1.0 INTRODUCTION

1.1 Monitoring Program Objectives

The major objectives of the Monitoring Program outlined in the Municipal Stormwater Permit are as follows:

- Assess compliance with the Los Angeles County Municipal Stormwater Permit No. CAS004001 (Permit).
- Measure and improve the effectiveness of the Stormwater Quality Management Plans (SQMPs).
- Assess the chemical, physical, and biological impacts of receiving waters resulting from urban runoff.
- Characterize stormwater discharges.
- Identify sources of pollutants.
- Assess the overall health and evaluate long-term trends in receiving water quality.

Ultimately, the results of the monitoring requirements should be used to refine the SQMP for the reduction of pollutant loadings and the protection and enhancement of the beneficial uses of the receiving water in Los Angeles County. The Monitoring Program was developed to address these objectives, and includes the following elements:

- Core monitoring, including mass emission, water column toxicity, tributary, shoreline, and trash monitoring.
- Regional monitoring, including estuary sampling, bioassessment, and three special studies (i.e., the New Development Impacts Study in the Santa Clara Watershed, Peak Discharge Impact Study, and Best Management Practice (BMP) Effectiveness Study). Studies were completed by 2008.

1.2 Monitoring Program Status

The 1994–1995 storm season was the first in which stormwater monitoring was required under the 1990 Los Angeles County National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater Permit (No. CA0061654). Automated and manual sampling was conducted to characterize stormwater quality and quantity during the 1994–1995 and 1995–1996 seasons.

The 1996–1997 season was the first storm season in which stormwater monitoring was conducted under the 1996 Municipal Stormwater Permit (No. CAS614001). Under the 1996 Municipal Stormwater Permit, the Monitoring Program scope was expanded to incorporate additional data collection through the mass emission, land use, and critical source monitoring programs as well as new pilot studies (e.g., wide channel and low-flow analyses).

Under the 2001 Permit adopted on December 13, 2001, the Monitoring Program eliminated land use and critical source elements and focused on core monitoring, regional monitoring, and three special studies. Due to the varying compliance dates for each element, only mass emission, water

column toxicity, and shoreline monitoring under the core Monitoring Program were addressed in the 2001–2002 Monitoring Report.

The 2002–2003, 2003–2004, 2005–2006, 2006–2007, 2007–2008, 2008–2009, 2009–2010, and 2010-2011 monitoring reports addressed the following programs and associated elements:

- Core Monitoring Program – mass emission, tributary, water column toxicity, shoreline, and trash monitoring.
- Regional Monitoring Program – estuary sampling and bioassessment and the results of the three special studies.

An Integrated Receiving Water Impacts Report, prepared in 2004–2005, also incorporated the results, analysis, and progress of the previously mentioned monitoring programs. The report also assessed trends from 1994–2005. Annual stormwater monitoring reports can be found on the Los Angeles County Department of Public Works (LADPW) website:
http://dpw.lacounty.gov/wmd/NPDES/report_directory.cfm.

The information summarized in the *2010-2011 Annual Stormwater Monitoring Report* monitoring period begins June 1, 2010, and concludes May 30, 2011.

1.2.1 Core Monitoring

1.2.1.1 Mass Emission Monitoring

Mass emission monitoring objectives are as follows:

- Estimate the mass emissions from the municipal separate storm sewer system (MS4).
- Assess mass emissions trends.
- Determine whether the MS4 is contributing to exceedances of water quality standards by comparing results to applicable standards in the *Water Quality Control Plan for the Los Angeles Region* (Basin Plan), the California Toxics Rule (CTR), and emissions from other discharges.

Seven mass emission monitoring stations (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)) were used to achieve the objectives outlined above during the 2010–2011 reporting period. Mass emission stations (MES) capture runoff from major county watersheds that generally have heterogeneous land use. All MES, except the Santa Clara River station, are equipped with automated samplers, including integral flow meters for flow-composited sample collection.

Sampling at the Santa Clara River station began during the 2002–2003 storm season. At this station, samples were collected manually, and flow-weighted composite samples were primarily produced using flow estimates obtained by monitoring staff. When conditions were appropriate, flow rates were obtained using real-time flow measurements from a LADPW Water Resources Division stream gauge near the station.

A minimum of three wet weather events, including the first storm event of the year, were monitored at each MES, as specified by the Monitoring Program. Grab samples were collected

for five storm events at each MES, except for San Gabriel River where grab samples were collected for four storm events due to lack of flow during 2010-11Event03. Grab samples were analyzed for conventional pollutants and bacteria. Composite samples were collected for four storm events at each MES except for San Gabriel River where composite samples were collected for three storm events due to lack of flow during 2010-11Event03. Composite samples were flow-weighted and were analyzed for general minerals, heavy metals, semi-volatiles, polychlorinated biphenyls, herbicides, organophosphate pesticides and chlorinated pesticides. An additional nine storms, for a total of fourteen storm events, were monitored and composite samples were collected for total suspended solids (TSS) analyses at Los Angeles River, Coyote Creek and Dominguez Channel. An additional eight storms, for a total of thirteen storm events, were monitored and composite samples were collected for TSS analyses at Ballona Creek, and Malibu Creek while an additional eight storms, for a total of 12 storm events, were monitored and composite samples were collected for TSS analyses at San Gabriel River. Refer to Appendix K, Table of Monitoring Events, for dates of wet weather and dry weather sampling events.

A total of two dry weather monitoring events were conducted at each MES, (with the exception of San Gabriel River where only one sample was collected due to lack of flow during 2010-11Event02). Grab samples were collected and analyzed for conventional pollutants and bacteria during all monitoring events. Dry weather composite samples were collected for both events at each station and were analyzed for general minerals, metals, semi-volatiles, chlorinated pesticides, organophosphate pesticides, herbicides and polychlorinated biphenyls,. Composite samples were collected and analyzed for TSS during both events at the stations (Appendix K). Refer to Appendix K – Table of Monitoring Events – for dates of wet and dry weather sampling events.

1.2.1.2 ***Water Column Toxicity Monitoring***

The objectives of water column toxicity monitoring are to evaluate the extent and cause of toxicity in receiving waters and to modify and use the SQMP to implement practices that eliminate or reduce sources of toxicity in stormwater. Composite samples were taken at the MES for toxicity analyses. Two wet weather events and two dry weather events were assessed at each MES during the 2010-2011 Season, with the exception of San Gabriel River, where only one wet weather and one dry weather event were sampled due to lack of flow (Appendix K).

1.2.1.3 ***Tributary Monitoring***

The objectives of tributary monitoring are to identify subwatersheds where stormwater discharges and dry weather discharges are causing or contributing to exceedances of water quality standards, and to prioritize drainage and sub-drainage areas requiring management actions.

A minimum of four storm events, including the first storm event of the year, and one dry weather event were sampled at each tributary monitoring station. Sampling for the 2010-2011 season was conducted at six tributary monitoring stations in the Dominguez Channel Watershed. The tributaries monitored included Project No. 1232 (TS19), PD 669 (TS20), Project Nos. 5246 & 74 (TS21), PD 21-Hollypark Drain (TS22), D.D.I. 8 (TS23), and Dominguez Channel at 116th Street (TS24). Grab samples were taken from each tributary location during six storm events. Grab samples were analyzed for conventional pollutants and bacteria. In addition, composite samples

for TSS analyses were collected during these six storm events. Flow weighted composite samples were collected during five storm events at each tributary station and analyzed for general minerals, heavy metals, semi-volatiles and pesticides.

During each dry weather monitoring event one grab sample was collected from each tributary station and analyzed for conventional pollutants and bacteria. Two composite samples were collected at each tributary station during dry weather and analyzed for general minerals, heavy metals, semi-volatiles, TSS, and pesticides (Appendix K).

1.2.1.4 ***Shoreline Monitoring***

The City of Los Angeles is required to monitor shoreline stations to evaluate the impacts to coastal receiving waters and to recreational beneficial uses that result from stormwater/urban runoff. Also, the Municipal Stormwater Permit requires that the City of Los Angeles perform an annual assessment of shoreline water quality data and submit these data to the Principal Permittee for inclusion in the monitoring report. The City of Los Angeles's assessment is included as Appendix D of this monitoring report.

1.2.1.5 ***Trash Monitoring***

The objectives of trash monitoring are to assess the quantities of trash in receiving waters after storm events and to identify areas impaired for trash. Visual observations of trash were made, and at least one photograph was taken at each MES after the maximum of 14 storm events at each MES, including the first storm event.

Permit-required trash compliance monitoring for Ballona Creek and Los Angeles River watersheds is described in Appendices I and J, respectively.

1.2.2 Regional Monitoring

The Los Angeles County Flood Control District (LACFCD) is participating in regional monitoring programs. These programs address public health concerns; monitor trends in natural resources and near shore habitats, and assess regional impacts from stormwater pollutants. The regional programs include estuary sampling and bioassessment, which are summarized below.

1.2.2.1 ***Estuary Sampling***

The LACFCD has participated in the coastal ecology committee of the Bight'03 project coordinated by the Southern California Coastal Water Research Project (SCCWRP). The goal of this study was to supplement the regional monitoring of the Southern California Bight estuarine habitats by sampling estuaries for sediment chemistry, sediment toxicity, and benthic infaunal communities; and to determine the spatial extent of potential impacts from stormwater discharges. All reports pertinent to the Bight'03 Project have been completed by SCCWRP and were released on the SCCWRP website in summer 2007 (http://www.sccwrp.org/Documents/BightDocuments/Bight03Documents/Bight03AssessmentReports.aspx).

1.2.2.2 Bioassessment

Bioassessment monitoring was conducted to help assess the biological integrity of a waterbody and to help determine potential sources of biological impairment, where they may exist. A series of metrics or indices are used to characterize the streambed biological community as well as the physical habitat of a station. These metrics can be compared with those found at reference stations to help determine the potential for anthropogenic influences on the biological community. The LACFCD typically performs annual Los Angeles County stream bioassessments in October, as required in Section II.G of the Monitoring and Reporting Program of the Municipal Stormwater Monitoring Permit. Sampling stations are located throughout each of the six major watersheds and were selected to represent the diverse environments of the Los Angeles region. Table 1-1 lists the sampling station locations, and Figure 1-1 is a map showing the geographical location of the sampling stations. In 2010, bioassessment monitoring was conducted at 18 stations. The final report for the most recent year of the Bioassessment Monitoring Program (i.e., 2010) is included in Appendix H.

The state's Surface Water Ambient Monitoring Program (SWAMP) will combine information gathered from the biological surveys in the County with data collected from surrounding counties to refine an index of biological integrity for the Southern California region.

1.2.3 Special Studies

The LACFCD has conducted the following special monitoring programs, as required by the 2001 Municipal Stormwater Permit.

1.2.3.1 New Development Impacts Study in the Santa Clara Watershed

The objective of the New Development Impacts Study in the Santa Clara Watershed was to evaluate the effectiveness of the Standard Urban Stormwater Mitigation Plan (SUSMP) BMPs for pollutant reduction in stormwater runoff. To perform this study, the United States Environmental Protection Agency (USEPA) Storm Water Management Model was used to conduct a deterministic hydrological assessment coupled with a stochastic Monte Carlo approach for modeling stormwater runoff water quality. The New Development Impact Study Report was completed and submitted to the Regional Water Quality Control Board (RWQCB) on April 7, 2008.

1.2.3.2 Peak Discharge Impact Study

This study was conducted to fulfill the requirement to develop numeric criteria for peak flow control by assessing the potential cause and effect relationships between urbanization in watersheds and stream erosion in Los Angeles County. SCCWRP and the LACFCD jointly conducted the study through a consultant contract. The study results were previously reported. The Executive Summary can be found in Appendix B of the *1994–2005 Integrated Receiving Water Impacts Report* (WESTON, 2005).

1.2.3.3 Best Management Practice Effectiveness Study

Sampling of all BMPs in the BMP Effectiveness Study was completed in the 2006–2007 season.