Avenida de la Playa Storm Drain Upgrades

(SD IRWMP Project #178)

Attachment 6: Monitoring, Assessment and Performance Measures

The *Avenida de la Playa Storm Drain Upgrades and Dry Weather Diversion* (Project) is intended to address localized flooding issues in La Jolla caused by the inadequate storm drainage system. Several deficiencies exist in the current system, starting at the outfall structure and continuing upstream into the drainage system servicing the watershed. The project will also have the added benefit of reducing the pollutant load and volume of runoff entering the storm drain system in the La Jolla (ASBS 29) watershed. To ensure that the project meets intended goals, assessments or monitoring programs will be implemented to document progress. Below is a description of each project goal and their corresponding monitoring efforts:

Project Goals

Reduce Flood Damage and Flood risk along Avenida De la Playa

Due to significant urbanization, steep slopes, and a highly developed storm drain network in the upper reaches of the system, the watershed is highly responsive to rainfall events, sending fast-moving surges of storm water downstream. Runoff from this watershed is primarily collected and conveyed in the underground storm drain system until it reaches the large series of pipes running along Avenida de la Playa. Goals of the project will be achieved by measures to minimize sedimentation in the outfall structure during high tide and eliminate sedimentation in the storm sewers. Increasing the storm drain system or exceed the capacity of the upstream 72-inch RCP and requires the addition of two (2) 51-inch by 90-inch RCBs.

Mitigate impacts of hydro-modification: Storm water flows have been known to increase due to hydro-modification (urbanization and the installation of large impervious pavement areas) transporting concentrations of contaminants. To reduce transportation of gross solids and sediments from fast flowing urban runoff a higher capacity storm drain system will be installed. To monitoring decreases in sediment, this project will monitor sediment concentrations in storm water floes. The measureable target for this objective is to reduce sediment observed and measured as seen from post-construction compared to pre-construction conditions.

Reduce indicator bacteria and other pollutants: A diversion structure for low flow conditions will be included in a reach of the storm sewer where it can be directed away from the ASBS. The water quality monitoring effort, as mentioned above, will employ automated samplers and flow meters to collect flow-weighted composite samples throughout entire storm events from each of the monitoring locations. Grab samples will be collected during peak discharge for microbiological analyses. To effectively estimate the reduction (or change) in analyte concentrations, the quantity and quality of runoff entering the BMPs will be compared to the quantity and quality of water discharged from the BMPs and/or preconstruction sampling and monitoring data at the same locations. This data will allow a direct estimate of the total reduction in mass loadings and removal rates for a variety of contaminants. Water Quality monitoring will include both dry weather and wet weather monitoring components to include a complete range of data from which to measure performance.

Improve water quality in The ASBS thereby improving recreational opportunities such as swimming: The ASBS 29 and drains into The ASBS which provides many recreational and aesthetic benefits specifically at Kellogg Park, the La Jolla Shores Park and the La Jolla Ecological Reserve. A diversion structure for low flow conditions will be included in a reach of the storm sewer where it can be directed away from the ASBS. By implementing this component of the project, excessive bacteria loading from urban runoff entering The ASBS will be reduced. In addition the discharge of gross solids and trash will be reduce through five (5) continuous deflective separator units (CDS) will be installed along the storm drain pipe and divert trash from the storm flow after it enters the storm drain network.

Trash removal quantities measure from maintenance activities will be measured which will allow for the direct estimate of total reduction of gross solids.

Increase community awareness of storm water pollution prevention: To monitor the successfulness of community awareness programs the project will coordinate public survey and questionnaire dispersals to measure awareness level.

Monitoring System

Monitoring the effectiveness of the Avenida de la Playa Storm Drain Upgrades and Dry Weather Diversion project is a key element in determining the extent to which the project will reduce flooding, improve water quality, and enhance the beneficial uses of the ASBS. To assess project effectiveness, a Before-After-Control-Impact (BACI) design will be used, wherein monitoring assessments will be made before the project is initiated and after construction is completed. The assessments will take place during dry weather conditions, to assess the effectiveness of the dry weather diversion, and during wet weather conditions, to assess changes in flooding impacts, water quality, and trash removal.

During dry weather, the existing conditions of the Avenida de la Playa storm drain and the outfall will be assessed by monitoring flow and collecting samples for water chemistry and bacterial analyses. Several samples will be collected to allow for a robust analysis of existing conditions prior to project completion. A thorough visual inspection of the outfall with photodocumentation of pre-construction conditions will also be conducted. After the project is completed, the sampling protocol will be repeated for comparison to pre-construction conditions. Concentration and load reductions will be calculated from constituent concentrations and flow measurements to determine the effectiveness of the dry weather diversion.

During wet weather, pre-construction assessment of flow, water quality (including trash), and extent of flooding will be conducted. Pre-construction monitoring will consist of pollutograph monitoring, where discrete samples are taken over the course of a storm event and analyzed for bacteria and chemical constituents. The extent of flooding will be documented through visual observations and photodocumentaton and by recording the area of inundation on a site map. The protocol will be repeated during a similar-sized storm after construction is completed and the data sets will be compared to determine the effectiveness of the project in reducing flooding, removing trash, and improving water quality. The monitoring will follow Surface Water Ambient Monitoring Program and ASBS Special Protections guidelines to ensure that the results are statistically viable and scientifically defensible.

Data for the effectiveness assessment will be gathered from sampling and analysis from preconstruction (baseline) and post construction water quality monitoring which will be collected at the locations of at least three and storm water curb inlets of where the storm water filtration units ate to be located at the site. In addition to the influent and effluent of the storm drain pipeline to be bypassed for the future inline bacterial treatment system (BTS) and hydrodynamic separator. At least 8 storm events should be sampled at each monitoring location during the wet season (October through May). For the first two storm events, an operational assessment of the BMPs will be conducted to ensure that the BMPs and the monitoring equipment are functioning properly. Field crews will observe and document any operational issues at the filtration units, and bacterial treatment system basin. Flow rates will be measured during these first two events; however, water quality samples will not be collected until it can be verified by on-site field crews that all equipment is operating properly.

The water quality monitoring effort will employ automated samplers and flow meters to collect flow-weighted composite samples throughout entire storm events from each of the monitoring locations. Grab samples will be collected during peak discharge for microbiological analyses. To effectively estimate the reduction (or change) in analyte concentrations, the quantity and quality of runoff entering the BMPs will be compared to the quantity and quality of water discharged from the BMPs and/or preconstruction sampling and monitoring data at the same locations. This data will allow a direct estimate of the total reduction in mass loadings and removal rates for a variety of contaminants.

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Constituents selected for this Effectiveness Assessment study to be constructed for these BMP are prioritized into Tier 1 and Tier 2 categories. Tier 1 constituents are considered a priority for water quality monitoring in this study because they are; 1) consistent with other BMP monitoring guidance to address street runoff such as the Caltrans Guidance Manual: Storm Water Monitoring Protocols (Caltrans, July 2000); 2) specifically identified as constituents of concern in the ASBS and/or subject to a TMDL; or 3) consistent with other City monitoring efforts currently underway in the watershed, such as the San Diego Bay Watershed Urban Runoff Management Program At least 8 storm events should be sampled at each monitoring location during the wet season (October through May). For the first two storm events, an operational assessment of the BMPs will be conducted to ensure that the BMPs and the monitoring equipment are functioning properly. Field crews will observe and document any operational issues at the filtration units, and bacterial treatment system basin. Flow rates will be measured during these first two events; however, water quality samples will not be collected until it can be verified by on-site field crews that all equipment is operating properly.

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Estimates of the number of samples required to yield statistically valid monitoring results are necessary for making decisions about the nature and extent of monitoring efforts. For this study, the appropriate number of samples is the number required to discern a significant difference between the influent and effluent. The sample size will depend on the specified mean percent constituent removal rate desired. Because of the variability of rainfall and runoff quality, it is necessary to sample a number of storms to generate statistically reliable answers to the study questions. The number of samples needed depends upon the variability in the data, the magnitude of the effect being studied, and the degree of confidence desired in the answer.

These BMPs would not be implemented if they did not remove a significant fraction of the constituent of concern. The most commonly used confidence level in scientific studies is 95 percent. However, due to

the high variability in storm water data, use of a 95 percent confidence level results in an impractical number of samples, or masks the effectiveness of BMPs known to remove pollutants. For this reason, a 90 percent confidence level is appropriate for BMP pilot studies and is the confidence level chosen for this study. The statistical procedure used to estimate the number of samples required is described in the Caltrans BMP Pilot Study Guidance Manual.

Storm selection criteria described for this effectiveness assessment studies will likely entail a minimum 0.25 inch of rainfall and 72 hour antecedent dry period, an average of 8 storms per year can be expected. A minimum of 8 samples are required. Consideration must also be given to the number of unproductive monitoring events that are likely to occur. Rainfall may not happen as predicted, or may be of insufficient quantity (i.e., a “false start”).

Samples can also be missed due to problems with autosamplers. When planning a study, it is reasonable to assume that one out of four sampling events will be unsuccessful. In addition an operational assessment of the BMPs will be conducted during the first two storm events to ensure that the BMPs and the monitoring equipment are functioning properly. Field crews will observe and document any operational issues at the filtration units and the bioretention cells. Flows will be measured during these first two events; however, water quality samples will not be collected until it can be verified by on-site field crews that all equipment is operating properly. m, and the Chollas Creek Storm Drain Characterization Study. Tier 2 constituents may also have been identified as pollutants of concern in the subject watersheds; however, adding these constituents may need to be considered in light of the available budget for sampling and analyses. Evaluation of pollutant removal effectiveness of Tier 2 constituents may also be of interest if implementation of these BMPs is being considered in other watersheds with specific water quality concerns.

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After the assessment is completed, a report will be prepared documenting the results of the study. The report will be submitted to the grantors and applicable resource agencies for review, and then finalized after incorporating reviewer comments.