCB 206	EPA Method 8270	0.005
PCB 209	EPA Method 8270	0.005
Aroclor-1248	EPA 608,EPA 8082	0.5
Aroclor-1254	EPA 608,EPA 8082	0.5
Aroclor-1260	EPA 608,EPA 8082	0.5

1. Monitoring for PCBs will be reported as the summation of aroclors and a minimum of at least 50 congeners. List of aroclors and congeners were obtained from Table C8 in the State's Surface Water Ambient Monitoring Program's Quality Assurance Program Plan.

3.7 Organophosphate Pesticides and Herbicides

Organophosphate pesticides, triamine pesticides and herbicides list in Table E-2 of the MRP are summarized in Table 3-8. Due to the fact that diazinon and chlorpyrifos are no longer available for residential use, these constituents are now rarely detected. When detected, concentrations rarely exceed available ambient water quality criteria for protection of aquatic life. Malathion, however, remains a common constituent in stormwater runoff but this pesticide is not as toxic as other organophosphate pesticides.

Two compounds in this list, atrazine and simazine, are not organophosphate pesticides but can be analyzed by EPA Method 8141a. Both are triazine herbicides which are used for control of broadleaf weeds. Based upon historical data, herbicides such as these and the three additional separately listed compounds are unlikely to require continued analysis after completion of initial screening of Table E-2 constituents. Alternative analytical methods may be considered and used as long as the established reporting limits can be met.

Table 3-8. Organophosphate Pesticides and Herbicides Analytical Methods, and Quantitation Limits

ORGANOPHOSPHATE PESTICIDES	METHOD	Reporting Limit µg/L
Atrazine	EPA507, 8141A	1
Chlorpyrifos	EPA8141A	0.05
Cyanazine	EPA8141A	1
Diazinon	EPA8141A	0.01
Malathion	EPA8141A	1
Prometryn	EPA8141A	1
Simazine	EPA8141A	1
HERBICIDES		
Glyphosate	EPA547	5
2,4-D	EPA515.3	0.02
2,4,5-TP-SILVEX	EPA515.3	0.2

3.8 Semivolatile Organic Compounds (Acid, Base/Neutral)

Semivolatile organic compounds (SVOCs) from Table E-2 of the MRP are listed in Table 3-9 below. Acids consist mostly of phenolic compounds which are uncommon in stormwater samples. Base/neutrals include polynuclear aromatic hydrocarbons (PAHs) and phthalates. SVOCa were only measured during the first two years of the City of Long Beach Stormwater Monitoring Program. Very few analytes were detected and those that were detected were typically less than 10 times the reporting limit. Phthalates were among the most common SVOCs detected and are 303(d) listed based upon measurements taken over ten years ago. Phthalates have been historically a common laboratory contaminant due to the significant use of plastic in laboratories but they are also a common environmental contaminant for the same reason.

Table 3-9. **Semivolatile Organic Compounds, Analytical Methods, and Quantification Limits.,**

SEMIVOLATILE ORGANIC COMPOUNDS	METHOD	Reporting Limit
ACIDS		**µg/L**
2-Chlorophenol	EPA625	2
4-Chloro-3-methylphenol	EPA625	1
2,4-Dichlorophenol	EPA625	1
2,4-Dimethylphenol	EPA625	2
2,4-Dinitrophenol	EPA625	5
2-Nitrophenol	EPA625	10
4-Nitrophenol	EPA625	5
Pentachlorophenol	EPA625	2
Phenol	EPA625	1
2,4,6-Trichlorophenol	EPA625	10
BASE/NEUTRAL		µg/L
Acenaphthene	EPA625	1
Acenaphthylene	EPA625	2
Anthracene	EPA625	2
Benzidine	EPA625	5
1,2 Benzanthracene	EPA625	5
Benzo(a)pyrene	EPA625	2
Benzo(g,h,i)perylene	EPA625	5
3,4 Benzofluoranthene	EPA625	10
Benzo(k)fluoranthene	EPA625	2
Bis(2-Chloroethoxy) methane	EPA625	5
Bis(2-Chloroisopropyl) ether	EPA625	2
Bis(2-Chloroethyl) ether	EPA625	1
Bis(2-Ethylhexl) phthalate	EPA625	5
4-Bromophenyl phenyl ether	EPA625	5
Butyl benzyl phthalate	EPA625	10
2-Chloroethyl vinyl ether	EPA625	1
2-Chloronaphthalene	EPA625	10
4-Chlorophenyl phenyl ether	EPA625	5
Chrysene	EPA625	5
Dibenzo(a,h)anthracene	EPA625	0.1
1,3-Dichlorobenzene	EPA625	1
1,4-Dichlorobenzene	EPA625	1
1,2-Dichlorobenzene	EPA625	1
3,3-Dichlorobenzidine	EPA625	5
Diethyl phthalate	EPA625	2
Dimethyl phthalate	EPA625	2
di-n-Butyl phthalate	EPA625	10
2,4-Dinitrotoluene	EPA625	5
2,6-Dinitrotoluene	EPA625	5
4,6 Dinitro-2-methylphenol	EPA625	5

SEMIVOLATILE ORGANIC COMPOUNDS	METHOD	Reporting Limit
1,2-Diphenylhydrazine	EPA625	1
di-n-Octyl phthalate	EPA625	10
Fluoranthene	EPA625	0.05
Fluorene	EPA625	0.1
Hexachlorobenzene	EPA625	1
Hexachlorobutadiene	EPA625	1
Hexachloro-cyclopentadiene	EPA625	5
Hexachloroethane	EPA625	1
Indeno(1,2,3-cd)pyrene	EPA625	0.05
Isophorone	EPA625	1
Naphthalene	EPA625	0.2
Nitrobenzene	EPA625	1
N-Nitroso-dimethyl amine	EPA625	5
N-Nitroso-diphenyl amine	EPA625	1
N-Nitroso-di-n-propyl amine	EPA625	5
Phenanthrene	EPA625	0.05
Pyrene	EPA625	0.05
1,2,4-Trichlorobenzene	EPA625	1

4 Aquatic Toxicity Testing and Toxicity Identification Evaluations

Aquatic toxicity testing supports the identification of best management practices (BMPs) to address sources of toxicity in urban runoff. Monitoring begins in the receiving water and the information gained is used to identify constituents for monitoring at outfalls to support the identification of pollutants that need to be addressed in the WMP. The sub-sections below describe the detailed process for conducting aquatic toxicity monitoring, evaluating results, and the technical and logistical rationale. Control measures and management actions to address confirmed toxicity caused by urban runoff are addressed by the WMP, either via currently identified management actions or those that are identified via adaptive management of the WMP.

4.2 Sensitive Species Selection

The Permit MRP (page E-32) states that sensitivity screening to select the most sensitive test species should be conducted unless "a sensitive test species has already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s), then monitoring shall be conducted using only that test species." Previous relevant studies conducted in the watershed should be considered. Such studies may have been completed via previous MS4 sampling, wastewater NPDES sampling, or special studies conducted within the watershed.

As described in the MRP (page E-31), if samples are collected in receiving waters with salinity less than 1 part per thousand (ppt), or from outfalls discharging to receiving waters with salinity less than 1 ppt, toxicity tests should be conducted on the most sensitive test species in accordance with species and short-term test methods in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136). Salinities of both dry and wet weather discharges from the Los Cerritos Channel are considered to meet the freshwater criterion. During extreme high tides, salinity at the LCC1 receiving water monitoring site can exceed 1 ppt but dry weather sampling is always scheduled to avoid these extremes. The freshwater test species identified in the MRP are:

- A static renewal toxicity test with the fathead minnow, *Pimephales promelas* (Larval Survival and Growth Test Method 1000.04).
- A static renewal toxicity test with the daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.05).
- A static renewal toxicity test with the green alga, *Selenastrum capricornutum* (also named *Raphidocelis subcapitata*) (Growth Test Method 1003.0).

The three test species were evaluated to determine if either a sensitive test species had already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s). In reviewing the available data in the Los Angeles River, Los Cerritos Channel, and the San Gabriel River watersheds, organophosphate pesticides and/or metals have been identified as problematic and are generally considered the primary aquatic life toxicants of concern found in urban runoff. Pyrethroid pesticides are known to be present in urban runoff and potentially contribute to toxicity in these waters. Tests specific to pyrethroid pesticides are simply less common. Given the knowledge of the presence of these potential toxicants in the watershed, the sensitivities of each of the three species were considered to evaluate which is the most sensitive to the potential toxicants in the watersheds.

Ceriodaphnia dubia has been reported as a sensitive test species for historical and current use pesticides and metals, and studies indicate that it is more sensitive to the toxicants of concern than *P. promelas* or *S. capricornutum*. In its aquatic life copper criteria document, the USEPA reports greater sensitivity of *C. dubia* to copper (species mean acute value of 5.93 µg/L) compared to *Pimephales promelas* (species mean acute value of 69.93 µg/L; EPA, 2007). *C. dubia's* relatively higher sensitive to metals is common across multiple metals. Researchers at the University of California, Davis also reviewed available species sensitivity values in developing pesticide criteria for the Central Valley Regional Water Quality Control Board. The UC Davis researchers reported higher sensitivity of *C. dubia* to diazinon and bifenthrin (species mean acute value of 0.34 µg/l and 0.105 µg/L) compared to *P. promelas* (species mean acute value of 7804 µg/L and 0.405 µg/L; Palumbo et al., 2010a, b). Additionally, a study of the City of Stockton urban stormwater runoff found acute and chronic toxicity to *C. dubia*, with no toxicity to *S. capricornutum* or *P. promelas* (Lee and Lee, 2001). The toxicity was attributed to organophosphate pesticides, indicating a higher sensitivity of *C. dubia* compared to *S. capricornutum* or *P. promelas*. *P. promelas* is generally less sensitive to metals and pesticides but has been found to be more sensitive to ammonia than *C. dubia*. However, as ammonia is not typically a constituent of concern for urban runoff and ammonia is not consistently observed above the toxic thresholds in the watershed, *P. promelas* is not considered a particularly sensitive species for evaluating the impacts of urban runoff in receiving waters in the watershed.

Selenastrum capricornutum is a species that is sensitive to herbicides; however, while sometimes present in urban runoff, measured concentrations are typically very low. Herbicides have not been identified as a potential toxicant in the watershed. *S. capricornutum* is also not considered the most sensitive species as it is not sensitive to either pyrethroids or organophosphate pesticides and is not as sensitive to metals as *C. dubia*. The *S. capricornutum* growth test can also be affected by high concentrations of suspended and dissolved solids, color and pH extremes, which can interfere with the determination of sample toxicity. As a result, it is common to manipulate the sample by centrifugation and filtration to remove solids in order to conduct the test. This process may affect the toxicity of the sample. In a study of urban highway stormwater runoff (Kayhanian et. al, 2008), the green alga response to the stormwater samples was more variable than both the *C. dubia* and the *P. promelas* and in some cases the alga growth was considered to be potentially enhanced due to the presence of stimulatory nutrients.

As *C. dubia* is identified as the most sensitive to known potential toxicant(s) typically found in receiving waters and urban runoff in the freshwater potions of the watershed and has demonstrated toxicity in programs within the watershed (CWH and ABC Laboratories, 2013), *C. dubia* is selected as the most sensitive species. The species also has the advantage of being easily maintained in in-house mass cultures. The simplicity of the test, the ease of interpreting results, and the smaller volume necessary to run the test, make the test a valuable screening tool. The ease of sample collection and higher sensitivity will support assessing the presence of ambient receiving water toxicity or long term effects of toxic stormwater over time. As such, toxicity testing will be conducted using *C. dubia*.

An alternative species of water fleas, *Daphnia magna*, may be used if the water being tested has elevated hardness. *C. dubia* test organisms are typically cultured in moderately hard waters (80-100 mg/L CaCO3) and can have increased sensitivity to elevated water hardness greater than 400 mg/L CaCO3), which is beyond their typical habitat range. Because of this, *Daphnia magna* may be substituted in instances where hardness in site waters exceeds 400 mg/L ($CaCO_3$). *Daphnia magna* is more tolerant to high hardness levels and is a suitable substitution for *C. dubia* in these instances (Cowgill and Milazzo, 1990).

4.3 Testing Period

The following describes the testing periods to assess toxicity in samples collected in the LCC WMP area during dry and wet weather conditions. Short-term chronic tests will be used to assess both survival and reproductive/growth endpoints for *C. dubia* for both wet and dry weather sampling efforts. Although wet weather conditions in the region generally persist for less than the chronic testing periods (7 days), the *C. dubia* chronic test will be used for wet weather toxicity testing in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA, 2002a). Utilization of standard chronic tests on wet weather samples are not expected to generate results representative of the typical conditions found in the receiving water intended to be simulated by toxicity testing.

4.4 Toxicity Endpoint Assessment and Toxicity Identification Evaluation Triggers

Per the MRP, toxicity test endpoints will be analyzed, using the Test of Significant Toxicity (TST) t-test approach specified by the USEPA (USEPA, 2010). The Permit specifies that the chronic in-stream waste concentration (IWC) is set at 100% receiving water for receiving water samples and 100% effluent for outfall samples. Using the TST approach, a t-value is calculated for a test result and compared with a critical t-value from USEPA's TST Implementation Document (USEPA, 2010). Follow-up triggers are generally based on the Permit specified statistical assessment as described below.

For chronic *C. dubia* toxicity testing, if a ≥50% reduction in survival or reproduction is observed between the sample and laboratory control that is statistically significant, a toxicity identification evaluation (TIE) will be performed.

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. If the cause of toxicity is readily apparent or is caused by pathogen related mortality or epibiont interference with the test, the result will be rejected, if necessary, a modified testing procedure will be developed for future testing.

In cases where significant endpoint toxicity effects greater than 50% are observed in the original sample, but the follow-up TIE positive control "signal" is found to not be statistically significant, the cause of toxicity will be considered non-persistent. No immediate follow-up testing is required on the sample.

However, future test results will be evaluated to determine if implementation of concurrent TIE treatments are needed to provide an opportunity to identify the cause of toxicity.

4.5 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 removal 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 USEPA's 1991 Methods for Aquatic Toxicity Identification 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 utilizes methods to characterize the physical/chemical nature of the constituents, which cause toxicity. Such characteristics as solubility, volatility and filterability are determined without specifically identifying the toxicants. Phase I results are intended as a first step in specifically identifying the toxicants but the data generated can also be used to develop treatment methods to remove toxicity without specific identification of the toxicants.
- Phase II utilizes methods to specifically identify toxicants.
- Phase III utilizes methods to confirm the suspected toxicants.

A Phase I TIE will be conducted on samples that exceed a TIE trigger described in Section 4.5. Water quality data will be reviewed to future 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 4-1. 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, 1992, 1993a-b).

Table 4-1. Phase I and II Toxicity Identification Evaluation Sample Manipulations

TIE Sample Manipulation	Expected Response
pH Adjustment (pH 7 and 8.5)	Alters toxicity in pH sensitive compounds (i.e., ammonia and some trace metals)
Filtration or centrifugation*	Removes particulates and associated toxicants
Ethylenediamine-Tetraacetic Acid (EDTA) or Cation Exchange Column*	Chelates trace metals, particularly divalent cationic metals
Sodium thiosulfate (STS) addition	Reduces toxicants attributable to oxidants (i.e., chlorine) and some trace metals
Piperonyl Butoxide (PBO)*	Reduces toxicity from organophosphate pesticides such as diazinon, chlorpyrifos and malathion, and enhances pyrethroid toxicity
Carboxylesterase addition(1)	Hydrolyzes pyrethroids
Temperature adjustments(2)	Pyrethroids become more toxic when test temperatures are decreased
Solid Phase Extraction (SPE) with C18 column*	Removes non-polar organics (including pesticides) and some relatively non-polar metal chelates
Sequential Solvent Extraction of C18 column	Further resolution of SPE-extracted compounds for chemical analyses
No Manipulation*	Baseline test for comparing the relative effectiveness of other manipulations

* Denotes treatments that will be conducted during the initiation of toxicity monitoring, but may be revised as the program is implemented. These treatments were recommended for initial stormwater testing in Appendix E (Toxicity Testing Tool for Stormwater Discharges) of the State Water Resources Control Board's June 2012 Public Review Draft "Policy for Toxicity Assessment and Control".

1 Carboxylesterase addition has been used in recent studies to help identify pyrethroid-associated toxicity (Wheelock et al., 2004; Weston and Amweg, 2007). However, this treatment is experimental in nature and should be used along with other pyrethroid-targeted TIE treatments (e.g., PBO addition).

2 Temperature adjustments are another recent manipulation used to evaluate pyrethroid-associated toxicity. Lower temperatures increase the lethality of pyrethroid pesticides. (Harwood, You and Lydy, 2009)

The Watershed Group will identify the cause(s) of toxicity using a selection of treatments in Table 4-1 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 if 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 that are analyzed via EPA Method 200.8) 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 fails 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 following any Phase II TIEs.

For the purposes of determining whether a TIE is inconclusive, TIEs will be considered inconclusive if:

- The toxicity is persistent (i.e., observed in the baseline), and
- The cause of toxicity cannot be attributed to a class of constituents (e.g., insecticides, metals, etc.) that can be targeted for monitoring.

If (1) a combination of causes that act in a synergistic or additive manner are identified; (2) the toxicity can be removed with a treatment or via a combination of the TIE treatments; or (3) the analysis of water quality data collected during the same event identify the pollutant or analytical class of pollutants, the result of a TIE is considered conclusive.

Note that the MRP (page E-33) allows a TIE Prioritization Metric (as described in Appendix E of the Stormwater Monitoring Coalition's Model Monitoring Program) for use in ranking sites for TIEs. However, as the extent to which TIEs will be conducted is unknown, prioritization cannot be conducted at this time. However, prioritization may be utilized in the future based on the results of toxicity monitoring and an approach to prioritization will be developed through the CIMP adaptive management process and will be described in future versions of the CIMP.

4.6 Follow Up on Toxicity Testing Results

Our suggested approach is that If the results of two TIEs on separate receiving samples collected during the same conditions (i.e., wet or dry weather) are inconclusive, a toxicity test conducted during the same conditions (i.e., wet or dry weather), using the same test species, will be conducted at applicable upstream outfalls as soon as feasible (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of an inconclusive TIE). The same TIE evaluation triggers and TIE approach presented in Section 4.3 and 4.4, respectively will be followed based on the results of the outfall sample.

The MRP (page E-33) indicates the following actions should be taken when a toxicant or class of toxicants is identified through a TIE:

1. Group Members shall analyze for the toxicant(s) during the next scheduled sampling event in the discharge from the outfall(s) upstream of the receiving water location.
2. If the toxicant is present in the discharge from the outfall at levels above the applicable receiving water limitation, a toxicity reduction evaluation (TRE) will be performed for that toxicant.

The list of constituents monitored at outfalls identified in the CIMP will be modified based on the results of the TIEs. Similarly, upon completion of a successful dry weather TIE, additional constituents identified in the TIE will be added to monitoring requirements at outfalls with significant non-stormwater flows. Monitoring for those constituents will occur as soon as feasible following the completion of a successful

TIE (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of a successful TIE).

The requirements of the TREs will be met as part of the adaptive management process in the WMPs rather than the CIMP. The identification and implementation of control measures to address the causes of toxicity are tied to management of the stormwater program, not the CIMP. It is expected that the requirements of TREs will only be conducted for toxicants that are not already addressed by an existing Permit requirement (i.e., TMDLs) or existing or planned management actions.

The Water Boards' TMDL Roundtable is currently evaluating options to streamline and consistently respond to urban-use pesticide impairment listings throughout the State including a statewide urban-use pesticide TMDL modeled after the San Francisco Bay Area Urban Creeks Pesticides TMDL. In Addition to toxicity testing, statewide efforts will be monitored to study these pesticides being discussed by the California Stormwater Quality Association (CASQA) Pesticides sub-committee and other Regional Water Boards. The toxicity approach is subject to modifications based on discussions with the Regional Board.

4.7 Summary of Aquatic Toxicity Monitoring

The approach to conducting aquatic toxicity monitoring as described in the previous sections is summarized in detail in Figure 4.1. The intent of the approach is to identify the cause of toxicity observed in receiving water to the extent possible with the toxicity testing tools available, thereby directing outfall monitoring for the pollutants causing toxicity with the ultimate goal of supporting the development and implementation of management actions.

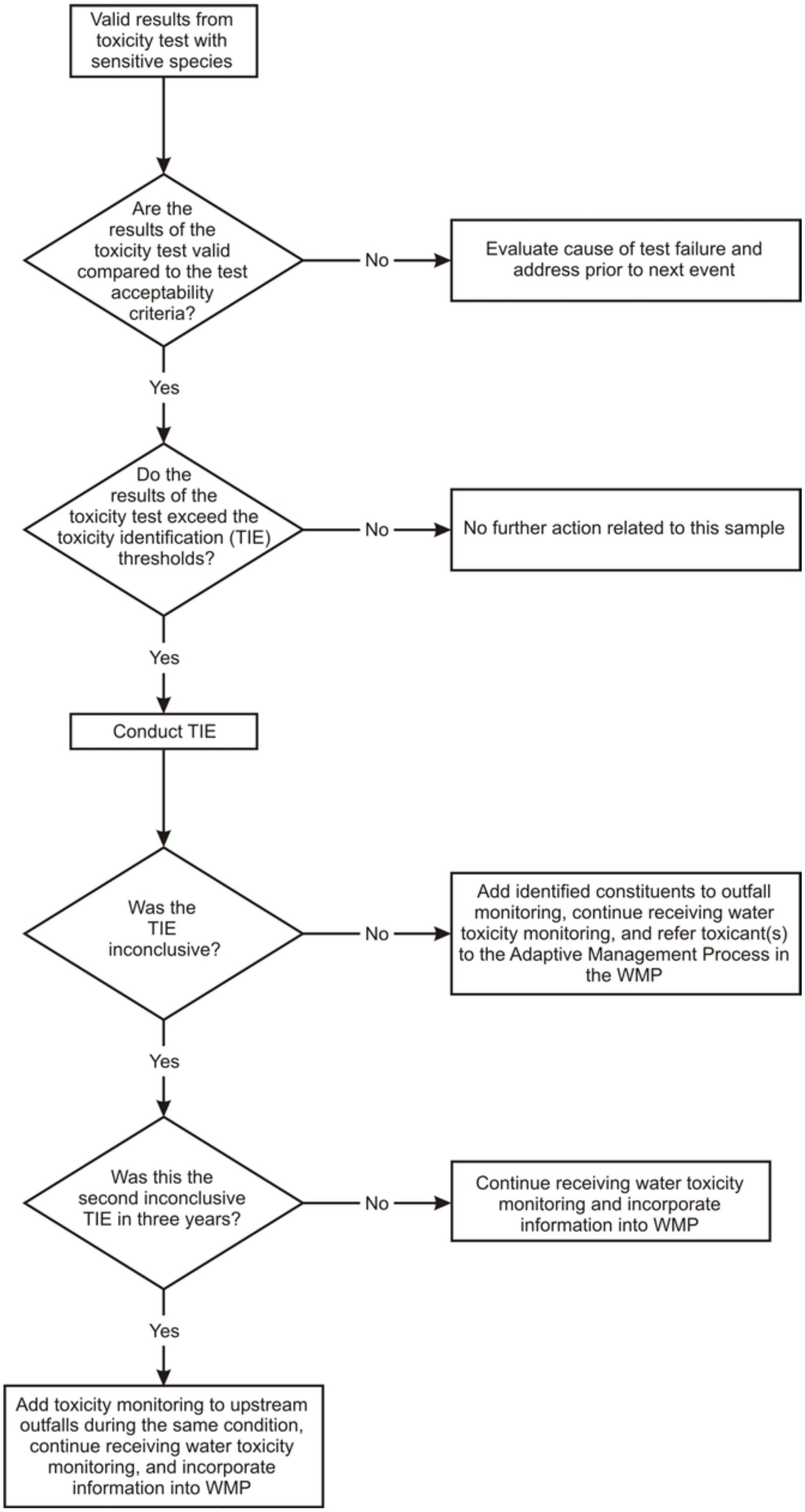

Figure 4.1. Detailed Aquatic Toxicity Assessment Process.

5 Receiving Water Quality Monitoring (Wet and Dry Weather)

Receiving water quality monitoring will primarily be conducted with automated stormwater monitoring equipment detailed in Appendix A. Water samples for bacteria, oil and grease, petroleum hydrocarbons, low level mercury, and volatile organic compounds must be collected separately as grab samples. Appendix A also discussed manual collection of water samples when required. This section addresses both the equipment and protocol used for collection of flow-weighted and time-weighted composite samples. The monitoring site LCC1 as shown in Figure 1-2 will serve as the Receiving Water and TMDL compliance monitoring location for the Los Cerritos Channel. The monitoring equipment provides continuous records of rainfall at this site as well as flow during storm events. This site monitors and records all flows exceeding 18 cfs. Flow estimates are based upon a rating curve established for a former gaging station located approximately 100 feet upstream.

During dry weather monitoring, manual flow measurements are required to obtain instantaneous estimates of flow rates. Measurements are taken at a position where flow is relative uniform over a distance of 10 to 20 feet. Measurements are taken to determine to average width of the flowing water and the depth of water at the center of the flow. Water velocities are recorded by the time required for particles to travel a measured distance along the channel. The velocity of water flow is multiplied by the cross-sectional area of the channel to estimate flow. Since the channel approximates a triangular form, the cross-sectional area of the flowing water is calculated as ½ of the depth at the center of the channel multiplied by the width of flowing water. Dry weather flows have averaged approximately 0.5 cfs during the past five years.

5.1 Sampling Frequency and Mobilization Requirements

Monitoring of receiving water quality will be performed four times a year during the wet season and two times a year during dry weather conditions. Screening for Table E-2 constituents listed in the MRP will be conducted during the first significant storm of the year and during a critically dry weather period. Large sampling volumes are required to incorporate all analytical tests and associated QA/QC needed for Table E-2 constituents, bioassay tests and to provide sufficient volumes should TIEs be required. Due to these requirements, mobilization criteria for the initial wet weather events will differ from subsequent events.

Mobilization of field crews will typically start when there is both a 70% probability of rainfall within 24 hours of the arrival of a predicted storm event and Quantitative Precipitation Forecasts (QPFs) indicate that a minimum of 0.25 inches will occur within a 24-hour time period. Due to the importance of the first storm event of the year, crews will be mobilized to prepare the site (or sites) for monitoring 24 hours in advance of any events with at least a 50% probability of rainfall and QPFs of at least 0.20 inches within a 24-hour time period. If weather forecasts for the first storm of the season indicate development of a condition known as a "cut-off low"[6,] partial field teams may initially be deployed to

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[6] A closed upper-level low which has become completely displaced (cut off) from basic westerly current, and moves independently of that current. Cutoff lows may remain nearly stationary for days, or on occasion may move westward opposite to the prevailing flow aloft (i.e., retrogression).

prepare stations since such conditions create highly unpredictable situations that have the potential to suddenly move onshore with higher than expected rainfall. Full mobilization will require an upgrade in the local forecast to a predicted rainfall of at least 0.25 inches with a minimum probability of 70% within 12 hours of the event. For the purposes of this CIMP, weather forecasts and Quantitative Precipitation Forecasts (QPFs) provided by the Los Angeles/Oxnard National Weather Service and the California Nevada River Forecast Center will be used to assess whether mobilization criteria are met.

Once the screening phase has been completed for Table E-2 constituents, storm events will be considered suitable for monitoring given a minimum of 72 hours (3 days) with cumulative rainfall of less than 0.1 inches of rainfall within the watershed. Evaluation of antecedent rainfall conditions will initially be based upon Los Angeles County ALERT (Automatic Local Evaluation in Real Time) stations and rain gauges within or near the Los Cerritos Channel Watershed and rainfall measured at LCC1. The rain gauge located at Signal Hill City Hall (#335) will serve as the primary site for evaluation of antecedent conditions. The rain gauge installed at LCC1 will serve as the secondary site if the primary site is inoperable or unavailable. As the Primary Watershed Segmentation (PWS) sites come on line, these sites will also be used to evaluate antecedent conditions. Assessment of antecedent conditions will be based upon average rainfall measured at sites located within the watershed boundaries and that are known to be fully operable. Due to anticipated reductions in required stormwater volumes, monitoring of subsequent storm events will be based upon weather forecasts predicting rainfall of 0.25 inches at probability of at least 70% within 24 hours of the predicted event. Once crews are mobilized for a storm event, rainfall must exceed a minimum of 0.25 inches and provide sufficient rainfall to project objectives. One of the three storm events to be sampled at the LCC1 Receiving Water Monitoring Site is only intended to address the requirements of the metals TMDL. At this site, a minimum rainfall event of 0.15 to 0.25 inches would be expected fulfill sampling requirements for the TMDL constituents and provide a representative flow-composite sample due to the fact that the watershed is highly impervious.

Two monitoring events are required during dry weather conditions. There has been no indication that seasonal trends exist with respect to dry weather flows in the Los Cerritos Channel Watershed but data from the ongoing Proposition 84 study will provide information to evaluate if seasonality in flow exists in different areas of the watershed. Based upon existing information, dry weather monitoring at the LCC1 Receiving Water Monitoring Site will be conducted once in late spring/early summer (May to June) and again towards the end of the dry season in September/October. This will be consistent with historical dry weather sampling conducted under the City of Long Beach NPDES Permit. During the dry season, the only restriction on sampling will be that total rainfall over the 72 hour time period preceding the sampling event does not exceed 0.1 inches. In practice, rainfall is very rare during the summer months. With the exception of unusual periods when hurricanes developing off of Baja California cause some precipitation to spin north, rainfall events are very infrequent. When practical, dry weather monitoring will be conducted during periods with less than 0.1 inches of rain occur over the previous week.

5.2 Sampling Constituents

With minor exceptions, chemical analyses are scheduled to be conducted for all analytes listed in Table 3-3 through Table 3-9 during the first significant rainfall of the season and again during a period of critical low flow. Chemical constituents not detected in excess of their respective Method Detection

Limits (MDLs) or that do not exceed available water quality standards will be considered for removal during subsequent surveys. Adjustments to the list of analytical tests will be assessed separately for wet and dry weather sampling requirements. Since the initial screening event may be followed too quickly for the data to be received and fully evaluated, the field team must be prepared to collect water samples for the testing the full set of Table E-2 constituents during the second sampling event.

Most of the general and conventional pollutants listed in Table 3-3 will continue to be analyzed as part of the base monitoring requirements for continued monitoring for both receiving waters and for the metals TMDL. The only pollutants considered for elimination will be cyanide, total phenols, perchlorate, and MTBE. Analysis of chloride and fluoride will continue to be used to assist in the interpretation of potential potable water sources during in association with the non-stormwater screening program. In addition, microbiological constituents (Table 3-4), nutrients (Table 3-5), chlordane compounds listed in Table 3-7 and TMDL metals (Table 3-6) will continue to be part of the ongoing monitoring at LLC1.

As noted in the previous section, it has been determined that adequate data exist to determine which of the three freshwater species are considered to be most sensitive during both storm events and dry weather periods. Available literature and local data indicate that the most sensitive bioassay test species is *Ceriodaphnia dubia*. The prior section on Aquatic Toxicity Testing and TIEs goes into detail as to species selection and the overall approach recommended for measuring toxicity in the receiving waters and strategies to eliminate any sources of toxicity. During wet weather conditions, bioassay tests will be performed based upon exposure to 100 percent test waters over a 48-hour time period since this time exposure is deemed to be more consistent with the duration of typical storm events. Since exposure times during the dry season are much longer, dry weather testing will utilize 7-day chronic toxicity tests that assess both survival and reproductive endpoints for *C. dubia*. Chronic testing will also be conducted on 100 percent undiluted samples. Table 5-1 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 sublethal endpoints will be assessed using EPA's TST procedure to determine if there is a statistically significant 50% difference between sample controls and the test waters and ultimately determine if further testing should be is necessary.

Table 5-1. Toxicity Test Volume Requirements for Aquatic Toxicity Testing as part of the Los Cerritos Channel Coordinated Integrated Monitoring Program.

Test Organism	Toxicity Test Type	Test Concentration	Volume Required for Initial Screen (L)	Minimum Volume Required for TIE (L)[1]
Freshwater Tests for Samples with Salinity < 1.0 ppt				
Daphnid Water Flea (*Ceriodaphnia dubia*)	48-Hour Acute Survival 7-day Chronic Survival and Reproduction	100% only	1.5	10
Sample Receipt Water Quality	--	--	1.0	--
Total volume required per event for samples with salinity < 1.0 ppt			2.5	a

[1] Minimum volume for the TIE is for Phase 1 characterization testing only. The additional volume collected for potential TIE testing can be held in refrigeration (4°C in the dark, no head space) and shipped to the laboratory at a later date if needed.

Note: The NPDES permit targets a 36-hr holding time for initiation of testing but allows a maximum holding time of 72-hr if necessary.

6 Primary Watershed Segmentation (PWS) Sites

6.2 Sampling Frequency and Mobilization Requirements

The sampling frequency and mobilization requirements for the PWS sites will be consistent with monitoring conducted at the LCC1. A total of three storm events will be monitored at each PWS site once they are installed. Monitoring will be concurrent with LCC1 monitoring in order to allow for comparison of pollutant loading rates associated with each segment relative to ultimate pollutant loads measured at the LCC1 site.

6.3 PWS Sampling Constituents

Constituents monitored at each PWS site will include all TMDL constituents as well as general and conventional constituents necessary to assist in evaluation of the data (Table 6-1). Constituents included in the MAL list and monitored at the outfall sites will be included in an annual MAL Assessment Report reported as part of the Annual Report. The MAL Assessment Report will summarize the monitoring data in comparison to the applicable MALs, and identify those subwatersheds where the running average concentrations of these constituents exceed the MALs by twenty percent or more.

Table 6-1. Constituents Monitored at Primary Watershed Segment (PWS) Sites.

CONSTITUENTS CONVENTIONAL POLLUTANTS	METHOD	TARGET REPORTING LIMITS mg/L
Total Suspended Solids	EPA 160.2	1
Total Dissolved Solids	EPA 160.1	1
Volatile Suspended Solids	EPA 160.4	1
Total Organic Carbon	EPA 415.1	1
Chemical Oxygen Demand	EPA 410.1	4
Alkalinity	EPA 310.1	5
Specific Conductance	EPA 120.1	1
Total Hardness	EPA 130.2	1
MBAS	EPA 425.1	0.02
Chloride	EPA300.0	2
Fluoride	EPA300.0	0.1
METALS (Dissolved & Total)	**METHOD**	**ug/L**
Copper	EPA200.8	0.5
Lead	EPA200.8	0.5
Zinc	EPA200.8	1

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7 Secondary Watershed Segmentation (SWS) Sites (Wet Weather)

Secondary Watershed Segmentation (SWS) sites will be monitored with portable equipment that will be used to assist in tracking sources of constituents found to be elevated at one of the Primary Watershed Segmentation sites. The portable monitoring stations will consist of a battery powered autosamplers triggered by sensors installed in the channel to detect the start of flow. Once triggered, the samplers will take time-weighted samples for a 24-hour period. The autosamplers will be set to take 200 mL samples every 15 minutes while is present in the channel. All sample composite bottles and materials contacting the water will be identical to those used for each of the "permanent" or fixed monitoring sites.

SWS sites are expected to be deployed upstream of PWS sites where specific contaminants are found to be elevated. Tentative locations (Figure 1-2) have been established at sites in each subwatershed should PWS monitoring data indicate that forensic monitoring is necessary to further isolate areas contributing excessive pollutant loads. The selected sites further segment the subwatersheds into two areas and are designed to be monitored concurrently with the SWS site. Pre-selection of candidate SWS sites was intended to facilitate implementation of forensic monitoring by clearly identifying the next step if conditions are met that trigger further testing.

SWS monitoring will be triggered if the running average of any MAL constituent is exceeded by 20 percent or if the running average of MAL or TMDL constituents at a PWS site exceeds the running average at other PWS sites by more than 20 percent. SWS sites would focus on monitoring the specific constituent of concern and any additional data necessary to help interpret the results. For example, if the constituent of concern is a trace metal, monitoring at SWS sites would include both TSS and hardness.

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8 Non-Stormwater (NSW) Outfall Monitoring

Detailed objectives of the screening and monitoring process (Section IX.A, page E-23 of the MRP) include the following:

1. Develop criteria or other means to ensure that all outfalls with significant non-stormwater discharges are identified and assessed during the term of this Order.

2. For outfalls determined to have significant non-stormwater flow, determine whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources.

3. Refer information related to identified IC/IDs to the IC/ID Elimination Program (Part VI.D.10 of the Order) for appropriate action.

4. Based on existing screening or monitoring data or other institutional knowledge, assess the impact of non-stormwater discharges (other than identified IC/IDs) on the receiving water.

5. Prioritize monitoring of outfalls considering the potential threat to the receiving water and applicable TMDL compliance schedules.

6. Conduct monitoring or assess existing monitoring data to determine the impact of non-stormwater discharges on the receiving water.

7. Conduct monitoring or other investigations to identify the source of pollutants in non-stormwater discharges.

8. Use results of the screening process to evaluate the conditionally exempt non-stormwater discharges identified in Parts III.A.2 and III.A.3 of the Order and take appropriate actions pursuant to Part III.A.4.d of the Order for those discharges that have been found to be a source of pollutants. Any future reclassification will occur per the conditions in Parts III.A.2 or III.A.6 of the Order.

9. Maximize the use of Permittee resources by integrating the screening and monitoring process into existing or planned CIMP efforts.

Ultimately, the NSW program is intended to establish a process for identifying outfalls that serve as potential sources of contaminants. Sites where initial screening indicates the potential for discharges of a magnitude considered to have the potential to cause or contribute to exceedances of receiving water limitations will require further efforts to classify the discharges and determine appropriate actions, if any.

In cases where flow or other factors show evidence of potential discharges of concern, the program will take further action to determine if the flows are illicit, exempt, conditionally exempt, conditionally exempt but non-essential, or if the source(s) of the discharge cannot be identified (unknown). Illicit discharges require immediate action and, if they cannot be eliminated, monitoring will be implemented until such time that the illicit discharge can be eliminated. Discharges classified as conditionally exempt but non-essential or unknown also require ongoing monitoring.

The following sections summarize the elements of the program and processes to ultimately eliminate major sources of non-stormwater discharges.

8.1 Non-Stormwater Outfall Screening and Monitoring Program

The NSW Outfall Screening and Monitoring Program will consist of a screening phase designed to initially classify outfalls into one of three categories. Three screening surveys will be conducted starting in the summer of 2014 to identify outfalls or other discharges that are considered to be significant and persistent sources of non-stormwater flow to either the open channels or receiving waters.

The initial survey will focus on completing an inventory of all outfalls (refer to Appendix E) to receiving waters. Outfalls greater than 12-inches in diameter (or equivalent) will be photographed and documented. All minor outfalls[7] (outfalls less than 36-inches in diameter or equivalent) without evidence of the presence of industrial activities will be maintained in the database but will be considered as not requiring any further action.

If while in the process of conducting any of the site inspections, the inspection team encounters a transitory discharge, such as a liquid or oil spill, the problem will be immediately referred to the appropriate local jurisdiction for clean-up or response. If it is not readily apparent which jurisdictional authority has responsibility; the discharge will be reported to the WMG technical committee chair.

Information from all three screening surveys will be consolidated to assist in the identification and ranking of outfalls considered to have significant NSW discharges. Multiple lines of evidence will be considered when assessing the significance of a discharge. Data from the field screening program such as flow measurements, general observations and *in-situ* water quality information will be given primary consideration but land uses within the drainage area will also be considered.

A combination of field observations, flow measurements and field water quality measurements collected during the screening surveys will be used to classify outfalls into one of the following three categories that will determine further actions (Figure 8-1):

1. **Suspect Discharge** – Outfalls with persistent high flows during at least two out of three visits and with high severity on one or more physical indicators (odors, oil deposits, etc.). Outfalls in this category require prioritization and further investigation.

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[7] Minor municipal separate storm sewer outfall (or ''minor outfall'') means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of less than 36 inches or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of less than 50 acres); or for MS4s that receive stormwater from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of less than 12 inches or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or less)

2. **Potential Discharge** - Flowing or non-flowing outfalls with presence of two or more physical indicators. Outfalls in this category are considered to be low priority but will be continue to be monitored periodically to determine if the sites are subject to less frequent, discharges or determine if actions can be taken to reduce or eliminate the factors that lead to the site being considered a potential source of contaminants.

3**. Unlikely Discharge** - Non-flowing outfalls with no physical indicators of an illicit discharge. Outfalls within this classification would be not be subject to any further screening.

Initial screening activities will emphasize use of field water quality instrumentation and/or simple field test kits to assist in classifying discharges. Collection of water samples for limited laboratory testing may be incorporated into the program as requirements for more complex, accurate and scientifically supportable data become necessary to characterize NSW discharges and provide scientifically supportable data to track the source of these discharges. The Center for Watershed Protection (CWP) and Pitt (2004) provide an evaluation of twelve analytes for assistance in determining the source of NSW discharges (Table 8-2). Three of the analytes can be measured with *in-situ* instrumentation. Others can be analyzed relatively inexpensively by use of field test kits or can be analyzed in an ELAP-certified laboratory. In addition, three to five of the listed tests are often considered sufficient to screen for illicit discharges. Ammonia, MBAS, fluoride (assuming tap water is fluorinated), and potassium are considered to confidently differentiate between sewage, wash water, tap water and industrial wastes. Incorporation of *in-situ* measurement of temperature, pH, TDS/salinity, turbidity and dissolved oxygen can further assist in characterizing and tracking the source(s) of an NSW discharge.

8.1.1 Identification of Outfalls with Significant Non-Stormwater Discharges

Existing monitoring data or institutional knowledge (Objective 4) are not available to allow identification of outfalls with significant NSW discharges. The screening program is necessary to collect information necessary to identify outfalls with potentially significant NSW discharges. The outfall screening includes collection of information necessary to provide an accurate inventory of the major outfalls, assess flow from each outfall and in the receiving waters, determine the general characteristics of the receiving waters (e.g. is flow present, does the flow from the outfall represent a large proportion of the flow, is it an earthen or lined channel), and record general observations indicative of possible illicit discharges. The initial screening survey(s) will also be used to refine the inventory information required in Section 8.1.2.

Table 8-1. Outline of the NSW Outfall Screening and Monitoring Program.

Element	Description	Timing of Completion
1. Outfall Screening	Because data required to implement the NSW Outfall Program are not available, the Permittees will implement a screening process to determine which outfalls exhibit significant NSW discharges and those that do not require further investigation. Data will be recorded on Outfall Reconnaissance Investigation (ORI) forms and in the associated database.	The Outfall Screening process is currently being implemented. Identification of obvious illicit discharges will be immediately addressed. Otherwise, the Outfall Screening process will be completed prior to starting source investigations.
2. Identification of outfalls with significant NSW discharge (Part IX.C of the MRP)	Data from the Outfall Screening process will be used to categorize MS4 outfalls on the basis of discharge flow rates, field water quality and physical observations.	Concurrent with Outfall Screening December 28, 2014 with Annual CIMP Report
3. Inventory of Outfalls with NSW discharge (Part IX.D of the MRP)	Develop an inventory of all major MS4 outfalls, identify outfalls with known NSW discharges and identify outfalls with no flow requiring no further assessment.	Concurrent with Outfall Screening December 28, 2014 with Annual CIMP Report
4. Prioritized source investigation (Part IX.E of the MRP)	Use the data collected during the Outfall Screening process to further prioritize outfalls for source investigations.	Prioritization for Source Investigation will be occur after completion of Outfall Screening
5. Identify sources of significant NSW discharges (Part IX.F of the MRP)	For outfalls exhibiting significant NSW discharges, Permittees will perform source investigations per the established prioritization.	Complete source investigations for 25% of the outfalls with significant NSW discharges by December 28, 2015 and 100% by December 28, 2017
6. Monitoring NSW discharges exceeding criteria (Part IX.G of the MRP)	Monitor outfalls determined to convey significant NSW discharges comprised of 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

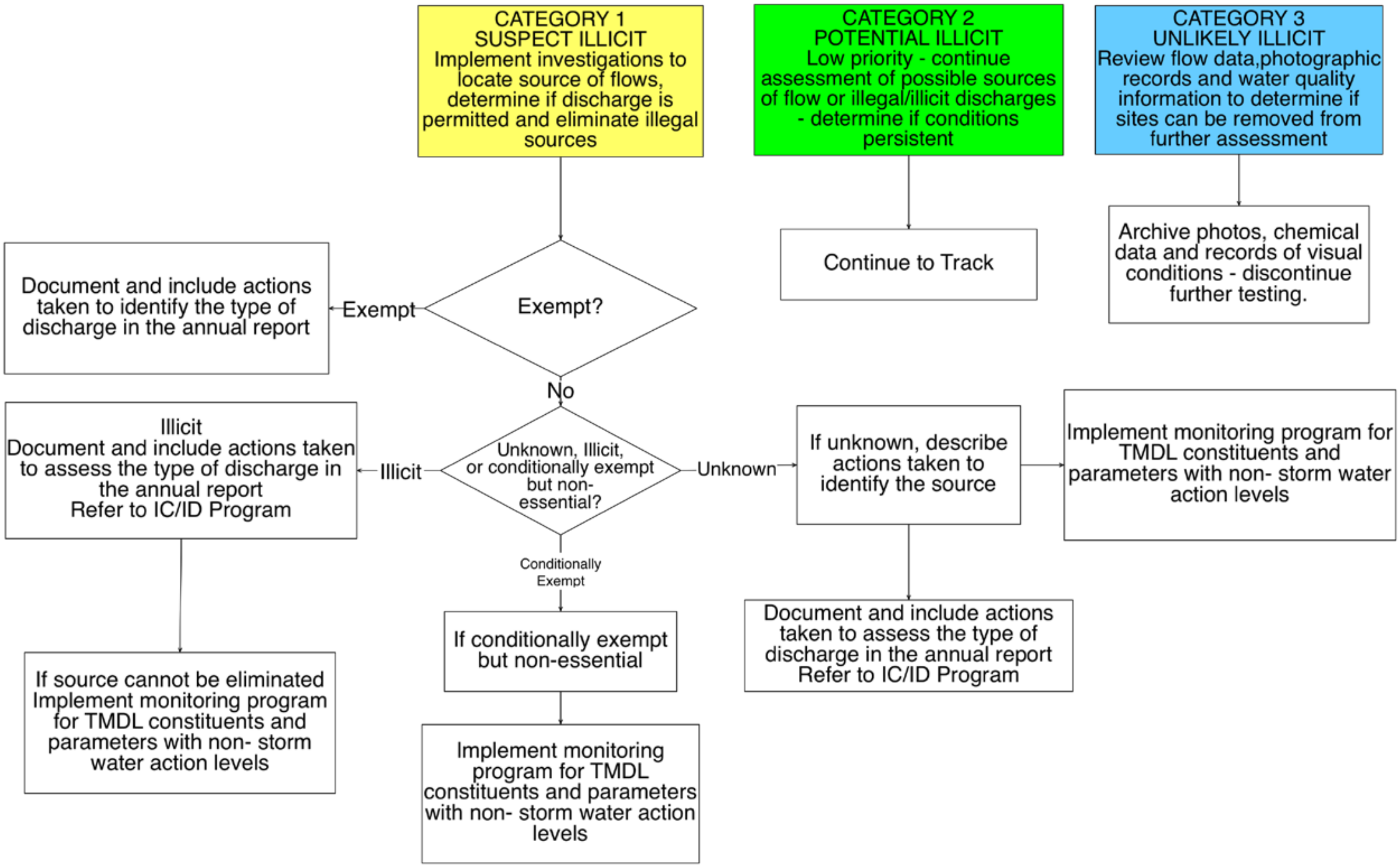

Figure 8-1. Flow Diagram of NSW Outfall Program after Classifying Outfalls during Initial Screening.

Table 8-2. Potential Indicator Parameters for Identification of Sources of NSW Discharges.

Indicator Parameters	
Ammonia	E. coli
Boron	Fluoride
Chlorine	Hardness
Color	pH - Field
Conductivity-Field	Potassium
Detergents – Surfactants (MBAS or fluorescence)	Turbidity

Based upon CWP and Pitt 2004. Illicit Discharge Detection and Elimination A Guidance Manual for Program Development and Technical Assessments

The outfall screening process has already been initiated in order to meet the established schedule for completion of 25% of the source identification work. Once the screening process is completed Permittees are required to identify MS4 outfalls with "significant" NSW discharges. The MRP (Section IX.C.1) indicates that significant NSW discharges may be determined based upon one or more of the following characteristics:

a. Discharges from major outfalls subject to dry weather TMDLs.

b. Discharges for which existing monitoring data exceeds Non-Stormwater Action Levels (NALs) identified in Attachment G of the Order.

c. Non-stormwater discharges that have caused or have the potential to cause overtopping of downstream diversions.

d. Discharges exceeding a proposed threshold discharge rate as determined by the Permittee.

Most of these characteristics are either unlikely to differentiate significant NSW discharges or the information will not be available when the screening process is completed. Multiple lines of evidence derived from flow measurements, observations and *in-situ* water quality information recorded on the Outfall Reconnaissance Investigation (ORI) forms used during the screening process will be used to determine "significant" NSW discharges and appropriately rank sites for source investigations. The relative magnitude of the discharges, persistence of the flow, visual and physical characteristics recorded at each site, and land uses associated with the drainage may also be considered. Characteristics of the receiving waters (flow, channel characteristics –hard or soft-bottom, etc.) at the discharge location will also be considered when determining the relative significance of NSW discharges. The most important consideration is whether the discharge has the potential to cause or contribute to exceedance of receiving water quality limitations. Factors that provide the best insight with respect to these impacts will receive the greatest weight when establishing the list of "significant" NSW discharges.

8.1.2 Inventory of MS4 Outfalls with Non-Stormwater Discharges

Part VII.A of the MRP requires that the CIMP plan(s) include a map(s) and/or database of the MS4 that includes the elements listed in Table 8-3. Most required elements are complete and included with this CIMP. Elements requiring further development include the Effective Impervious Area, information on the length of open channels and underground pipes equal to or greater than 18 inches, and the drainage areas associated with each outfall. Sub-basins used for the WMMS model are currently associated with each outfall within that sub-basin. If an outfall is identified as a significant source of NSW discharges, drainage areas for each targeted outfall will be refined and updated in the database. Additional information such as documenting presence of significant NSW discharges, links to a database documenting water quality measurements at sites with significant NSW discharges will be updated annually and submitted with the CIMP annual report.

As a component of the inventory and screening process, Permittees are required to document the physical attributes of MS4 outfalls determined to have significant non-stormwater discharges. Table 8-4 summarizes the minimum physical attributes required to be recorded and linked to the outfall database.

These data will be maintained using the Outfall Reconnaissance Inventory (ORI) field form and associated database (Appendix C) developed by CWP and Pitt (2004). Data entry can be accomplished by completing the ORI form while conducting the screening survey. Current forms are shown in the Appendix D but may be modified as the parameters and database are modified to provide different information more relevant to the NSW program.

Table 8-3. Basic Database and Mapping Information for the Watershed.

Database Element	Status	
	Complete	Schedule
1. Surface water bodies within the Permittee(s) jurisdiction	X	
2. Sub-watershed (HUC 12) boundaries	X	
3. Land use overlay	X	
4. Effective Impervious Area (EIA) overlay (if available)		Will provide if available
5. Jurisdictional boundaries	X	
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)	X[1]	
7. The location of all dry weather diversions	X	
8. The location of all major MS4 outfalls within the Permittee's jurisdictional boundary. Each major outfall shall be assigned an alphanumeric identifier, which must be noted on the map	X[2]	
9. Notation of outfalls with significant non-stormwater discharges (to be updated annually)	X	ongoing
10. Storm drain outfall catchment areas for each major outfall within the Permittee(s) jurisdiction	X[3]	ongoing
11. Each mapped MS4 outfall shall be linked to a database containing descriptive and monitoring data associated with the outfall. The data shall include:[4]		
a. Ownership	X	
b. Coordinates	X	
c. Physical description	X	
d. Photographs of the outfall, where possible to provide baseline information to track operation and maintenance needs over time	X	
e. Determination of whether the outfall conveys significant non-stormwater discharges		ongoing
f. Stormwater and non-stormwater monitoring data		ongoing

1. Locations are identified but the length of all open channel and underground pipes are not fully documented.
2. Attributes in the shapefile contain a Unique ID for all outfalls greater than 12" in diameter.
3. Catchments for each outfall are included as the area of the sub-basins associated with each outfall. Several outfalls may drain these sub-basins. Data will be developed as needed to resolve the drainage areas specific to each outfall.
4. Efforts are ongoing to define ownership and maintenance responsibility. As data become available, information regarding the conveyance of NSW and associated water quality data will be added to the database. Information will be updated based upon the three screening surveys.

Table 8-4. Minimum Physical Attributes Recorded during the Outfall Screening Process.

Database Element	
a.	Date and time of last visual observation or inspection
b.	Outfall alpha-numeric identifier
c.	Description of outfall structure including size (e.g., diameter and shape)
d.	Description of receiving water at the point of discharge (e.g., natural, soft-bottom with armored sides, trapezoidal, concrete channel)
e.	Latitude/longitude coordinates
f.	Nearest street address
g.	Parking, access, and safety considerations
h.	Photographs of outfall condition
i.	Photographs of significant non-stormwater discharge (or indicators of discharge) unless safety considerations preclude obtaining photographs
j.	Estimation of discharge rate
k.	All diversions either upstream or downstream of the outfall
l.	Observations regarding discharge characteristics such as turbidity, odor, color, presence of debris, floatables, or characteristics that could aid in pollutant source identification
m.	Observations regarding the receiving water such as flow, channel type, hard/soft bottom (added minimum attribute.)

8.1.3 Prioritized Source Identification

After completion of the initial reconnaissance survey and the two additional screening surveys, sites will be ranked based upon both initial flow observations from the reconnaissance inventory and the classifications assigned during each of the screening surveys. Source investigations will be scheduled to be conducted at sites categorized as Potential Illicit discharges.

The MRP (IX.E.1) states that prioritization of source investigations should be based upon the following items in order of importance.

a. Outfalls discharging directly to receiving waters with WQBELs or receiving water limitations in the TMDL provisions for which final compliance deadlines have passed.

b. All major outfalls and other outfalls that discharge to a receiving water subject to a TMDL shall be prioritized according to TMDL compliance schedules.

c. Outfalls for which monitoring data exist and indicate recurring exceedances of one or more of the Action Levels identified in Attachment G of this Order.

d. All other major outfalls identified to have significant non-stormwater discharges.

Additional information from the screening process will be used to refine priorities. Sites with evidence of higher, more frequent flow, presence of odors or stains will be assigned higher priorities for source investigations.

8.1.4 Identify Source(s) of Significant Non-Stormwater Discharges

The screening and source identification component of the program is intended to identify the source or sources of contaminants contributing to an NSW discharge. The prioritized list of major outfalls with significant NSW discharges will be used to direct investigations starting with outfalls deemed to present the greatest risk to the receiving water body.

The Order requires the WMG to develop a source identification schedule based on the prioritized list of outfalls exhibiting significant NSW discharges. Source investigations will be conducted for no less than 25% of the outfalls in the inventory by December 2015 and 100% of the outfalls in the inventory by December 2017.

Part IX.A.2 of the MRP requires Permittees to classify the source investigation results into one of four endpoints: illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources. If source investigations indicate the source is illicit or unknown, the Permittee will document actions to eliminate the discharge and implement monitoring if the discharge cannot be eliminated.

If the source of a discharge is found to be attributable to natural flows or authorized conditionally exempt NSW discharge, the Permittee must identify the basis for the determination (natural flows) and identify the NPDES permitted discharger. If the source is found to be a conditionally exempt but non-essential discharge, monitoring is required to determine whether the discharge should remain conditionally exempt or be prohibited.

Source investigations will be conducted using a variety of different approaches depending upon the initial screening results, land use within the area drained by the discharge point, and the availability of drainage maps. Any additional water quality sampling will emphasize analysis of simple indicators, most of which can be either taken to a laboratory or analyzed in the field using field test kits. Such testing would only be conducted as needed to differentiate major sources of flows or to assist in assessing mixed sources rather than detailed characterization of the discharge. Investigations may include:

- Tracking of dry weather flows from the location where they are first observed in an upstream direction along the conveyance system.
- Collection of additional water samples for analysis of NWS indicators for assistance in differentiating major categories of discharges such as tap water, groundwater, wash waters and industrial wastewaters.
- Compiling and reviewing available resources including past monitoring and investigation data, land use/MS4 maps, aerial photography, existing NPDES discharge permits and property ownership information.

If source tracking efforts indicate that the discharge originates from a jurisdiction upstream of the boundaries of the LCC WMP, the appropriate jurisdiction and the Regional Board 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 discharges are 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.

8.1.5 Monitor Non-Stormwater Discharges Exceeding Criteria

As required in the MRP (Part II.3.3), outfalls with significant NSW discharges that remain unaddressed after source identification will be monitored. The objectives of the non-stormwater outfall based monitoring program include the following:

a. Determine whether a Permittee's discharge is in compliance with applicable NSW WQBELs derived from TMDL WLAs;

b. Determine whether a Permittee's discharge exceeds NSW action levels, as described in Attachment G of the Order;

c. Determine whether a Permittee's discharge contributes to or causes an exceedance of receiving water limitations; and

d. Assist a Permittee in identifying illicit discharges as described in Part VI.D.10 of the Order.

After completion of source investigations, outfalls found to convey NSW discharges 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. Conducting NSW monitoring at the same time as receiving water dry weather monitoring will be more cost effective and allow evaluation of whether the NSW discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water.

Monitoring of NSW discharges is expected to undergo substantial changes from year to year as the result of ongoing actions taken to control or eliminate these discharges. As NSW discharges are addressed, monitoring of the discharges will no longer be required. In addition, if monitoring demonstrates that discharges do not exceed any WQBELs, non-stormwater action levels, or water quality standards for pollutants identified on the 303(d) list after the first year, monitoring of the pollutants meeting all receiving water limitations will be no longer be necessary. Due to potential frequent adjustments in the number and location of outfalls requiring monitoring and pollutants requiring monitoring, the annual CIMP report is expected to communicate adjustments in the number and locations of monitored discharges, pollutants being monitored and justifications for any adjustments.

8.1.5.1 Monitoring Parameters and Frequency

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:

a. Flow;

b. Pollutants assigned a WQBEL or receiving water limitation to implement TMDL Provisions for the respective receiving water, as identified in Attachments L - R of the Order;

c. Other pollutants identified on the CWA section 303(d) List for the receiving water or downstream receiving waters;

d. Pollutants identified in a TIE conducted in response to observed aquatic toxicity during dry weather at the nearest downstream receiving water monitoring station (LCC1) during the last sample event or, where the TIE conducted on the receiving water sample was inconclusive, aquatic toxicity (if the discharge exhibits aquatic toxicity, then a TIE shall be conducted); and

e. Other parameters in Table E-2 identified as exceeding the lowest applicable water quality objective at LCC1 (the nearest downstream receiving water station) per Part VI.D.1.d.

The MRP (Part IX.G.2-4) specifies the following monitoring frequency for NSW outfall monitoring:

- For outfalls subject to a dry weather TMDL, the monitoring frequency shall be per the approved TMDL monitoring plan or as otherwise specified in the TMDL or as specified in an approved CIMP.
- For outfalls not subject to dry weather TMDLs, approximately quarterly for first year.
- Monitoring can be eliminated or reduced to twice per year, beginning in the second year of monitoring if pollutant concentrations measured during the first year do not exceed WQBELs, MALs or water quality standards for pollutants identified on the 303(d) List.

While a monitoring frequency of four times per year is specified in the Permit, it is inconsistent with the dry weather receiving water monitoring requirements. The receiving water monitoring requires two dry weather monitoring events per year. Additionally, during the term of the current Permit, outfalls are required to be screened at least once and those with significant NSW discharges will be subject to a source investigation. As a result, the LCC WMG recommends that NSW outfall monitoring events be conducted twice per year. The NSW outfall monitoring events will be coordinated with the dry weather receiving water monitoring events to provide better opportunities to determine if the NSW discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water.

Any monitoring required will be performed using grab samples (refer to Appendix A for field sampling procedures) rather than automated samplers. Bacteria, which are expected to be the limiting factor at many sites during dry weather, require collection by grab methods and delivery to the laboratory within 6 hours. Based upon the much reduced variability experienced in measurements of dry weather flows associated with ongoing monitoring programs, measured concentrations of other analytes are not expected to vary significantly over a 24-hour period.

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9 New Development/Re-Development Effectiveness Tracking

Each of the cities in the watershed will maintain an electronic database to track qualifying new development and re-development projects that are subject to the Planning and Land Development Programs of Part VI.D.7 of Order No. R4 2012- 0175 and Part VII.J of Order No. R4 2014-0024. The electronic databases contain the information listed in Table 9-1 that includes details about the project and the design of onsite and offsite best management practices, as well as descriptions of the required information.

To promote consistency across the watershed and facilitate future planning and research within the watershed, all of the cities within the watershed are subscribing to MS4Front, a web-based software system designed to streamline record keeping for MS4 permits and assists with annual reporting. The cities concluded that although it is a sophisticated management tool, it is flexible and relatively easy to use. The existing tracking programs will be converted to MS4Front.

Table 9-1. Information Required in the New Development/Re-Development Tracking Database.

	Required Information	Description
General Site Information	Project Name and Developer Name	Brief name of project and developer information (e.g. name, address, and phone number).
	Project Location and Map	Coordinates and map of the project location. The map should be linked to the GIS storm-drain map required in part VII.A of the Permit.
	Documentation of issuance of requirements to the developer	Date that the project developer was issued the Permit requirements for the project (e.g. conditions of approval).
	Date of Certificate of Occupancy	Date that the Certificate of Occupancy was issued.
On-site BMP Sizing Information	85th percentile storm event (inches per 24 hours)	85th percentile storm depth for the project location calculated using the Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles.
	95th percentile storm event (inches per 24 hours)	95th percentile storm depth for the project location calculated using the *Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles*. Only applies if the project drains directly to a natural drainage system[8] and is subject to hydromodification control measures.
	Project design storm (inches per 24 hours)	The design storm for each BMP as calculated using the Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles.
	Projects design volume (gallons or MGD)	The design storm volume (design storm multiplied by tributary area and runoff coefficient) for each BMP.
	Percent of design storm volume to be retained on site	The percentage of the design volume which on-site BMPs will retain.
	Other design criteria required to meet hydromodification requirements for projects that directly drain to natural water bodies	Information relevant to determine if the project meets hydromodification requirements as described in the Permit e.g., peak flow and velocity in natural water body, peak flow from project area in mitigated and unmitigated condition, etc.). Only applies if the project drains directly to a natural drainage system.
	One -year, one-hour storm intensity as depicted on the most recently issued isohyetal map published by the Los Angeles County Hydrologist for flow-through BMPs	If flow-through BMPs (e.g., sand filters, media filters) for water quality are used at the project, provide the one-year, one-hour storm intensity at the project site from the most recent isohyetal map issued by LA County.
Off-site BMP Information	Location and maps of off-site mitigation, groundwater replenishment, or retrofit sites	If any off-site mitigation is used, provide locations and maps linked to the GIS storm-drain map required in part VII.A of the Permit.
	Design volume for water quality mitigation treatment BMPs	The calculated design volume, If water quality mitigation is required.
	Percent of design storm volume to be infiltrated at an off-site mitigation or groundwater replenishment project site	The percentage of the design volume which off-site mitigation or groundwater replenishment will retain.
	Percent of design storm volume to be retained or treated with biofiltration at an off-site retrofit project	The percentage of the design volume which off-site biofiltration will retain or treat.

[8] A natural drainage system is defined as a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system.

10 Reporting

Reporting will normally consist of Annual CIMP Reports and semi-annual data reports. Discharge Assessment Plans will only be submitted if TIEs are found to produce inconsistent results during two consecutive tests. These include the following reports:

Annual CIMP Reports

Annual CIMP monitoring reports are required to be submitted to the Regional Water Board Executive Officer by December 15th of each year in the form of three compact disks (CDs). The reporting period will cover July 1 through June 30. The annual reporting process is intended to meet the following objectives.

Summary information allowing the Regional Board to assess:

a. Each Permittee's participation in one or more Watershed Management Programs.
b. The impact of each Permittee(s) stormwater and non-stormwater discharges on the receiving water.
c. Each Permittee's compliance with receiving water limitations, numeric water quality-based effluent limitations, and non-stormwater action levels.
d. The effectiveness of each Permittee(s) control measures in reducing discharges of pollutants from the MS4 to receiving waters.
e. Whether the quality of MS4 discharges and the health of receiving waters is improving, staying the same, or declining as a result watershed management program efforts, and/or TMDL implementation measures, or other Minimum Control Measures.
f. Whether changes in water quality can be attributed to pollutant controls imposed on new development, re-development, or retrofit projects.

Data Submittals

Analytical data reports are required to be submitted to the Regional Board on a semi-annual basis in accordance with the Southern California Municipal Storm Water Monitoring Coalition's Standardized Data Transfer Formats. These reports are required to be subject to verification and validation prior to submittal. They are to cover monitoring periods of July 1 through December 31 for the mid-year report and January 1- June 30 for the end of year report. These data reports should summarize:

- Exceedances of applicable WQBELs, receiving water limitations, or any available interim action levels or other aquatic toxicity thresholds.
- Basic information regarding sampling dates, locations, or other pertinent documentation.

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11 References

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