EXECUTIVE SUMMARY

ES.1 Introduction

On November 8, 2012, the Los Angeles Regional Water Quality Control Board (LARWQCB) adopted a new National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) Permit, Order R4-2012-0175 (2012 Permit), for the coastal watersheds of Los Angeles County. This monitoring report is submitted pursuant to the Monitoring and Reporting Program for the 2012 Permit, attached as Exhibit E to that permit. In accordance with the 2012 permit, permittees are required to develop a new monitoring program. In doing so, each permittee may choose to develop an Integrated Monitoring Program (IMP) or Coordinated Integrated Monitoring Program (CIMP) through which it will meet its monitoring obligations. The County of Los Angeles and the Los Angeles County Flood Control District (LACFCD) have chosen to participate in the development of CIMPs for their respective watersheds. The CIMPs were submitted to the Regional Board on or before June 30, 2014. The County and the LACFCD are currently awaiting approval of these CIMPs.

Section IV.C.8 of the Monitoring Program provides that the monitoring requirements pursuant to Order No. 0-182 (2001 Permit), Monitoring and Reporting Program CI 6948, and approved Total Maximum Daily Load (TMDL) monitoring programs shall remain in effect until the Executive Officer approves the IMPs and CIMPs. Accordingly, for the past monitoring year, monitoring has been conducted under the protocols set forth in that order and those plans. This report sets forth those results.

ES.1.1 Core Monitoring Program

Pursuant to the protocol set forth in the 2001 Monitoring Program, monitoring was conducted at seven mass emission stations (MES) (i.e., Ballona Creek (S01), Malibu Creek (S02), Los Angeles River (S10), Coyote Creek (S13), San Gabriel River (S14), Dominguez Channel (S28), and Santa Clara River (S29)). The 2001Monitoring Program also provided that tributaries shall be monitored to identify sub-watersheds where stormwater discharges and non-stormwater (dry weather) discharges are causing or contributing to exceedances of water quality standards, and to prioritize drainage and sub-drainage areas requiring management actions. During the 2013-2014 monitoring year, sampling was continued at six tributary monitoring stations in the Malibu Creek Watershed. The tributaries monitored included Upper Las Virgenes Creek (TS25), Cheseboro Canyon (TS26), Lower Lindero Creek (TS27), Medea Creek (TS28), Liberty Canyon Channel (TS29), and PD 728 at Foxfield Drive (TS30).

Trash monitoring was also conducted at MES to identify areas impaired for trash. Visual observations of trash were made, and at least one photograph was taken at each MES after the first storm event and at least three additional storm events, with the exception of Santa Clara MES (only two additional storms were monitored) and Malibu Creek MES (only one additional storm was monitored). Trash monitoring was also conducted in the Ballona Creek and Los Angeles River watersheds (described in Appendices I and J, respectively).

In addition, the City of Los Angeles monitored shoreline stations to evaluate the impacts of urban runoff on coastal receiving waters and beneficial uses and performed an annual assessment

of shoreline water quality data. The City of Los Angeles's assessment is included as Appendix D of this monitoring report.

ES.1.2 Regional Monitoring

The LACFCD has participated in regional monitoring programs, including estuary sampling (Bight '03, Bight '08, and Bight '13), which evaluated estuarine habitats for sediment chemistry, sediment toxicity, and benthic infaunal community health. Results are posted on the Southern California Coastal Water Research Project (SCCWRP) website as they become available.

Bioassessment was also conducted to help assess the biological integrity of a waterbody and to help determine potential sources of biological impairment, where they may exist. A total of 20 sampling stations representing the six major watersheds were selected to represent the diverse environments of the Los Angeles region. The final report for the most recent year of the Bioassessment Monitoring Program (i.e., 2013) is included in Appendix H.

ES.2 Summary of Methodology

The core monitoring program was conducted in compliance with the monitoring protocols set forth by the 2001 Permit and the Stormwater Quality Management Program (SQMP). Water quality samples were collected from seven watersheds and analyzed as part of the 2013–2014 Monitoring Program. The seven watersheds included Ballona Creek, Malibu Creek, Los Angeles River, Coyote Creek, San Gabriel River, Dominguez Channel, and Santa Clara River. Collection and analysis of stormwater runoff during wet weather conditions and ambient (dry) weather runoff were performed at MES and tributary locations.

Sample collection was required at MES locations for a minimum of three storm events (including the first storm event of the season) and two dry events. Due to the dry conditions that prevailed during the 2013-2014 monitoring season, only two samples were collected during wet weather at the Malibu Creek MES (S02) and only one dry weather sample was collected at the San Gabriel River MES (S14).

At the tributary stations located in the Malibu Creek Watershed, sample collection was required for a minimum of four storm events (including the first storm event of the season) and one dry event. Due to the dry conditions, only two samples were collected during wet weather at each of tributary stations (TS25, TS26, TS27, TS28, TS29, and TS30). Insufficient sample was collected to complete all chemical analyses during the first wet weather event at each of the tributary stations except Medea Creek (TS28) and Liberty Canyon (TS29) due to equipment malfunction. Stormwater samples and ambient water samples were analyzed in accordance with the 2001 Permit requirements for chemical constituents, indicator bacteria, and toxicity to bioassay test organisms.

ES.2.1 Precipitation and Flow Monitoring

Precipitation monitoring was conducted at or near each MES using the various automatic rain gauges that LACFCD operates throughout Los Angeles County. Existing gauges near the

monitored watersheds were also used in stormwater runoff calculations and were essential in developing runoff characteristics for these watersheds.

Because the monitoring program required flow-weighted composites for many constituents, flow monitoring equipment was used to trigger the automated samplers. Flows were determined from water elevation measurements.

ES.2.2 MES and Tributary Wet and Dry Weather Sampling

During the 2013-2014 monitoring season, analyses of stormwater samples consisted of field measurements, grab samples, and composite samples. Field measurements included temperature and pH at all stations. Grab samples were collected during the initial portion of the storm event (i.e., on the rising limb of the hydrograph) and were analyzed for indicator bacteria and conventional pollutants. Composite samples consisted of a mixed sample created by combining a series aliquots of specific volume collected at specific flow-volume intervals. Flow-weighted composite storm samples were obtained using an automated sampler at all stations except Santa Clara MES, where composite samples were obtained by sampling discretely from the river at 20-minute intervals for the first three hours of the storm (or the duration of the storm if it was less than three hours). The discrete samples were then mixed in the laboratory in proportion to the estimated flow rates. Composite samples were analyzed for conventional constituents, general minerals, nutrients, metals, semivolatile organics, base neutral, chlorinated pesticides, polychlorinated biphenyls (PCBs), organophosphate pesticides, and herbicides. Water column toxicity analyses were performed during two wet weather events for composite samples collected at the MES. In addition, storm events resulting in at least 0.25 inch of rainfall were monitored for total suspended solids (TSS) at all MES equipped with automatic samplers.

Dry weather sampling methods were similar, except samples were collected as time-weighted composites over a 24-hour period.

Quality assurance (QA)/quality control (QC) is an essential component of the monitoring program. All QA/QC procedures were followed for training of field personnel; labeling of bottles; chain of custody; sampling equipment setup; and sample collection, transport, and analysis.

ES.3 Summary of Monitoring Results

The 2001 Monitoring Program consisted of core monitoring, regional monitoring, and special studies. The core monitoring program included the following elements:

- Mass emission monitoring.
- Water column toxicity monitoring.
- Tributary monitoring.
- Shoreline monitoring.
- Trash monitoring.

ES.3.1 Mass Emission Monitoring

Based on results of the mass emission monitoring, the following three water quality analyses were conducted:

- A comparison to applicable water quality standards.
- An analysis of pollutant loads and trends.
- An evaluation of the correlation between constituents of concern and TSS.

Monitoring results were compared to water quality indicators based on water quality objectives (WQOs) established in the Water Quality Control Plan for the Los Angeles Region (Basin Plan) and the California Toxics Rule (CTR), 40 CFR Part 131. The Basin Plan is designed to enhance water quality and to protect the beneficial uses of all regional waters. The CTR promulgates criteria for priority toxic pollutants in the State of California for inland surface waters and enclosed bays and estuaries.

A summary of the constituents that did not meet applicable WQOs at MES for at least one event is presented in the table below.

Summary of Constituents that Did Not Meet Water Quality Objectives at Mass Emission Stations during 2013-2014 for One or More Events

Mass Emission Station/Watershed	Wet	Dry
Ballona Creek (S01)[1,2,3]	*E. coli*, dissolved copper, dissolved zinc, dissolved lead, DO	NA
Malibu Creek (S02)	*E. coli*	DO
Los Angeles River (S10)[1,2,3]	*E. coli*, cyanide, pH, dissolved copper, dissolved zinc	pH
Coyote Creek (S13)[2,3]	*E. coli*, pH, dissolved copper, dissolved zinc	*E. coli*
San Gabriel River (S14)[2,3]	*E. coli*, DO	DO, chloride
Dominguez Channel (S28)[1,2,3]	*E. coli*, DO, pH, Dissolved copper, Dissolved zinc	*E. coli*
Santa Clara River (S29)	*E. coli*	DO

NA – all applicable water quality objectives were met.
DO – dissolved oxygen
[1]More urbanized watersheds.
[2]Subject to the bacteria water quality objective high-flow suspension (LARWQCB, 2003).
[3]The high flow suspension did not apply to Ballona Creek during 2013-14Event09, 2013-14Event10, 2013-14Event12, and 2013-14Event15; to Los Angeles River during 2013-14Event09 and 2013-14Event12; to Coyote Creek during 2013-14Event09, 2013-14Event10, and 2013-14Event12; to San Gabriel River during 2013-14Event15; and to Dominguez Channel during 2013-14Event09, 2013-14Event10, 2013-14Event12, and 2013-14Event15.

ES.3.2 Water Column Toxicity Analysis

Water column toxicity monitoring was performed at all MES. In total, four samples were analyzed for toxicity at each station (i.e., two wet weather samples and two dry weather samples). The only exception was San Gabriel River (S14), where only one dry weather sample was collected due to the absence of flow during the first dry weather monitoring event.

One freshwater species (water flea) and one marine species (sea urchin) were used for toxicity testing. The water flea, *Ceriodaphnia dubia*, was used in chronic seven-day reproduction and survival bioassays. The sea urchin, *Strongylocentrotus purpuratus*, was used in chronic fertilization bioassays.

During wet weather, bioassay tests exposing *C. dubia* to wet weather effluent samples from each of the seven MES indicated that no toxicity to *C. dubia* survival or reproduction was observed for both events. Toxicity tests measuring *S. purpuratus* fertilization in exposures to wet weather effluent samples from all seven MES indicated that no toxicity to *S. purpuratus* fertilization was observed in the test samples.

During dry weather, bioassay tests exposing *C. dubia* to dry weather effluent samples from each MES indicated that slight toxicity to *C. dubia* reproduction was observed in dry weather samples collected from Malibu Creek. A toxicity identification evaluation (TIE) was not necessary. Toxicity tests measuring *S. purpuratus* fertilization in exposures to dry weather effluent samples from each MES indicated that no toxicity to slight toxicity to *S. purpuratus* fertilization was observed in the test samples. All of the inhibitory concentration (IC) values (IC_{25} and IC_{50}) were greater than 100% test substance, the no-observed-effect concentrations (NOEC) values ranged from 50 to 100% test substance, and the toxicity units (TUs) were less than 1.

ES.3.3 Tributary Monitoring

The 2001 Monitoring Program provided that there shall be tributary monitoring in an attempt to identify sub-watersheds where stormwater discharges are causing or contributing to exceedances of water quality standards and to prioritize drainage and sub-drainage areas that need management actions. A summary of the constituents that did not meet applicable WQOs at tributary stations for at least one event is presented in the table below.

Summary of Constituents That Did Not Meet Water Quality Objectives at Tributary Stations during 2013-2014 for One or More Events

Tributary/Sub-Watershed	Wet	Dry
Upper Las Virgenes Creek (TS25)	*E. coli*	*E. coli*, sulfate, TDS
Cheseboro Canyon (TS26)	*E. coli*, dissolved copper, dissolved zinc	*E. coli*, DO, sulfate, TDS
Lower Lindero Creek (TS27)	*E. coli*	*E. coli*, DO, sulfate, TDS
Medea Creek (TS28)	*E. coli*, sulfate	Sulfate, TDS
Liberty Canyon Channel (TS29)	*E. coli*, dissolved copper	*E. coli*, DO, sulfate, dissolved copper
PD 728 at Foxfield Dr. (TS30)	*E. coli*	*E. coli*, sulfate

DO – dissolved oxygen
TDS – total dissolved solids.

ES.3.4 Correlations to Total Suspended Solids

A Spearman's Rank Test was used to determine whether a significant positive or negative correlation existed between analyte results and TSS concentrations at each MES, with the exception of the Malibu Creek MES, during wet weather conditions. Too few samples were collected at Malibu Creek MES and at the tributary stations to allow for analysis of correlations. Additionally, the findings from the San Gabriel and Santa Clara MES locations should be considered in the context of the small sample size (n=3) during the 2013-2014 monitoring season. A summary of constituents found to have correlations to TSS concentrations is presented in the following table. Priority constituents (those constituents that did not meet WQOs in one or more monitoring events) are marked with an asterisk.

Correlations Between Constituents and TSS at Mass Emission Stations

Mass Emission/Watershed	Wet	
	Positively Correlated with TSS	Negatively Correlated with TSS
Ballona Creek (S01)	Dissolved lead*, Lead	Dissolved antimony, Kjeldahl N
Malibu Creek (S02)[1]	NA	NA
Los Angeles River (S10)	Selenium[2]	None
Coyote Creek (S13)	None	None
San Gabriel River (S14)[3]	Arsenic, chromium, copper, dissolved aluminum, dissolved arsenic, dissolved iron, dissolved lead, dissolved zinc, lead, nickel, turbidity, VSS, zinc	Alkalinity, BOD, chloride, *E. coli**, fecal enterococcus, fecal streptococcus, hardness, nitrite-N, pH, specific conductance, sulfate, TDS, TOC
Dominguez Channel (S28)	2-4-D[2], MBAS	Ammonia, NH_3-N
Santa Clara River (S29)[3]	Aluminum, antimony, barium, COD, chromium, copper, dissolved aluminum, dissolved antimony, dissolved chromium, dissolved copper, dissolved iron, dissolved lead, dissolved zinc, iron, lead, nickel, nitrate (NO_3), nitrate-N, nitrite-N, total phosphorus, TOC, turbidity, VSS, zinc	Alkalinity, chloride, hardness, sulfate, TDS

* Priority constituent.
[1] Too few wet weather events to perform correlation analyses.
[2] Significant with p value of <0.10 rather than <0.05.
[3] Likely correlations; too few wet weather events for confirmation.
TDS = total dissolved solids.
TOC = total organic carbon.
VSS = volatile suspended solids.
BOD = biochemical oxygen demand.
COD = chemical oxygen demand.
MBAS = methylene blue active substances
NA = not applicable.

ES.3.5 Wet Weather and Dry Weather Constituent Loads for Each Mass Emission Station

Constituent loads were calculated to determine whether there was a relationship between storm event size and the total load for a given constituent. During wet weather, calculated loads varied between stations and storm events. First-flush loading signatures (i.e., higher loads during the first monitored storm of the season than would be expected based on rainfall totals) were observed for at least one constituent at the following five of the seven MES locations: Ballona Creek, Los Angeles River, Coyote Creek, Dominguez Channel, and Santa Clara River. Rainfall totals were much higher during 2013-14Event13, the event during which the greatest loads were

observed at all MES, compared to the other wet weather events. Rainfall totals during 2013-14Event13 ranged from 1.84 to 5.20 inches, whereas the rainfall totals during the other events, including the first flush, were all under 1 inch.

During dry weather, constituent loads varied between stations and between sampling events. In general, the highest variability was observed in *E. coli* loads and TSS loads, which were generally higher during the first dry event compared to the second. TSS loads were much greater at Los Angeles River during both dry weather events than at any of the other MES. Overall, constituent loads were lower at Santa Clara River MES than at other MES.

ES.3.6 Total Suspended Solids Trend Analysis

TSS concentrations from 2000 to 2014 were evaluated separately for wet and dry weather at each MES. The summary table below presents the method used for trend evaluation and the statistical trend information on TSS data collected at each MES over the past 14 years.

Trend Analysis of Wet Weather Total Suspended Solids Concentrations at Mass Emission Stations from 2000–2014

Station	p-value	Method	Trend
Ballona Creek at Sawtelle (S01)	0.498	Mann-Kendall	Not significant
Malibu Creek at Piuma (S02)	0.069	Regression	Not significant
Los Angeles River at Wardlow (S10)	0.806	Regression	Not significant
Coyote Creek at Spring (S13)	0.428	Mann-Kendall	Not significant
San Gabriel River (S14)	**0.019**	Regression	Significant decreasing
Dominguez Channel at Artesia (S28)	0.116	Mann-Kendall	Not significant
Santa Clara River (S29)	**0.001**	Mann-Kendall	Significant decreasing

Bold text indicates significant trend with p value <0.05.

Trend Analysis of Dry Weather Total Suspended Solids Concentrations at Mass Emission Stations from 2000–2014

Station	p-value	Method	Trend
Ballona Creek at Sawtelle (S01)	0.631	Regression	Not significant
Malibu Creek at Piuma (S02)	0.051	Regression	Not significant
Los Angeles River at Wardlow (S10)	0.600	Regression	Not significant
Coyote Creek at Spring (S13)	0.451	Regression	Not significant
San Gabriel River (S14)	0.274	Regression	Not significant
Dominguez Channel at Artesia (S28)	0.688	Regression	Not significant
Santa Clara River (S29)	**0.005**	Mann-Kendall	Significant decreasing

Bold text indicates significant trend.

ES.3.7 Trash Monitoring

The 2001 Permit required a minimum of one photograph at each MES after the first storm event and three additional storm events per year. During the 2013-2014 monitoring season, visual observations of trash were made and at least one photograph was taken at each MES after the first storm event. In addition, photographs were taken at each MES after at least three additional storm events, with the exceptions of the Malibu Creek MES, which was only monitored during one additional storm event, and the Santa Clara MES, which was monitored during two additional storm events.

ES.4 Recommendations

On November 8, 2012, the LARWQCB adopted a new NPDES MS4 Permit (Order R4-2012-0175) for the coastal watersheds of Los Angeles County. The 2012 Permit, which became effective on December 28, 2012, provides a watershed management approach to address water quality protection. Under the 2012 Permit monitoring protocols, the 2001 Permit Monitoring and Reporting Program will continue until the IMPs and CIMPs submitted by the Watershed Management Groups throughout the Los Angeles Basin are approved by the Executive Officer of the LARWQCB. Due to the timing of the approval of CIMPs, MES monitoring will be conducted during the 2014-2015 monitoring season in accordance with the protocols of the 2001 Permit.

The 2001 Permit Monitoring and Reporting Program included provisions for tributary monitoring in sub-watersheds where stormwater discharges and non-stormwater (dry weather) discharges are causing or contributing to exceedances of water quality standards, and to prioritize drainage and sub-drainage areas requiring management actions. The 2012 Permit does not require tributary monitoring. However, monitoring in the tributaries will be continued until CIMPs submitted by the Watershed Management Groups are approved by the LARWQCB.

It is recommended that the field monitoring of DO and pH continue to be incorporated into in the monitoring program. DO measurements in samples may be impacted through sample handling and transportation, and sampling guidelines generally call for the measurement of DO as soon as possible after sampling. It is possible that the change in DO levels between the field and the laboratory may cause or contribute to observed DO readings outside the water quality objective range. Measuring pH in the field may limit effects of water hardness and alkalinity on changes to the pH levels measured in the analytical laboratory.