MONITORING PROGRAM OBJECTIVES

The major objectives of the monitoring program outlined in the Municipal Stormwater Permit are to:

- Assess compliance with the Municipal Stormwater Permit CAS004001.
- Measure and improve the effectiveness of the Stormwater Quality Management Program (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 Storm Water Quality Monitoring Program (SQMP) for the reduction of pollutant loadings and the protection and enhancement of the beneficial uses of the receiving waters in the County of Los Angeles. The monitoring program was designed to address these objectives through the implementation of several elements:

1.0 Core monitoring, which includes:

  1.1 Mass emission monitoring.

  1.2 Water column toxicity monitoring.

  1.3 Tributary monitoring.

  1.4 Shoreline monitoring.

  1.5 Trash monitoring.

2.0 Regional monitoring, including:

  2.1 Estuary sampling.

  2.2 Bioassessment.

3.0 Three special studies, including:

  3.1 The New Development Impacts Study in the Santa Clara watershed.

3.2 The Peak Discharge Impact Study.

3.3 The Best Management Practice (BMP) Effectiveness Study.

SUMMARY OF MONITORING RESULTS

1.0 CORE MONITORING

1.1 ***Mass Emission Monitoring***

The purpose of mass emission monitoring is to:

- Estimate the mass emissions from the Municipal Separate Storm Sewer System (MS4).
- Assess trends in the mass emissions over time.
- Determine if the MS4 is contributing to exceedances of water quality standards by comparing results to applicable standards in the Basin Plan for the Coastal watersheds of Los Angeles and Ventura Counties (Basin Plan) and the Criterion Maximum Concentration (CMC) of the California Toxics Rule (CTR), and with emissions from other discharges.

Flows were measured and water quality samples were taken at the following seven mass emission monitoring sites:

- Ballona Creek.
- Malibu Creek.
- Los Angeles River.
- Coyote Creek.
- San Gabriel River.
- Dominguez Channel.
- Santa Clara River.

All mass emission sites, except the Santa Clara River site, are equipped with automated samplers with integral flow meters for collecting flow-composite samples. A minimum of three storm events, including the first storm, and two dry-weather events were sampled at each mass emission site. Total Suspended Solids (TSS) were collected from three storm events at the Santa Clara River mass emission site; 10 storm events at San Gabriel River; 11 storm events at Ballona Creek and Malibu Creek; 12 storm

events at Dominguez Channel; and 13 storm events at Los Angeles River and Coyote Creek mass emission sites.

Based on results of the mass emission monitoring, three different water quality analyses were conducted.

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

Summaries of the analyses are as follows:

Comparison Study
A comparison of the monitoring results to the lowest applicable water quality standards in the Basin Plan and the CMC of the CTR was conducted. The Basin Plan is designed to enhance water quality and 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. Appendix B details results of the monitoring at the mass emission sites, indicating exceedances.

The following conclusions were drawn from the mass emission comparison study:

Wet Weather
Priorities were chosen to be those in which at least 67 percent of samples exceeded strictest applicable water quality standards. The results indicated that the aforementioned threshold was exceeded for the following constituents and at stated sites:

- Fecal Coliform at all mass emission monitoring sites, except Malibu Creek.
- Metals in all watersheds, except Malibu Creek.
- Ammonia in all watersheds, except Malibu Creek and San Gabriel River watersheds.
- Sulfate in Malibu Creek watershed. Sulfate was also the only constituent for which at least 67 percent of samples exceeded the most stringent applicable water quality standards in this watershed during the 2007-08 storm year.

Notable differences between this year's results and the 1994-2005 list of Constituents of Concern in the 1994-2005 Integrated Receiving Water Impact Report included:

- None of the dissolved metals were found to be an issue in any of the watersheds during this monitoring season. However, dissolved metals were identified as

Constituents of Concern in Coyote Creek, Los Angeles River, Dominguez Channel, and Ballona Creek in the 1994-2005 Integrated Receiving Water Impacts Report.

- Cyanide was a priority in Ballona Creek, Coyote Creek, and Dominguez Channel only during the first storm season event (2007-08 Event 21) as opposed to all watersheds as reported in the 1994-2005 Integrated Receiving Water Impacts Report.

- Ammonia was not identified as a Constituent of Concern in the 1994-2005 Integrated Receiving Water Impacts Report, but Ammonia was a priority at all stations, except at Malibu Creek and San Gabriel River mass emission stations.

- Sulfate was not identified as a Constituent of Concern in the 1994-2005 Integrated Receiving Water Impacts Report, but Sulfate was a priority at Malibu Creek mass emission station.

Dry Weather

Since the Municipal Stormwater Permit requires only two dry-weather samples at each mass emission monitoring station, using the priority criteria as the threshold indicates that both samples exceeded the water quality standard observations included the following:

- The 2007-08 dry-weather exceedances differed from those on the list of Constituents of Concern identified in the 1994-2005 Integrated Receiving Water Impacts Report.

- Only one exceedance of the water quality standards for Aluminum was found at San Gabriel River and another for Copper at Dominguez Channel during dry-weather monitoring this season.

- Cyanide exceedances were not found in any dry weather samples collected during this season, whereas it was a listed Constituent of Concern across all watersheds in the 1994-2005 Integrated Receiving Water Impacts Report.

- Fecal Coliform was a priority at Dominguez Channel mass emission station. Malibu Creek's and Santa Clara River's dry-weather samples indicated no exceedances of the water quality standards for Fecal Coliform during this season.

- Chloride and Total Dissolved Solids (TDS) were not identified as Constituents of Concern in the 1994-2005 Integrated Receiving Water Impacts Report. However, all dry weather samples this year exceeded the water quality objective guidelines at Santa Clara River for Chloride; and Ballona Creek, Coyote Creek, and Dominguez Channel for TDS.

- There are no water body specific objectives for TDS at Ballona Creek, Coyote Creek, and Dominguez Channel. The effluent limit was based upon the guidelines in the Basin Plan, which would be protective of the potential MUN (Municipal Drinking Water Supply) Beneficial Use.

Loading and Trend Analysis

Samples were collected and analyzed for TSS at all mass emission stations equipped with automated samplers for all storm events that resulted in at least 0.25-inch rainfall as required by the Municipal Stormwater Permit.

Some first flush phenomena are observed, primarily with pollutants associated with particulate matter, and storms with greater runoff volumes typically have larger pollutant loadings. An analysis of historical long-term temporal trends can be found in the 1994-2005 Integrated Receiving Water Impacts Report. Additional long-term trend analysis will be conducted for the next Integrated Receiving Water Impacts Report.

The following conclusions were deduced from the loading analysis:

- First flush phenomenon was observed for most constituents whose concentrations came either from their insoluble or suspended form (i.e. TSS, oil and grease, etc…) or from a combination of their insoluble or suspended form and their dissolved form (i.e., total metals).

- The total runoff volume and pollutant loading at the Los Angeles River Monitoring Station was usually higher than at the other monitoring stations probably because Los Angeles River watershed has approximately two to twenty-five times the surface area of the other watersheds.

- The Los Angeles River is the largest contributor of TSS out of the seven mass emission stations monitored, although other watersheds sometimes contribute larger loads during particular storm events.

- Five of the seven mass emissions stations exhibited first flush phenomena for TSS. TSS concentrations tended to decrease with fluctuation over the season except at Malibu Creek, and concentrations in the San Gabriel watershed varied largely by storm.

- TSS concentrations were usually higher during wet weather than during dry-weather sampling events.

- High levels of Aluminum, Copper, and Zinc were observed at most mass emission stations during most events, and the metals levels tended to decline through the storm season.

- High levels of Fecal Coliform and Ammonia were also observed at most mass emission stations during most events.

Correlation Study

An analysis of the correlation between metals and other constituents and TSS levels for two mass emission monitoring stations (San Gabriel River and Santa Clara River) and one tributary monitoring station (Upper San Jose Creek) was performed. Only constituents that had at least three detections during the 2007-08 storm season were included in the analysis. Dry-weather data were not included in this correlation analysis as only two dry-weather events were conducted. Only those correlations with an R^2 value greater than 0.85 are presented in this report.

Background

The 1994-2005 Integrated Receiving Water Impacts Report presented an analysis of the metals and TSS correlation. This report found that there was poor correlation between TSS and metals in all watersheds except the Santa Clara River watershed. It was suggested to remove the TSS correlation requirement from the permit in order to free up resources for increased tributary monitoring. These suggestions were included in the 2006 Report on Waste Discharge. In anticipation of the RWQCBs concurrence, TSS correlation analysis was only conducted for the Santa Clara River watershed, Ballona Creek watershed and the Adams Drain watershed in the 2005-06 Stormwater Monitoring Report; and for the Santa Clara River watershed, San Gabriel River watershed and the Upper San Jose Creek watershed in the 2006-07 Stormwater Monitoring Report.

Public Works continued the reduced TSS correlation efforts recommended in the 2006 Report of Waste Discharge as we did not receive any communication from the Regional Water Quality Control Board (RWQCB) directing otherwise.

Current Efforts

TSS correlations were prepared for the Santa Clara River, the San Gabriel River, and Upper San Jose Creek in this report. A trend line was projected on each of the constituent-versus-TSS plots and the coefficient of determination (R^2) was calculated to see if there was any correlation between the concentrations for each constituent and TSS (Figure 4-5). The closer the value of R^2 is to the number one, the stronger the correlation of the two variables. A value of 0.85 was chosen as a threshold.

The following conclusions were deduced from the correlation study analysis:

- The Santa Clara River Watershed, which the 1994-2005 Integrated Receiving Water Impacts Report indicated exhibited the largest number of correlations, had 20 constituents that correlated with TSS with an R^2 value greater than 0.85, the selected threshold. Of those 20 constituents, the highest observable R^2 value was 1 (Iron) and the lowest was 0.87268 (Dissolved Nickel).

    - Metals such as Iron, Chromium, Copper, Aluminum, Zinc, Barium, Nickel, Lead, and especially the insoluble form of these metals (the difference between the total concentration and the dissolved concentration) exhibited a strong correlation with TSS, suggesting that the removal of TSS will possibly

help reduce their levels in the water and help achieve the water quality objectives.

- The San Gabriel River Watershed had only 4 constituents with an R^2 value greater than 0.85. Of those 4 constituents, the highest observable R^2 value was 0.99991 (Chloride) and the lowest was 0.91599 (Aluminum).

  - Aluminum is the only metal that showed a strong correlation with TSS in the San Gabriel watershed and Appendix B 2007-08 Sampling Results for San Gabriel River indicated exceedances of Aluminum in accordance with the Basin Plan. Dissolved Aluminum was not detected in any of the stormwater samples collected during the 2007-08 storm year. This suggests that Aluminum was mainly in its insoluble form; and therefore, the removal of TSS will definitely help reduce the level of Aluminum in the water and possibly help achieve the water quality objective set forth in the Basin Plan.

- The Upper San Jose Creek Watershed had 17 constituents with a R^2 value greater than 0.85. Of those 17 constituents, the highest observable R^2 value was 0.99944 (Barium) and the lowest was 0.87868 (Alkalinity as CaCO3).

  - Similar to the case of the Santa Clara Watershed, metals in the Upper San Jose Creek Watershed such as Barium, Lead, Copper, Iron, Aluminum, Zinc, Nickel, Chromium, and especially the insoluble form of these metals (the difference between the total concentration and the dissolved concentration) exhibited a strong correlation with TSS. Appendix B 2007-2008 Sampling Results for Upper San Jose Creek indicated that Lead, Copper, and Zinc exceeded water quality objectives from the CMC of the CTR, and Aluminum exceeded its water quality objective in accordance with the Basin Plan. Thus, the removal of TSS will possibly help reduce the levels of these metals in the water and help achieve the water quality objectives.

- Aluminum had a very strong correlation with TSS for San Gabriel River (major river) and Upper San Jose Creek (tributary merging into major river). This association of Aluminum with particulate matter should be considered when implementing source identification and enforcement activities.

- TSS correlation may prove to be a useful tool in the selection of appropriate BMPs to remove sediment.

- Use of the newly created Integrated Water Quality Database will allow for more extensive TSS correlation efforts in the future.

1.2 *Water Column Toxicity Monitoring*

The purpose of water column toxicity monitoring is to evaluate the extent and causes of toxicity in receiving waters and to modify and utilize the SQMP to implement practices that eliminate or reduce sources of toxicity in stormwater.

Water column toxicity monitoring was performed at all mass emission sites in accordance with the Municipal Stormwater Permit. In total, four samples were analyzed for toxicity at each site. Dry-weather samples were collected on November 28, 2007 (2007-2008Event27), and April 9, 2008 (2007-2008Event47); and wet-weather samples were collected during the first rain event of the season on September 22, 2007 (2007-2008Event21), and during the second rain event of the season on November 30, 2007 (2007-2008Event30), at all mass emission sites.

Toxicity test results included the No Observed Effect Concentration (NOEC), 50 percent Effective Concentration (EC50), 50 percent Lethal Concentration (LC50), and toxicity unit (TU). NOEC is the highest concentration of toxicant that would cause no observable adverse effects on the test organisms, which means the values for the observed responses statistically are insignificantly different from the controls. EC50 is the toxicant concentration that would cause an observable adverse effect on a quantal response (such as death, fertilization, germination, or development) in 50 percent of the test population. When the observable effect is death or immobility, the term Lethal Concentration or LC is used in place of the term Effective Concentration or EC. TU is defined in the permit as 100/(LC50 or EC50). A TU value greater than or equal to 1.00 is considered substantially toxic and requires a TIE.

The following conclusions were deduced from the water column toxicity testing:

- Ceriodaphnia dubia survival and reproduction were significantly affected by exposure to the dry-weather sample collected from Los Angeles River mass emission site on April 9, 2008. That sample had TU values equal to 2.91 (survival) and 2.26 (reproduction). The baseline test conducted on the sample did not detect any toxicity, indicating no purpose to continue with further TIE manipulations. The toxicant was most likely associated with volatile compound(s).

- Sea urchin fertilization was only significantly affected by exposure to the dry-weather sample collected from the Ballona Creek mass emission site on November 28, 2007. That sample had TU value equal to 2.64. The baseline test conducted on the sample did not detect any toxicity, indicating no purpose to continue with further TIE manipulations. The toxicant was most likely associated with volatile compound(s).

- Ceriodaphnia dubia survival and reproduction were significantly affected by exposure to the wet-weather sample collected from Malibu Creek mass emission site on September 22, 2007. That sample had TU values equal to 3.20 (survival) and 2.90 (reproduction). The baseline test conducted on the sample did not detect any toxicity, indicating no purpose to continue with further TIE manipulations. The toxicant was most likely associated with volatile compound(s).

- Sea urchin fertilization was significantly affected by exposure to the wet-weather samples collected from four mass emission sites (Malibu Creek, San Gabriel River, Dominguez Channel, and Santa Clara River) on September 22, 2007. These samples had TU values equal to 1.33, 2.05, 1.25, and 3.13, respectively. In accordance with the Permit, TIEs were attempted on these samples and toxicity was not observed during the baseline toxicity testing, indicating no purpose for furtherance of the TIE analysis. The toxicant was most likely associated with volatile compound(s).

- Sea urchin fertilization was significantly affected by exposure to the wet-weather sample collected from the Santa Clara River mass emission site on November 30, 2007. That sample had TU value equal to 1.24. The baseline test conducted on the sample did not detect any toxicity, indicating no purpose to continue with further TIE manipulations. The toxicant was most likely associated with volatile compound(s).

1.3 *Tributary Monitoring*

The purpose of tributary monitoring is to:

- Identify subwatersheds where stormwater discharges are causing or contributing to exceedances of water quality standards.

- To prioritize drainage and subdrainage areas that need management actions.

Sampling for the 2007-08 season was conducted at six tributary monitoring stations in the San Gabriel River Watershed. The tributaries monitored included:

- Big Dalton Wash/Walnut Creek.

- Puente Creek.

- Upper San Jose Creek.

- Maplewood Channel.

- North Fork Coyote Creek.

- Storm Drain 21 (Artesia-Norwalk Drain).

A total of five storm events, including the first storm of the season, and two dry events were sampled at each tributary monitoring site.

It was not possible to accurately identify any issues based on dry-weather results as only two samples were taken at each tributary monitoring station in compliance with the Municipal Stormwater Permit as modified by the Los Angeles RWQCB. Nevertheless, efforts were extended to analyze data from the two dry-weather events.

A comparison was made between tributary water quality results and the most stringent water quality objectives from the Basin Plan and the CMC of the CTR. To be consistent with the analyses for mass emission stations, the same priority criteria was applied. To help focus management actions, a ranking based upon the Mean Magnitude of Exceedance Ratios (MMER) per tributary was created for each of the constituents for which at least 67 percent of samples exceeded applicable water quality standards. The magnitude of exceedance ratio was calculated by dividing the strictest applicable water quality objective for a constituent into its reported value for each sampling event. The MMER then was the average magnitude of exceedance. The confidence level (or probability) for the mean concentration of a constituent in question to significantly exceed its water quality objective was also calculated in combination with analysis of variance and mean comparison analysis to help confirm the ranking order.

The following conclusions were drawn from the wet-weather tributary comparison study:

- These wet-weather results align generally with the Constituents of Concern for San Gabriel River and Coyote Creek Mass Emission stations, respectively, identified in the 1994-2005 Integrated Receiving Water Impacts Report.

- Priorities were not found for Lead and Dissolved Lead, which were identified as Constituents of Concern in San Gabriel River and Coyote Creek in the 1994-2005 Integrated Receiving Water Impacts Report.

- Ammonia was not identified in that list of Constituents of Concern for San Gabriel River or Coyote Creek in the 1994-2005 Integrated Receiving Water Impacts Report. Nevertheless, priorities for Ammonia were found at all tributary sites.

- Total Zinc was also not identified in the above list of Constituents of Concern for San Gabriel River or Coyote Creek in the 1994-2005 Integrated Receiving Water Impacts Report, yet priorities for Total Zinc were found in Dalton/Walnut Creek, Puente Creek, Maplewood Channel, and SD21 monitoring sites.

- Total Aluminum was not a Constituent of Concern in Coyote Creek according to the 1994-2005 Integrated Receiving Water Impacts Report, yet priorities were found in both North Fork Coyote Creek and Maplewood Channel.

- Cyanide was not found to be a priority in any tributary. However, it was identified in the 1994-2005 Constituents of Concern list for both San Gabriel River and Coyote Creek.

- The San Gabriel River watershed would benefit from focusing management actions on Dalton/Walnut Creek for Total Aluminum, Total Copper, and Total Zinc; on Upper San Jose Creek for Fecal Coliform; and on Puente Creek for Ammonia.

- The Coyote Creek Watershed would benefit from focusing management actions

on Maplewood Channel for Ammonia, Total Aluminum, Total Copper, Total Zinc; and on North Fork Coyote Creek for Fecal Coliform.

The following conclusions were drawn from the dry-weather tributary comparison study:

- Of the constituents that exceeded the priority threshold described above, only Fecal Coliform aligns with the list of Constituents of Concern for San Gabriel River and Coyote Creek in the 1994-2005 Integrated Receiving Water Impacts Report.

- Total Copper, which was identified as Constituent of Concern in both San Gabriel River and Coyote Creek in 1994-2005 Integrated Receiving Water Impacts Report, was a priority only in Dalton/Walnut Creek

- Priorities were not found for Dissolved Lead in the Coyote Creek tributaries, nor for Cyanide in either the San Gabriel River tributaries or the Coyote Creek tributaries.

- None of the tributary sites had priorities for Total Lead.

- Dry-weather samples indicated priorities for TDS in Puente Creek, Upper San Jose Creek, Maplewood Channel, and North Fork Coyote Creek. There are no water body specific objectives for TDS in these tributaries; and therefore, the effluent limit was based upon the guidelines in the Basin Plan, which would be protective of the potential MUN (Municipal Drinking Water Supply) Beneficial Use.

- Dry-weather sample results indicated that Puente Creek, Upper San Jose Creek, and Artesia-Norwalk Storm Drain (SD 21) had priorities for Ammonia. Ammonia was not on the 1994-2005 list of Constituents of Concern for San Gabriel River or Coyote Creek.

- The San Gabriel River watershed would benefit from focusing management actions on Dalton/Walnut Creek for Fecal Coliform and Total Copper; on Upper San Jose Creek for Ammonia; and on Puente Creek for Total Dissolved Solids.

- The Coyote Creek Watershed would benefit from focusing management actions on SD 21 for Fecal Coliform and Ammonia; Maplewood Channel for Total Copper; and on North Fork Coyote Creek for Total Dissolved Solids.

1.4 *Shoreline Monitoring*

The City of Los Angeles is required to monitor shoreline stations to evaluate the impacts to coastal receiving waters and impacts to recreational beneficial uses resulting from stormwater/urban runoff. Also, the Municipal Stormwater Permit requires the City of Los Angeles to annually assess shoreline water quality data and submit it to the Principal Permittee for inclusion in the monitoring report. The

City of Los Angeles' report is attached as Appendix D. Note that the Los Angeles County Flood Control District (LACFCD) Principal Permittee, does not necessarily agree with all statements and conclusions presented by the City of Los Angeles.

1.5 *Trash Monitoring*

The objectives of trash monitoring are to:

- Assess the quantities of trash in receiving waters after storm events.
- Identify areas impaired for trash.

Visual observations of trash were made and a minimum of one photograph at each mass emission station was taken after four storm events including the first storm event.

Results of trash compliance monitoring for unincorporated Los Angeles County areas and for some cities in the Ballona Creek watershed are included in Appendix I. Also included are results from the unincorporated Los Angeles County areas for the Los Angeles River watershed.

2.0 REGIONAL MONITORING

2.1 **Estuary Sampling**

LACFCD is participating in the coastal ecology committee of the Bight 2003 project coordinated by the Southern California Coastal Waters Research Project (SCCWRP), in compliance with Section II.F of the Monitoring and Reporting Program of the stormwater monitoring requirements. The two primary objectives of Bight 2003 are to estimate the extent and magnitude of ecological change in the Southern California Bight and to determine the mass balance of pollutants that currently reside within the Southern California Bight. Regional monitoring components include coastal ecology, shoreline microbiology, and water quality. This project has been conducted in collaboration with various organizations including regulators, wastewater and stormwater permittees, and citizen volunteers under the coordination of SCCWRP.

The goal of the Estuary Sampling program is to supplement the regional monitoring of the Southern California Bight estuarine habitats by sampling estuaries for sediment chemistry, sediment toxicity, and benthic macroinvertebrate diversity to determine the spatial extent of sediment fate from stormwater, and the magnitudes of its effects. In the LACFCD, the estuaries sampled were those of Malibu Creek, Ballona Creek, Los Angeles River, San Gabriel River, and Dominguez Channel.

All reports pertinent to the Bight 2003 Project have been completed by SCCWRP and were released on their website in Summer 2007.

The website address is: http://www.sccwrp.org/regional/03bight/03docs.html

2.2 Bioassessment

Bioassessments aid in evaluating a water body's qualitative integrity by detecting biological responses and trends resulting from exposure to pollution within watersheds. An ultimate goal is to identify probable causes of impairment not detected by chemical and physical water quality analysis. The Monitoring and Reporting Program, Section II.G of the Stormwater Monitoring Permit requires Public Works to perform stream bioassessments in October every year. Sampling sites were spread 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 sampling stations geographical location.

The State's Surface Water Ambient Monitoring Program will take information gathered from the biological surveys in the LACFCD and combine it with data collected from surrounding counties to refine an Index of Biotic Integrity (a quantitative multi-metric scoring system for assessing the quality of benthic macroinvertebrate assemblages), for the Southern California region. The final report from the most recent year of the Bioassessment Monitoring Program (2007) is included in Appendix H of this annual report.

Some program findings included:

- The Cold Creek station had the highest Index of Biotic Integrity score warranting a Good rating.
- The upstream sites of the Arroyo Seco and San Gabriel River received Fair ratings.
- The fourteen other sites had Poor to Very Poor ratings.
- Five of the seventeen stations were located in highly modified, concrete-lined urban water courses, and these sites all had Index of Biotic Integrity ratings of Poor or Very Poor.
- Comparison of Index of Biotic Integrity scores for the five survey years to date did not indicate any change at any of the sites.

3.0 SPECIAL STUDIES

LACFCD is conducting the following special monitoring programs as required by the 2001 Municipal Stormwater Permit:

3.1 *New Development Impacts Study in the Santa Clara Watershed*

The objective of the New Development Impacts Study in the Santa Clara Watershed is to evaluate the effectiveness of the Standard Urban Stormwater Mitigation Plan (SUSMP) BMPs at reducing pollutants in stormwater runoff.

The Permit originally required the LACFCD, with support from the City of Santa Clarita, to sample stormwater runoff in two similar watersheds, one developed with SUSMP and the other without. After failing to find two similar catchments developed with and without SUSMP guidelines, the Regional Board, in a letter dated March 7, 2003, allowed the LACFCD and the City of Santa Clarita to fulfill this permit requirement by simulating the expected improvements from implementation of SUSMP through a mathematical modeling. On November 13, 2003, we submitted a work plan for the modeling to the Regional Board. The USEPA's Stormwater Management Model was used to conduct a deterministic hydrological modeling coupled with a stochastic Monte Carlo approach for modeling stormwater runoff water quality. A small watershed tributary to the Santa Clara River in the western side of the City of Santa Clarita was selected for the modeling. The 160-acre drainage area of this pre-SUSMP site includes a mix of residential, commercial, transportation, and open space land uses.

A monitoring station and rain gage were installed at the outlet of the watershed to monitor the existing flow and water quality. The station included a flow meter and automatic sampler. The hydrologic data monitored for the site includes rainfall and storm drain flow data during the 2006/07 wet season. Water quality analysis associated with storm events during the monitoring period is conducted for metals, nutrients, indicator bacteria, pH, conductivity, hardness, and suspended solids. Over the course of the monitoring period (10/2006-05/2007), three storm events were successfully monitored and water samples were analyzed for water quality constituents. In addition to the three major storm events, monitoring of three minor storms for limited water quality constituents was also conducted. Monitoring data were used to calibrate the hydrologic model.

The modeling consisted of three scenarios: existing condition (developed without SUSMP), SUSMP condition, and pre-development condition. The existing scenario was calibrated using monitored storm events. For the SUSMP scenario six BMPs were evaluated: (i) detention basin, (ii) infiltration basin, (iii) disconnected imperviousness/cisterns, (iv) bioretention cells/media filters, (v) biofilters/swales, and (vi) hydrodynamic devices. For all of these BMPs, it is assumed that BMPs are designed to treat the SUSMP storm, which is 0.75 inch.

The final report for this project was submitted to the Regional Board on April 7, 2008.

Some of the findings of the study included:

- The peak flow for the predeveloped condition is estimated at only 10 percent of the existing condition.

- The only two BMPs that meet the SUSMP requirement for no change in peak flow are infiltration and detention basins.

- Bioretention cells/media filters, grass swales, and hydrodynamic devices performed similarly in pollutant reduction, but had minimal or no impact on peak flow or total volume reduction.

- Infiltration basin is the only BMP that meets the SUSMP requirement for both peak flow and water quality goals. Therefore, unless infiltration basins are employed, additional infiltration or advanced treatment BMPs or combinations of these traditional treatment BMP types will be required to meet water quality objectives and sufficiently mitigate peak flows.

- Besides infiltration basins, the most effective BMP combination is detention basins plus any other BMP types that most closely achieve water quality objectives (e.g., media filters/bioretention, grass swales, or hydrodynamic devices).

3.2 ***Peak Discharge Impact Study***

The 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 the LACFCD.

An Executive Summary from the study results was included in Appendix B of the 1994-2005 Integrated Receiving Water Impacts Report. The Executive Summary can be found at http://ladpw.org/wmd/NPDES/1994-05_report/contents.html

3.3 ***Best Management Practices Effectiveness Study***

Sampling of all BMPs in the BMP Effectiveness Study was completed in the 2006–07 season.

Recommendations

The core monitoring program as prescribed in the Permit is designed to achieve the objectives in Section 1.1. However, in actuality data gathered by the program are insufficient for use in identifying pollution sources, making management decisions with respect to BMP implementation, and evaluating the effectiveness of existing control measures. Answering these questions would require more targeted, and possibly more localized, monitoring programs. The beginning of such a program is under development by the LACFCD as described in its Receiving Waters Limitations Compliance Report submitted to the Regional Board on October 15, 2007.

Many of the polychlorinated biphenyls, SOVs, and chlorinated pesticides cannot be compared to the water quality standards because there are no standards listed in the Basin Plan or CTR. However, even if there were water quality standards, all of these constituents were not detected at any of the mass emission or tributary monitoring stations. We recommend sampling for these constituents one time per year during the first storm event.

There appears to be some correlation between sediments and certain constituents. Further analysis is recommended.

The Permit is unclear with regard to which water quality standards to be applied to each of the monitoring programs. To reduce any uncertainty, we request that the Los Angeles RWQCB provide a current compilation of applicable water quality standards.

Best Management Practices Implementation

Priorities found at various sites during this monitoring year included Aluminum, Copper, Zinc, TDS, Sulfate, Chloride, Fecal Coliform, and Ammonia. Discussion of BMP implementation is not possible in this Annual Monitoring Report. Long term trends will need to be determined and analyzed prior to making any management decisions regarding BMP implementation.

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